Mdu Entrance Exam

MCA & Comp. Sci

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- For Entrance Exam

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Computer Questions

1. In Excel you can use a function to combine text from two cells into one cell. But you can use an operator to do the same thing. Which operator is that?
(a) & (ampersan
(b) = (equal sign)
(c) (space)
(d) All of the above
(e) All of the above

2. Screen that at shows all the icons when you turn on your computer th ____
(a) Desktop
(b) Face to face
(c) Viewer
(d) View space
(e) None of these

3. Retrieval of information from a computer is called:
(a) Output
(b) Input
(c) Data
(d) Information
(e) Processing

4. If in a computer, 16 bits are used to specify address in a RAM, the number of addresses will be ___
(a) 216
(b) 65,536
(c) 64K
(d) 128K
(e) 35K

5. A dot-matrix printer-
(a) is an input-output device
(b) is an output device only
(c) is an input device only
(d) only 2 &amp 3
(e) None of these

6. Excel is a collection of
(a) Workbook
(b) Worksheets
(c) Graphs
(d) Charts
(e) None of the above

7. A credit card-sized expansion board that is inserted into portable computers that connects the modem to the telephone wall jack is:
(a) Internal modem
(b) External modem
(c) PC Card modem
(d) Wireless modem
(e) Wired modem

8. Which file format can be added to a PowerPoint show?
(a) .jpg
(b) .giv
(c) .wav
(d) All of the above
(e) All of the above

9. Where is the disk put in a computer ?
(a) in the modem
(b) in the hard drive
(c) into the CPU
(d) in the disk drive
(e) None of these

10. In Windows operating system to minimize all of the windows
(a) Windows Logo
(b) Windows Logo + BREAK
(c) Windows Logo + D
(d) Windows Logo + M
(e) All of the above

11. ASCII-8 is
(a) An extended version of ASCIl-7
(b) Is a 8-bit code
(c) Both A & B are true
(d) Both A & B are false
(e) All of the above

12. In Microsoft PowerPoint the following will not advance the slides in a slide show view
(a) Esc key
(b) The spacebar
(c) The Enter key
(d) The mouse button
(e) All of the above

13. In Windows operating system when you delete a file or folder, it doesn't actually get deleted right away, it goes to the ————.
(a) Recycle Bin
(b) Dust Bin
(c) Cycle Bin
(d) None of these
(e) All of the above

14. Process of finding/ correcting program errors is
(a) Bugs
(b) Debugging
(c) Hacking
(d) Cracking
(e) All of the above

15. The first layer in OSI reference model is
(a) Network
(b) Physical
(c) Application
(d) Data link
(e) None of these

16. Fax machines and imaging systems are examples of
(a) bar-code readers
(b) imaging systems
(c) scanning devices
(d) pen-based systems
(e) None of these

17. The smallest storage unit in a computer is...

(a) Nibble
(b) Byte
(c) Bit
(d) Word
(e) None of these

18. Excel uses the .... Function when creating a data table
(a) Average
(b) Count
(c) Sum
(d) Table
(e) All of the above

19. To avoid the wastage of memory, the instruction length should be
(a) Multiple of character size only
(b) Of word size only
(c) Of file size only
(d) Of word size which is multiple of character size
(e) None of these

20. In a slide presentation, a typical slide does not have _____
(a) Photo images, charts, graphs
(b) Clip arts
(c) Audio Clips
(d) Content
(e) Full motion video

21. Which process checks to ensure the components of the computer are operating and connected properly ?
(a) Booting
(b) Processing
(c) Saving
(d) Editing
(e) None of these

22. In addition to keying data directly into a database, data entry can be done from a(n)
(a) input form
(b) table
(c) field
(d) data dictionary
(e) None of these

23. Computer output which is displayed on the screen of a terminal without a permanent copy is called
(a) Soft copy
(b) Hard copy
(c) Hardware
(d) None of these
(e) All of the above

24. What term is used for the occurrence of values for data elements more than once?
(a) Concurrency
(b) Redundancy
(c) Enumeration
(d) Iteration
(e) None of these

25. Which of the following is specially designed computer chips that reside inside other devices, such as your car or your electronic thermostat etc.?
(a) Robotic computers
(b) Mainframe computers
(c) Embedded computers
(d) Peripheral computers
(e) None of these

26. In_____, a file is transferred from another computer to your computer.
(a) Copy
(b) Upload
(c) Download
(d) Upgrade
(e) RSS

27. You can protect a floppy disk.
(a) Read
(b) Read and Write
(c) Write
(d) All of the above
(e) None of these

28. _____ is responsible for overall control and co-ordination of instruction execution.
(a) CPU
(b) ALU
(c) RAM
(d) Control UNIT
(e) None of these

29. Which of the following memory can be erased using Ultra Violet Rays?
(a) RAM
(b) ROM
(c) PROM
(d) EPROM
(e) EEPROM

30. In Excel this function converts miles to kilometers, kilograms to pounds, and so on
(a) Convert
(b) Product
(c) Change
(d) All of above
(e) All of the above

31. Which of the following terms is associated with the computers processing speed?
(a) MIPS(Million Instruction Per Second)
(b) FCFS
(c) MPEG
(d) TIFF
(e) None of these

32. Following is true for Bandwidth
(a) The wider the bandwidth of a communications system the more data it can transmit in a given period of time.

(b) The narrow the bandwidth of a communications system the more data it can transmit in a given period of time.
(c) The wider the bandwidth of a communications system the less data it can transmit in a given period of time.
(d) None is true
(e) All of the above

33. In Excel comments can be added to cells using
(a) Edit > Comments
(b) Insert > Comments
(c) File > Comments
(d) View > Comments
(e) All of the above

34. A file which has not been alerted, compressed, or manipulated in any way by the computer is called?
(a) temp file
(b) raw file
(c) permanent file
(d) distort file
(e) None of these

35. In Excel you can quickly change the appearance of your work by choosing Auto Format from the ..... Menu
(a) Edit
(b) View
(c) Format
(d) Tools
(e) All of the above

36. Hardware that adds two numbers is:
(a) the control unit
(b) an internal CPU register
(c) arithmetic Logic Unit
(d) Browser
(e) None of these

37. In Excel to copy cell contents using drag and drop press the
(a) End key
(b) Shift key
(c) Ctrl key
(d) Esc key
(e) All of the above

38. Software instructions intended to satisfy a user specific processing needs are called
(a) systems software
(b) microcomputer
(c) documentation
(d) applications software
(e) All of the above

39. In Excel two common wildcard characters that Excel recognizes are
(a) * and?
(b) < and >
(c) ^ and/
(d) + and -
(e) All of the above

40. Microsoft Office is
(a) Desktop applications
(b) Operating system
(c) Command window
(d) None of these
(e) All of the above

41. In Excel which of the following options is not located in the Page Setup dialog box?
(a) Page Break Preview.
(b) Page Orientation
(c) Margins
(d) Headers and Footers
(e) All of the above

42. What do you need for an ink jet printer?
(a) A drum
(b) A cartridge
(c) A ribbon
(d) All of the above
(e) None of these

43. A dot-matrix printer
(a) is an input-output device
(b) is an output device only
(c) is an input device only
(d) both 2 and 3
(e) None of these

44. www stands for ____
(a) World Word Web
(b) World Wide Web
(c) World White Web
(d) World Work Web
(e) None of these

45. What is correcting errors in a program called ?
(a) Interpreting
(b) Translating
(c) Debugging
(d) Compiling
(e) None of these

46. In Excel which of the following formulas is not entered correctly?
(a) =10+50
(b) =B7*B1
(c) =B7+14
(d) 10+50
(e) All of the above

47. Magnetic tape can serve as
(a) input media
(b) output media
(c) secondary-storage media
(d) all the above
(e) All of the above

48. In Excel you can zoom a worksheet
(a) With the mouse pointer in Print Preview
(b) With the zoom button on the Print Preview toolbar

(c) With the Zoom command on the view menu
(d) All of the above
(e) All of the above

49. An impact printer creates characters by using...?
(a) An inked ribbon and print head
(b) Electrically charged ink
(c) An ink pen
(d) All of the above
(e) None of these

50. What are bas, doc, and html examples of?
(a) extensions
(b) domains
(c) protocols
(d) databases
(e) None of these

51. All the deleted files go to
(a) Recycle Bin
(b) Task Bar
(c) Tool Bar
(d) My Computer
(e) None of these

52. Where should floppy disks be stored?
(a) By a sunny window
(b) In a drawer
(c) All of the above
(d) By magnet objects
(e) None of these

53. SCSI is related to
(a) Network
(b) Storage
(c) Data transfer
(d) Images
(e) Resolution

54. The lowest form of Computer language is called _____.
(a) BASIC
(b) FORTRAN
(c) Machine Language
(d) COBOL
(e) None of these

55. How many options does a BINARY choice offer?
(a) None
(b) One
(c) Two
(d) it depends on the amount of memory on the computer
(e) It depends on the speed of the computer\&#039s processor

56. In Excel cell reference for a range of cells that starts in cell B1 and goes over to column G and down to row 10 is
(a) B1-G10
(b) B1.G10
(c) B1;G10
(d) B1:G10*
(e) All of the above

57. In Excel the Paste Special command lets you copy and paste
(a) Multiply the selection by a copied value
(b) Cell comments
(c) Formatting options
(d) The resulting values of a formula instead of the actual formula
(e) All of the above

58. What is the permanent memory built into your computer called ?
(a) RAM
(b) Floppy
(c) CPU
(d) CO-ROM
(e) ROM

59. An error in a computer program is referred as
(a) Bug
(b) Bit
(c) Virus
(d) None of these
(e) All of the above

60. The four main functions of a computer are:
(a) Input, processing, output and storage
(b) Learning, thinking, intelligence and virtuosity
(c) Data, information, bits and bytes
(d) Hardware, software, modeling and operations
(e) None of these

61. The set of computer programs, procedures, and associated documentation related to the effective operation of a computer system is referred as
(a) Software
(b) Hardware
(c) Hardcopy
(d) Softcopy
(e) All of the above

62. Which of the following is also known as brain of computer?
(a) Control unit
(b) Central Processing unit
(c) Arithmetic and language unit
(d) Monitor
(e) None of these

63. What type of computer chips are said to be volatile?
(a) ROM chips
(b) RAM chips
(c) DRAM
(d) All of the above
(e) None of these -

64. A set of flip flops integrated together is called ___
(a) Counter
(b) Adder
(c) Register
(d) Flip flop
(e) All of the above

65. In Excel Text formulas
(a) Replace cell references
(b) Return ASCII values of characters
(c) Concatenate and manipulate text
(d) Show formula error value
(e) All of the above

66. _____is a high speed memory ,that can be used in between CPU and main memory
(a) CPU
(b) buffer
(c) Spooling
(d) Cache
(e) None of these

67. What are responsible for storing permanent data and instructions?
(a) RAM chips
(b) All of the above
(c) DRAM chips
(d) ROM chips
(e) None of these

68. In Excel you can use the drag and drop method to
(a) Copy cell contents
(b) Delete cells contents
(c) Add cell contents
(d) All of above
(e) All of the above

69. For seeing the output, you use
(a) Monitor
(b) Keyboard
(c) Mouse
(d) Scanner
(e) None of these

70. _____ Bar is located at top of WordPad / Notepad /MS Word window.
(a) Title
(b) Menu
(c) Tool
(d) Format
(e) None of these

71. Zipping a file means
(a) Encrypting the message
(b) Compressing the message
(c) Transfer the message
(d) All of these
(e) None of these

72. In Microsoft PowerPoint the following options changes the fill color of an object back to the default color
(a) Template
(b) Automatic
(c) Patterns
(d) Fill colors
(e) All of the above

73. In Excel to protect a worksheet, you can choose Protection and the Protect Sheet from the ....menu
(a) Edit
(b) Format
(c) Tools
(d) Data
(e) All of the above

74. The steps and tasks needed to process data, such as responses to questions or clicking an icon, are called_____.
(a) The O/S
(b) Instructions
(c) Data flow
(d) Application software
(e) None of these

75. In a worksheet you can select
(a) Etire worksheet
(b) Rows
(c) Columns
(d) All of the above
(e) All of the above

76. The Pentium processor contains-
(a) tens thousands of transistors
(b) hundred thousands of transistors
(c) thousands of transistors
(d) several millions of transistors
(e) hundred transistors

77. Microsoft Word is a word processor that saves in its proprietary————format.
(a) .doc
(b) .pdf
(c) .txt
(d) None of these
(e) All of the above

78. For checking spelling one uses
(a) Dictionary Disk
(b) Index disk
(c) Directory
(d) None of these
(e) All of the above

79. Microsoft Windows provides a graphics application named
(a) Paint
(b) Adobe Photoshop
(c) Jasc Paint Shop
(d) None of these
(e) All of the above

80. Which storage device has the largest capacity in Mb?
(a) A floppy disk
(b) A CD-ROM
(c) Magnetic tape storage
(d) All of the above
(e) None of these

81. What does Ctrl + B shortcut accomplish in Ms-Word?
(a) It converts selected text into the next larger size of the same font
(b) It adds a line break to the document
(c) It makes the selected text bold
(d) It applies Italic formatting t the selected text.
(e) All of the above

82. When we open an Internet site we see www. What is the full form of www?
(a) worldwide wakeup
(b) world wide web
(c) word wading works
(d) words wide Spiderman web
(e) wet works spider web

83. Cache memory
(a) Is a Static RAM
(b) Increases the speed of processing by making current programs and data available to the CPU at a rapid rate
(c) Both A & B are true
(d) Both A & B are false
(e) All of the above

84. The hexadecimal number system has a base of
(a) 2
(b) 4
(c) 8
(d) 16
(e) All of the above

85. The programs and data processed by the CPU are stored in _____
(a) Internal Memory
(b) External Memory
(c) Mass Memory
(d) Non-volatile memory
(e) None of these

86. You cannot link Excel worksheet data to a Word document
(a) With the right drag method
(b) With a hyperlink
(c) With the copy and paste special commands
(d) With the copy and paste buttons on the standard toolbar
(e) All of the above

87. Document reader is
(a) An optical input device used to read documents
(b) A device that arrange the documents
(c) A device that is used to edit document
(d) None of these
(e) All of the above

88. A device used for transmission of images scanned at a transmitting point and duplicated at a receiving point is
(a) Facsimile (FAX)
(b) Telephone
(c) Photocopier
(d) None of these
(e) All of the above

89. Software that manages data in more than one file at a time and these files are treated as tables with rows and columns rather than as lists of records is
(a) Relational Data Base Management Package
(b) Data Base Management Package
(c) Documentation Package
(d) None of these
(e) All of the above

90. An image on a computer screen is made up of a matrix of what?
(a) Byte
(b) Pixels
(c) Bit
(d) Palette
(e) None of these

91. What is the other name for LAN Card ?
(a) Network Connector
(b) NIC
(c) Internet Card
(d) MODEM
(e) None of these

92. Bit stands for
(a) binary digit
(b) one binary piece of information
(c) Both A and B are true
(d) None is true
(e) All of the above

93. The following are all computing devices , except&
(a) notebook computers
(b) cellular telephones
(c) digital scanners
(d) personal digital assistants
(e) None of these

94. Following is false for BASIC
(a) Beginners All-Purpose Symbolic Instruction Code
(b) High-level interactive programming language
(c) Works in timesharing environment
(d) Low level object oriented language
(e) All of the above

95. Which of the following features make UNIX Operating System popular?
(a) Multi-tasking
(b) Multi-user
(c) Reliable
(d) All
(e) Multi-Threading

96. Microsoft Office is
(a) Shareware
(b) Public domain software
(c) Open-source software
(d) A vertical market application

(e) An application suite

97. An error is also known as
(a) bug
(b) debug
(c) cursor
(d) icon
(e) None of these

98. Which of the following is different from other ?
(a) Internet
(b) Windows
(c) Unix
(d) Linux
(e) None of these

99. Which among the following is not a security/ private risk?
(a) Spam
(b) Hacking
(c) Virus
(d) Phishing
(e) None of these

100. Memory unit is one part of____.
(a) Control unit
(b) Central Processing Unit
(c) Input device
(d) Output device
(e) None of these

101. In Excel the cell labeled F5 refers to
(a) row F column 5
(b) column F row 5
(c) function available in cells
(d) function key F4
(e) All of the above

102. Structured query language (SQL) is used in the following?
(a) Create database
(b) Create &amp Modify Databases
(c) Create, Modify &amp Query Databases
(d) Modify Database
(e) None of these

103. In Windows operating system the shortcut key Windows Logo+F
(a) Restore the minimized windows
(b) Open My Computer
(c) Search for a file or a folder
(d) Search for computers
(e) All of the above

104. In Windows operating system move the insertion point to the beginning of the previous paragraph
(a) CTRL+RIGHT ARROW
(b) CTRL+LEFT ARROW
(c) CTRL+DOWN ARROW
(d) None of these
(e) All of the above

105. A received E-mail may be :
(a) Read
(b) Unread
(c) Stored
(d) All the above
(e) None of these

106. The brains of the computer which executes the instructions, is called the:
(a) CPU
(b) RAM
(c) Motherboard
(d) System Unit
(e) None of these

107. Which of the following is the key function of a firewall?
(a) Monitoring
(b) Deleting
(c) Record
(d) Copying
(e) Moving

108. A digitizing tablet can be used for?
(a) Tracing diagrams
(b) Printing letters
(c) Reading barcodes
(d) Playing
(e) None of these

109. On which button does help menu exist?
(a) End
(b) Start
(c) Turn off
(d) Restart
(e) None of these

110. In Excel____contains one ormore worksheets.
(a) Template
(b) Workbook
(c) Active cell
(d) Label
(e) None of these

111. In Microsoft PowerPoint special effects used to introduce slides in a presentation are called
(a) Effects
(b) Custom animations
(c) Transitions
(d) Present animations
(e) All of the above

112. Following is not true for Backup files
(a) These are the files which are generated automatically in when one saves a document.
(b) These files help in protecting the document due to out of order of the computer or power failure.
(c) These files delete as soon as computer is turned off
(d) None of these
(e) All of the above

113. In Excel the keyboard shortcut (button or buttons to be presse for creating a chart from the selected cells
(a) F3

(b) F5
(c) F7
(d) F11
(e) All of the above

114. In Excel Hyperlinks can be
(a) Text
(b) Drawing objects
(c) Pictures
(d) All of above
(e) All of the above

115. In Excel divide symbol is
(a) /
(b) D
(c) \
(d))
(e) All of the above

116. A(n)_____camera is a peripheral device used to capture still images in a digital format
(a) digital
(b) analog
(c) classic
(d) film
(e) None of these

117. Speed of line printer is limited by the speed of
(a) paper movements
(b) cartridge used
(c) length of paper
(d) All of these
(e) None of these

118. A device that can convert digital signal to analog signal is-
(a) a packet
(b) Modem
(c) Switch
(d) Router
(e) None of these

119. Like a virus, it is also a self-replicating program. The difference between a virus and it is that a worm does not create copies of itself on one system: it propagates through computer networks.
(a) Keylogger
(b) Worm
(c) Cracker
(d) None of these
(e) All of the above

120. What digits are representative of all binary numbers?
(a) 0
(b) 1
(c) both 0 and 1
(d) 3
(e) None of these

121. Output hardware is often categorized according to whether it:
(a) is expensive
(b) requires a large amount of electricity to work
(c) produces hardcopy or softcopy
(d) can fit on a desktop
(e) None of the above

122. In Excel how many characters can be typed in a single cell?
(a) 256
(b) 1024
(c) 32,000
(d) 65,535
(e) All of the above

123. An affordable technology that uses existing telephone lines to provide high-speed connections is called_____.
(a) ISDN
(b) microwave
(c) cable modem
(d) DSL
(e) ALU

124. The two broad categories of software are generally
(a) Word processing and spreadsheet
(b) Transaction and application
(c) Windows and Mac OS
(d) System and application
(e) None of these

125. The telephone is an example of a(n)___signal.
(a) analog
(b) digital
(c) modulated
(d) demodulated
(e) compiler

126. A data transmission medium made of tiny threads of glass or plastic that can transmit huge amount of information at the speed of light is
(a) Fiber optic cable
(b) Copper cable
(c) Twisted wire cable
(d) None of these
(e) All of the above

127. A program that remains in the memory while other programs are executing
(a) Resident Program
(b) Non-Resident Program
(c) Permanent Program
(d) None of these
(e) All of the above

128. Which of the following storage medium stores instructions or data temporarily during processing?
(a) Cache
(b) ROM
(c) EPROM
(d) RAM
(e) None of these

129. In Excel which of the following is not a valid data type in excel

(a) Number
(b) Character
(c) Label
(d) Date/time
(e) All of the above

130. A byte can hold one_____of data.
(a) bit
(b) binary digit
(c) character
(d) kilobyte
(e) None of these

131. Which of the following used in programming the first computers?
(a) Object code
(b) Source code
(c) Machine language
(d) Assembly language
(e) None of these

132. BLOB is
(a) Binary Large Object
(b) A long bit string representing complex data
(c) Object oriented language
(d) Only A & B are true
(e) All of the above

133. DSL is an example of a(n)_____connection.
(a) network
(b) wireless
(c) slow
(d) broadband
(e) None of these

134. Who is accredited with developing the architecture of the modern computer?
(a) Sir Clive Sinclair
(b) Bill Gates
(c) All of the above
(d) None of these
(e) John Von Neumann

135. _____ are the parallel electrical conducting lines that link different components on the mother board.
(a) Buses
(b) Conductors
(c) Assemblies
(d) Connectors
(e) None of these

136. Anonymous FTP is the
(a) Internet file transfer protocol
(b) Protocol that requires password
(c) Non access files
(d) None of these
(e) All of the above

137. Unwanted repetitious messages, such as unsolicited bulk e-mail is known as____.
(a) Spam
(b) Trash
(c) Calibri
(d) Courier
(e) None

138. The combination of the operating system and the processor is referred to as the computer:
(a) CPU
(b) Platform
(c) BIOS
(d) CMOS
(e) None of these

139. A memory in CPU that holds program instructions, input data, intermediate results and the output information produced during processing is
(a) Secondary memory
(b) Primary memory
(c) Auxiliary memory
(d) None of these
(e) All of the above

140. Aligns the selected text or line to justify the screen press-------
(a) Ctrl + c
(b) Ctrl + I
(c) Ctrl + J
(d) Ctrl + k
(e) None of these

141. The ability to recover and read deleted or damaged files from a criminal computer is an example of a law enforcement specialty called
(a) Robotics
(b) Simulation
(c) Computer forensic
(d) Animation
(e) None

142. In Microsoft Word move the insertion point to the beginning of the previous paragraph
(a) CTRL+RIGHT ARROW
(b) CTRL+LEFT ARROW
(c) CTRL+DOWN ARROW
(d) None of these
(e) All of the above

143. In Windows operating system shortcut key CTRL+Windows Logo+F
(a) Restore the minimized windows
(b) Open My Computer
(c) Search for a file or a folder
(d) Search for computers
(e) All of the above

144. Which part is the brain&of the Computer?
(a) CPU
(b) Monitor
(c) RAM
(d) ROM
(e) None of these

145. In Windows operating system after you double-click a character on the grid of characters, keyboard shortcut CTRL+HOME is used for
(a) Move to the first character
(b) Move to the last character
(c) Switch between Enlarged and Normal mode when a character is selected
(d) None of these
(e) All of the above

146. In Microsoft PowerPoint slide show options available to the presenter include all of the following except
(a) Transitions command
(b) Speaker notes command
(c) Meeting reminder command
(d) Navigation commands
(e) All of the above

147. In Excel when you copy a formula
(a) Excel erases the original copy of the formula
(b) Excel edits cell references in the newly copied formula
(c) Excel adjusts absolute cell references
(d) Excel doesn't adjust relative cell references
(e) All of the above

148. Which of the following is not a factor affecting the processing capability or performance of a PC system?
(a) The clock speed of the microprocessor
(b) The revolutions per minute of the printer disk
(c) The primary storage capacity of the processor
(d) The built-in instruction set available to the microprocessor
(e) None of the above

149. EDP is referred to
(a) Electronic Data Processing
(b) Data processing through equipment that is predominantly electronic such as digital computer
(c) Both A & B
(d) None of these
(e) All of the above

150. Which area in an excel window allows entering values and formulas?
(a) Title bar
(b) Menu bar
(c) Formula bar
(d) Standard toolbar
(e) All of the above

151. What menu is selected to cut, copy, and paste?
(a) File
(b) Tools
(c) Special
(d) Edit
(e) None of these

152. A hyperlink can be .....
(a) Text
(b) Image
(c) Paragraph
(d) All the above
(e) None of these

153. In Excel which symbol must all formula begin with?
(a) =
(b) +
(c) (
(d) @
(e) All of the above

154. A binary numbers are represented by
(a) Digits 0 and 1
(b) Digits 0,1,....,8
(c) Digits A,B, C,...
(d) None of these
(e) All of the above

155. Which of the following is not a language of DBMS?
(a) PASCAL
(b) PLI
(c) DML
(d) DDL
(e) All of the above

156. Microsoft Office Groove is
(a) A proprietary peer-to-peer software package aimed at businesses
(b) An application that supports editing scanned documents
(c) A scanning and OCR application
(d) Diagram and flowcharting software
(e) All of the above

157. IC chips used in computers are usually made of:
(a) Lead
(b) Silicon
(c) Chromium
(d) Gold
(e) None of these

158. One megabyte equals approximately
(a) 1,000 bits
(b) 1,000 bytes
(c) 1 million bytes
(d) 1 million bits
(e) 1,000 bytes

159. BSNL Reliance, Shaw cable, AOL, Tata Indicom all can be kept in which one of the following groups?
(a) ISDN
(b) IRC
(c) ISP
(d) ICONS
(e) None of these

160. In Excel worksheet can have a maximum of .... Number of rows
(a) 256
(b) 1024
(c) 32,000
(d) 65,535

(e) All of the above

161. What does the Ctrl + I shortcut key accomplish in Ms-Word?
(a) It converts selected text into the next larger size of the same font
(b) It adds a line break to the document
(c) It makes the selected text bold
(d) It applies Italic formatting t the selected text.
(e) All of the above

162. An excel workbook is a collection of
(a) Workbooks
(b) Worksheets
(c) Charts
(d) Worksheets and charts
(e) All of the above

163. When a key is pressed on the keyboard, which standard is used for converting the keystroke into the corresponding bits?
(a) ANSI
(b) ASCII
(c) EBCDIC
(d) ISO
(e) None of these

164. References to each file on a disk are stored in a
(a) file allocation table
(b) root allocation table
(c) linking directory
(d) root directory
(e) directory allocation table

165. In Windows operating system the shortcut key Windows Logo+SHIFT+M is used for
(a) Restore the minimized windows
(b) Open My Computer
(c) Search for a file or a folder
(d) Search for computers
(e) All of the above

166. _____ refers to a set of characters of a particular design.
(a) Calligraph
(b) Typeface
(c) Keyface
(d) Formation
(e) None of these

167. Data entry can be performed with all of the following except
(a) OCR/ OMR
(b) COM
(c) Voice-recognition systems
(d) MICR
(e) All of the above

168. In Excel accounting style shows negative numbers in
(a) Bold
(b) Brackets
(c) Parentheses
(d) Quotes
(e) All of the above

169. For creating a document, you use..... Command at File Menu.
(a) Open
(b) Close
(c) New
(d) Save
(e) None of these

170. BISYNC is
(a) Binary synchronous
(b) A process of transmitting data
(c) A half-duplex, character-oriented, synchronous data communications transmission method
(d) All the above
(e) All of the above

171. Which of the following terms is the most closely related to main memory?
(a) nonvolatile
(b) permanent
(c) control unit
(d) temporary
(e) None of the above.

172. _____ displays each slide of the PPT as a thumbnail and is used to re-arrange them.
(a) Slide Show
(b) Slide Display
(c) Slide Design
(d) Slide Layout
(e) Slide Sorter

173. Microsoft Office InterConnect is
(a) Business-relationship database
(b) An application that supports editing scanned documents
(c) A scanning and OCR application
(d) None of these
(e) All of the above

174. _____ provides a common address space and routes the packets of data across the entire internet?
(a) IP
(b) TCP
(c) UDP
(d) ALU
(e) None of these

175. Unsolicited commercial email is commonly known as
(a) spam
(b) junk
(c) hoaxes
(d) hypertext
(e) None of these

176. In Excel to name a constant, you use the ..... dialog box

(a) Create names
(b) Define name
(c) Paste name
(d) Format cells
(e) All of the above

177. _____are specially designed computer chips which reside inside other devices, such as your car or your electronic thermostat.
(a) Servers
(b) Embedded computers
(c) Robotic computers
(d) Mainframes
(e) None of these

178. In Excel to cancel the marquee, press
(a) Ctrl + End
(b) End
(c) Esc
(d) Shift + Esc
(e) All of the above

179. CPU performs read/write operations at any point in time in
(a) ROM
(b) PROM
(c) EPROM
(d) RAM
(e) All of the above

180. SMTP, FTP and DNS are applications of the _____ layer.
(a) data link
(b) network
(c) transport
(d) application
(e) None of these

181. What is a backup?
(a) Restoring the information backup
(b) An exact copy of a system&request information
(c) The ability to get a system up and running in the event of a system crash or failure
(d) All of these
(e) None of these

182. Which of the following commands is used to select the whole document?
(a) Ctrl + A
(b) Alt + F5
(c) Shift + S
(d) Can&rsquot be done
(e) None of these

183. In Windows operating system after you double-click a character on the grid of characters, keyboard shortcut PAGE UP is used for
(a) Move up one screen at a time
(b) Move down one screen at a time
(c) Move to the beginning of the line
(d) Move to the end of the line
(e) All of the above

184. An assembler is a
(a) Translator
(b) Hardware
(c) Assembly language
(d) None of these
(e) All of the above

185. Which of the following would most likely NOT be a symptom of a virus?
(a) Existing program files and icons disappear.
(b) The CD-ROM stops functioning.
(c) The Web browser opens to an unusual home page.
(d) Odd messages or images are displayed on the screen.
(e) None of these

186. In Excel In a worksheet you can select
(a) The entire worksheet
(b) Rows
(c) Columns
(d) All of the above
(e) All of the above

187. In Excel which of the following special function keys allow the content in cell
(a) Esc
(b) Shift
(c) Return
(d) Tab
(e) All of the above

188. BUG is -
(a) To find error in any software testing
(b) To find error in any software code
(c) logical error of any program
(d) both 1 &amp 2
(e) None of these

189. A collection of interrelated files in a computer is a _____.
(a) file manager
(b) field
(c) record
(d) database
(e) None of these

190. In Excel to activate the previous cell in a preselected range, press
(a) The Alt key
(b) The Tab key
(c) The Enter key
(d) None of above
(e) All of the above

191. In Excel to add two cells (A1 and A2) together you use the following formula
(a) =A1 + A2
(b) =Add(A1+A2)
(c) =together(A1:A2)
(d) A1 plus A2
(e) All of the above

192. A storage devices where the access time is effectively independent of the location of the data is referred as
(a) Direct access
(b) Secondary storage
(c) Primary storage
(d) None of these
(e) All of the above

193. ..... is a type of memory organization or image file format used to store digital images
(a) Pixmap
(b) GUI
(c) Pixel
(d) Resolution
(e) Vector graphics

194. What is an e-mail attachment?
(a) A receipt sent by the recipient
(b) A separate document from another program sent along with an e-mail message
(c) A malicious parasite that feeds off your messages and destroys the contents
(d) A list of CC or BCC recipients
(e) None of these

195. A sizeable geographical area with communication based on the telephone system is though as
(a) Local area network
(b) Wide area network
(c) Modulator-Demodulator
(d) All of the above
(e) None of the above

196. One kilobyte is equal to:
(a) 1000 bytes
(b) 100 bytes
(c) 1024 bytes
(d) 1023 bytes
(e) None of these

197. In Excel each excel file is called a workbook because
(a) It can contain text and data
(b) It can be modified
(c) It can contain many sheets including worksheets and chart sheets
(d) You have to work hard to create it
(e) All of the above

198. In Excel the following is not an example of a value
(a) 350
(b) May 10, 2001
(c) 57&per cent;
(d) Serial Number 50771
(e) All of the above

199. An advantage of the laser printer respect to impact printer is
(a) it is quieter/ faster
(b) output is of a high quality
(c) support wide range of type fonts
(d) all the above
(e) All of the above

200. In Excel which functions will calculate the number of workdays between 6/9/2004 and 8/12/2004
(a) Workday
(b) Date
(c) Networkdays
(d) All of the above
(e) All of the above

201. The design of the network is called the network
(a) Architecture
(b) server
(c) transmission
(d) type
(e) None of these

202. The name a user assigns to a document is called a (n)
(a) filename
(b) program
(c) record
(d) data
(e) None of these

203. The following is an nonvolatile memory
(a) ROM
(b) RAM
(c) LSI
(d) VLSI
(e) All of the above

204. In Excel following term describes explanatory text attached to a cell
(a) Callout
(b) Comment
(c) Dialog
(d) Extension
(e) All of the above

205. In Windows operating system the shortcut key CTRL+L is used for
(a) Open the Favorites bar
(b) Open the Open dialog box
(c) Start another instance of the browser with the same Web address
(d) Open the Open dialog box, the same as CTRL+L
(e) All of the above

206. _____ are viruses that are triggered by the passage of time or on a certain date.
(a) Boot-sector viruses
(b) Macro viruses
(c) Time bombs
(d) Worms
(e) None of these

207. Ctrl + H keyboard short cut in MS word is used to ....
(a) Open Font dialog box
(b) Align Center
(c) Open Replace Box
(d) Insert Link
(e) None of these

208. Which of the following is an input device which is used with interactive graphics to locate a place on the screen?
(a) Bus
(b) Modem
(c) Magnetic Tape
(d) Mouse
(e) Scanner

209. _____ is processed by the computer into information.
(a) numbers
(b) processor
(c) input
(d) data
(e) None of these

210. Which is not a functions of firewall ?
(a) To block websites from being able to access your computer.
(b) To regulate some of the flow of traffic between computers networks of different trust level.
(c) It stops anyone on the outside from establishing a connection with a computer in your private network.
(d) Only 2 and 3
(e) None of these

211. A fixed number of adjacent bits that represent a particular character or symbol are referred as
(a) Byte
(b) Octal
(c) Bubble
(d) None of these
(e) All of the above

212. How did the computer mouse get its name?
(a) Its cable looks like a tail
(b) Because it squeaks when moved
(c) It has ears
(d) Teeth outside mouth
(e) None of these

213. A technique used to reduce the speed mismatch between slow speed I/O devices and fast CPU is called
(a) Spooling
(b) Paging
(c) Segmentation
(d) None of these
(e) All of the above

214. To insert a new slide in a presentation press which shortcut key will used.
(a) CTRL + N
(b) CTRL + M
(c) CTRL + O
(d) CTRL + S
(e) CTRL + F

215. Which key is used to indent a paragraph in MS word?
(a) Shift
(b) tab
(c) Ctrl
(d) Esc
(e) None of these

216. What is the shortcut key to Undo the last action in a document?
(a) Ctrl + X
(b) Ctrl + Y
(c) Ctrl + Z
(d) Ctrl + U
(e) None of these

217. The primary memory of a personal computer consists
(a) ROM only
(b) RAM only
(c) Both ROM and RAM
(d) Memory module
(e) All of the above

218. There are three types of data found in a spreadsheet
(a) data, words, numbers
(b) equations, data, numbers
(c) words, numbers, labels
(d) numbers formulas, labels
(e) All of the above

219. A special high-speed line used by large corporations to support digital communications is known as:
(a) satellite/air connection service lines
(b) cable modems
(c) digital subscriber lines
(d) T1, T2, T3 and T4 lines
(e) None of the above

220. Which of the following commands is used to select the whole document?
(a) Ctrl + A
(b) Alt + F5
(c) Shift + S
(d) Can&rsquot be done
(e) None of these

221. A processor that collects the transmissions from several communications media and sends them over a single line that operates at a higher capacity is called____.
(a) multiplexor
(b) bridge
(c) hub
(d) router
(e) None of these

222. Full form of TCP is:
(a) Transmission Control Protocol
(b) Total Control Protocol
(c) Transmission Control Program
(d) Totaling Control Program
(e) None of these

223. In Excel autofill feature

(a) Extends a sequential series of data
(b) Automatically adds range of cell values
(c) Applies a boarder around the selected cells
(d) None of the above
(e) All of the above

224. The most frequently used instructions of a computer program are likely to be fetched from
(a) the hard disk
(b) cache memory
(c) RAM
(d) registers
(e) None of these

225. CPU is a/an .....
(a) Expansion card
(b) Mother board
(c) Microprocessor
(d) Memory
(e) Graphic Card

226. What is the primary goal of a computer system ?
(a) To utilize the stored data
(b) To start the application
(c) To turn data into information
(d) All of the above
(e) None of these

227. Which of the following statements is FALSE concerning file names?
(a) Files may share the same name or the same extension but not both
(b) Every file in the same folder must have a unique name
(c) File extension is another name for file type
(d) The file extension come safter the dot (.)
(e) None of these

228. Bandwidth refers to_____.
(a) the cost of the cable required to implement a WAN
(b) the cost of the cable required to implement a LAN
(c) the amount of information a peer-to-peer network can store
(d) the amount of information a communications medium can transfer in a given amount of time
(e) None of these

229. In Excel which of the following formulas will Excel not be able to calculate?
(a) =SUM(Sales)-A3
(b) =SUM(A1:A5)*.5
(c) =SUM(A1:A5)/(10-10)
(d) =SUM(A1:A5)-10
(e) All of the above

230. A flat, circular plate coated with a magnetic material on which data can be stored by magnetization of portions of the flat surface is
(a) Disk
(b) Tape
(c) Pen drive
(d) None of these
(e) All of the above

231. What happens when you boot up a PC?
(a) Portions of the operating system are copied from disk into memory
(b) Portions of the operating system are copied from memory onto disk
(c) Portions of the operating system are compiled
(d) Portions of the operating system are emulated
(e) None of these

232. The total time elapsed between submission of command and data to a computer and getting the result of computation is the
(a) Access time
(b) Response time
(c) Entrance time
(d) None of these
(e) All of the above

233. Following is not true for magnetic tape
(a) low cost
(b) direct-access storage medium
(c) compact and portable
(d) highly reliable
(e) All of the above

234. The binary equivalent of decimal number 98 is
(a) 1110001
(b) 1110100
(c) 1100010
(d) 1111001
(e) None of these

235. A characteristic of the ASCII code is
(a) its limitation to a maximum of 96 character configuration
(b) its use of the zone codes 1010, 1011 and 1100
(c) its independence from Hollerith code
(d) All of these
(e) None of these

236. Programming language built into user programs such as Word and Excel are known as___?
(a) 4GLs
(b) macro languages
(c) object-oriented languages
(d) visual programming languages
(e) None of these

237. Which of the following is part of the system unit?
(a) Keyboard
(b) Floppy disks
(c) Monitor
(d) Memory
(e) CD

238. In Excel when you group worksheets
(a) You can enter variable data on multiple worksheets at one time

(b) You can print more than one worksheet at a time
(c) You can enter common data, formats, and formulas on multiple worksheets at one time
(d) (B) and (C)
(e) All of the above

239. _____was the precursor to internet as we know it today?
(a) ARPANET
(b) USENET
(c) TELNET
(d) DBMS
(e) None of these

240. ..... is a combination of software and hardware
(a) Firmware
(b) Shareware
(c) Freeware
(d) Netware
(e) Software

241. In computer file systems which among the following are top or first in hierarchy?
(a) root directory
(b) parent directory
(c) home directory
(d) working directory
(e) None of these

242. Circuits that provide a communication path between two or more devices of a digital computer system is
(a) Car
(b) Bus
(c) Truck
(d) None of these
(e) All of the above

243. In Windows operating system the shortcut key CTRL+E is used for
(a) Open the Organize Favorites dialog box
(b) Open the Search bar
(c) Start the Find utility
(d) Open the History bar
(e) All of the above

244. CPU speed can be measured in
(a) BPS
(b) MIPS
(c) GHz
(d) MPI
(e) KHz

245. In Windows operating system the shortcut key CTRL+N is used for
(a) Open the Favorites bar
(b) Open the Open dialog box
(c) Start another instance of the browser with the same Web address
(d) Open the Open dialog box, the same as CTRL+L
(e) All of the above

246. A network that requires human interventions to route signals is
(a) bus network
(b) ring network
(c) star network
(d) T-switched network
(e) None of these

247. In a disk, each block of data is written into ?
(a) one sector
(b) three sector
(c) Two sectors
(d) Two or more sectors
(e) either two or three sectors

248. Default header of a worksheet
(a) Username
(b) Date and time
(c) Sheet name
(d) Workspace name
(e) None of these

249. Information on a hard disk is usually backed-up using a..?
(a) CD-ROM
(b) Magnetic tape
(c) Floppy disk
(d) All of the above
(e) None of these

250. .jpeg stands for
(a) Joint Photographic Experts Group
(b) JPEG image file
(c) Power point presentation
(d) Multiple network graphic
(e) None of these

251. In Windows operating system it is a very important part of Windows, clicking on it opens up what is called the start menu
(a) Start button
(b) Sidebar
(c) Icons
(d) None of these
(e) All of the above

252. In Excel which do you press to enter the current date in a cell?
(a) Ctrl + Shift +:
(b) Ctrl +;
(c) Ctrl + F10
(d) All of above
(e) All of the above

253. What is the full form of SDRM?
(a) Shift Dynamic random access memory
(b) Synchronous Dynamic random access memory
(c) System Dynamic random access memory
(d) Serial Dynamic random access memory
(e) None of these

254. In Windows operating system shortcut for paste is
(a) CTRL+C

(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

255. Computer connected to a LAN (Local Area Network) can____.
(a) run faster
(b) go on line
(c) share information and /or share peripheral equipment
(d) E-mail
(e) None

256. Which type of file is created by word processing programs?
(a) database file
(b) storage file
(c) worksheet file
(d) document file
(e) graphical file

257. In MS Word Key F12 opens___?
(a) Save dialog box
(b) print dialog box
(c) New dialog box
(d) Save as dialog
(e) None of these

258. Which of the following commands is given to reboot the computer?
(a) Ctrl + Alt + Del
(b) Ctrl + Shift + Tab
(c) Ctrl + Shift + Del
(d) Ctrl + Alt + shift
(e) Ctrl + Alt + Tab

259. _____ is the ability of an operating system to control the activities of multiple programs at the same time.
(a) Multitasking
(b) Streamlining
(c) Multiuser
(d) Simulation
(e) None of these

260. A term means that the application software is priced separately from the computer hardware is called
(a) Unbundled
(b) Bundled
(c) Utility
(d) None of these
(e) All of the above

261. A modem that is contained within the system unit is called:
(a) External
(b) Internal
(c) Wireless
(d) Wi-Fi
(e) Bluetooth

262. The word size of a microprocessor refers to:
(a) the number of machine operations performed/ second
(b) the amount of information that can be stored/ cycle
(c) the amount of information that can be stored in bytes
(d) none of these
(e) All of the above

263. A modem that does not need to be connected to a telephone line is the___modem.
(a) external
(b) internal
(c) wireless
(d) DSL
(e) NSL

264. What menu is selected to change the font and style?
(a) Tools
(b) File
(c) Format
(d) Edit
(e) None of these

265. Which of the following statements is FALSE concerning file names?
(a) Files may share the same name or the same extension but not both
(b) Every file in the same folder must have a unique name
(c) File extension is another name for file type
(d) The file extension comes before the dot (.) followed by the file name
(e) None of these

266. In Excel when the formula bar is activated, you can see
(a) The Edit Formula button
(b) The Cancel button
(c) The Enter button
(d) All of above
(e) All of the above

267. Which part of the computer helps to store information?
(a) Disk drive
(b) Keyboard
(c) Monitor
(d) Printer
(e) None of these

268. A protocol that specifies how a personal computer can connect to a mail server on the Internet and download E-mail is known as
(a) Post office protocol
(b) System protocol
(c) Network protocol
(d) None of these
(e) All of the above

269. In Excel getting data from a cell located in a different sheet is called
(a) Accessing
(b) Referencing
(c) Updating
(d) Functioning
(e) All of the above

270. C, BASIC, COBOL, and Java are examples of _____ languages
(a) low-level
(b) high-level
(c) system programming
(d) computer
(e) None of these

271. The 16 bit Microprocessor means that it has?
(a) 16 address lines
(b) 16 Buses
(c) 16 Data lines
(d) 16 routes
(e) None of these

272. It is a self-replicating program that infects computer and spreads by inserting copies of itself into other executable code or documents.
(a) Keylogger
(b) Worm
(c) Virus
(d) Cracker
(e) All of the above

273. Maximum character EBCDIC can code
(a) 8
(b) 16
(c) 64
(d) 256
(e) All of the above

274. The vast network of computers that connects millions of people all over the world is called.
(a) LAN
(b) web
(c) hypertext
(d) internet
(e) None of these

275. What is the minimum number of rows and columns that a word table can have?
(a) Zero
(b) 2 rows and 1 column
(c) 2 rows and 2 column
(d) 1 row and 1 column
(e) All of the above

276. Which of the following systems mimics human thinking?
(a) Artificial intelligence
(b) Intelligent agent
(c) Bot
(d) Database management system
(e) None of these

277. Which kind of storage device can be carried around?
(a) Floppy disk
(b) Hard disk
(c) System cabinet
(d) Hard disk drive
(e) Floppy disk drive

278. The time required to complete a single, continuous execution of an object program is called
(a) Run time
(b) Access time
(c) Random time
(d) Response time
(e) All of the above

279. A network geometric arrangement in which a single connecting line is shared by a number of nodes is called
(a) Car Topology
(b) Bus Topology
(c) Truck Topology
(d) None of these
(e) All of the above

280. In Microsoft Word shortcut key CTRL+E is used for
(a) Open the Organize Favorites dialog box
(b) Open the Search bar
(c) Start the Find utility
(d) Open the History bar
(e) All of the above

281. A device operating at the physical layer is called a
(a) Bridge
(b) Router
(c) Repeater
(d) All of the above
(e) None of these

282. In Windows operating system the shortcut key CTRL+F is used for
(a) Open the Organize Favorites dialog box
(b) Open the Search bar
(c) Start the Find utility
(d) Open the History bar
(e) All of the above

283. In Excel you can use drag and drop to embed excel worksheet data in a word document
(a) By dragging a range of excel data to the word button on the taskbar while pressing the Ctrl key
(b) By dragging a range of excel data to the Word button on the taskbar while pressing Shift key
(c) By displaying both applications side-byside and dragging a selected range of Excel data into the word application window while pressing the Ctrl key
(d) None
(e) All of the above

284. Approximately how many bytes make one Megabyte?

(a) One Thousand
(b) Ten Thousand
(c) One Hundred
(d) One Million
(e) None of these

285. The primary purpose of software is to turn data into:
(a) Websites
(b) graphs
(c) programs
(d) objects
(e) information

286. _____refers to the letter and number of the intersecting column and row.
(a) Cell address
(b) Cell location
(c) Cell position
(d) Cell column
(e) Cell row

287. It is a software program designed to record ('log') every keystroke on the machine on which it runs
(a) Keylogger
(b) Worm
(c) Virus
(d) Cracker
(e) All of the above

288. A device that is used to transmit data from one location to another is referred as
(a) Storage
(b) Memory
(c) Carrier
(d) None of these
(e) All of the above

289. In Windows operating system to cut something the following shortcut is used-
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

290. In Windows operating system move the insertion point to the beginning of the previous word
(a) Shortcut CTRL+RIGHT ARROW
(b) Shortcut CTRL+LEFT ARROW
(c) Shortcut CTRL+DOWN ARROW
(d) None of these
(e) All of the above

291. In Windows operating system Shortcut for copy is
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

292. A computer connected to a Local Area Network can:
(a) Run faster
(b) Be accessed online
(c) Share information and/or share peripheral equipment
(d) Be used to send Email
(e) None of these

293. In Windows operating system shortcut CTRL+SHIFT while dragging an item
(a) Delete the selected item permanently without placing the item in the Recycle Bin
(b) Copy the selected item
(c) Rename the selected item
(d) Create a shortcut to the selected item
(e) All of the above

294. In Excel the following is not a basic step in creating a worksheet
(a) Save the workbook
(b) Modify the worksheet
(c) Enter text and data
(d) Copy the worksheet
(e) All of the above

295. Which of the following commands is given to reboot the computer?
(a) Ctrl + Alt + Del
(b) Ctrl + Shift + Tab
(c) Ctrl + Shift + Del
(d) Ctrl + Alt + shift
(e) Ctrl + Alt + Tab

296. The ability of an OS to run more than one application at a time is called
(a) multitasking
(b) object-oriented programming
(c) multi-user computing
(d) time-sharing
(e) None of these

297. In Windows operating system Shortcut CTRL+Z is for
(a) Undo something
(b) Delete something
(c) Paste something
(d) None of these
(e) All of the above

298. In Microsoft PowerPoint following should be used when you want to add a slide to an existing presentation
(a) File, add a new slide
(b) Insert, new slide
(c) File, open
(d) File, new
(e) All of the above

299. The real business and competitive value of information technology lies in
(a) The software applications that are used by many companies
(b) The capabilities of the software and value of the information, a business acquires and uses

(c) The infrastructure of hardware, networks, and other IT facilities that are commonly used by many companies
(d) The capabilities of the hardware and the speed at which it processes information
(e) None of these

300. Which of the following shortcut key is used to check spelling?
(a) F1
(b) F2
(c) F7
(d) F9
(e) All of the above

301. The first generation of computers was based upon?
(a) Transistors
(b) ICs
(c) Valves
(d) Conductor
(e) Diodes

302. CRSYX-MP belongs to___generation.
(a) First
(b) Second
(c) Third
(d) Fourth
(e) Fifth

303. When you print preview a worksheet
(a) the entire worksheet is displayed
(b) the selected range is displayed
(c) the active portion of the worksheet is displayed
(d) All of the above
(e) All of the above

304. Bluetooth is a type of radio wave information transmission system that is good for about:
(a) 30 feet
(b) 30 yards
(c) 30 miles
(d) 300 miles
(e) 3000 miles

305. DOS stands for_____.
(a) Disk Operating System
(b) Disk operating session
(c) Digital Operating System
(d) Digital Open system
(e) None of these

306. Electronic Mail /Message System (EMMS) best suits to
(a) Postal service
(b) Telephone service
(c) Telegraph service
(d) None of these
(e) All of the above

307. In Excel the following displays the contents of the active cell
(a) Active cell
(b) Formula bar
(c) Menu bar
(d) Name box
(e) All of the above

308. Factory production lines can be automated using...?
(a) Machine tools
(b) VDUs
(c) Plotters
(d) All of the above
(e) None of these

309. What is the base of hexadecimal number system?
(a) 2
(b) 8
(c) 16
(d) 10
(e) None of these

310. When you are typing the text in a document, you would need to hit the enter key at the end of every _____.
(a) Line
(b) Sentence
(c) Paragraph
(d) Word
(e) File

311. What is the decimal from of 3b4?
(a) 846
(b) 848
(c) 946
(d) 948
(e) None of these

312. The vast network of computers that connects millions of people all over the world is called____.
(a) LAN
(b) Web
(c) Hypertext
(d) Internet
(e) None of these

313. 1024 MB = ?
(a) 1 YB
(b) 1 KB
(c) 1 PB
(d) 1 ZB
(e) None of these

314. The computer code for interchange of information between terminals is-
(a) ASCII
(b) BCD
(c) BCDIC
(d) Hollerith
(e) None of these

315. A pictorial representation that uses predefined symbols to describe either the logic of a computer program or the data flow and processing steps of a system is referred as
(a) Flowchart
(b) Algorithm

(c) Program
(d) None of these
(e) All of the above

316. To save an existing file with a new name or to a new location, you should use the_____command.
(a) Save
(b) Save and Replace
(c) Save As
(d) New File
(e) None of these

317. In Excel value used in a formula that does not change is called a
(a) Cell address
(b) Constant
(c) Function
(d) Range
(e) All of the above

318. In Windows operating system the shortcut key CTRL+R is used for
(a) Open the Print dialog box
(b) Update the current Web page
(c) Close the current window
(d) None of these
(e) All of the above

319. Which of the following is used for manufacturing chips?
(a) Bus
(b) Control unit
(c) Semiconductors
(d) a and b only
(e) None of the above

320. In Microsoft Word shortcut key CTRL+F is used for
(a) Open the Organize Favorites dialog box
(b) Open the Search bar
(c) Start the Find utility
(d) Open the History bar
(e) All of the above

321. Which one of the following is not a DOS prompt ?
(a) C & gt
(b) B & gt
(c) A & gt
(d) ENTER
(e) None of these.

322. In Windows operating system the shortcut key CTRL+O is used for
(a) Open the Favorites bar
(b) Open the Open dialog box
(c) Start another instance of the browser with the same Web address
(d) Open the Open dialog box, the same as CTRL+L
(e) All of the above

323. ..... is not available on the Ruler of MS Word screen
(a) Centre Indent
(b) Right Indent
(c) Left Indent
(d) Tab stop box
(e) None of these

324. In Excel you can enter which types of data into worksheet cells?
(a) Labels, values, and formulas
(b) Labels and values but not formulas
(c) Values and formulas but not labels
(d) Formulas only
(e) All of the above

325. _____is an invalid type of database key.
(a) Structured primary key
(b) Atomic primary key
(c) Primary key
(d) Composite primary key
(e) None of these

326. In Microsoft Word to cut something the following shortcut is used
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

327. In Microsoft Word move the insertion point to the beginning of the previous word
(a) Shortcut CTRL+RIGHT ARROW
(b) Shortcut CTRL+LEFT ARROW
(c) Shortcut CTRL+DOWN ARROW
(d) None of these
(e) All of the above

328. In Windows operating system to paste something after cutting the following shortcut is used
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

329. Formatting a disk results in all the data being...?
(a) Saved to the disk
(b) Copied from the disk
(c) Deleted from the disk
(d) All of the above
(e) None of these

330. In Microsoft Word shortcut CTRL+SHIFT while dragging an item
(a) Delete the selected item permanently without placing the item in the Recycle Bin
(b) Copy the selected item
(c) Rename the selected item
(d) Create a shortcut to the selected item
(e) All of the above

331. In Excel the following is not a basic step in creating a worksheet
(a) Save workbook
(b) Modifiy the worksheet

(c) Enter text and data
(d) Copy the worksheet
(e) All of the above

332. In Excel to access the Go To Special feature, you can press
(a) Ctrl + G
(b) Ctrl + O
(c) Ctrl + Shift + G
(d) Ctrl + 1
(e) All of the above

333. A(n)_____is a combination of hardware and software that facilitates the sharing of information between computing devices.
(a) network
(b) peripheral
(c) expansion board
(d) digital device
(e) None of these

334. In Microsoft Word shortcut CTRL+Z is for
(a) Undo something
(b) Delete something
(c) Paste something
(d) None of these
(e) All of the above

335. Microsoft Excel is
(a) financial planning package
(b) electronic spreadsheet
(c) graphics package
(d) data-base management package
(e) All of the above

336. What type of virus use computer hosts to reproduces it?
(a) Time bomb
(b) worm
(c) Melissa virus
(d) Macro virus
(e) None of these

337. is the process of carrying out commands.
(a) Fetching
(b) Storing
(c) Executing
(d) Decoding
(e) None of these

338. The purpose of the primary key in a database is to
(a) unlock the database
(b) provide a map of the data
(c) uniquely identify a record
(d) establish constraints on database operations
(e) None of the above

339. Information travels between components on the mother board through_____.
(a) Flash memory
(b) CMOS
(c) Bays
(d) Buses
(e) Peripherals

340. In Excel when you are typing an equation into a cell the first thing that must be entered is
(a) the first cell referenced
(b) parenthesis
(c) quotation marks
(d) an equal sign
(e) All of the above

341. One nibble is equal to
(a) 4 bits
(b) 8 bits
(c) 6 bits
(d) 16 bits
(e) None of the above

342. A Winchester disk is a
(a) Disk Stack
(b) Removable disk
(c) Flexible disk
(d) All of the above
(e) None of the above

343. In Excel without using the mouse or the arrow keys, what is the fastest way of getting to cell A1 in a spreadsheet?
(a) Press Ctrl +Home
(b) Press Home
(c) Press Shift + Home
(d) Press Alt + Home
(e) All of the above

344. Ctrl, shift and alt are called ..... keys.
(a) adjustment
(b) function
(c) modifier
(d) alphanumeric
(e) None of these

345. ROM is composed of-
(a) Magnetic cores
(b) Micro-processors
(c) Photoelectric cells
(d) Floppy disks
(e) None of these

346. EBCDIC is
(a) 6-bit coding system
(b) 7-bit coding system
(c) 8-bit coding system
(d) 9-bit coding system
(e) All of the above

347. Personal logs or journal entries posted on the Web are known as
(a) list serves
(b) Webcasts
(c) blogs
(d) subject directories
(e) None of these

348. Which among the following is correct about 4GL?
(a) A computer brand

(b) A software brand
(c) A software program
(d) A programming language
(e) None of these

349. The higher the resolution of a monitor, the
(a) larger the pixels
(b) less clear the screen is
(c) further apart the pixels
(d) closer together are the pixels
(e) None of these

350. A byte represents a group of:
(a) 10 bits
(b) 40 bits
(c) 16 bits
(d) 18 bits
(e) 8 bits

351. A program written in machine language is called?
(a) Assembler
(b) Object
(c) Computer
(d) Machine
(e) None

352. Automatic execution of high-priority computer programs that have been designed to preempt the use of computer resources is referred as
(a) Foreground processing
(b) background processing
(c) black processing
(d) white processing
(e) All of the above

353. Auxiliary storage is
(a) Secondary storage
(b) Primary storage
(c) Processing device
(d) None of these
(e) All of the above

354. A temporary storage area, attached to the CPU, for I/O operations, is a-
(a) Channel
(b) Buffer
(c) Register
(d) Core
(e) None of these

355. In Microsoft Word shortcut key CTRL+R is used for
(a) Open the Print dialog box
(b) Update the current Web page
(c) Close the current window
(d) None of these
(e) All of the above

356. Internal Memory in a Central Processing Unit Comprises of which of the following?
(a) Bus
(b) A set of ALUs
(c) A set of registers
(d) Ward disk memory
(e) All of these

357. In Windows operating system the shortcut key CTRL+W is used for
(a) Open the Print dialog box
(b) Update the current Web page
(c) Close the current window
(d) None of these
(e) All of the above

358. Condensing output data to exhibit specific information is
(a) Calculating
(b) Recording
(c) Merging
(d) Summarising
(e) None of the above

359. In Windows operating system the shortcut key CTRL+H is used for
(a) Open the Organize Favorites dialog box
(b) Open the Search bar
(c) Start the Find utility
(d) Open the History bar
(e) All of the above

360. ..... is not available on the Ruler of MS Word screen
(a) Centre Indent
(b) Right Indent
(c) Left Indent
(d) Tab stop box
(e) None of these

361. Which of the following refers to a small, single-site network?
(a) LAN
(b) DSL
(c) RAM
(d) USB
(e) CPU

362. Information is?
(a) Summarization process of data
(b) Data Information
(c) Textual form of data
(d) Facts and figures
(e) None of these

363. To insert a new slide in a presentation, press
(a) CTRL+N
(b) CTRL+M
(c) CTRL+O
(d) CTRL+S
(e) CTRL+F

364. In Excel when a label is too long to fit within a worksheet cell, you typically must
(a) Shorten the label
(b) Increase the column width
(c) Decrease the column width
(d) Adjust the row height
(e) All of the above

365. In Microsoft Word shortcut for paste is
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

366. _____is a point and draw device.
(a) Scanner
(b) Printer
(c) Mouse
(d) Keyboard
(e) CD- ROM

367. In Excel Documentation should include
(a) Destination and users of the output data
(b) Source of input data
(c) Information on the purpose of the workbook
(d) All of the above
(e) All of the above

368. Which of the following groups consist of only output devices?
(a) Scanner, Printer, Monitor
(b) Keyboard, Printer, Monitor
(c) Mouse, Printer, Monitor
(d) Plotter, Printer, Monitor
(e) None of these

369. In Windows operating system to copy something the following shortcut is used
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

370. Servers are computers that provide resources to other computers connected to a _____
(a) network
(b) mainframe
(c) supercomputer
(d) client
(e) None of these

371. URL stands for___.
(a) Uniform Resource Locator
(b) Universal resource locator
(c) Address bar
(d) All 1, 2 &amp 3 are correct
(e) None of these

372. A_____is not a form of Biometrics.
(a) fingerprint
(b) password
(c) retina scan
(d) breath scan
(e) None of these

373. _____is the process of dividing the disk into tracks and sectors.
(a) Tracking
(b) Formatting
(c) Crashing
(d) Allotting
(e) None of these

374. ___is the process of carrying out commands.
(a) Fetching
(b) Storing
(c) Executing
(d) Decoding
(e) None of these

375. Primary memory is used by the ?
(a) user
(b) input device
(c) CPU
(d) all of these
(e) None of these

376. Information travels between components on the mother board through-
(a) Flash memory
(b) CMOS
(c) Bays
(d) Buses
(e) Peripherals

377. _____is a form of permanent memory that holds all the instructions the computer needs to start up and does not get erased when the power is turned off.
(a) The Network Interface Card
(b) The CPU
(c) RAM
(d) ROM
(e) None of these

378. What is the smallest and largest font size available in Font Size tool on formatting toolbar?
(a) 8 and 72
(b) 8 and 64
(c) 12 and 72
(d) None of above
(e) None of the Above

379. In Windows operating system one press F1 key to
(a) Display help
(b) Cut
(c) Paste
(d) None of these
(e) All of the above

380. Which of the following methods cannot be used to edit the contents of a cell In Excel?
(a) Press the Alt key
(b) Clicking the formula bar
(c) Pressing the F2 key
(d) Double clicking the cell
(e) All of the above

381. What are small high speed memory units used for storing temporary results?
(a) All of the above
(b) Registers

(c) Control unit
(d) CPUs
(e) None of these

382. In laser printers, printing is achieved by deflecting _____laser beam on to surface of a drum
(a) magnetized
(b) photosensitive
(c) magnetic
(d) Either 1 or 2
(e) None of these

383. IP address contains..... Bits.
(a) 8 bits
(b) 16 bits
(c) 32 bits
(d) 40 bits
(e) None of these

384. A spooler is a(n):
(a) location in memory that maintains the contents of a document until it prints out
(b) Print job
(c) Program that coordinates the print jobs that are waiting to print
(d) Message sent from the printer to the operating system when a print job is completed
(e) None of these

385. Computer network is a
(a) A distributed data processing system
(b) Multiple computers are linked together for the purpose of data communication and resource sharing
(c) Both A & B are false
(d) Both A & B are true
(e) All of the above

386. How are data organized in a spreadsheet?
(a) Lines &amp spaces
(b) Layers &amp Planes
(c) Height &amp Width
(d) Rows &amp Columns
(e) None of these

387. Which storage device cannot be erased?
(a) A CD-ROM
(b) None of these
(c) Magnetic tape storage
(d) All of the above-
(e) A floppy disk

388. In second generation, ... language were introduced after binary language
(a) Assembly level language
(b) High level language
(c) Low level language
(d) Data definition language
(e) Structured query language

389. A program that generally has more user-friendly interface than a DBMS is called a___?
(a) front end
(b) repository
(c) back end
(d) form
(e) None of these

390. A method of providing virtual memory
(a) Segmentation
(b) De-fragmentation
(c) Paging
(d) None of these
(e) All of the above

391. Instructions and memory address are represented by __
(a) Character code
(b) Binary code
(c) Binary word
(d) Parity bit
(e) Bite code

392. _____is the detailed written description of the programming cycle and the program accompanied by the test results and a printout of the program.
(a) Output
(b) Spec Sheets
(c) Documentation
(d) Report
(e) Detail sheet

393. Which of the following is true?
(a) Byte is a single digit in a binary number
(b) Bit represents a grouping of digital numbers
(c) Eight-digit binary number is called a byte
(d) Eight-digit binary number is called a bit
(e) None of these

394. In Microsoft Word shortcut key CTRL+W is used for
(a) Open the Print dialog box
(b) Update the current Web page
(c) Close the current window
(d) None of these
(e) All of the above

395. In Excel advantage of using a spreadsheet is
(a) calculations can be done automatically.
(b) changing data automatically updates calculations
(c) more flexibility
(d) all of the above
(e) All of the above

396. In Microsoft Word shortcut key CTRL+H is used for
(a) Open the Organize Favorites dialog box
(b) Open the Search bar
(c) Start the Find utility
(d) Open the History bar
(e) All of the above

397. CUI stands for
(a) Character User Interface
(b) Central User Intercom
(c) Common User Interface
(d) Control User Interface

(e) None of these

398. A_____typically connects personal computers within a very limited geographical area, usually within a single building.
(a) LAN
(b) BAN
(c) TAN
(d) NAN
(e) None of these

399. Which computers are used in the weather forecasting industry?
(a) Super computers
(b) Notebook computers
(c) Jon Von Neumann computers
(d) All of the above
(e) None of these

400. In Windows operating system to move backward through the tabs
(a) CTRL+TAB
(b) CTRL+SHIFT+TAB
(c) SHIFT+TAB
(d) None of these
(e) All of the above

401. In Windows operating system these are small pictures that represent files, folders, programs, and other items. Each one is used to make the computer do something.
(a) Sidebar
(b) Icons
(c) Taskbar
(d) None of these
(e) All of the above

402. In Microsoft Word shortcut for copy is
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

403. Disk access time is-
(a) seek time
(b) Latency time
(c) Seek time + Latency time
(d) Disk time
(e) None of these

404. When writing a document, you can use the _____ feature to find an appropriate word or an alternative word if you find yourself stuck for the right word.
(a) dictionary
(b) word finder
(c) encyclopedia
(d) thesaurus
(e) None of these

405. File ..... shrinks the size of a file so it requires less storage space.
(a) scanning
(b) synthesizing
(c) defragmenting
(d) compression
(e) None of these

406. In Microsoft Word system to copy something the following shortcut is used
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

407. A ..... shares hardware, software, and data among authorized users.
(a) network
(b) protocol
(c) hyperlink
(d) transmitter
(e) None of these

408. Digitizer is an input device
(a) Used to convert graphic and pictorial data into binary inputs for a digital computer
(b) Used to convert graphic and pictorial data into analog inputs for a digital computer.
(c) Used for debugging
(d) None of these
(e) All of the above

409. Hard disk drives are considered_____storage.
(a) flash
(b) non-volatile
(c) temporary
(d) nonpermanent
(e) None of these

410. How many margins are on a page?
(a) Two (header and footer)
(b) Four (top, bottom, right, left)
(c) Two (landscape and portrait)
(d) Two (top and bottom)
(e) None of these

411. The Word FTP stands for?
(a) File Translate Protocol
(b) File Transit Protocol
(c) File Transfer protocol
(d) file typing protocol
(e) None of these

412. The_____tells the computer how to use its components.
(a) utility
(b) network
(c) operating system
(d) application program
(e) None of these

413. In Excel which is not an advantage of using computerized spreadsheets?
(a) Flexibility of moving entries

(b) Speed of calculation
(c) Ability of generate tables
(d) Cost of initial setup
(e) All of the above

414. In Microsoft PowerPoint the following should be used with the mouse when you want to draw a perfect shape
(a) The spacebar
(b) The alt key
(c) The ctrl key
(d) The shift key
(e) All of the above

415. How many bits of information can each memory cell in a computer chip hold?
(a) 8 bits
(b) 1 bit
(c) 0 bits
(d) All of the above
(e) None of these

416. In Windows operating system shortcut key Windows Logo+F1
(a) Display Windows Help
(b) Lock the keyboard
(c) Open the Run dialog box
(d) Open Utility Manager
(e) All of the above

417. In Excel the following will not cut information
(a) Pressing Ctrl + C
(b) Selecting Edit>Cut from the menu
(c) Clicking the Cut button on the standard
(d) Pressing Ctrl+X
(e) All of the above

418. In Excel to open the Format Cells dialog box, press
(a) Alt + 1
(b) Ctrl + 1
(c) Ctrl + Shift + 1
(d) F1
(e) All of the above

419. Who was the inventor of world wide web ?
(a) Marks Zuckerberg
(b) Tim Berners Lee
(c) Thomas Reardon
(d) Ray Tomlinson
(e) Henery A Rowland

420. An example of an embedded system is ..... ?
(a) A CD-ROM
(b) A machine tool
(c) A calculator
(d) All of the above
(e) None of these

421. In Excel all worksheet formula
(a) Manipulate values
(b) Manipulate labels
(c) Return a formula result
(d) Use the addition operator
(e) All of the above

422. APL is
(a) A high level language for specifying complex algorithms.
(b) A real-time language primarily for scientific applications.
(c) Only A is true
(d) Both A & B are true
(e) All of the above

423. How are data organised in a spreadsheet?
(a) Lines and spaces
(b) Layers and planes
(c) Height and width
(d) Rows and columns
(e) None of these

424. Magnetic tape is not practical for applications where data must be quickly recalled because tape is:
(a) A random-access medium
(b) A sequential access medium
(c) A read only medium
(d) Fragile and easily damaged
(e) An expensive storage medium

425. Which one of the following is not an internal DOS command?
(a) BACKUP
(b) COPY
(c) CLS
(d) BREAK
(e) None of these

426. A method of using a communication channel in which signals can be transmitted between a source and a destination in both directions simultaneously is called
(a) Full duplex
(b) Half duplex
(c) Quarter duplex
(d) None of these
(e) All of the above

427. In Windows operating system shortcut CTRL+A is to
(a) Select all
(b) Highlight a block of text
(c) Delete something
(d) Paste something
(e) All of the above

428. The father of Modern Computer is_____.
(a) Charles Babbage
(b) Von-neumann
(c) Danies Ritchel
(d) Blaise Pascal
(e) None

429. Before data can be transmitted, they must be transformed to_____.
(a) periodic signals

(b) electromagnetic signals
(c) aperiodic signals
(d) low-frequency sine waves
(e) None of these

430. Which of the following is NOT a type of broadband Internet connection?
(a) cable
(b) DSL
(c) Dial-up
(d) Satellite
(e) None of these

431. Specialized programs that allow particular input or output devices to communicate with the rest of the computer system are called___.
(a) operating systems
(b) utilities
(c) device drivers
(d) language translators
(e) Connectors

432. In Microsoft PowerPoint you can edit an embedded organization chart object by
(a) Clicking edit object
(b) Double clicking the organization chart object
(c) Right clicking the chart object, then clicking edit MS-Organizaiton Chart object
(d) (B) and (C)
(e) All of the above

433. Which of the following transforms input data into output data?
(a) Peripherals
(b) RAM
(c) ROM
(d) CPU
(e) None of these

434. In Excel to save a workbook, you
(a) Click the save button on the standard toolbar from the menu
(b) Press Ctrl+F5
(c) Click Save on the Windows Start button
(d) Select Edit>Save
(e) All of the above

435. End means?
(a) Logical end of a program
(b) Physical end of a program
(c) Both1 and 2
(d) all of the above
(e) None of these

436. A scientific institution performing intensive mathematical operations for a complex model that required extremely powerful computing capabilities will most likely use a(n):
(a) Supercomputer
(b) PC
(c) mainframe
(d) ISP
(e) None of these

437. The following typically happens in the output phase of a computer based information system
(a) Data is put into the computer for processing
(b) Information is produced in hardcopy/ softcopy form
(c) Mathematical calculations are performed
(d) All of the above.
(e) All of the above

438. Advantage of a multiprogramming system is
(a) simultaneous execution of program instructions from two applications
(b) concurrent processing of two or more programs
(c) single processing at a time
(d) none of these
(e) All of the above

439. In Microsoft Word to paste something after cutting the following shortcut is used
(a) CTRL+C
(b) CTRL+X
(c) CTRL+V
(d) None of these
(e) All of the above

440. A computer-intensive problem runs on a_____.
(a) server
(b) mainframe
(c) supercomputer
(d) super PC
(e) None of these

441. The term_____designates equipment that might be added to a computer system to enhance its functionality.
(a) digital device
(b) system add-on
(c) disk pack
(d) peripheral device
(e) None of these

442. Which button on the quick access toolbar allow you to cancel your recent commands or action.
(a) Search
(b) Cut
(c) Document
(d) Undo
(e) None of these

443. In Windows operating system to move forward through the tabs
(a) CTRL+TAB
(b) CTRL+SHIFT+TAB
(c) SHIFT+TAB
(d) None of these
(e) All of the above

444. The linking of computers with a communication system is called
(a) Networking

(b) Pairing
(c) Interlocking
(d) Assembling
(e) Sharing

445. The checking operation performed on input is called
(a) validation of data
(b) verification of data
(c) Verification of data
(d) control of data
(e) All of the above

446. Most mail program automatically complete the following two parts in an e-mail
(a) From : and Body :
(b) From : and Date :
(c) From : And To :
(d) From : and Subject :
(e) None of these

447. A selection, choice, or condition involving two possibilities is referred as
(a) Unary
(b) Binary
(c) Octal
(d) None of these
(e) All of the above

448. The basic goal of computer process is to convert data into _____
(a) Files
(b) tables
(c) information
(d) graphs
(e) None of these

449. The mirror image of the whole hard disk including the OS, applications, files and data is created by a _____.
(a) Utility program
(b) Driver
(c) Backup software
(d) OS
(e) None of these.

450. Which key is used in combination with another key to perform a specific task?
(a) function
(b) arrow
(c) space bar
(d) control
(e) None of these

451. What are connector symbol?
(a) They are used in a flowchart
(b) It represents a junction in a flow line
(c) Often used to transfer flow between different pages of a lengthy chart
(d) All the above
(e) None of these

452. Extended ASCII uses
(a) 8 bits for coding
(b) 9 bits for coding
(c) 10 bits for coding
(d) 11 bits for coding
(e) All of the above

453. Portability is program ability to run on
(a) dissimilar machines with minimum modification
(b) similar machines with maximum modification
(c) dissimilar machines with maximum modification
(d) similar machines with maximum modification
(e) All of the above

454. Hard copy is a term used to describe...?
(a) Printed output
(b) Writing on a hard board
(c) Storing information on the hard disk
(d) All of the above
(e) None of these

455. Which cannot be used to close the Word application
(a) ALT+ F4
(b) File-&gt Close
(c) File-&gt Exit
(d) X button in the word window
(e) None of these

456. Which of the following deals with data organised in rows and columns?
(a) Matrix
(b) Spreadsheet
(c) Word document
(d) PPT
(e) MS Paint

457. In Excel worksheet range is a
(a) A command used for data modeling
(b) A range of values such as from 23 to 234
(c) A group of cells
(d) A group of worksheets
(e) All of the above

458. What is gutter margin?
(a) Margin that is added to the left margin when printing
(b) Margin that is added to right margin when printing
(c) Margin that is added to the binding side of page when printing
(d) Margin that is added to the outside of the page when printing
(e) None of these

459. In Excel you can print
(a) A range of cells by range name
(b) An entire worksheet
(c) A single worksheet
(d) All of the above
(e) All of the above

460. A_____is a computer connected to two networks.

(a) link
(b) server
(c) gateway
(d) bridge way
(e) None of these

461. A firewall is .....
(a) A software program
(b) A virus program
(c) A Hardware
(d) All the above
(e) Only and 3

462. Archive is
(a) Backup storage
(b) Forward operation
(c) Primary storage
(d) None of these
(e) All of the above

463. A language that refers to the way people think mathematically is called as _____
(a) Functional language
(b) Cross-platform language
(c) Event driven programming language
(d) all of the above
(e) None of these

464. In Microsoft Word shortcut CTRL+A is to
(a) Select all
(b) Highlight a block of text
(c) Delete something
(d) Paste something
(e) All of the above

465. Who is the chief of Microsoft?
(a) Charles Babbage
(b) Bill Gates
(c) Bill Clinton
(d) Bush
(e) None of these

466. Graphics for word processor
(a) Peripheral
(b) Clip art
(c) Highlight
(d) Execute
(e) All of the above

467. In Excel..... is a group of cells that form a rectangle on the screen.
(a) Calculation
(b) Formula
(c) Range
(d) Range address
(e) All of the above

468. Excel worksheet cells work very similarly to what common element of the windows graphical user interface
(a) Option buttons
(b) List boxes
(c) Text boxes
(d) Combo boxes
(e) All of the above

469. Control Unit of a digital computer is often called the
(a) Clock
(b) Nerve center
(c) ICs
(d) All of the above
(e) None of these

470. What do you use to create a chart?
(a) Pie Wizard
(b) Excel Wizard
(c) Data Wizard
(d) Chart Wizard
(e) None of these

471. Which of the following is a popular programming language for developing multimedia web pages, websites, and web-based applications?
(a) COBOL
(b) Java
(c) BASIC
(d) Assembler
(e) None of these

472. Where are programs and data kept while the processor is using them?
(a) Main memory
(b) Secondary memory
(c) Disk memory
(d) Program memory
(e) None of these

473. SMPS stands for_____.
(a) Switched mode power supply
(b) Start mode power supply
(c) Store mode power supply
(d) Single mode power supply
(e) None

474. PU can transmit at a time to main memory and to input and output devices
(a) Data width
(b) Bus width
(c) Memory width
(d) Capacity
(e) None of these

475. In Microsoft PowerPoint the following is not an option when printing handouts
(a) Six slides per page
(b) Five slides per page
(c) Three slides per page
(d) Two slides per page
(e) All of the above

476. In Windows operating system to move backward through the options
(a) CTRL+TAB
(b) CTRL+SHIFT+TAB
(c) SHIFT+TAB
(d) None of these

(e) All of the above

477. Personal computers can be connected together to form a_____.
(a) server
(b) super computer
(c) network
(d) enterprise
(e) None of these

478. The term --- designate equipment that might be added to a computer system to enhance. Its functionality.
(a) Digital device
(b) system add
(c) Disk pack
(d) Peripheral device
(e) None of these

479. The software that allows users to surf the Internet is called a/an
(a) Search engine
(b) Internet Service Provider (ISP)
(c) Multimedia application
(d) Browser
(e) None of these

480. In Windows operating system shortcut CTRL+C is used for
(a) Cut
(b) Paste
(c) Copy
(d) None of these
(e) All of the above

481. For creating a document, you use_____command at File Menu.
(a) New
(b) Open
(c) Document
(d) Type
(e) None of these

482. In Microsoft PowerPoint in order to see all the slides on one screen use
(a) View, slide sorter
(b) View, slide
(c) View, master
(d) View, slide show
(e) All of the above

483. Which key is used in combination with another key to perform a specific task?
(a) Function
(b) Control
(c) Arrow
(d) Space bar
(e) None of these

484. A number system with a base of two is referred as
(a) Unary number system
(b) Binary number system
(c) Octal number system
(d) None of these
(e) All of the above

485. In Excel which menu option can be sued to split windows into two
(a) Format > window
(b) View > window > split
(c) Window > split
(d) View > split
(e) All of the above

486. Which of the following was (were) not used in first-generation computers?
(a) vacuum tubes
(b) punch cards
(c) magnetic core
(d) all of the above
(e) All of the above

487. Which key is used in combination with another key to perform a specific task?
(a) function
(b) arrow
(c) space bar
(d) control
(e) None of these

488. Which of the following is true concerning personal computers?
(a) They have been most successful in the home.
(b) They are user friendly
(c) No specific programming technique required
(d) All the above.
(e) All of the above

489. In Excel on an excel sheet the active cell in indicated by
(a) A dark wide boarder
(b) A dotted border
(c) A blinking border
(d) None of above
(e) All of the above

490. ASCII File is
(a) document file in the universally recognized text format
(b) Word processor
(c) System file
(d) None of these
(e) All of the above

491. In Excel the following setup options cannot be set in the page setup dialog box?
(a) Printer selection
(b) Vertical or horizontal placement
(c) Orientation
(d) Row and column titles
(e) All of the above

492. Information on a computer is stored as
(a) analog data
(b) digital data
(c) modem data

(d) watts data
(e) None of these

493. In Microsoft PowerPoint toolbars that are displayed by default in the PowerPoint window includes
(a) Menu bar, standard toolbar, formatting toolbar, drawing toolbar, status bar
(b) Menu bar, standard toolbar, formatting toolbar, drawing toolbar, status bar
(c) Standard toolbar, formatting toolbar, drawing toolbar, status bar
(d) Menu bar, standard toolbar, status bar, drawing toolbar
(e) All of the above

494. All of the following statements concerning files are true EXCEPT:
(a) A file is a collection of related pieces of information stored together for easy reference.
(b) Files can be generated from an application
(c) Files are stored in RAM
(d) Files should be organized in folders.
(e) None of these

495. The term bit is short for _____
(a) megabyte
(b) binary language
(c) binary digit
(d) binary number
(e) None of these

496. In Excel you can create only a horizontal page break by first selecting
(a) A row below the row where you want the page break to occure
(b) A cell in row 1
(c) A cell in column A
(d)
(a) and (C)
(e) All of the above

497. Following is not the from of secondary storage
(a) Magnetic tape
(b) CD's
(c) Disk
(d) Hard disk
(e) All of the above

498. Which of the following is not a type of key?
(a) Alphabetic Keys
(b) Numeric keys
(c) Function keys
(d) Toggle keys
(e) None of these

499. The capacity of a communication channel is measured in ___
(a) Bandwidth
(b) Bit capacity
(c) Baud rate
(d) Data flow
(e) Store data

500. The first spam email was sent by
(a) Gary Thuerk
(b) Adi Shamir
(c) Alan Kay
(d) Charles Thomas
(e) Henry Phillips

501. The following are basic types of record access methods
(a) sequential and random
(b) direct and immediate
(c) sequential and indexed
(d) on-line and real-time
(e) All of the above

502. Cyberspace is being governed by a system of law and regulation called?
(a) Civil Law
(b) Criminal Law
(c) Electronic Law
(d) Cyber Law
(e) Cyber Authority

503. Which application is used to prepare a presentation/ slide show?
(a) Photoshop
(b) Power Point
(c) Outlook Express
(d) Internet explorer
(e) All of the above

504. In Excel the drag and drop method of copying or moving
(a) Can be used between worksheets but not workbooks
(b) Can be used between workbooks but not worksheets
(c) Can be used between workbooks but not worksheets
(d) None
(e) All of the above

505. In Microsoft PowerPoint the following provides a printed copy of your presentation
(a) Outline
(b) Speaker notes
(c) Audience handouts
(d) All of the above
(e) All of the above

506. In MICR, C stands for
(a) Code
(b) Colour
(c) Computer
(d) Character
(e) None of these

507. What do you use to create a chart?
(a) Pie Wizard
(b) Excel Wizard
(c) Data Wizard
(d) Chart Wizard

(e) None of these

508. A tuple is a
(a) column of a table
(b) two-dimensional table
(c) row of a table
(d) key of a table
(e) None of these

509. Four of the following five are alike in a certain way and so form a group. Which is the one that does not belong to the group?
(a) MESH
(b) SAFARI
(c) AVANT
(d) GOOGLE CHROME
(e) MOZILLA FIREFOX

510. The errors that can be pointed out by the compiler are:
(a) Syntax error
(b) Symantic error
(c) Logical error
(d) Internal error
(e) None of these

511. In Excel it is acceptable to let long text flow into adjacent cells on a worksheet when
(a) Data will be entered in the adjacent cells
(b) No data will be entered in the adjacent cells
(c) There is not suitable abbreviation of the text
(d) There is not time to format the Text
(e) All of the above

512. In Microsoft PowerPoint the following presentation elements can you modify using the slide master
(a) Slide comments
(b) Slide transitions
(c) Speaker note font and color
(d) All of above
(e) All of the above

513. What is the standard code the computer industry created to represent characters?
(a) DASI
(b) ASSH
(c) ASCII
(d) BASCII
(e) EPROM

514. In Windows operating system it sits at the bottom of windows desktop screen. It shows you which programs are running and allows you to switch between them. It also contains the Start button which one can use to access programs, folders, and computer settings.
(a) Sidebar
(b) Icons
(c) Taskbar
(d) None of these
(e) All of the above

515. The term_____designates equipment that might be added to a computer system to enhance its functionality.
(a) digital device
(b) system add-on
(c) disk pack
(d) peripheral device
(e) None of these

516. The software that allows users to surf the Internet is called a/an
(a) Search engine
(b) Internet Service Provider (ISP)
(c) Multimedia application
(d) Browser
(e) None of these

517. In Microsoft Word shortcut CTRL+C is used for
(a) Cut
(b) Paste
(c) Copy
(d) None of these
(e) All of the above

518. Bubble Memory is
(a) nonvolatile
(b) volatile
(c) permanent
(d) None of these
(e) All of the above

519. Technique of using disk space to make programs believe that the system contains more random access memory (RAM) than is actually available is called
(a) Virtual memory
(b) Secondary memory
(c) Primary memory
(d) None of these
(e) All of the above

520. When the pointer is positioned on a_____it is shaped like a hand.
(a) Grammar error
(b) Hyperlink
(c) Screen tip
(d) Spelling error
(e) Formatting error

521. In Windows operating system shortcut DELETE is for
(a) Undo something
(b) Delete something
(c) Paste something
(d) None of these
(e) All of the above

522. FORTRAN is
(a) Formula Translation
(b) A high-level mathematically oriented programming language
(c) Both A & B

(d) None of these
(e) All of the above

523. In Microsoft PowerPoint the following is the default page setup orientation for notes pages, outlines and handouts
(a) Vertical
(b) Landscape
(c) Portrait
(d) None of above
(e) All of the above

524. GUI is the acronym for:
(a) Generation User Interface
(b) General User Interface
(c) Graphical User Instruction
(d) Graphical User Interface
(e) None of these

525. The rectangular area of the screen that displays a program, data, and/or information is a
(a) title bar
(b) button
(c) dialog box
(d) window
(e) None of these

526. In Excel on an Excel sheet the active cell in indicated by
(a) A dark wide border
(b) A dotted border
(c) A blinking border
(d) None of above
(e) All of the above

527. An optical input device that is used to read documents printed in a special type font is known as
(a) Document reader
(b) Documentation
(c) Printer
(d) None of these
(e) All of the above

528. Which type of resource does have greater probability to become shared resource in a computer network?
(a) Printers
(b) Speakers
(c) Floppy Disc Drivers
(d) Keyboards
(e) None of these

529. _____ applications refers to those applications in which text, sound, graphics, motion video and animation are all combined.
(a) Animation
(b) Multimedia
(c) Maxmedia
(d) Flash
(e) None of these

530. In Microsoft PowerPoint the best place to find animated images for your presentation
(a) Microsoft online
(b) Word clipart
(c) PowerPoint tools and ins
(d) All of the above
(e) All of the above

531. Primary advantage of key-to-tape data-entry systems
(a) A large percentage of editing can be performed at the time of data entry
(b) Key verification is easily performed
(c) The tape is reusable
(d) Keying errors can be detected as they occur
(e) All of the above

532. The central processing unit contains which of the following as a component?
(a) Memory Regulation Unit
(b) Flow Control Unit
(c) Arithmetic Logic Unit
(d) Instruction Manipulation Unit
(e) None of these

533. In Excel you can create hyperlinks from the Excel workbook to
(a) A webpage on company internet
(b) A web page on the internet
(c) Other Office application documents
(d) All
(e) All of the above

534. System software is the set of programs that enables the computer hardware devices and ..... software to work together.
(a) Management
(b) Processing
(c) Utility
(d) Application
(e) None of these

535. In word, what combination of keys do you press to delete an entire word?
(a) Ctrl + del
(b) Alt + del
(c) Shift + Backspace
(d) Shift + Alt + del
(e) None of these

536. A coding structure in which characters are represented by means of a series of parallel bars is
(a) Bar Code
(b) Menu bar
(c) Numeric bar
(d) None of these
(e) All of the above

537. BIOS is responsible for
(a) handling the particulars of input/output operations
(b) output operations

(c) input operations
(d) None of these
(e) All of the above

538. A storage device or medium where the access time is dependent upon the location of the data is called
(a) Serial access
(b) Parallel access
(c) Null access
(d) None of these
(e) All of the above

539. In Excel you can edit a cell by
(a) Clicking the formula button
(b) Double clicking the cell to edit it in-place
(c) Selecting Edit>Edit Cell from the menu
(d) None of above
(e) All of the above

540. In a database, information should be organized and accessed according to which of the following?
(a) Physical position
(b) Logical structure
(c) Data dictionary
(d) Physical structure
(e) None of these

541. Which among the following is a diskette?
(a) Cartridge
(b) Toner
(c) Floppy
(d) CD
(e) Hard Disk

542. Data going into the computer is called?
(a) Output
(b) Algorithm
(c) Input
(d) Calculations
(e) Flowchart

543. What does C represent in MICR?
(a) Code
(b) Column
(c) Computer
(d) Character
(e) None of these

544. What do you use to create a chart?
(a) Pie Wizard
(b) Excel Wizard
(c) Data Wizard
(d) Chart Wizard
(e) None of these

545. A menu contains a list of
(a) commands
(b) data
(c) objects
(d) reports
(e) None of these

546. Microsoft Office Suite spreadsheet program is
(a) Microsoft Excel
(b) Microsoft Word
(c) Microsoft Powerpoint
(d) None of these
(e) All of the above

547. The case that holds all the physical parts of the computer is called
(a) System unit
(b) Platform
(c) Integrated platform
(d) Mainframe
(e) None of these

548. The function of Key F4 is
(a) Delete
(b) Repeat last function
(c) Refresh
(d) Copy
(e) None of these

549. In Excel Comments put in cells are called
(a) Smart tip
(b) Cell tip
(c) Web tip
(d) Soft tip
(e) All of the above

550. The term DBMS is referred to
(a) Data Base Management system
(b) The software used for the management, maintenance and retrieval of the data stored in a data base
(c) Both A & B are true
(d) None of these
(e) All of the above

551. In Windows operating system it is the long horizontal bar at the bottom of a screen. Unlike the desktop, which can get obscured by the windows on top of it, it is visible almost all the time.
(a) Sidebar
(b) Icons
(c) Taskbar
(d) None of these
(e) All of the above

552. The method of file organization in which data records in a file are arranged in a specified order according to a key field is known as the
(a) Direct access method
(b) Queuing method
(c) Predetermined method
(d) Sequential access method
(e) None of these

553. Format command is used to create.....
(a) Sector
(b) memory
(c) Tracks
(d) Tracks and sector
(e) None of these

554. In Nonvolatile memory device

(a) Data contained in them is not lost when the power turned off
(b) Data contained in them is lost when the power turned off.
(c) data contained in them is permanent and not be rewrite
(d) None of these
(e) All of the above

555. In Excel constant is another name for this type of data
(a) number
(b) equation
(c) formula
(d) description
(e) All of the above

556. Buffer is device/ storage area
(a) Where data are temporarily stored
(b) Where data is permanently stored
(c) Where data error occurs
(d) None of these
(e) All of the above

557. Programs stored in ROM are called ___
(a) Hardware
(b) Firmware
(c) Software
(d) all of above
(e) None of these

558. In Microsoft Word shortcut DELETE is for
(a) Undo something
(b) Delete something
(c) Paste something
(d) None of these
(e) All of the above

559. Which language is most suited for commercial applications?
(a) Fortran
(b) Cobol
(c) Basic
(d) Prolog
(e) None of these

560. In Excel Status indicators are located on the
(a) Vertical scroll bar
(b) Horizontal scroll bar
(c) Formula bar
(d) Standard toolbar
(e) All of the above

561. The first graphical web browser are?
(a) Gopher
(b) WAIS
(c) CERN
(d) Mosaic
(e) None of these

562. Why are headers and footers used in document?
(a) To enhance the overall appearance of the document
(b) To mark the starting and ending of a page
(c) To make large document more readable
(d) To allow page headers and footers to appear on document when it is printed
(e) All of the above

563. Console is
(a) A device that enables human operators to communicate with the computer
(b) A device that enables human operators not to communicate with the computer
(c) Communication between computers
(d) None of these
(e) All of the above

564. A process of collecting, organizing, storing and otherwise maintaining a complete historical record of programs and other documents used or prepared during the different phases of the system is called
(a) Documentation
(b) Document reader
(c) Data process
(d) None of these
(e) All of the above

565. A unit of a computer system that interprets instructions and executes them is known as
(a) Processor
(b) Storage
(c) Peripherals
(d) None of these
(e) All of the above

566. _____ are usually downloaded into the folder carrying Temporary Internet Files and are written into the computer by the websites you visit.
(a) Anonymous Files
(b) Cookies
(c) Banner Ads
(d) Images
(e) History

567. A popular presentation program for Windows and Mac in Microsoft Office is
(a) Microsoft Word
(b) Microsoft PowerPoint
(c) Microsoft Access
(d) None of these
(e) All of the above

568. What is MP3?
(a) A mouse
(b) A printer
(c) A sound format
(d) A scanner
(e) None of these

569. Microsoft Office is an office suite, for the
(a) Microsoft Windows operating systems
(b) Mac OS X operating systems
(c) Both A and B are true
(d) None is true

(e) All of the above

570. In a disk system time required for a read/ write head to move to the track where the record to be read or written is stored is
(a) Access time
(b) Random time
(c) Response time
(d) Seek time
(e) All of the above

571. The most common input devices are the_____and the_____.
(a) microphone, printer
(b) scanner, monitor
(c) digital camera, speakers
(d) keyboard, mouse
(e) None of these

572. In windows XP, which shortcut is used you lock the computer?
(a) Ctrl + L
(b) Windows Key + k
(c) Ctrl + K
(d) Scroll Lock key
(e) Windows Key + L

573. This part of operating system manages the essential peripherals, such as the keyboard, screen , disk drives, and parallel and serial ports____
(a) basic input/output system
(b) secondary input/output system
(c) peripheral input/output system
(d) marginal input/output system
(e) None of these

574. _____is the example of magnetic disk.
(a) Hard-disk
(b) DVD
(c) RAM
(d) Pen drive
(e) None of these

575. In Batch processing
(a) Several computer programs runs one after another without human interaction to run each program individually.
(b) Several computer programs runs one after another with human interaction to run each program individually
(c) Selected computer programs runs one after another with human interaction to run each program individually
(d) None is true
(e) All of the above

576. In Microsoft PowerPoint you can show the shortcut menu during the slide show by
(a) Clicking the shortcut button on the formatting toolbar
(b) Right clicking the current slide
(c) Clicking an icon on the current slide
(d) (B) and (A)
(e) All of the above

577. What is the responsibility of the logical unit in the CPU of a computer?
(a) Producing result
(b) Comparing numbers
(c) Controlling flow of information
(d) Performing mathematical operations
(e) Controlling flow of data

578. In Excel intersection of a row and column is called:
(a) Cata
(b) A field.
(c) A cell
(d) An equation.
(e) All of the above

579. Audio response is
(a) output medium
(b) produces verbal responses from the computer system
(c) Both A & B true
(d) None is true
(e) All of the above

580. In MICR, C stands for ___
(a) Code
(b) Colour
(c) Computer
(d) Character
(e) Country

581. In Excel which of the following is not a way to complete a cell entry?
(a) Pressing enter
(b) Pressing any arrow key on the keyboard
(c) Clicking the Enter button on the Formula bar
(d) Pressing spacebar
(e) All of the above

582. COBOL is widely used in_____applications.
(a) Commercial
(b) Scientific
(c) Space
(d) Mathematical
(e) None of these

583. A competitor to the dominant Lotus 1-2-3 is
(a) Microsoft Excel
(b) Microsoft Word
(c) Microsoft PowerPoint
(d) None of these
(e) All of the above

584. Which of the following best describes a computer-based information system?
(a) system where computer is used to turn data into information
(b) inputting data
(c) processing data
(d) data is put into the computer for processing
(e) All of the above

585. In Windows operating system shortcut CTRL while dragging an item
(a) Delete the selected item permanently without placing the item in the Recycle Bin
(b) Copy the selected item
(c) Rename the selected item
(d) Create a shortcut to the selected item
(e) All of the above

586. A program that translates mnemonic statements into executable instructions is referred as
(a) Software
(b) Assembler
(c) Translator
(d) None of these
(e) All of the above

587. Which of the following is the standard interactive and programming language for getting information from a database?
(a) DCOM
(b) Java
(c) SQL
(d) Cova
(e) Mercury

588. Data communications involving telegraph lines uses
(a) simplex lines
(b) wideband channels
(c) narrowband channels
(d) dialed service
(e) All of the above

589. A device that connects to a network without the use of cables is said to be
(a) distributed
(b) centralized
(c) open source
(d) wireless
(e) None of these

590. The Internet allows you to
(a) send electronic mail
(b) view web pages
(c) connect to servers all around the world
(d) All of these
(e) None of these

591. It contains data descriptions and defines the name, data type, and length of each field in the database
(a) data dictionary
(b) data table
(c) data record
(d) data field
(e) None of these

592. Which of the following controls the way in which the computer system functions and provides a means by which users can interact with the computer?
(a) O/S
(b) Motherboard
(c) Platform
(d) I/O gateway
(e) None of these

593. These hacker breaks security for altruistic or at least non-malicious reasons.
(a) White hat
(b) Grey hat
(c) Blue hat
(d) None of these
(e) All of the above

594. One or more identifying lines printed at the bottom of a page are referred as
(a) Header
(b) Footer
(c) Index
(d) None of these
(e) All of the above

595. The Internet began with the development of
(a) USENET
(b) ARPANET
(c) Ethernet
(d) Intranet
(e) None of these

596. Which of the following device is used only in LAN (Local Area Network)?
(a) Gateway
(b) Modem
(c) NIC
(d) Router
(e) None of these

597. Mahesh and Pavan are employees of company X working in different countries, on the same project. Which of the following Computer technologies would be useful for them to have Review monthly meets?
(a) Video-display software
(b) Video digitizing
(c) Video Conferencing
(d) Video Scanning
(e) None of these

598. MS-DOS is usually supplied on a
(a) hard disk
(b) cartridge tape
(c) CD ROM
(d) floppy disk or diskettes
(e) None of these

599. What are you most likely to use when playing
(a) Touch screen a computer game?
(b) Light pen
(c) notepad
(d) Joystick
(e) None of these

600. Diskette is a
(a) A low-cost, thin flexible magnetic disk storage device

(b) High volume storage device
(c) Primary storage device
(d) None of these
(e) All of the above

601. This manual tells you how to use a software program
(a) documentation
(b) programming
(c) technical
(d) user
(e) None of these

602. The unit KIPS is used to measure the speed of ___
(a) Processor
(b) Disk drive
(c) Printer
(d) Tape drive
(e) None of these

603. This type of hardware consists of devices that translate data into a form the computer can process
(a) application
(b) input
(c) system
(d) All of these
(e) None of these

604. To create slideshows, composed of text, graphics, movies and other objects, which can be displayed on-screen and navigated through by the presenter or printed out on transparencies or slides one uses
(a) Microsoft Word
(b) Microsoft PowerPoint
(c) Microsoft Access
(d) None of these
(e) All of the above

605. What would you NOT use with a flatbed plotter?
(a) A pen
(b) Eraser
(c) Paper
(d) All of the above
(e) None of these

606. What is a popular program for creating documents that can be read on both a PC and a Macintosh computer?
(a) Microsoft Word
(b) Adobe In Design
(c) Adobe Acrobat
(d) QuarkXPress
(e) None of these

607. The_____becomes different shapes depending on the task you are performing?
(a) Active tab
(b) Insertion point
(c) Mouse pointer
(d) Ribbon
(e) None of these

608. Which function calculates the average of a given set of numbers in Excel?
(a) Min
(b) Max
(c) Count
(d) Avg
(e) Sum

609. Which of the following is the largest unit of storage?
(a) GB
(b) KB
(c) MB
(d) TB
(e) YB

610. Microsoft Office Picture Manager is
(a) Basic photo management software
(b) An application that supports editing scanned documents
(c) A scanning and OCR application
(d) None of these
(e) All of the above

611. In Windows operating system CTRL+SHIFT with any of the arrow keys
(a) Highlight a block of text
(b) Delete something
(c) Paste something
(d) None of these
(e) All of the above

612. In Windows operating system move the insertion point to the beginning of the next word.
(a) Shortcut CTRL+RIGHT ARROW
(b) Shortcut CTRL+LEFT ARROW
(c) Shortcut CTRL+DOWN ARROW
(d) None of these
(e) All of the above

613. Press the___button to have the window fill the entire screen.
(a) close
(b) Maximize
(c) Minimize
(d) All of the above
(e) None of these

614. Technology no longer protected by copyright, available to everyone, is considered to be:
(a) Proprietary
(b) open.
(c) Experimental.
(d) in the public domain.
(e) None of these

615. Which disk contains permanent magnetic disk?
(a) CD
(b) DVD
(c) HDD
(d) BRD
(e) None of these

616. Which of the following is true?

(a) Plotters are not available for microcomputer systems
(b) Micro-computer are not programmed like conventional computers
(c) Mini-computers are task-oriented
(d) The contents of ROM are easily changed
(e) None of these

617. In MICR, C stands for?
(a) Code
(b) Color
(c) Computer
(d) Character
(e) None of these

618. In Excel you can activate a cell by
(a) Pressing the Tab key
(b) Clicking the cell
(c) Pressing an arrow key
(d) All of the above
(e) All of the above

619. In Microsoft PowerPoint the following toolbars provides different options in various master views
(a) Common tasks toolbar
(b) Drawing toolbar
(c) Formatting toolbar
(d) Standard toolbar
(e) All of the above

620. For Database management one uses
(a) Microsoft EXCEL
(b) Microsoft PowerPoint
(c) Microsoft Access
(d) None of these
(e) All of the above

621. Which of the following is not a database object?
(a) Table
(b) Queries
(c) Reports
(d) Relationship
(e) All of the above

622. In Microsoft Word shortcut CTRL while dragging an item
(a) Delete the selected item permanently without placing the item in the Recycle Bin
(b) Copy the selected item
(c) Rename the selected item
(d) Create a shortcut to the selected item
(e) All of the above

623. What is used in most programs that is a part of a program and guides the user through certain steps?
(a) Software
(b) Wizard
(c) Wiki
(d) operating
(e) None of these

624. Right clicking something in Excel
(a) Deletes the object
(b) Nothing the right mouse button is there for left handed people
(c) Opens a shortcut menu listing everything you can do to the object
(d) Selects the object
(e) All of the above

625. In Microsoft PowerPoint the following is not one of PowerPoint's views
(a) Slide show view
(b) Slide view
(c) Presentation view
(d) Outline view
(e) All of the above

626. In Excel to select an individual data marker or data label, you must
(a) Double click the data series
(b) Right click selected marker
(c) Click once to select the series markers or labels and click the desired marker or label again
(d) Double click the marker or label
(e) All of the above

627. In Excel when integrating word and excel, word is usually the
(a) Server
(b) Destination
(c) Client
(d)
(a) and (C)
(e) All of the above

628. Elementary data item are
(a) data item which is not broken down into smaller units
(b) data item that can be broken down into smaller units
(c) data item which is not decomposed into smaller units
(d) none of these
(e) All of the above

629. In Windows operating system the shortcut key CTRL+I is used for
(a) Open the Favorites bar
(b) Open the Open dialog box
(c) Start another instance of the browser with the same Web address
(d) Open the Open dialog box, the same as CTRL+L
(e) All of the above

630. In Windows operating system to display or hide the Start menu
(a) Windows Logo
(b) Windows Logo + BREAK
(c) Windows Logo + D
(d) Windows Logo + M
(e) All of the above

631. .....is collection of web pages and .....is the very first page that we see on opening of a web-site

(a) Home-page, Web-page
(b) Web-site, Home-page
(c) Web-page, Home-page
(d) Web-page, Web-site
(e) None of these

632. Which of the following is not true of a magnetic disk?
(a) Users can update records by writing over the old data
(b) It provides sequential access to stored data
(c) It is slow relative to magnetic tape
(d) All of the above are true
(e) All of the above

633. Which of the following is NOT one of the four major data processing functions of a computer?
(a) gathering data
(b) processing data into information
(c) analyzing the data or information
(d) storing the data or information
(e) None of these

634. When using PowerPoint, to play a PowerPoint show for previewing the show, select
(a) View, slide sorter
(b) View, slide
(c) View, slide show
(d) View outline
(e) All of the above

635. Which of the following is a file in computer?
(a) Hard disk
(b) Magnetic Drum
(c) Floppy disk
(d) Portable Document Format
(e) None of these

636. A compiler _____
(a) translates machine language into a high level language
(b) translates one statement at a time as the program executes
(c) translates two statements at a time as the program executes
(d) produces object code
(e) is less sophisticated than an assembler

637. A laser printer does NOT use?
(a) A photoconductive drum
(b) A print head
(c) A laser beam
(d) All of the above
(e) None of these

638. The time period during which a computer is malfunctioning or not operating correctly due to machine failures is referred as
(a) Downtime
(b) Uptime
(c) Runtime
(d) None of these
(e) All of the above

639. A register in CPU used to store the address of the next instruction to be executed is known as
(a) Program counter
(b) Program library
(c) Programmer
(d) None of these
(e) All of the above

640. Timing and Control unit is a part of a(n) ....
(a) Arithmetic Logic Unit
(b) Processor
(c) Memory
(d) CMOS
(e) BIOS

641. Which computers are connected to many terminals and can multitask?
(a) Minicomputers
(b) LEO 1 computers
(c) Personal computers running MS-DOS
(d) All of the above
(e) None of these

642. Ctrl, shift and alt are called_____keys.
(a) adjustment
(b) function
(c) modifier
(d) alphanumeric
(e) None of these

643. The computer is made of which of the following hardware equipment's?
(a) Monitor, CPU (Central Processing Unit), Keyboard, Mouse, Software and Network
(b) Monitor, CPU (Central Processing Unit), Keyboard, Mouse, Programme and Network
(c) Monitor, CPU (Central Processing Unit), Keyboard, Mouse, Printer and Modem
(d) Monitor, CPU (Central Processing Unit), Keyboard, Mouse, Applications and Network
(e) None of these

644. Which computers use single chip processors?
(a) All of the above
(b) Parallel computers
(c) Cray computers
(d) Personal computers
(e) None of these

645. A directory within a directory is called a_____.
(a) Mini Directory
(b) Junior Directory
(c) Part Directory
(d) Sub Directory
(e) None of these

646. What kind of scheme is the HTTP protocol?
(a) get/put
(b) store/forward
(c) queuing
(d) search/return

(e) request/response

647. The daily processing of corrections to customer accounts best exemplifies the processing mode of
(a) batch processing
(b) real-time processing
(c) time-sharing
(d) off-line processing
(e) None of these

648. In Microsoft Word using CTRL+SHIFT with any of the arrow keys
(a) Highlight a block of text
(b) Delete something
(c) Paste something
(d) None of these
(e) All of the above

649. In Windows operating system move the insertion point to the beginning of the next paragraph
(a) Shortcut CTRL+RIGHT ARROW
(b) Shortcut CTRL+LEFT ARROW
(c) Shortcut CTRL+DOWN ARROW
(d) None of these
(e) All of the above

650. Which of the following is a popular programming language for developing multimedia web pages, websites, and web-based applications?
(a) COBOL
(b) Java
(c) BASIC
(d) Assembler
(e) None of these

651. In Excel term refers to a specific set of values saved with the workbook
(a) Range
(b) Scenario
(c) Trend line
(d) What-if analysis
(e) All of the above

652. Which of the following places the common data elements in order from smallest to largest
(a) character, file, record, field, database
(b) character, record, field, database, file
(c) character, field, record, file, database
(d) Bit, byte, character, record, field, file, database,
(e) None of these

653. In Excel the view that puts a blue line around each page that would be printed is the
(a) Print Preview
(b) Normal View
(c) Page Break Preview
(d) Split View
(e) All of the above

654. What are the individual dots which make up a picture on the monitor screen called?
(a) Coloured spots
(b) All of the above
(c) Pixies
(d) Pixels
(e) None of these

655. In Excel you can activate a cell by
(a) Pressing the Tab key
(b) Clicking the cell
(c) Pressing an arrow key
(d) All of above
(e) All of the above

656. Asynchronous communication is
(a) Communication between independently operating units
(b) Communication between dependent operating units
(c) Communication between independent and dependent operating units
(d) None of these
(e) All of the above

657. The first version of MS Office to be released for the Microsoft Windows operating system is
(a) Microsoft Office 0
(b) Microsoft Office 2003
(c) Microsoft Office 2007
(d) Microsoft Office XP
(e) All of the above

658. In Windows operating system the clock in windows xp sits on the ————— and displays the system time.
(a) Taskbar
(b) Start menu
(c) Desktop
(d) None of these
(e) All of the above

659. Total memory of system can be known using?
(a) DIR commands
(b) MEM commands
(c) Warm boot
(d) TOT MEM commands
(e) None of these

660. A branch of computer science that deals with computers that possess reasoning, learning and thinking capabilities that resemble those of human beings is recognized as?
(a) Software engineering
(b) Artificial intelligence
(c) Hardware engineering
(d) None of these
(e) All of the above

661. Which of the following will translate images of text, drawings, and photos into digital form?
(a) digitizer
(b) modem
(c) scanner
(d) keyboard
(e) None of these

662. Comparing with secondary storage, primary storage is
(a) slow and inexpensive
(b) fast and inexpensive
(c) fast and expensive
(d) slow and expensive
(e) All of the above

663. In Excel to delete an embedded objects, first
(a) Double click the object
(b) Select the object by clicking it
(c) Press the Shift + Delete keys
(d) Select it and then press the delete key
(e) All of the above

664. In Microsoft PowerPoint view that displays only text (title and bullets) is
(a) Slide show
(b) Slide sorter view
(c) Notes page view
(d) Outline view
(e) All of the above

665. A process known as_____is used by large retailers to study trends.
(a) data mining
(b) data selection
(c) POS
(d) data conversion
(e) None of these

666. In Windows operating system the shortcut key CTRL+B is used for
(a) Open the Organize Favorites dialog box
(b) Open the Search bar
(c) Start the Find utility
(d) Open the History bar
(e) All of the above

667. Word Processors that is the part of Windows operating system
(a) Wordpad
(b) Notepad
(c) Adobe Photoshop
(d) Jasc Paint Shop
(e) All of the above

668. Which of the following is not a protocol in the application layer of TCP/IP suit:
(a) HTTP
(b) TCP
(c) HTTPS
(d) Telnet
(e) None of these

669. While recording a macro, the third step will be
(a) Using your mouse or key-board, perform the task you want to automate
(b) Assign a keyboard shortcut to the macro
(c) Give the macro a name
(d) Start recording
(e) Select the location of macro on toolbar

670. Which of the following is a pointing device?
(a) Hard disk
(b) CD-ROM drive
(c) Touch screen used for computer input.
(d) RAM
(e) None of these

671. What do the abbreviations VAB stand for?
(a) Voice activated broadcasting
(b) Visual audio board
(c) Voice answer back
(d) All of the above
(e) None of these

672. The_____of a system includes the programs or instructions.
(a) Hardware
(b) Icon
(c) Information
(d) Software
(e) None of these

673. What is the full form of USB as used in computer related activities?
(a) Universal Security Block
(b) Ultra Serial Block
(c) United Service Block
(d) Universal Serial Bus
(e) None of these

674. A telephone number, a birth date, and a customer name are all examples of
(a) a record
(b) data
(c) a file
(d) a database
(e) None of these

675. Resolution of laser printer is specified in terms of
(a) DPI
(b) LPM
(c) CPM
(d) PPM
(e) None of these

676. One who designs, writes, tests and maintenance computer programs is called
(a) Programmer
(b) Operator
(c) User
(d) None of these
(e) All of the above

677. When using characters in Windows, what code does a window use?
(a) ASCII
(b) UNICODE
(c) MORSE
(d) IDBC
(e) WESTRN

678. All processing of computers is done in
(a) Monitor

(b) CPU
(c) Keyboard
(d) RAM
(e) Rom

679. In Microsoft PowerPoint the following allow you to select more than one slide in a presentation
(a) Alt + Click each slide
(b) Shift + drag each slide
(c) Shift + Click each slide
(d) Ctrl + Click each slide
(e) All of the above

680. Who invented world wide web?
(a) Mosaic corporation
(b) Opera corporation
(c) Tim berner lee
(d) Vint cert
(e) None of these

681. In Excel you can insert labels for
(a) All the data markers on a chart
(b) A data series
(c) A selected data marker
(d) All of the above
(e) All of the above

682. A directory within a directory is called ___
(a) Mini Directory
(b) Junior Directory
(c) Part Directory
(d) Sub Directory
(e) Web Directory

683. What is the default font in MS Word?
(a) Gothic Bold
(b) MV Biol
(c) Times new roman
(d) Arial
(e) None of these

684. A unit for measuring data transmission speed that describes the capacity of a carrier is referred as
(a) Baud
(b) Bit
(c) Bond
(d) Batch
(e) All of the above

685. To move to the beginning of a line of text, press _____key?
(a) Home
(b) Ctrl
(c) Space
(d) Enter
(e) None of these

686. In Microsoft Word move the insertion point to the beginning of the next word
(a) Shortcut CTRL+RIGHT ARROW
(b) Shortcut CTRL+LEFT ARROW
(c) Shortcut CTRL+DOWN ARROW
(d) None of these
(e) All of the above

687. It uses pictures(called icons) and menus displayed on the screen to send commands to the computer system
(a) command-based user interface
(b) GUI
(c) system utility
(d) API
(e) None of the above

688. What does a light pen contain?
(a) Refillable ink
(b) Light sensitive elements
(c) Pencil lead
(d) Blue Ink
(e) None of these

689. Alerts are mostly appears in___?
(a) Check box
(b) Combo box
(c) Dialog box
(d) Window box
(e) None of these

690. Compiling creates a (n) ____
(a) program specification
(b) algorithm
(c) executable program
(d) subroutine
(e) None of these

691. Which of the following terms applies to communication between two computer systems?
(a) computer literacy
(b) power supply
(c) applications software
(d) connectivity
(e) All of the above

692. The following piece of hardware is used as input phase of a computer-based information system
(a) Printer
(b) Diskette
(c) Monitor
(d) Keyboard
(e) All of the above

693. Which of the following converts all the statements in a program in a single batch and the resulting collection of instructions is placed in a new file?
(a) Compiler
(b) Interpreter
(c) Converter
(d) Instruction
(e) None of these

694. Microsoft Word, Microsoft Excel, and Microsoft PowerPoint are the part of
(a) Microsoft Office Suite
(b) Microsoft Windows
(c) Mac OS X
(d) None of these

(e) All of the above

695. In Excel,____contains one or more worksheets.
(a) Template
(b) Workbook
(c) Active cell
(d) Label
(e) None of these

696. Which of the following statements in regard to directories is false?
(a) Directories with files can be deleted
(b) Directories cannot be renamed
(c) The root directory is always at the highest level
(d) Directories can exist inside directories
(e) None of the above

697. The feature of Word that automatically adjusts the amount of space between certain combination of characters so that an entire word looks more evenly spaced is termed as
(a) Spacing
(b) Kerning
(c) Positioning
(d) Scaling
(e) Justifying

698. A term used for diskette is
(a) disk cartridge
(b) disk pack
(c) floppy disk
(d) none of these
(e) All of the above

699. Thesaurus tool in MS Word is used for-
(a) Spelling suggestions
(b) Grammar options
(c) Synonyms and Antonyms words
(d) All of above
(e) None of the Above

700. In Excel to delete an embedded object, first
(a) Double click the object
(b) Select the object by clicking it
(c) Press the Shift + Delete keys
(d) Select it and then press Delete key
(e) All of the above

701. A characteristic of card system is:
(a) slowness in processing data
(b) using cards as records of transactions
(c) needing a larger data staff
(d) all of these
(e) None of these

702. The Process of analyzing the data stored with the back office staff is known as
(a) Data mining
(b) Data migration
(c) Data entry
(d) Data interpretation
(e) Data warehousing

703. In Microsoft Word shortcut key CTRL+B is used for
(a) Open the Organize Favorites dialog box
(b) Open the Search bar
(c) Start the Find utility
(d) Open the History bar
(e) All of the above

704. Sending an e-mail is same as
(a) writing a letter
(b) drawing a picture
(c) talking on phone
(d) sending a package
(e) None of these

705. _____Storage capacity are frequently measured in
(a) Hz
(b) Byte
(c) MlPS
(d) bps
(e) None of these

706. In Microsoft PowerPoint the following is the default page setup orientation for slides in PowerPoint
(a) Vertical
(b) Landscape
(c) Portrait
(d) None of above
(e) All of the above

707. _____ is when the more power-hungry components, such as the monitor and the hard drive, are put in idle.
(a) Hibernation
(b) Power down
(c) Standby mode
(d) The shutdown procedure
(e) None of these

708. _____ is a talk that can be automatically downloaded over the Internet and is available in Digital Format.
(a) Wiki
(b) Show
(c) Podcast
(d) Blog
(e) Movie

709. A CD-RW disk
(a) has a faster access than an internal disk
(b) is a form of optical disk, so it can only be written once
(c) holds less data than a floppy disk
(d) can be erased and rewritten
(e) None of these

710. Following is not the operating system
(a) UNIX
(b) DOS
(c) WINDOWS
(d) BASIC
(e) All of the above

711. ASCII is
(a) A standard coding system for computers

(b) Hardware device
(c) Software
(d) None of these
(e) All of the above

712. A data communication facility on which data can be transmitted in two directions is referred as
(a) Duplex
(b) Simplex
(c) Triplex
(d) None of these
(e) All of the above

713. Which of the following refers to the memory in your computer?
(a) RAM
(b) DSL
(c) USB
(d) LAN
(e) CPU

714. Which bus carries information between processors and peripherals?
(a) Autobus
(b) Data bus
(c) Address bus
(d) All of the above
(e) None of these

715. You can use the tab key to
(a) Move a cursor across the screen
(b) Indent a paragraph
(c) Move the cursor down the screen
(d) Only
(e) and

716. In Excel you can add a hyperlink to your worksheet by pressing
(a) Alt + K
(b) Ctrl + H
(c) Ctrl + K
(d) Ctrl + Shift + K
(e) All of the above

717. Instead of buying new computer, productivity of old one can be economically enhanced with the help of?
(a) Motherboard
(b) Breadboard
(c) Daughter board
(d) Grandmother board.
(e) All of the above

718. In Excel Tab scrolling button
(a) Allow you to view a different worksheet
(b) Allow you to view additional worksheet rows down
(c) Allow you to view additional worksheet columns to the right
(d) Allow you to view additional sheets tabs
(e) All of the above

719. Which of the following is input/output device?
(a) monitors
(b) punched cards
(c) optical scanners
(d) all the above
(e) All of the above

720. The process of starting the computer and loading of operating system programs for execution is known as
(a) initialization
(b) retrieving
(c) loading
(d) searching
(e) booting

721. BIOS is an abbreviation for
(a) Binary Input/Binary Output
(b) Binary synchronous
(c) Binary digit
(d) None of these
(e) All of the above

722. The first page of a Web site is called the
(a) Home page
(b) Index
(c) Java Script
(d) Book mark
(e) None of these:

723. In Microsoft Word move the insertion point to the beginning of the next paragraph
(a) Shortcut CTRL+RIGHT ARROW
(b) Shortcut CTRL+LEFT ARROW
(c) Shortcut CTRL+DOWN ARROW
(d) None of these
(e) All of the above

724. The operating system is the most common type of _____software.
(a) Communication
(b) System software
(c) Word-processing software
(d) Spreadsheet software
(e) None of these

725. A small amount of memory included in the processor for high speed access is called-
(a) Register
(b) Cache
(c) RAM
(d) ROM
(e) None of these

726. Which of these language uses both interpreter and compiler
(a) COBOL
(b) CASIC
(c) JAVA
(d) C++
(e) All of these

727. It contains specific rules and words that express the logical steps of an algorithm
(a) programming language

(b) syntax
(c) programming structure
(d) logic chart
(e) None of these

728. Which of the following terms applies to communication between separate computer systems?
(a) Computer literacy
(b) Power supply
(c) Applications software
(d) Connectivity
(e) None of the above

729. Which of the following is a part of the Central Processing Unit
(a) Printer
(b) Keyboard
(c) Mouse
(d) Arithmetic Logic Unit
(e) None of these

730. CAD stands for_____.
(a) Computer aided design
(b) Computer algorithm for design
(c) Computer application in design
(d) All of the above
(e) None of these

731. It is a Note-taking software for use with tablet PCs or regular PCs.
(a) Microsoft OneNote
(b) Microsoft PowerPoint
(c) Microsoft Access
(d) None of these
(e) All of the above

732. Constant is a value written into a program instruction
(a) that does not change during the execution of the program
(b) that can change during the execution of the program
(c) that can vary during the execution of the program
(d) none of these
(e) All of the above

733. An organized collection of data about a single entity is called
(a) Directory
(b) File
(c) Subdirectory
(d) Database
(e) None of these

734. Where would you find a magnetic strip?
(a) Speakers
(b) Credit card
(c) Smart card
(d) All of the above
(e) None of these

735. A term used interchangeably with diskette is-
(a) Disk cartridge
(b) Disk pack
(c) Floppy disk
(d) Packette disk
(e) None of these

736. CDs are of which shape?
(a) Square
(b) Rectangular
(c) Round
(d) Hexagonal
(e) None of these

737. In Excel to open an existing workbook, you can click the Open button on the ..... toolbar.
(a) Drawing
(b) Formatting
(c) Forms
(d) Standard
(e) All of the above

738. Software such as viruses, worms and Trojan horses, that has a malicious intent, is known as
(a) spyware
(b) adware
(c) spam
(d) malware
(e) None of these

739. The speed at which data is transferred from the main memory to another medium on which data are recorded is referred as
(a) Data transfer rate
(b) Byte
(c) Buds
(d) None of these
(e) All of the above

740. In Windows operating system the shortcut key CTRL+P is used for
(a) Open the Print dialog box
(b) Update the current Web page
(c) Close the current window
(d) None of these
(e) All of the above

741. Excel files have a default extension of
(a) Xls
(b) Xlw
(c) Wk1
(d) 123
(e) All of the above

742. Which of the following printer cannot print graphics?
(a) Ink-jet
(b) Daisy Wheel
(c) Laser
(d) Dot-matrix
(e) None

743. Which of the following terms is just the connection of networks that can be joined together?
(a) virtual private network
(b) internet
(c) intranet
(d) extranet
(e) None of these

744. In Microsoft PowerPoint are symbols used to identify items in a list
(a) Icons
(b) Markers
(c) Bullets
(d) Graphics
(e) All of the above

745. In Windows operating system to Display the desktop
(a) Windows Logo
(b) Windows Logo + BREAK
(c) Windows Logo + D
(d) Windows Logo + M
(e) All of the above

746. Who is known as father of computers?
(a) Herman Hollerith
(b) Grace Hoppers
(c) Newton
(d) Charles Babbage
(e) Larry Page

747. To see first row and first column in an excel sheet at all times even if you scroll till the end of sheet
(a) Use workbook views feature
(b) Use switch windows feature
(c) Use freeze panes feature
(d) Use freeze row and freeze column option
(e) Use headings

748. Speech recognition is
(a) Ability to input data directly into a computer system by speaking to it
(b) Ability to output data directly from a computer system by speaking.
(c) Processing of voice in computer systems
(d) None of these
(e) All of the above

749. In Excel which of the following is not an option in the spelling dialog box
(a) Edit
(b) Ignore
(c) Ignore all
(d) Change
(e) All of the above

750. When you are working on a document on PC, where is the document temporarily stored?
(a) RAM
(b) ROM
(c) The CPU
(d) Flash memory
(e) The CD-Rom

751. POS data-entry system is used extensively by
(a) banking industry
(b) grocery industry
(c) railroad industry
(d) word-processing industry
(e) All of the above

752. In Windows operating system after you double-click a character on the grid of characters, keyboard shortcut CTRL+END is used for
(a) Move to the first character
(b) Move to the last character
(c) Switch between Enlarged and Normal mode when a character is selected
(d) None of these
(e) All of the above

753. What is a shortcut key to print the current page or document ?
(a) Alt + P
(b) Ctrl + V
(c) Ctrl + P
(d) Shift + P
(e) None of these

754. In Windows operating system after you double-click a character on the grid of characters, keyboard shortcut SPACEBAR is used for
(a) Move to the first character
(b) Move to the last character
(c) Switch between Enlarged and Normal mode when a character is selected*
(d) None of these
(e) All of the above

755. In Microsoft PowerPoint the following command select all object at one time when selecting multiple objects to be deleted
(a) Alt + A
(b) Ctrl + A
(c) Shift + Enter
(d) Edit, Select All
(e) All of the above

756. Where would you find the letters QUERTY?
(a) Mouse
(b) Screen
(c) Numeric Keypad
(d) Keyboard
(e) None of these

757. If a previously saved file is edited ?
(a) it cannot be saved again
(b) the changes will automatically be saved in the file
(c) the file will only have to be saved again if it is more than one page in length
(d) its name must be changed
(e) the file must be saved again to store the changes

758. BISYNC is an abbreviation for
(a) Binary Input/Binary Output
(b) Binary synchronous
(c) Binary digit
(d) None of these
(e) All of the above

759. Which one of the following is the first second-generation computer?
(a) IBM 7090
(b) IBM 801
(c) IBM 7070
(d) IBM 650
(e) None of the above

760. In Windows operating system to delete the selected item permanently without placing the item in the Recycle Bin
(a) Shortcut SHIFT+DELETE
(b) Shortcut CTRL while dragging an item
(c) Shortcut CTRL+SHIFT while dragging an item
(d) None of these
(e) All of the above

761. The advantages of COM are its___and_.
(a) compact size; readability
(b) compact size; speed
(c) readability; speed
(d) compact size; low cost
(e) All of the above

762. Which parts of the computer perform arithmetic calculations?
(a) Registers
(b) ALU
(c) Logic bus
(d) All of the above
(e) None of these

763. The use of parity bit is for
(a) coding
(b) indexing
(c) error-detection
(d) none of these
(e) All of the above

764. Diagnostic routines is a
(a) Programs used to print error messages
(b) Indicates system problems and improper program instructions.
(c) Both A & B are true
(d) None of these
(e) All of the above

765. Which of the following is used for manufacturing chips?
(a) control bus
(b) control unit
(c) parity unit
(d) semiconductor
(e) None of the above

766. Which of the following is a part of Central Processing Unit?
(a) Printer
(b) Keyboard
(c) Mouse
(d) Arithmetic and Logic unit
(e) None of these

767. The overall design, construction, organization and interconnecting of the various components of a computer system is referred as
(a) Computer Architecture
(b) Computer Flow chart
(c) Computer Algorithm
(d) None of these
(e) All of the above

768. A personal information manager and e-mail communication software in MS Office is
(a) Microsoft Outlook
(b) Microsoft Word
(c) Microsoft PowerPoint
(d) None of these
(e) All of the above

769. Digital Computer is a computer
(a) that works with discrete quantities
(b) that works with analog quantities
(c) Both A & B
(d) None of these
(e) All of the above

770. In Windows operating system shortcut key Windows Logo+ L
(a) Display Windows Help
(b) Lock the keyboard
(c) Open the Run dialog box
(d) Open Utility Manager
(e) All of the above

771. In Excel you can use the horizontal and vertical scroll bars to
(a) Split a worksheet into two panes
(b) View different rows and columns edit the contents of a cell
(c) Edit the contents of a cell
(d) View different worksheets
(e) All of the above

772. In Windows operating system shortcut key Windows Logo+R
(a) Display Windows Help
(b) Lock the keyboard
(c) Open the Run dialog box
(d) Open Utility Manager
(e) All of the above

773. The following device allows the user to add external components to a computer system
(a) Storage devices
(b) Keyboards
(c) Ports/ system boards

(d) Diskettes
(e) All of the above

774. In Microsoft PowerPoint any and every command can be found on the
(a) Drawing toolbar
(b) Formatting toolbar
(c) Standard toolbar
(d) Menu bar
(e) All of the above

775. For large network which topology is used?
(a) Star
(b) Ring
(c) Bus
(d) Mesh
(e) None of these

776. _____ is the process of finding and removing errors in software code.
(a) Debugging
(b) Compiling
(c) Testing
(d) Running
(e) None of these

777. In Microsoft Word shortcut key CTRL+P is used for
(a) Open the Print dialog box
(b) Update the current Web page
(c) Close the current window
(d) None of these
(e) All of the above

778. In Excel which of the following is an absolute cell reference?
(a) !A!1
(b) A1
(c) #a#1
(d) A1
(e) All of the above

779. A VDU is used as
(a) Input device only
(b) Output device only
(c) Both 1 and 2
(d) all of the above
(e) None of these

780. This hacker is a hacker of ambiguous ethics and/or borderline legality, often frankly admitted.
(a) White hat
(b) Grey hat
(c) Blue hat
(d) None of these
(e) All of the above

781. While buying a PC system, one should first
(a) identify hardware components
(b) define computing needs
(c) both A and B
(d) None of these
(e) All of the above

782. In Excel this type of software is similar to an accountant's worksheet
(a) Word processing
(b) Database
(c) Spreadsheets
(d) Graphics
(e) All of the above

783. In Windows operating system SHIFT with any of the arrow keys
(a) Highlight a block of text
(b) Delete something
(c) Paste something
(d) Select more than one item in a window or on the desktop, or select text in a document
(e) All of the above

784. Computers manipulate data in many ways, and this manipulation is called_____.
(a) utilizing
(b) batching
(c) upgrading
(d) processing
(e) None of these

785. When you install new programs on your computer, it is typically added to the_?
(a) All programs
(b) Select programs
(c) Start programs
(d) Desktop programs
(e) None of these

786. In Excel which of the following is not an option in the spelling dialog box
(a) Edit
(b) Ignore
(c) Ignore all
(d) Change
(e) All of the above

787. The contents of these chips are lost when the computer is switched off?
(a) RAM chips
(b) ROM chips
(c) DRAM chips
(d) All of the above
(e) None of these

788. The blinking point which shows your position in the text is called
(a) Blinker
(b) Cursor
(c) Cursor
(d) Pointer
(e) None of these

789. In Windows operating system after you double-click a character on the grid of characters, keyboard shortcut PAGE DOWN is used for
(a) Move up one screen at a time
(b) Move down one screen at a time

(c) Move to the beginning of the line
(d) Move to the end of the line
(e) All of the above

790. ANSI is
(a) American National Standards Institute
(b) A USA based national organization that establishes uniform standards in several fields of computers.
(c) Both A & B are true
(d) None is true
(e) All of the above

791. In Windows operating system after you double-click a character on the grid of characters, keyboard shortcut HOME is used for
(a) Move up one screen at a time
(b) Move down one screen at a time
(c) Move to the beginning of the line
(d) Move to the end of the line
(e) All of the above

792. In Excel to move to the previous worksheet, press
(a) Alt + PgUp
(b) Ctrl + PgUp
(c) Ctrl + PgDn
(d) Shift + Tab
(e) All of the above

793. Which of the following groups consist of only input devices ?
(a) Mouse, Keyboard, Monitor
(b) Mouse, Keyboard, Monitor
(c) Mouse, Keyboard, Plotter
(d) Mouse, Keyboard, Scanner
(e) None of these

794. Which of the following is a high level language?
(a) Java script
(b) Php
(c) C#
(d) C
(e) All of the above

795. A group of related items/ section of program coding treated as a unit is referred as
(a) Block
(b) Duplex
(c) Street
(d) None of these
(e) All of the above

796. A personal computer is designed to meet the computing needs of a(n)
(a) individual
(b) department
(c) company
(d) city
(e) None of these

797. In Microsoft Word to delete the selected item permanently without placing the item in the Recycle Bin
(a) Shortcut SHIFT+DELETE
(b) Shortcut CTRL while dragging an item
(c) Shortcut CTRL+SHIFT while dragging an item
(d) None of these
(e) All of the above

798. A(n)_____converts and executes one statement at a time.
(a) compiler
(b) interpreter
(c) converter
(d) instructions
(e) None of these

799. The Principle advantage of adding memory to a printer is to increase:
(a) resolution
(b) Print Speed
(c) Number of colors in output
(d) DPI
(e) None of these

800. A tuple is a
(a) column of a table
(b) two-dimensional table
(c) row of a table
(d) key of a table
(e) None of these

801. Technique of placing software/programs in a ROM semiconductor chip is called
(a) PROM
(b) EPROM
(c) firm ware
(d) microprocessor
(e) All of the above

802. In Windows operating system it is a window that is used to display text or to receive text from you. The type of text it displays or the type of text you are asked to provide depends on the application or the situation.
(a) Control's Focus
(b) Dialog Boxes
(c) Command Buttons
(d) Text Boxes
(e) All of the above

803. A sender must not be able to deny that he sent a specific message when he in fact did. This is an aspect of security called_____.
(a) privacy
(b) authentication
(c) integrity
(d) non-repudiation
(e) None of these

804. The overall design, construction, organization and interconnecting of the various components of a computer system is referred as
(a) Computer Architecture
(b) Computer Flow chart

(c) Computer Algorithm
(d) None of these
(e) All of the above

805. It is software for creating newsletters, business cards, flyers, greeting cards or postcards.
(a) Microsoft Publisher
(b) Microsoft PowerPoint
(c) Microsoft Access
(d) None of these
(e) All of the above

806. Broadband channel is the
(a) The fastest carriers where data transfer rates is of 1 million baud (bits/second or more.
(b) The slower carriers where data transfer rates is of 56k baud
(c) Musical channel
(d) None of these
(e) All of the above

807. Which of the following is not an operating system?
(a) DOS
(b) Oracle
(c) Linux
(d) Windows
(e) None of these

808. A hacker contacts you my phone or email and attempts to acquire your password
(a) spoofing
(b) phishing
(c) spamming
(d) bugging
(e) None of these

809. Files created with Lotus 1-2-3 have an extension
(a) DOC
(b) XLS
(c) 123
(d) WK1
(e) All of the above

810. SNOBOL is
(a) string oriented symbolic language
(b) high-level language
(c) both A & B
(d) None of these
(e) All of the above

811. User-friendly means
(a) Easy to use, operate and understand etc.
(b) Understood by means of straight forward guide.
(c) Process that makes it easier for novice to use a computer.
(d) All of the above
(e) None of these

812. Which of the following is the process of transferring software programme from a secondary storage media into the hard disc?
(a) Storage
(b) Updating
(c) Upload
(d) installation
(e) None of these

813. In Windows operating system shortcut SHIFT+DELETE is used for
(a) Delete the selected item permanently without placing the item in the Recycle Bin
(b) Copy the selected item
(c) Rename the selected item
(d) Create a shortcut to the selected item
(e) All of the above

814. Linux is a (n)_____operating system.
(a) open-source
(b) Microsoft
(c) Windows
(d) Mac
(e) None of these

815. Extension name of flash file is_.
(a) .pdf
(b) .swf
(c) .pmd
(d) .prd
(e) None of these

816. A sequence of instruction (software) that is substituted for hardware and stored in read only memory (ROM) is called
(a) Integrated circuit
(b) Firmware
(c) Flip-flop
(d) None of these
(e) All of the above

817. The word bandwidth is also used to mean___?
(a) width of the data cable
(b) amount of data transferred
(c) number of the computers on a particular network
(d) Both 1 &amp 2
(e) None of these

818. Something which has easily-understood instructions is said to be
(a) information
(b) word processing
(c) user friendly
(d) icon
(e) None of these

819. Excel workbook contains
(a) Workbooks
(b) Worksheets
(c) Worksheets and charts
(d) Work areas
(e) All of these

820. In Microsoft Word using SHIFT with any of the arrow keys
(a) Highlight a block of text

(b) Delete something
(c) Paste something
(d) Select more than one item in a window or on the desktop, or select text in a document
(e) All of the above

821. To produce a high - quality graphics (hardcopy) in color, you would want to use a
(a) Virtual Printer
(b) Laser Printer
(c) Ink - jet Printer
(d) Plotter
(e) RGB Monitor

822. In Excel All macro keyboard shortcuts include the ..... key
(a) Alt
(b) Ctrl
(c) F11
(d) Shift
(e) All of the above

823. Internet banking is an example of
(a) Electronic funds transfer (EFT)
(b) EDP (Electronic Data Processing)
(c) EBCDIC
(d) ASCII
(e) All of the above

824. By CD you can
(a) Read
(b) Write
(c) Read and Write
(d) Either Read or Write
(e) None of these

825. A fault in a computer program which prevents it from working correctly is known as_____.
(a) Boot
(b) Bug
(c) Biff
(d) Strap
(e) None

826. Which is the example of spread sheet?
(a) MS word
(b) MS excel
(c) Power point
(d) MS Access
(e) None of these

827. Terminals is
(a) An input device which allows a user to communicate directly with a computer system.
(b) An output device which allows a user to communicate directly with a computer system.
(c) Both A & B
(d) None of these
(e) All of the above

828. Allocation of a resources in a time dependent fashion to several program simultaneously called
(a) multi user
(b) multi-tasking
(c) time sharing
(d) Multiprogramming
(e) None of these

829. The attributes and methods for each object are stored in.
(a) an object instance
(b) an object connection
(c) an assembly structure
(d) an object repository
(e) None of these

830. In Windows operating system after you double-click a character on the grid of characters, keyboard shortcut DOWN ARROW is used for
(a) Move to the right or to the beginning of the next line
(b) Move to the left or to the end of the previous line
(c) Move up one row
(d) Move down one row
(e) All of the above

831. A device designed to read information encoded onto a small plastic card is.
(a) light pen
(b) Punch card
(c) magnetic tape
(d) magnetic
(e) badge reader

832. An operation in which data is moved to a different location is referred as
(a) Block move
(b) Street move
(c) Delete
(d) None of these
(e) All of the above

833. Following is true for the digital computer
(a) Information is in form of a string of binary digits
(b) It can be used as analog processor
(c) It is less accurate than the analog computer
(d) None of these.
(e) All of the above

834. Transmission of data in one direction is called
(a) Simplex
(b) Duplex
(c) Triplex
(d) None of these
(e) All of the above

835. _____ is the process of finding errors in software code?
(a) Compiling
(b) Testing
(c) Running
(d) Debugging
(e) None of these

836. The performance of a hard drive or other storage device, meaning how long it takes to locate a file is called?
(a) Response time
(b) Access Time
(c) Quick time
(d) Processing time
(e) None of these

837. Communications device, combines transmissions from several devices into on line is
(a) concentrator
(b) modifier
(c) multiplexer
(d) full-duplex line
(e) All of the above

838. The_____can be programmed one time by either the manufacturer or the computer user. Once programmed, it cannot be modified.
(a) RAM
(b) ROM
(c) PROM
(d) EPROM
(e) All of the above

839. In Excel you can use the drag and drop method to
(a) Copy cell contents
(b) Move cell contents
(c) Add cell contents
(d) A and B
(e) All of the above

840. _____ is a set of rules that tell the computer what to do.
(a) Procedural language
(b) Natural language
(c) Command language
(d) Programming language
(e) Instructions

841. Which bus controls the sequencing of read/write operations?
(a) Control bus
(b) Address bus
(c) Data bus
(d) All of the above
(e) None of these

842. Which of the following products/softwares is not associated with Microsoft?
(a) Microsoft Silverlight
(b) Windows CE
(c) Surface Tablet
(d) Windows Live
(e) None of these

843. In Microsoft PowerPoint cell is defined as
(a) The intersection of a column and a row
(b) An input box
(c) A rectangular marker
(d) All of the above
(e) All of the above

844. What is the file extension of Ms-Word97- 2003 document?
(a) Dot
(b) Doc
(c) Dom
(d) Txt
(e) All of the above

845. In Excel Multiple calculations can be made in a single formula using
(a) standard formulas
(b) array formula
(c) complex formulas
(d) smart formula
(e) All of the above

846. Disk operating system is referred for
(a) DOS
(b) Operating system which contains the disk-oriented commands and uses disk devices for permanent storage
(c) Both A & B
(d) None of these
(e) All of the above

847. Travel agents use this computer system when reserving flights.
(a) Supercomputer
(b) Mainframe computer
(c) Personal computer
(d) All of the above
(e) None of these

848. The OCR is used for the preparation of
(a) electricity bills
(b) insurance premium
(c) telephone bills
(d) All of these
(e) None of these

849. A set of corresponding track in the all surface of a disk pack is known as-
(a) Surface
(b) Cylinder
(c) Track
(d) platter
(e) None of these

850. In Microsoft Word shortcut SHIFT+DELETE is used for
(a) Delete the selected item permanently without placing the item in the Recycle Bin
(b) Copy the selected item
(c) Rename the selected item
(d) Create a shortcut to the selected item
(e) All of the above

851. A collection of program that controls how your computer system runs and processes information is called_____.
(a) Operating System

(b) Computer
(c) Office
(d) Compiler
(e) Interpreter

852. In Excel what symbol is used before a number to make it a label?
(a) " (quote)
(b) = (equal)
(c) _ (underscore)
(d) ' (apostrophe)
(e) All of the above

853. Pick the odd one out:
(a) Interpreter
(b) Operating System
(c) Compiler
(d) Assembler
(e) None of these

854. In Windows operating system to Display the System Properties dialog box
(a) Windows Logo
(b) Windows Logo + BREAK
(c) Windows Logo + D
(d) Windows Logo + M
(e) All of the above

855. What maintains the status of the last operation carried out by the ALU?
(a) Instruction pointer .
(b) Status register
(c) Accumulator
(d) All of the above
(e) None of these

856. In Excel default header for a worksheet is
(a) Your name
(b) The date and time
(c) None
(d) The sheet tab name
(e) All of the above

857. If you want to find the Paste Special option, you would use the Clipboard group on the tab of PowerPoint_____.
(a) Home
(b) Slideshow
(c) Page Layout
(d) Design
(e) Insert

858. PROM is a_____memory i.e. the stored information remain even if power is switched off.
(a) Volatile memory
(b) Buffer memory
(c) Spooling
(d) Non-volatile
(e) None of these

859. _____in a computer is used for calculation and comparison.
(a) ALU
(b) ROM
(c) CPU
(d) Control Unit
(e) None of these

860. In Excel if you press ....., the cell accepts your typing as its contents.
(a) Enter
(b) Ctrl + Enter
(c) TAB
(d) Insert
(e) All of the above

861. A disk content that is recorded at the time of manufacture and that cannot be changed or erased by the user.
(a) READ ONLY
(b) Memory only
(c) Run only
(d) WRITES ONLY
(e) None of these

862. If a new device is attached to a computer, such as a printer or scanner, its_____must be installed before the device can be used.
(a) buffer
(b) driver
(c) pager
(d) server
(e) None of these

863. The technique that extends storage capacities of main memory beyond the actual size of the main memory is called_____.
(a) multitasking
(b) virtual storage
(c) multiprocessing
(d) multiprogramming
(e) switching

864. What excel feature can you use if you want to work with one record at a time?
(a) Auto Complete
(b) Auto Filter
(c) Data Form
(d) Sub Totals
(e) All of the above

865. ..... is an icon that opens a folder of icons for all the resources on the computer like hard drive and printer?
(a) My documents
(b) Recycle bin
(c) My computer
(d) Accessories
(e) None of these

866. Which layer of the OSI model performs segmentation of a data stream
(a) Application layer
(b) Network layer
(c) Physical layer

(d) Transport layer
(e) Presentation layer

867. In Windows operating system after you double-click a character on the grid of characters, keyboard shortcut END is used for
(a) Move up one screen at a time
(b) Move down one screen at a time
(c) Move to the beginning of the line
(d) Move to the end of the line
(e) All of the above

868. A daisy wheel is a type of...?
(a) None of these
(b) Storage device
(c) Pointing device
(d) All of the above
(e) Printer

869. A relatively new technology that allows wireless connectivity:
(a) Bluetooth
(b) Black tooth
(c) Blue band
(d) Broadband
(e) Wi- fi

870. Computer_____is whatever is typed, submitted, or transmitted to a computer system.
(a) input
(b) output
(c) data
(d) circuitry
(e) None of these

871. Cache memory is a
(a) Small buffer storage
(b) Permanent storage
(c) Main memory
(d) None of these
(e) All of the above

872. An automatic machine that is made to perform routine human tasks is
(a) Computer
(b) Robot
(c) Tanker
(d) None of these
(e) All of the above

873. In Windows operating system the shortcut key Windows Logo+E is used for
(a) Restore the minimized windows
(b) Open My Computer
(c) Search for a file or a folder
(d) Search for computers
(e) All of the above

874. Verification of a login name and password is known as:
(a) configuration
(b) accessibility
(c) authentication
(d) logging in
(e) None of these

875. Magnetic tape is a..?
(a) Random access medium
(b) A parallel access medium
(c) Serial access medium
(d) All of the above
(e) None of these

876. Memory which forgets everything when you switch off the power is known as
(a) Corrupted
(b) Volatile
(c) Non-Volatile
(d) Non-Corrupted
(e) None

877. The type of input includes
(a) Programme
(b) Data
(c) Commands
(d) User response
(e) All of the above

878. The_____key and the_____key can be used in combination with other keys to perform shortcuts and special tasks.
(a) Control, Alt
(b) Function, toggle
(c) Delete, Insert
(d) Caps Lock, Num Lock
(e) None of these

879. The word processor in MS office suite is
(a) Microsoft Word
(b) Microsoft Excel
(c) Microsoft PowerPoint
(d) None of these
(e) All of the above

880. In Microsoft PowerPoint you can tell when an object is active because
(a) The object is highlighted
(b) Eight small sizing handles appear surrounding the text
(c) A box frame appears surrounding the text
(d) (B) and (C)
(e) All of the above

881. This type of software contains rows and columns.
(a) Drawing
(b) Spreadsheet
(c) Database
(d) Word processing
(e) All of the above

882. The_____allows you to choose where to go and is located below the standards buttons toolbar.
(a) system menu
(b) Address bar
(c) Menu bar
(d) Task bar

(e) None of these

883. In Excel to select a column the easiest method is to
(a) Double click any cell in the column
(b) Drag from the top cell in the column to the last cell in the column
(c) Click the column heading
(d) Click the column label
(e) All of the above

884. The_____enables you to simultaneously keep multiple web pages open in one browser window.
(a) Tab bar
(b) pop-up helper
(c) Tab row
(d) Address bar
(e) None of these

885. Abacus was the first ___
(a) Electronic computer
(b) Mechanical computer
(c) Electronic calculator
(d) Mechanical calculator
(e) Electronic chip

886. This power protection device includes a battery that provides a few minutes of power.
(a) surge suppressor
(b) line conditioner
(c) generator
(d) UPS
(e) None of these

887. The personal computers are also referred as
(a) desk top micros
(b) advanced computers
(c) palmtop computers
(d) all the above
(e) All of the above

888. OCR stands for ____
(a) Optical Character Recognition
(b) Optical CPU Recognition
(c) Optimal Character Rendering
(d) Other Character Restoration
(e) None of these

889. In Excel typical worksheet has .... Number of columns
(a) 128
(b) 256
(c) 512
(d) 1024
(e) All of the above

890. Traffic in a VPN is not____.
(a) invisible from public networks
(b) logically separated from other traffic
(c) accessible from unauthorised public networks
(d) restricted to a single protocol in IP Sec
(e) None of these

891. The very first version of Microsoft Office was released for
(a) Windows operating system
(b) Apple Macintosh OS
(c) Unix
(d) None of these
(e) All of the above

892. A sequential electronic circuit which can be placed in one out of two stable states where each state may be used to represent a binary digit is stated as
(a) Integrated circuit
(b) Firmware
(c) Flip-flop
(d) None of these
(e) All of the above

893. In Excel default header for a worksheet is
(a) Your name
(b) The date and time
(c) None
(d) The sheet tab name
(e) All of the above

894. ..... Shows all the websites and pages that are visited over a period of time.
(a) Home page
(b) Toolbar
(c) Task bar
(d) History
(e) Cookies

895. The amount of data that a disk may contain is known as the disk
(a) Volume
(b) Size
(c) All of the above
(d) Storage capacity
(e) None of these

896. Microsoft Office Document Imaging is
(a) An application that supports editing scanned documents
(b) A scanning and OCR application
(c) Diagram and flowcharting software
(d) None of these
(e) All of the above

897. A semiconductor memory which allows the eraser of the information stored in it so that new information can be stared in it is referred as
(a) EPROM
(b) ROM
(c) RAM
(d) None of these
(e) All of the above

898. Content that is recorded at the time of manufacture and that cannot be changed or erased by the user is
(a) read-only
(b) memory-only
(c) run-only
(d) write-only
(e) None of these

899. If a new device is attached to a computer, such as a printer or scanner, its_____must be installed before the device can be used.
(a) buffer
(b) driver
(c) pager
(d) server
(e) None of these

900. A_____is a bi-stable electronic circuit that has two stable states.
(a) Multivibrator
(b) Flip-flop
(c) Logic gates
(d) laten
(e) None of these

901. In Excel you can copy cell formats from one cell to another by using the
(a) Backspace key
(b) Default font
(c) Format painter
(d) Formatting toolbar
(e) All of the above

902. _____ is the act of copying or downloading a program from a network and making multiple copies of it.
(a) Network piracy
(b) Plagiarism
(c) Software piracy
(d) Site-license piracy
(e) None of these

903. In Microsoft PowerPoint auto clipart is a feature that
(a) Automatically places clipart in your presentation
(b) Scans your presentation for incorrect spelling in your words on each slide
(c) Scans your presentation for incorrect spelling in Word Arts objects
(d) All of above
(e) All of the above

904. Name of the executable file of MS word is-
(a) MS Word
(b) MS Word .exe
(c) Win Word
(d) Win Word.exe
(e) None of these

905. Transformation of input into output is performed by?
(a) Peripherals
(b) Memory
(c) Storage
(d) The Input-Output unit
(e) The CPU

906. An algebra that deals with logical propositions which are either true or false is referred as
(a) Boolean algebra
(b) Modern Algebra
(c) Abstract Algebra
(d) None of these
(e) All of the above

907. Track Ball and Light pen are examples of
(a) Input devices
(b) Output Devices
(c) Input/output
(d) Name of Video game
(e) None of these

908. Cache memory is
(a) Smaller and faster than main storage
(b) Bigger and slower then main storage
(c) Smaller but slower than main memory
(d) Bigger and faster than main memory
(e) All of the above

909. First microprocessor was used in which of the following?
(a) Computer
(b) Calculator
(c) Telephones
(d) Printers
(e) None of these

910. Distributed data processing configuration where all activities passes through a centrally located computer is
(a) ring network
(b) spider network
(c) hierarchical network
(d) data control network
(e) All of the above

911. People often call_____as the brain of computer system.
(a) Control Unit
(b) Arithmetic Logic Unit
(c) Central Processing Unit
(d) Storage Unit
(e) Store data

912. RAM stands for?
(a) Random Allowed Memory
(b) Ready Access Memory
(c) Random Access Memory
(d) Random Added Memory
(e) Random Ambiguity Memory

913. What are the units used to count the speed of a printer?
(a) CPM
(b) DPI
(c) PPM
(d) BIT
(e) None of these

914. When installing_____, the user must copy and usually decompress program files from a CD-ROM or other medium to the hard disk.

(a) programming software
(b) system hardware
(c) applications hardware
(d) applications software
(e) None of these

915. It is a visual aspect that indicates that a control is ready to receive input from you in Windows operating system
(a) Control's Focus
(b) Dialog Boxes
(c) Command Buttons
(d) Text Boxes
(e) All of the above

916. Which of the following statements is true?
(a) Minicomputer works faster than Microcomputer
(b) Microcomputer works faster than Minicomputer
(c) Speed of both the computers is the same
(d) The speeds of both these computers cannot be compared with the speed of advanced computer
(e) None of these

917. Bandwidth is
(a) The range of frequencies available for data transmission
(b) Data transmission rate
(c) Alternate for rubber band
(d) None is true
(e) All of the above

918. Data that is copied from an application is stored in the____.
(a) driver
(b) clipboard
(c) terminal
(d) prompt
(e) None of these

919. A removable direct-access storage medium containing multiple magnetic disks mounted vertically on a single-shaft is referred as
(a) Tape pack
(b) Disk pack
(c) Cylinder
(d) None of these
(e) All of the above

920. In Excel to select a column the easiest method is to
(a) Double click any cell in the column
(b) Drag from the top cell in the column to the last cell in the column
(c) Click the column heading
(d) Click the column label
(e) All of the above

921. In Excel when creating a vertical page break
(a) The active cell must be A1
(b) The active cell can be anywhere in the worksheet
(c) The active cell must be in row 1
(d) The active cell must be in column A
(e) All of the above

922. In Excel to copy cell contents using drag and drop, press the
(a) End key
(b) Shift key
(c) Esc key
(d) None of above
(e) All of the above

923. ..... is a device or a software in computer, that determines the next network point to which a packet is forwarded towards its destination.
(a) Switch
(b) Network
(c) Bridge
(d) Router
(e) None of these

924. In Windows operating system the ———— ——— is the main screen area that one sees after he turn on a computer and log on to Windows.
(a) Desktop
(b) Icons
(c) Taskbar
(d) None of these
(e) All of the above

925. What input device can be used for marking
(a) Optical mark reader
(b) Bar code reader
(c) Mouse a multiple choice test?
(d) All of the above
(e) None of these

926. When was the first Windows operating system launched?
(a) 1984
(b) 1985
(c) 1988
(d) 1989
(e) 1990

927. The background of any Word document___
(a) is always white colour
(b) is the colour you present under the Options menu
(c) is always the same for the entire document
(d) can have any colour you choose
(e) None of these

928. Text Editor that is the part of Windows operating system
(a) Wordpad
(b) Notepad
(c) Adobe Photoshop
(d) Jasc Paint Shop
(e) All of the above

929. IBM stands for_____.
(a) Internal Business Management

(b) International Business Management
(c) International Business Machines
(d) Internal Business Machines
(e) None of these

930. ..... file format used for data compression and archiving
(a) .EXE
(b) .INI
(c) .COM
(d) .ZIP
(e) .WIN

931. A program which helps to create written document and lets you go back and make corrections as necessary
(a) Home row keys
(b) Tool bar
(c) Spreadsheet
(d) Word processor
(e) All of the above

932. What is output ?
(a) What the processor takes from the user
(b) What the user gives tothe processor
(c) What the processor gets from the user
(d) What the processor gives to the user
(e) None of these

1.	a	2.	a	3.	a
4.	b	5.	b	6.	b
7.	c	8.	d	9.	d
10.	d	11.	a	12.	a
13.	a	14.	b	15.	b
16.	c	17.	c	18.	d
19.	d	20.	e	21.	a
22.	a	23.	a	24.	b
25.	b	26.	c	27.	c
28.	d	29.	d	30.	a
31.	a	32.	a	33.	b
34.	b	35.	c	36.	c
37.	d	38.	d	39.	a
40.	a	41.	a	42.	b
43.	b	44.	b	45.	c
46.	d	47.	d	48.	d
49.	a	50.	a	51.	a
52.	b	53.	b	54.	c
55.	c	56.	d	57.	d
58.	e	59.	a	60.	a
61.	a	62.	b	63.	b
64.	c	65.	c	66.	d
67.	d	68.	a	69.	a
70.	a	71.	b	72.	b
73.	c	74.	c	75.	d
76.	d	77.	a	78.	a
79.	a	80.	b	81.	b
82.	b	83.	c	84.	d
85.	d	86.	d	87.	a
88.	a	89.	a	90.	b
91.	b	92.	c	93.	c
94.	d	95.	d	96.	e
97.	a	98.	a	99.	a
100.	b	101.	b	102.	c
103.	c	104.	d	105.	d
106.	a	107.	a	108.	a
109.	b	110.	b	111.	c
112.	c	113.	d	114.	d
115.	a	116.	a	117.	a
118.	b	119.	b	120.	c
121.	c	122.	d	123.	d
124.	d	125.	a	126.	a
127.	a	128.	b	129.	b
130.	c	131.	c	132.	d
133.	d	134.	e	135.	a
136.	a	137.	a	138.	b
139.	b	140.	c	141.	c
142.	d	143.	d	144.	a
145.	a	146.	a	147.	b
148.	b	149.	c	150.	c
151.	d	152.	d	153.	a
154.	a	155.	a	156.	b
157.	b	158.	c	159.	c
160.	d	161.	d	162.	d
163.	a	164.	a	165.	a
166.	b	167.	b	168.	c
169.	c	170.	d	171.	d
172.	e	173.	a	174.	a
175.	a	176.	b	177.	b
178.	c	179.	c	180.	d
181.	d	182.	a	183.	a
184.	a	185.	b	186.	b
187.	c	188.	c	189.	d
190.	d	191.	a	192.	a
193.	a	194.	b	195.	b

196.	c	197.	c	198.	d
199.	d	200.	d	201.	a
202.	a	203.	a	204.	b
205.	b	206.	c	207.	c
208.	d	209.	d	210.	e
211.	a	212.	a	213.	a
214.	b	215.	b	216.	c
217.	c	218.	d	219.	d
220.	a	221.	a	222.	a
223.	b	224.	b	225.	c
226.	c	227.	d	228.	d
229.	a	230.	a	231.	a
232.	b	233.	b	234.	c
235.	c	236.	d	237.	d
238.	d	239.	a	240.	a
241.	a	242.	b	243.	b
244.	c	245.	c	246.	d
247.	d	248.	e	249.	a
250.	a	251.	a	252.	b
253.	b	254.	c	255.	c
256.	d	257.	d	258.	a
259.	a	260.	a	261.	b
262.	b	263.	c	264.	c
265.	d	266.	d	267.	a
268.	a	269.	b	270.	b
271.	c	272.	c	273.	d
274.	d	275.	d	276.	a
277.	a	278.	a	279.	b
280.	b	281.	c	282.	c
283.	d	284.	d	285.	e
286.	a	287.	a	288.	a
289.	b	290.	b	291.	c
292.	c	293.	d	294.	d
295.	a	296.	a	297.	a
298.	b	299.	b	300.	c
301.	c	302.	d	303.	d
304.	a	305.	a	306.	a
307.	b	308.	b	309.	c
310.	c	311.	d	312.	d
313.	e	314.	a	315.	a
316.	a	317.	b	318.	b
319.	c	320.	c	321.	d
322.	d	323.	a	324.	a
325.	a	326.	b	327.	b
328.	c	329.	c	330.	d
331.	d	332.	a	333.	a
334.	a	335.	b	336.	b
337.	c	338.	c	339.	d
340.	d	341.	a	342.	a
343.	a	344.	b	345.	b
346.	c	347.	c	348.	d
349.	d	350.	e	351.	a
352.	a	353.	a	354.	b
355.	b	356.	c	357.	c
358.	d	359.	d	360.	a
361.	a	362.	a	363.	b
364.	b	365.	c	366.	c
367.	d	368.	d	369.	a
370.	a	371.	a	372.	b
373.	b	374.	c	375.	c
376.	d	377.	d	378.	a
379.	a	380.	a	381.	b
382.	b	383.	c	384.	c
385.	d	386.	d	387.	e
388.	a	389.	a	390.	a
391.	b	392.	b	393.	c
394.	c	395.	d	396.	d
397.	a	398.	a	399.	a
400.	b	401.	b	402.	c
403.	c	404.	d	405.	d
406.	a	407.	a	408.	a
409.	b	410.	b	411.	c
412.	c	413.	d	414.	d
415.	a	416.	a	417.	a
418.	b	419.	b	420.	c
421.	c	422.	d	423.	d
424.	e	425.	a	426.	a
427.	a	428.	b	429.	b
430.	c	431.	c	432.	d
433.	d	434.	a	435.	a
436.	a	437.	b	438.	b
439.	c	440.	c	441.	d
442.	d	443.	a	444.	a
445.	a	446.	b	447.	b
448.	c	449.	c	450.	d
451.	d	452.	a	453.	a
454.	a	455.	b	456.	b
457.	c	458.	c	459.	d

460.	d	461.	e	462.	a
463.	a	464.	a	465.	b
466.	b	467.	c	468.	c
469.	d	470.	d	471.	a
472.	a	473.	a	474.	b
475.	b	476.	c	477.	c
478.	d	479.	d	480.	a
481.	a	482.	a	483.	b
484.	b	485.	c	486.	c
487.	d	488.	d	489.	a
490.	a	491.	a	492.	b
493.	b	494.	c	495.	c
496.	d	497.	d	498.	e
499.	a	500.	a	501.	a
502.	b	503.	b	504.	c
505.	c	506.	d	507.	d
508.	a	509.	a	510.	a
511.	b	512.	b	513.	c
514.	c	515.	d	516.	d
517.	a	518.	a	519.	a
520.	b	521.	b	522.	c
523.	c	524.	d	525.	d
526.	a	527.	a	528.	a
529.	b	530.	b	531.	c
532.	c	533.	d	534.	d
535.	e	536.	a	537.	a
538.	a	539.	b	540.	b
541.	c	542.	c	543.	d
544.	d	545.	a	546.	a
547.	a	548.	b	549.	b
550.	c	551.	c	552.	d
553.	d	554.	a	555.	a
556.	a	557.	b	558.	b
559.	c	560.	c	561.	d
562.	d	563.	a	564.	a
565.	a	566.	b	567.	b
568.	c	569.	c	570.	d
571.	d	572.	e	573.	a
574.	a	575.	a	576.	b
577.	b	578.	c	579.	c
580.	d	581.	d	582.	a
583.	a	584.	a	585.	b
586.	b	587.	c	588.	c
589.	d	590.	d	591.	a
592.	a	593.	a	594.	b
595.	b	596.	c	597.	c
598.	d	599.	d	600.	a
601.	a	602.	a	603.	b
604.	b	605.	c	606.	c
607.	d	608.	d	609.	e
610.	a	611.	a	612.	a
613.	b	614.	b	615.	c
616.	c	617.	d	618.	d
619.	a	620.	a	621.	a
622.	b	623.	b	624.	c
625.	c	626.	d	627.	d
628.	a	629.	a	630.	a
631.	b	632.	b	633.	c
634.	c	635.	d	636.	d
637.	a	638.	a	639.	a
640.	b	641.	b	642.	c
643.	c	644.	d	645.	d
646.	e	647.	a	648.	a
649.	a	650.	b	651.	b
652.	c	653.	c	654.	d
655.	d	656.	a	657.	a
658.	a	659.	b	660.	b
661.	c	662.	c	663.	d
664.	d	665.	a	666.	a
667.	a	668.	b	669.	b
670.	c	671.	c	672.	d
673.	d	674.	a	675.	a
676.	a	677.	b	678.	b
679.	c	680.	c	681.	d
682.	d	683.	e	684.	a
685.	a	686.	a	687.	b
688.	b	689.	c	690.	c
691.	d	692.	d	693.	a
694.	a	695.	a	696.	b
697.	b	698.	c	699.	c
700.	d	701.	d	702.	a
703.	a	704.	a	705.	b
706.	b	707.	c	708.	c
709.	d	710.	d	711.	a
712.	a	713.	a	714.	b
715.	b	716.	c	717.	c
718.	d	719.	d	720.	e
721.	a	722.	a	723.	a

724.	b	725.	b	726.	c
727.	c	728.	d	729.	d
730.	a	731.	a	732.	a
733.	b	734.	b	735.	c
736.	c	737.	d	738.	d
739.	a	740.	a	741.	a
742.	b	743.	b	744.	c
745.	c	746.	d	747.	d
748.	a	749.	a	750.	a
751.	b	752.	b	753.	c
754.	c	755.	d	756.	d
757.	e	758.	a	759.	a
760.	a	761.	b	762.	b
763.	c	764.	c	765.	d
766.	d	767.	a	768.	a
769.	a	770.	b	771.	b
772.	c	773.	c	774.	d
775.	d	776.	a	777.	a
778.	b	779.	b	780.	b
781.	c	782.	c	783.	d
784.	d	785.	a	786.	a
787.	a	788.	b	789.	b
790.	c	791.	c	792.	d
793.	d	794.	e	795.	a
796.	a	797.	a	798.	b
799.	b	800.	c	801.	c
802.	d	803.	d	804.	a
805.	a	806.	a	807.	b
808.	b	809.	c	810.	c
811.	d	812.	d	813.	a
814.	a	815.	b	816.	b
817.	b	818.	c	819.	c
820.	d	821.	d	822.	a
823.	a	824.	a	825.	b
826.	b	827.	c	828.	c
829.	d	830.	d	831.	e
832.	a	833.	a	834.	a
835.	b	836.	b	837.	c
838.	c	839.	d	840.	d
841.	a	842.	a	843.	a
844.	b	845.	b	846.	c
847.	c	848.	d	849.	d
850.	a	851.	a	852.	b
853.	b	854.	b	855.	c
856.	c	857.	d	858.	d
859.	a	860.	a	861.	a
862.	b	863.	b	864.	c
865.	c	866.	d	867.	d
868.	e	869.	a	870.	a
871.	a	872.	b	873.	b
874.	c	875.	c	876.	d
877.	d	878.	a	879.	a
880.	a	881.	b	882.	b
883.	c	884.	c	885.	d
886.	d	887.	a	888.	a
889.	b	890.	b	891.	b
892.	c	893.	c	894.	d
895.	d	896.	a	897.	a
898.	a	899.	b	900.	b
901.	c	902.	c	903.	d
904.	d	905.	e	906.	a
907.	a	908.	a	909.	b
910.	b	911.	c	912.	c
913.	d	914.	d	915.	a
916.	a	917.	a	918.	b
919.	b	920.	c	921.	c
922.	d	923.	d	924.	a
925.	a	926.	b	927.	b
928.	b	929.	c	930.	d
931.	d	932.	d		

CHAPTER

1

ALGEBRA

SETS

A set is a collection of well defined objects. The objects of a set are taken as distinct only on the ground of simplicity.

The objects that comprises of the set are called elements. Number of objects in a set can be finite or infinite.

For example, a set of chairs, the set of Nobel laureates in the worlds, the set of integers, the set of natural numbers less than 10, the set of points in the plane.

The number of elements in a set is called the cardinality of the set. (If S is a set the cardinality is denoted by |S|).

Usually a set is represented by its list of elements separated by comma, between two curly brackets.

For example, {1, 2, 3, 4, 5} is the list of integers bigger than 0 and lesser than or equal to 5.

TYPES OF SETS

In sets theory, there are many types of sets. Some of them are discussed below.

Singleton Set

A set contains only one element. *For example:* A = {3} and B = {pencil}. Here A and B are containing only one element so both are singleton sets.

Empty Set/Null Set

An empty set is a set with no element. It is denoted by A = { } or A = ?.

Proper Set

If A and B are two sets, then A is a proper subset of B if $A \subseteq B$ but $A \neq B$.

For example, If B = {x, y, z} then A = {x, z} is a proper subset of B.

Power Set

The collection of all subsets of a set is the power set of that set. If A is the set then P(A) is denoted as its power set.

The number of elements contained by any power set can be calculated by $n[P(A)] = 2^n$ where n is the number of elements in set A.

For example, If A = {x, y} then, P(A) = {∅, {x}, {y}, {x, y}}

Number of elements in P(A) = $2^2 = 4$.

Universal Set

Any set which is a superset of all the sets under consideration and usually it is denoted as S or U.

For example, Let P = {a, b, c} and Q = {x, b, z} then we take S = {a, b, c, x, z} as universe set.

Equal Sets

Two sets P and Q are equal if both are a subset of each other.

Mathematically: If $P \subseteq Q$ and $Q \subseteq P$ then P = Q.

For example, P = {3, 6, 8} and Q = {6, 3, 8}

RELATION

A relation is a set of ordered pairs. Any set of ordered pairs is, therefore, a relation. The set of first components of the ordered pairs is called the domain and the set of second component is called the range, *e.g.,* in the relation, {(5, 7), (2, 9), (1, 4), (0, 1)}, the domain is {5, 2, 1, 0} and the range is {7, 9, 4, 1}.

Notation for relation : The letter 'R' is used to designate a relation. *For example,*

(*i*) R = {(2, 9), (3, 8), (4, 7), (6, 10)}

(*ii*) R = {(x, y) : x, $y \in$ W, $y = x^2$}.

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The notation xRy: If (x, y) is a member of a relation R, then the symbol xRy is also used and read 'x is the relation R to y, *i.e.*, $(x, y) \in R \Rightarrow xRy$.

Some Particular Relations on a Set

Let A be any (non-empty) set:

(*i*) **Empty relation:** As $\phi \subset A \times A$, ϕ is a relation on A. This relation is called the empty relation on A.

For example: Consider the relation R on the set A = (1, 2, 3) given by

$$R = \{(a, b) : a, b \in A, a + b = 10\}$$

Here $A \times A = \{(1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (2, 3), (3, 1), (3, 2), (3, 3)\}$ and we note that no pair (a, b) in $A \times A$ satisfies the condition $a + b = 10$, so R is empty set. Therefore, R is the empty relation.

(*ii*) **Universal relation:** As $A \times A \subset A \times A$, $A \times A$ is a relation on A. This relation is called the universal relation on A.

For example: Consider the relation R on the set A = {1, 2, 3} given by

$$R = \{(a, b) : a, b \in A, |a - b| \geq 0\}$$

We note that all pairs (b, a) in $A \times A$ satisfy $|a - b| \geq 0$, so R is the whole set $A \times A$. Therefore, R is the universal relation.

Both the empty relation and the universal relation are sometimes called trivial relations.

(*iii*) **Identity relation:** The relation $I_A = \{(a, a)$; for all $a \in A\}$ is called the identity relation on A. Note that in identity relation every element is related to itself only.

For example: If A = (1, 2, 3), then the identity relation on A is given by $I_A = \{(1, 1), (2, 2), (3, 3)\}$.

TYPES OF RELATIONS ON A SET

Let R be a relation on a (non-empty) set A, then R is called *a*

(*i*) reflexive relation iff a R a *i.e.*, $(a, a) \in R$ for all $a \in A$

(*ii*) symmetric relation iff a R b implies b R a *i.e.*, $(a, b) \in R$ implies $(a, c) \in R$ for all $a, b \in A$.

(*iii*) transitive relation iff a R b, b R c implies a R c *i.e.*, $(a, b) \in R$, $(b, c) \in R$ implies $(b, a) \in R$ for all $a, b, c \in A$.

Equivalence Relation

A relation R on a (non-empty) set A is called on equivalence relation iff it is:

(*i*) reflexive (*ii*) symmetric and (*iii*) transitive *i.e.*, iff

(*i*) a R a for all $a \in A$

(*ii*) a R b implies b R a for all $a, b \in A$ and

(*iii*) a R b, b R c implies a R c for all $a, b, c \in A$

FUNCTIONS

A function is simply used to represent the dependence of one quantity on the other and easily defined with the help of the concept of mapping. In simple words, a function is a relation which derives one output for each input.

The set A is called the domain of the function and the set B is called co-domain of the function. The set C of all members of B associated to members of A by the function is called the range of the function. Thus, in the function displayed in Fig.

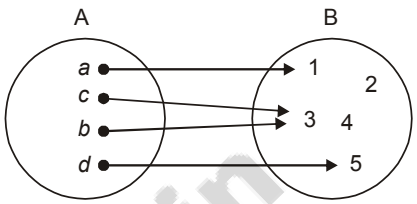

Fig.

Domain = $\{a, b, c, d\}$, Codomain = {1, 2, 3, 4, 5}, Range = {1, 3, 5}.

Note: Obviously, the range is the subset of co-domain.

TYPES OF FUNCTIONS

1. **One-one function:** A function 'f' from X to Y is called one-one (or injective) iff different elements of X have different images in Y *i.e.*, iff $x_1 \neq x_2 \Rightarrow f(x_1) \neq f(x_2)$ for all $x_1, x_2 \in x$, or equivalently, $f(x_1) = f(x_2) \Rightarrow x_1 = x_2$ for all $x_1, x_2 \in X$.
2. **Many-one function:** A function 'f' from X to Y is called many-one iff two or more elements of X have same image in Y. In other words, a function 'f' from X to Y is called many-one iff it is not one-one.
3. **Onto function:** A function 'f' from X to Y is called onto (or surjective) iff each elements of Y is the image of at least one element of X i.e., iff codomain of f = range of f *i.e.* iff $Y = f(X)$.
4. **Into function:** A function 'f' from X to Y is called into iff there exists at least one element in Y which is not the image of any element of X i.e., iff range of f is a proper subset of codomain of f. In other words, a function 'f' from X to Y is called into iff it is not onto.
5. **One-one correspondence:** A function 'f' from X to Y is called a one-one correspondence (or bijective) iff f is both one-one and onto.

Even and Odd Functions

A real function f is called an even function iff $f(-x) = f(x)$ for all $x \in D_f$ and f is called an odd function iff $f(-x) = -f(x)$ for all $x \in D_f$.

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DE MORGAN'S LAW

The complement of the union of two sets is the intersection of their complements and the complement of the intersection of two sets is the union of their complements. These are called De Morgan's laws.

(*i*) $(A \cup B)' = A' \cap B'$

(*ii*) $(A \cap B)' = A' \cup B'$

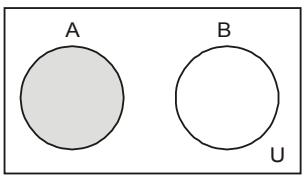
APPLICATION OF SET THEORY

If A is a finite set, then the number of elements in A is denoted by $n(A)$.

If A and B are two finite sets, then two cases arise:

Case 1: If A and B are disjoint, then there is no common element in A and B.

Therefore, $n(A \cup B) = n(A) + n(B)$



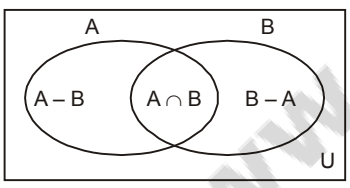
Case 2: If A and B are not disjoint, then there are common elements in A and B. We have

(*i*) $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

(*ii*) $n(A \cup B) = n(A - B) + n(B - A) + n(A \cap B)$

(*iii*) $n(A) = n(A - B) + n(A \cap B)$

(*iv*) $n(B) = n(B - A) + n(A \cap B)$



INVERSE FUNCTION

In mathematics, the inverse function of a function f is a function that undoes the operation of f. The inverse of f exists if and only if f is bijective, and if it exists, is denoted by $f'\{-1\}$.

PEANO AXIOMS

Peano axioms, also known as Peano's postulates, in number theory, five axioms introduced in 1889 by Italian mathematician Giuseppe Peano.

The five Peano axioms are:

1. Zero is a natural number.
2. Every natural number has a successor in the natural numbers.
3. Zero is not the successor of any natural number.
4. If the successor of two natural numbers is the same, then the two original numbers are the same.
5. If a set contains zero and the successor of every number is in the set, then the set contains the natural numbers.

INDICES

When a number 'P' is multiplied by itself 'n' time, then the product is called nth power of 'P' and is written as P^n. Here, P is called the base and n is known as the index of the power. Therefore, P^n is the exponential expression. P^n is read as 'P raised to the power n' or 'P to the power n'.

LAWS OF INDICES

Let P, Q be two real numbers and m, n be two positive integers, then

(*i*) $P^m \times P^n = P^{m+n}$

(*ii*) $\dfrac{P^m}{P^n} = P^{m-n}$

(*iii*) $(P^m)^n = P^{mn}$

(*iv*) $(PQ)^n = P^n \times Q^n$

(*v*) $\left(\dfrac{P}{Q}\right)^n = \dfrac{P^n}{Q^n}$

(*vi*) $P^0 = 1$

(*vii*) $P^{-n} = \dfrac{1}{P^n}$

SURDS

When root of a non-negative rational number (*i.e.*, quantities of type $\sqrt[n]{a}, a$ being a rational number) does not provide an exact solution, then this root is called a surd. *For example,* $\sqrt{2}, \sqrt{5}, 3\sqrt{8}, a+\sqrt{b}$, etc.

- All surds are irrational numbers.
- All irrational numbers are not surds.

LAWS OF SURDS

Let P, Q be two positive rational numbers and m, n be two positive integers, then

(*i*) $\sqrt[m]{P} = P^{1/m}$

(*ii*) $\sqrt[m]{PQ} = \sqrt[m]{P} \times \sqrt[m]{Q}$

(*iii*) $m\sqrt{\dfrac{P}{Q}} = \dfrac{\sqrt[m]{P}}{\sqrt[m]{Q}}$

(*iv*) $\left(\sqrt[m]{P}\right)^m = P$

(*v*) $\left(\sqrt[m]{P}\right)^n = (P^{1/m})^n = P^{n/m} = \sqrt[m]{P^n}$

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PROGRESSIONS

There are three types of progressions, which are as follow:

Arithmetic Progression (AP)

The progression of the form a, $a + d$, $a + 2d$, $a + 3d$,... is known as an arithmetic progression with first term a and common difference d. We have,

(*i*) nth term, $T_n = a + (n - 1)d$

(*ii*) Sum of n terms of AP, $S_n = \frac{n}{2}[2a + (n-1)d]$

(*iii*) Sum of n terms, $S_n = \frac{n}{2}[a + l)$, where, l = last term

Geometric Progression (GP)

The progression of the form a, ar, ar^2, ar^3, ... is known as a geometric progression with first term a and common ratio r. We have,

(*i*) nth term of GP, $T_n = ar^{n-1}$

(*ii*) Sum of n terms of GP, $S_n = \frac{a(1-r^n)}{(1-r)}$, where $r < 1$

(*iii*) Sum of n terms of GP, $S_n = \frac{a(r^n - 1)}{r-1}$, where $r > 1$

(*iv*) Sum of an infinite GP, $S_\infty = \frac{a}{1-r}$

Harmonic Progression (HP)

A series of quantities a_1, a_2, a_3, a_4, ..., a_n is said to be in HP when their reciprocals $\frac{1}{a_1}, \frac{1}{a_2}, \frac{1}{a_3}, ..., \frac{1}{a_n}$ are in AP.

- The converse is also true.
- Simply, there is no general formula for the sum of any number of quantities in HP. All questions in HP are generally solved by inverting the terms and making use of the properties of the corresponding AP.

PARTIAL FRACTIONS

When a rational expression is split into the sum of two or more rational expressions, the rational expressions that are a part of the sum are called partial fractions. This is referred to as splitting the given algebraic fraction into partial fractions. The denominator of the given algebraic expression has to be factorized to obtain the set of partial fractions.

Factor in denominator	Term in partial fraction decomposition
$ax + b$	$\frac{A}{ax+b}$
$(ax + b)^k$	$\frac{A_1}{ax+b} + \frac{A_2}{(ax+b)^2} + ... + \frac{A_k}{(ax+b)^k}$
$ax^2 + bx + c$	$\frac{Ax+B}{ax^2+bx+c}$
$(ax^2 + bx + c)^k$	$\frac{A_1x+B_1}{ax^2+bx+c} + \frac{A_2x+B_2}{(ax^2+bx+c)^2} + ... + \frac{A_kx+B_k}{(ax^2+bx+c)^k}$

BINOMIAL EXPRESSION

An algebraic expression consisting of two terms is called a binomial expression.

e.g., $(x + y)$, $(2x - 3y)$, $\left(x + \frac{1}{3x}\right)$, $\left(\frac{5}{6} - \frac{4}{x^2}\right)$ etc.

The theorem that gives a formula for the expansion of some power of a binomial expression is known as binomial theorem.

BINOMIAL THEOREM FOR POSITIVE INTEGRAL INDEX

Theorem: If x and y are real numbers, then for all $n \in N$,

$$(x + y)^n = {}^nC_0 x^n y^0 + {}^nC_1 x^{n-1} y^1 + {}^nC_2 x^{n-2} y^2 + ... + {}^nC_{n-1} x^1 y^{n-1} + {}^nC_n x^0 y^n$$

Some Observation in a Binomial Expansion

For $n \in N$, in the expansion of $(x + y)^n$

(*i*) the number of terms is $n + 1$.

(*ii*) the exponent of x decreases from n to 0.

(*iii*) the exponent of y increases from 0 to n.

(*iv*) the sum of exponents of x and y in any terms is n.

(*v*) ${}^nC_0$, ${}^nC_1$, ${}^nC_2$, ... ${}^nC_n$ are called binomial coefficients.

Since ${}^nC_r = {}^nC_{n-r}$

we have ${}^nC_0 = {}^nC_n$, ${}^nC_1 = {}^nC_{n-1}$, ${}^nC_2 = {}^nC_{n-2}$, ...

Important Particular Cases of the Binomial Expansion

(*i*) $(x - y)^n = {}^nC_0 x^n y^0 - {}^nC_1 x^{n-1} y^1 + {}^nC_2 x^{n-2} y^2 - .... + (-1)^n\, {}^nC_n\, x^0 y^n.$

(*ii*) $(1 + x)^n = {}^nC_0\, 1^n\, x^0 + {}^nC_1\, 1^{n-1}\, x^1 + {}^nC_2\, 1^{n-2} x^2 + ... + {}^nC_n\, 1^0\, x^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + ... + x^n.$

(*iii*) $(1 - x)^n = (1 + (-x))^n = {}^nC_0\, 1^n\, (-x)^0 + {}^nC_1\, 1^{n-1}\, (-x)^1 + {}^nC_2\, 1^{n-2}\, (-x)^2 + ... + {}^nC_n\, 1^0\, (-x)^n$

$= 1 - nx + \frac{n(n-1)}{2!}x^2 + ... + (-1)^n x^n.$

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(*iv*) The general term or the $(r + 1)^{th}$ term in the expansion of $(x + y)^n$ is given by

$$T_{r+1} = {}^nC_r x^{n-r}.\ y^r$$

(*v*) The middle term(s) is the expansion of $(x + y)^n$ is (are):

(*a*) If n is even, there is only one middle term which is given by:

$$T_{(n+2)/2} = {}^nC_{n/2}.x^{n/2}.y^{n/2}$$

(*b*) If n is odd, there are two middle terms which are:

$$T_{(n+1)/2}\ \&\ T_{[(n+1)/2]+1}$$

(*vi*) Term independent of x contains no x; Hence find the value of r for which the exponent of x is zero.

(*vii*) To find the numerically greatest term is the expansion of $(1 + x)^n$, $n \in N$ find $\frac{T_{r+1}}{T_r} = \frac{{}^nC_r x^r}{{}^nC_{r-1}x^{r-1}} = \frac{n-r+1}{r}x.$

Put the absolute value of x and find the value of r Consistent with the inequality $\frac{T_{r+1}}{T_r} > 1.$

Note that the numerically greatest term in the expansion of $(1 - x)^n$, $x > 0$, $n \in N$ is the same as the greatest term in $(1 + x)^n$.

Binomial Coefficients

(*i*) $C_0 + C_1 + C_2 + ... + C_n = 2^n$

(*ii*) $C_0 + C_2 + C_4 + ... = C_1 + C_3 + C_5 + ... = 2^{n-1}$

(*iii*) $C_0^2 + C_1^2 + C_2^2 + ... + C_n^2 = {}^{2n}C_n = \frac{(2n)!}{n!n!}$

(*iv*) $C_0.C_r + C_1.C_{r+1} + C_2.C_{r+2} + ... + C_{n-r}.C_n = \frac{(2n)!}{(n+r)(n-r)!}$

Remember: $(2n)! = 2^n.n!\ [1.\ 3.\ 5\ ....\ (2n - 1)]$

Exponential Series

(*i*) $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + ...\infty$; where x may be any real or complex & $e = \underset{a \to \infty}{\text{Limit}}\left(1 + \frac{1}{n}\right)^a$

(*ii*) $a^x = 1 + \frac{x}{1!}\ln a + \frac{x^2}{2!}\ln^2 a + \frac{x^3}{3!}\ln^3 a + ...\infty$ where $a > 0$

Note: (*a*) $e = 1 + \frac{1}{1!} + \frac{1}{2!} + \frac{1}{3!} + ...\infty$

(*b*) e is an irrational number lying between 2.7 & 2.8. Its value correct upto 10 places of decimal is 2.7182818284.

(*c*) $e + e^{-1} = 2\left(1 + \frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + ...\infty\right)$

(*d*) $e - e^{-1} = 2\left(1 + \frac{1}{3!} + \frac{1}{5!} + \frac{1}{7!} + ...\infty\right)$

(*e*) Logarithms to the base 'e' are known as the Napierian system, so named after Napier, their inventor. They are also called Natural Logarithm.

Logarithmic Series

(*i*) $\ln(1 + x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + ...\infty$

where $-1 < x \le 1$

(*ii*) $\ln(1 - x) = -\ x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} + ...\infty$

where $-1 \le x < 1$

(*iii*) $\ln\frac{(1+x)}{(1-x)} = 2\left(x + \frac{x^3}{3} + \frac{x^5}{5} + ...\infty\right) |x| < 1$

Remember: (*a*) $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + ...\infty = \ln 2$

(*b*) $e^{\ln x} = x$ (*c*) $\ln 2 = 0.693$ (*d*) $\ln 10 = 1$

DETERMINANTS

To every square matrix $A = [a_{ij}]$ of order n, we can associate a number (real or complex) called determinant of the matrix A, written as det A, where a_{ij} is the (i, j)th element of A.

If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, then determinant of A, denoted by $|A|$ (or det A), is given by

$$|A| = \begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc.$$

Remarks

(*i*) Only square matrices have determinants.

(*ii*) For a matrix A, $|A|$ is read as determinant of A and not, as modulus of A.

Properties of Determinants

For any square matrix A, $|A|$ satisfies the following properties.

(*i*) $|A'| = |A|$, where A' = transpose of matrix A.

(*ii*) If we interchange any two rows (or columns), then sign of the determinant changes.

(*iii*) If any two rows or any two columns in a determinant are identical (or proportional) then the value of the determinant is zero.

(*iv*) Multiplying a determinant by k means multiplying the elements of only one row (or one column) by k.

(*v*) If we multiply each element of a row (or a column) of a determinant by constant k, then value of the determinant is multiplied by k.

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(*vi*) If elements of a row (or a column) in a determinant can be expressed as the sum of two or more elements, then the given determinant can be expressed as the sum of two or more determinants.

System of Linear Equations

(*i*) Consider the equations:

$$a_1x + b_1y + c_1z = d_1$$
$$a_2x + b_2y + c_2z = d_2$$
$$a_3x + b_3y + c_3z = d_3$$

In matrix form, these equations can be written as AX = B, where

$$A = \begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}, X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \text{ and } B = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$$

(*ii*) Unique solution of equation AX = B is given by $X = A^{-1}B$, where $|A| \neq 0$.

(*iii*) A system of equations is consistent or inconsistent according as its solution exists or not.

(*iv*) For a square matrix A in matrix equation AX = B.

(*a*) If $|A| \neq 0$, then there exists unique solution.

(*b*) If $|A| = 0$ and (*adj* A) B $\neq 0$, then there exists no solution.

(*c*) If $|A| = 0$ and (*adj* A) B = 0, then system may or may not be consistent.

MATRICES

Matrices are the ordered rectangular array of numbers, which are used to express linear equations. A matrix has rows and columns. We can also perform the mathematical operations on matrices such as addition, subtraction, multiplication of matrix. Suppose the number of rows is m and columns is n, then the matrix is represented as $m \times n$ matrix.

INVERSE OF A MATRIX

Inverse of a matrix is defined usually for square matrices. For every $m \times n$ square matrix, there exists an inverse matrix. If A is the square matrix, then A^{-1} is the inverse of matrix A and satisfies the property:

$AA^{-1} = A^{-1}A = I$, where I is the Identity matrix.

Also, the determinant of the square matrix here should not be equal to zero.

MULTIPLE CHOICE QUESTIONS

1. If $f : [0, \infty) \to [0, \infty)$ and $f(x) = \dfrac{x}{1+x}$, then f is:

A. one-one and onto
B. one-one but not onto
C. onto but not one-one
D. neither one-one nor onto

2. For the sets of real numbers given by:

$R_1 = \{(x, y) : x \in R, y \in R, x^2 + y^2 \leq 25\}$

$R_2 = \{(x, y) : x \in R, y \in R, 9y \geq 4x^2\}$,

$R_1 \cap R_2$ is:

A. one-to-one
B. onto
C. one-to-one and onto
D. None of these

3. Given $f(x) = \ln\dfrac{1+x}{2-x}$ and $g(x) = \dfrac{3x+x^3}{1+3x^2}$. Then $f(g(x))$ is equal to:

A. $-f(x)$
B. $3f(x)$
C. $[f(x)]^2$
D. None of these

4. If a function satisfies the condition $f\left(x+\dfrac{1}{x}\right) = x^2 + \dfrac{1}{x^2}$, $x \neq 0$, then domain of $f(x)$ is:

A. $[-2, 2]$
B. $(-\infty, -2] \cup [2, \infty)$
C. $(0, \infty)$
D. None of these

5. For $|x - 1| + |x - 2| + |x - 3| \leq 6$, x belongs to:

A. $0 \leq x \leq 4$
B. $x \leq 0$ or $x \geq 4$
C. $x \leq -2$ or $x \geq 4$
D. none of these

6. If $f(x) + 2f(1 - x) = x^2 + 2 \ \forall \ x \in R$, then $f(x)$ is given as:

A. $\dfrac{(x-2)^2}{3}$
B. $x^2 - 2$
C. 1
D. None of these

7. Let $f : N \to N$ be defined as

$$f(n) = \begin{cases} \dfrac{n+1}{2} & \text{if } n \text{ is odd} \\ \dfrac{n}{2} & \text{if } n \text{ is even} \end{cases}$$

. Then f is :

A. one-to-one
B. one-to-one and onto
C. onto
D. None of these

8. Let the positive numbers a, b, c, d be in A.P. Then abc, abd, acd, bcd are:

A. Not in A.P./G.P./H.P.
B. in A.P.
C. in G.P.
D. in H.P.

9. The harmonic mean of the roots of the equation

$\left(5+\sqrt{2}\right)x^2 - \left(4+\sqrt{2}\right)x + 8 + 2\sqrt{2} = 0$ is:

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A. 2 B. 4
C. 6 D. 8

10. If $\cos(x - y)$, $\cos x$ and $\cos(x + y)$ are in H.P., then value of $\cos x \sec(y/2)$ is:
A. $\pm\sqrt{2}$ B. $\pm\sqrt{3}$
C. ± 2 D. ± 1

11. For a positive integer n,
let $a(n) = 1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+...+\frac{1}{(2^n)-1}$. Then
A. $a(200) > 100$ B. $a(100) < 100$
C. $a(50) < 25$ D. None of these

12. Let $S = \frac{4}{19}+\frac{44}{19^2}+\frac{444}{19^3}+...$ upto ∞. Then S is equal to:
A. $\frac{38}{81}$ B. $\frac{4}{19}$
C. $\frac{36}{171}$ D. None of these

13. If $a, b, c, ...$ are in G.P., and $a^{1/x} = b^{1/y} = c^{1/z} = ...$, then $x, y, z, ...$ are in:
A. H.P. B. G.P.
C. A.P. D. None of these

14. If $a^x = b^y = c^z = d^u$ and a, b, c, d are in G.P., then x, y, z, u are in:
A. A.P. B. G.P.
C. H.P. D. None of these

15. If a, b, c, d and p are distinct real numbers such that $(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + d^2) \le 0$, then a, b, c, d are in:
A. A.P. B. G.P.
C. H.P. D. None of these

Directions (Qs. No. 16-18): In the expansion of $\left(x^3 - \frac{1}{x^2}\right)^n$, where n is a positive integer, the sum of the coefficients of x^5 and x^{10} is 0.

16. What is n equal to?
A. 5 B. 10
C. 15 D. None of these

17. What is the value of the independent term?
A. 5005 B. 7200
C. – 5005 D. – 7200

18. What is the sum of the coefficients of the two middle terms?
A. 0 B. 1
C. –1 D. None of these

19. If the matrix $A = \begin{bmatrix} 2-x & 1 & 1 \\ 1 & 3-x & 0 \\ -1 & -3 & -x \end{bmatrix}$ is singular, then what is the solution set S?
A. S = {0, 2, 3} B. S = {–1, 2, 3}
C. S = {1, 2, 3} D. S = {2, 3}

20. If $l + m + n = 0$, then the system of equations $-2x + y + z = l$, $x - 2y + z = m$, $x + y - 2z = n$ has:
A. a trivial solution
B. no solution
C. a unique solution
D. infinitely many solutions

21. If $y(k) = \left(k^3 - \frac{1}{k}\right)^{2p} + \left(k^3 + \frac{1}{k}\right)^{2p}$, then function $y(k)$ is:
A. Even function
B. Odd function
C. Periodic function
D. Neither even nor odd function

22. The number of dissimilar terms in the expansion of $(a + b)^n$ is $n + 1$, therefore number of dissimilar terms in the expansion of $(a + b + c)^{12}$ is
A. 36 B. 91
C. 56 D. 48

23. Find the ratio of coefficient of x^{-37} and x^8 in the expansion of $\left(x^5 - \frac{1}{x^4}\right)^{16}$:
A. $\frac{(8!)^2}{3!(13)!}$ B. $\frac{13!3!}{8!5!}$
C. $-\frac{(8!)^2}{3!(13)!}$ D. None of these

24. If the ratio of coefficient of three consecutive term in the binomial expansion of $(1 + k)^p$ is 182:84:30. Then the average of these three consecutive terms are:
A. 18 B. 13
C. 12 D. 14

25. If the number $N = (13^{99} - 19^{93})$ is completely divisible by integer r. Then value r is:
A. 84 B. 172
C. 162 D. 144

26. In the expansion of $\left(\frac{x^3}{y} - \frac{y^3}{x}\right)^{12}$, find the ratio of the coefficient of the term independent of x and the coefficient of the term independent of y.
A. 3 B. 1
C. 12/7 D. None of these

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27. Find the term independent of x in $\left(1+\frac{1}{x}\right)^p (1+x)^q$ is:

A. ${}^{p+q}c_{p-q}$ B. ${}^{p+q}c_p$
C. ${}^{p+q}c_q$ D. None of these

28. The coefficient of x^6 in the expansion of:
$(1 - x - x^2 + x^3)^9$ is
A. 162 B. 605
C. 2430 D. None of these

29. If $(1 - 3x^2 + 2x^3)^6 = 1 + a_1x + a_2x^2 + ... + a_{18}x^{18}$, then $a_2 + a_4 + a_6 .... + a_{18}$
A. 2048 B. – 1811
C. – 2048 D. 2084

30. Find the numerical value of highest term in the expansion of $(p + q)^{15}$, where $p = 2$ and $q = 3$.
A. ${}^{15}c_6 3^9 2^6$ B. ${}^{15}c_9 2^9.3^6$
C. ${}^{15}c_8 3^8 2^7$ D. None of these

31. For the given system of equations $3\alpha x + 6y - 6z = 2$, $12x + 6\alpha y - 3z = 4$, $18x + 18y + 3\alpha z = 5$ has a unique solution, then α is not equal to:
A. 1 B. 4
C. 3 D. None of these

32. If $m, n \neq 0$, and $f(k) = m^k + n^k$ and

$$\begin{bmatrix} 3 & 1+f(1) & 1+f(2) \\ 1+f(1) & 1+f(2) & 1+f(3) \\ 1+f(2) & 1+f(3) & 1+f(3) \end{bmatrix} = a(1-m)^2(1-n)^2(m-n)^2,$$

then a is equal to
A. –1 B. 1
C. $m.n$ D. $\frac{1}{m.n}$

33. If $K(a) = \begin{bmatrix} \cos a & -\sin a \\ \sin a & \cos a \end{bmatrix}$, $[K(-b) = ?]$
Then which of the following are correct?
I. $K(a) \times K(-b) = -K(a - b)$
II. $K(a) \times K(-b) = K(a - b)$
III. The determinant of $K(a)$ is a cubic number.
A. Only I B. II and III
C. I and III D. I, II and III

34. Find the value of the determinant given below

$$\begin{bmatrix} \log a_n & \log a_{n+1} & \log a_{n+2} \\ \log a_{n+3} & \log a_{n+4} & \log a_{n+5} \\ \log a_{n+6} & \log a_{n+7} & \log a_{n+8} \end{bmatrix}$$

Here, $a_1, a_2, a_3, ..., a_n$ are in G.P.
A. 4 B. 0
C. –2 D. None of these

35. The system of equations
$k - rm - qn = 0$
$m - pn - rk = 0$
$n - qk - pm = 0$
Where k, m, n are not all zero, then
A. $p^2 + q^2 + r^2 - 2pqr = 1$
B. $p^2 + q^2 + r^2 + 2pqr = 1$
C. $p^2 + q^2 + r^2 + 2pqr = 0$
D. None of these

36. Let $P = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ -2 & -4 & -5 \end{bmatrix}$ and $Q = \begin{bmatrix} 3 & -2 & -1 \\ -4 & 1 & \beta \\ 2 & 0 & 1 \end{bmatrix}$.
If Q is the inverse of matrix P, then β is:
A. 5 B. –1
C. 2 D. –2

37. Equations $x + y + z = 6$, $x + 2y + 3z = 10$ and $x + 2y + \gamma z = \delta$ have infinite solutions.
Then which of the following are correct?
I. Product $(\gamma + \delta) * (\delta - \gamma)$ gives a number multiple of 8.
II. Product $(\gamma + \delta) * (\delta - \gamma)$ = L.C.M. of (γ, δ)
III. Number $(\gamma + \delta)$ and $(\delta - \gamma)$ are prime number.
A. Only I B. Only II
C. Only III D. I, II and III

38. Consider the system of simultaneous linear equations $p + 2aq + a = 0$, $p + 3bq + b = 0$ and $p + 4cq + c = 0$ has a non-zero solution, then a, b, c are in
A. A.P.
B. G.P.
C. H.P.
D. $3a + 2b + c = 0$

39. Consider the system of linear simple equations $x + 8ay - 2az = 0$, $x + 6by - 2bz = 0$ and $x + 4cy - 2cz = 0$. The relation among a, b and c for which the given equations are consistent are :
A. Satisfy $a + 2b - 3c = 0$
B. in A.P.
C. in G.P.
D. in H.P.

40. If $\Delta_k = \begin{bmatrix} \sin^2(n+1) & \sin^2(n^2) & \sin^2(n) \\ 2k-1 & c_k^{2n+1} & 1 \\ n^2-1 & 2^{2n} & n+1 \end{bmatrix}$ then value of $\sum_{k=0}^{n} \Delta_k$ is
A. 4 B. 3
C. 2 D. 0

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ANSWERS

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
B	D	B	B	A	A	C	D	B	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A	A	C	A	B	C	C	A	A	D
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
A	B	C	D	C	B	C	A	C	A
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
D	B	B	B	B	B	C	C	D	D

EXPLANATORY ANSWERS

1. The given function is $f(x)=\frac{x}{1+x}=1-\frac{1}{1+x}$.

Hence its range is [0, 1) which is a subset of [0, ∞). Also the function is one-one.

2. Here $x^2 + y^2 \le 25$ are the elements of R_1 lying with in and on the circle $x^2 + y^2 - 25$, where as $4x^2 \le 9y$ are the elements of R_2 lying with in and on the parabola $4x^2 = 9y$.

Hence relation $R_1 \cap R_2$ is not a function.

Hence (D) is the correct answer.

3. $$f(g(x))=\ln\frac{1+g(x)}{1-g(x)}=\ln\frac{1+\frac{3x+x^3}{1+3x^2}}{1-\frac{3x+x^3}{1+3x^2}}$$

$$= \ln\frac{(1+x)^3}{(1-x)^3}=3\ln\frac{1+x}{1-x}$$

$$= 3f(x)$$

Hence (B) is the correct answer.

4. $$f\left(x+\frac{1}{x}\right) = \left(x+\frac{1}{x}\right)^2-2$$

$\Rightarrow$ $f(y) = y^2 - 2$,

where $y = x+\frac{1}{x}$

for $x > 0$, $y = x+\frac{1}{x}\ge 2$

and for $x < 0$, $y = x+\frac{1}{x}\le -2$

5. We have,

$|x - 1 + x - 2 + x - 3| \le |x - 1| + |x - 2| + |x - 3| \le 6$

$\Rightarrow |3x - 6| \le 6 \Rightarrow -6 \le 3x - 6 \le 6 \Rightarrow 0 \le x \le 4$.

6. By replacing x with $(1 - x)$ in the given expression, we get

$f(1 - x) + 2f(1 - 1 + x) = (1 - x)^2 + 2$

$\Rightarrow$ $f(1 - x) + 2f(x) = (1 - x)^2 + 2$

Now, $f(x) + 2f(1 - x) - 2(f(1 - x) + 2f(x))$

$= x^2 + 2 - 2((1 - x)^2 + 2)$

$\Rightarrow$ $-3f(x) = x^2 + 2 - 2(3 - 2x + x^2)$

$\Rightarrow$ $3f(x) = x^2 - 4x + 4$

$\Rightarrow$ $f(x) = \frac{(x-2)^2}{3}$.

7. Here, $f(3) = 2$, $f(4) = 2$

Hence f is not one-to-one. Also

$f(1) = 1$, $f(2) = 1$, $f(3) = 2$, $f(4) = 2$, $f(5) = 3$, $f(6) = 3$, ... $f(2n = 1) = n$

and $f(2n) = n \Rightarrow$ Range of f = N.

Hence (C) is correct answer.

8. a, b, c, d are in A.P.

$\Rightarrow \frac{1}{a},\frac{1}{b},\frac{1}{c},\frac{1}{d}$ are in H.P. $\Rightarrow \frac{1}{d},\frac{1}{c},\frac{1}{b},\frac{1}{a}$ are in H.P.

Now multiply each term by $abcd$.

We ge, $\frac{abcd}{d},\frac{abcd}{c},\frac{abcd}{b},\frac{abcd}{a}$ are in H.P.

or, abc, abd, acd, bcd are in H.P.

9. $$\alpha + \beta = \frac{4+\sqrt{2}}{5+\sqrt{2}},$$

$$\alpha\beta = \frac{8+2\sqrt{2}}{5+\sqrt{2}}$$

$$\text{H.M.} = \frac{2\alpha\beta}{\alpha+\beta}=\frac{16+4\sqrt{2}}{4+\sqrt{2}}=4$$

10. $$\frac{2}{\cos x} = \frac{1}{\cos(x-y)}+\frac{1}{\cos(x+y)}$$

$\Rightarrow$ $2(\cos^2 x - \sin^2 y) = 2\cos x \cos x \cos y$

$\Rightarrow$ $\cos^2 x (1 - \cos y) = \sin^2 y = 1 - \cos^2 y$

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$\Rightarrow \qquad \cos^2 x = 1+\cos y = 2\cos^2\left(\frac{y}{2}\right)$

$\Rightarrow \qquad \cos x \sec\left(\frac{y}{2}\right) = \pm\sqrt{2}.$

11. $a(2n) = 1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+...+\frac{1}{2^{2n}-1}$

$> 1+\frac{1}{2}+\left(\frac{1}{3}+\frac{1}{4}\right)+\left(\frac{1}{5}+\frac{1}{6}+\frac{1}{7}+\frac{1}{8}\right)+...$

$+\left(\frac{1}{2^{2n-1}+1}+...+\frac{1}{2^{2n}}\right)-\frac{1}{2^{2n}}$

$> \frac{1}{2}+\frac{1}{2}+\frac{2}{4}+\frac{4}{8}+...+\frac{2^{2n-1}}{2^{2n}}+\left(\frac{1}{2}-\frac{1}{2^{2n}}\right) > \frac{n}{2}$ if $n > 1$

$\therefore \qquad a(200) > 100.$

12. $S = \frac{4}{19}+\frac{44}{19^2}+\frac{444}{19^3}+... \qquad ...(1)$

$\frac{1}{19}S = \frac{4}{19^2}+\frac{44}{19^3}+... \qquad ...(2)$

Subtracting (2) from (1), we get

$\left(\frac{18}{19}\right)S = \frac{4}{19}+\frac{40}{19^2}+\frac{400}{19^3}+...$

$= \frac{4/19}{1-10/19} = \frac{4}{9}$

$\Rightarrow \qquad S = \frac{19}{18}\times\frac{4}{9} = \frac{38}{81}$

13. $a^{1/x} = b^{1/y} = c^{1/z} = ... = k$(say)

$\Rightarrow \qquad \frac{\log a}{x} = \frac{\log b}{y} = \frac{\log c}{z} = ... \log k,$

As, a, b, c are in G.P.

then, $\qquad b^2 = ac$

$2 \log b = \log a + \log c$

Now, use $\log a$, $\log b$, $\log c$ ... are in A.P.

x, y and z are in A.P.

14. $a^x = b^y = c^z = d^u$

$\Rightarrow \qquad x \log a = y \log b = z \log c = u \log d$

$\Rightarrow \qquad \frac{\log a}{1/x} = \frac{\log b}{1/y} = \frac{\log c}{1/z} = \frac{\log d}{1/u}$

Now, use $\log a$, $\log b$, $\log c$, $\log d$ are in A.P.

15. $(a^2p^2 - 2abp + b^2) + (b^2p^2 - 2bcp + c^2)$
$+ (c^2p^2 - 2cdp + d^2) \le 0$

$\Rightarrow (ap - b)^2 + (bp - c)^2 + (cp - d)^2 \le 0$

As a, b, c, d and p are real this is possible if and only if:

$ap - b = 0,$
$bp - c = 0,$
$cp - d = 0$

$\Rightarrow \qquad \frac{b}{a} = \frac{c}{b} = \frac{d}{c}$

$\Rightarrow a, b, c, d$ are in G.P.

17. For the independent term,

put, $\quad 3n - 5r = 0$

$\Rightarrow \qquad 5r = 3n = 3 \times 15 \qquad [\because n = 15]$

$\therefore \qquad r = 9$

Now, put the value of r in eq.

We get, $\quad T_{9+1} = {}^{15}C_9(-1)^9.\ x^{(3\times 15 - 5\times 9)}$

$\Rightarrow \qquad T_{10} = -{}^{15}C_9.x^0 = -{}^{15}C_9 = -\frac{15!}{6!9!}$

$= -5005$

So, the value of independent term is -5005.

18. Since, $\qquad n = 15$

$\therefore$ Total term in the expansion of

$\left(x^3 - \frac{1}{x^2}\right)^{15}$ is 16.

So, middle term $= \left(\frac{16}{2}\right)$th term and $\left(\frac{16}{2}+1\right)$th term

= 8th term and 9th term

Now, the sum of the coefficients of the two middle terms

$= {}^{15}C_7(-1)^7 + {}^{15}C_8(-1)^8$

$= -{}^{15}C_7 + {}^{15}C_8$

$= -{}^{15}C_7 + {}^{15}C_7 \qquad [\because {}^nC_r = {}^nC_{n-r}]$

$= 0$

19. For the singular matrix.

$$\begin{vmatrix} 2-x & 1 & 1 \\ 1 & 3-x & 0 \\ -1 & -3 & -x \end{vmatrix} = 0$$

$\Rightarrow (2 - x)\ [x(x - 3)] - [-x] + [-3 + (3 - x)] = 0$

$\Rightarrow \qquad x(x - 3)\ (x - 2) = 0$

$\Rightarrow \qquad x = 0, 2, 3$

So, the solution set is, $S = \{0, 2, 3]$

20. $\Delta = \begin{bmatrix} -2 & 1 & 1 \\ 1 & -2 & 1 \\ 1 & 1 & -2 \end{bmatrix}$

$= -2(4 - 1) - 1(-2 - 1) + 1 + 2 = 0$

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$$\Delta = \begin{bmatrix} l & 1 & 1 \\ m & -2 & 1 \\ n & 1 & -2 \end{bmatrix} = \begin{bmatrix} l+m+n & 0 & 0 \\ m & -2 & 1 \\ n & 1 & -2 \end{bmatrix}$$

$[R_1 \to R_1 + R_2 + R_3]$

$[\because l + m + n = 0]$

$= 0$

Similarly, $\Delta_2 = \Delta_3 = 0$

Hence, the given system of equations has infinitely many solutions.

21. Given function $y(k) = \left(k^3 - \frac{1}{k}\right)^{2p} + \left(k^3 + \frac{1}{k}\right)^{2p}$

Binomial expansion of $\left(k^3 - \frac{1}{k}\right)^{2p}$

$$= {}^{2p}c_0(k^3)^{2p} - {}^{2p}c_1(k^3)^{2p-1}\left(\frac{1}{k}\right) + {}^{2p}c_2(k^3)^{2p-2}\left(\frac{1}{k}\right)^2 \ldots\ldots {}^{2p}c_{2p}\left(\frac{1}{k}\right)^{2p} \quad \ldots(1)$$

And, Binomial expansion of $\left(k^3 + \frac{1}{k}\right)^{2p}$

$$= {}^{2p}c_0(k^3)^{2p} + {}^{2p}c_1(k^3)^{2p-1}\left(\frac{1}{k}\right) + {}^{2p}c_2(k^3)^{2p-2}\left(\frac{1}{k}\right)^2 \ldots\ldots {}^{2p}c_{2p}\left(\frac{1}{k}\right)^{2p} \quad \ldots(2)$$

On adding (1) and (2), we get

$$y(k) = 2\left[{}^{2p}c_0(k^3)^{2p} + {}^{2p}c_2(k^3)^{2p-2}\left(\frac{1}{k}\right)^2 \ldots\ldots {}^{2p}c_{2p}\left(\frac{1}{k}\right)^{2p}\right]$$

On putting $k = -k$,

$$y(-k) = 2\left[{}^{2p}c_0(-k^3)^{2p} + {}^{2p}c_2(-k^3)^{2p-2}\left(-\frac{1}{k}\right)^2 \ldots\ldots {}^{2p}c_{2p}\left(-\frac{1}{k}\right)^{2p}\right]$$

Here, we see, in all term exponents of k is even term,

$$\therefore\ y(-k) = 2\left[{}^{2p}c_0(k^3)^{2p} + {}^{2p}c_2(k^3)^{2p-2}\left(\frac{1}{k}\right)^2 \ldots\ldots {}^{2p}c_{2p}\left(\frac{1}{k}\right)^{2p}\right]$$

Hence, $y(k) = y(-k)$. Thus the given function is even function.

22. Number of term in the expansion of $(a + b + c)^n$ is given by ${}^{n+2}C_2$.

Thus for $n = 12$; ${}^{n+2}C_2 = 14C_2 = \frac{14 \times 13}{2} = 91$.

Also, $(a + b + c)^{12} = [(a + b) + c]^{12}$

$= 12c_o\ (a + b)^{12} + 12c_1(a + b)^{11}\ c + \ldots + 12c_{12}c^{12}$

The R.H.S. contains, $13 + 12 + 11 + \ldots\ldots + 1$ terms

$$= \frac{13(13+1)}{2} = 91 \text{ terms}$$

23. Given expression : $\left(x^5 - \frac{1}{x^4}\right)^{16}$

Let r^{th} term have variable term x^{-37}, then

$${}^{16}c_r\left(x^5\right)^{16-r}\left(\frac{1}{x^4}\right)^r(-1)^r = k.x^{-37}$$

Where k = coefficient of the term

$\therefore \quad (x^5)^{16-r} \times x^{-4r} = x^{-37}$

$\Rightarrow \quad 80 - 9r = -37 \Rightarrow r = 13$

Now, coefficient of the term $(r = 13)$

$= {}^{16}c_{13}(-1)^{13} = -\ {}^{16}c_{13}$

Again, let t^{th} term have variable term x^8, then

$80 - 9t = 8 \Rightarrow t = 8$

Coefficient of the term $(t = 8) = {}^{16}c_8(-1)^8 = {}^{16}c_8$

$\therefore$ Required Ratio $= -\frac{{}^{16}c_{13}}{{}^{16}c_8} = -\frac{(8!)^2}{3!(13)!}$

24. Let the ratio of coefficient of three consecutive terms n^{th}, $(n + 1)^{th}$ and $(n + 2)^{th}$ is 182 : 84 : 30

Then, $\frac{{}^pc_{n-1}}{{}^pc_n} = \frac{182}{84} = \frac{13}{6}$

$$\frac{n}{p+1-n} = \frac{13}{6}$$

$6n = 13p - 13n + 13$

$\Rightarrow \quad 19n = 13p + 13 \quad \ldots(i)$

Similarly, $\frac{{}^pc_n}{{}^pc_{n+1}} = \frac{84}{30} = \frac{14}{5}$

$$\frac{\frac{p!}{(n)!(p-n)!}}{\frac{p!}{(n+1)!(p-n-1)!}} = \frac{14}{5}$$

$$\frac{n+1}{p-n} = \frac{14}{5}$$

$\Rightarrow \quad 5n + 5 = 14p - 14n$

$\Rightarrow \quad 19n = 14p - 5 \quad \ldots(ii)$

From (i) and (ii), we get $p = 18$ and $n = 13$

Then, three consecutive terms are 13th, 14th and 15th terms

And Average $= \frac{13+14+15}{3} = 14$

25. $13 = (1 + 3 \times 4)$ and $19 = (1 + 9 \times 2)$

Now, $13^{99} - 19^{93} = (1 + 3.4)^{99} - (1 + 9.2)^{93}$

$= \{{}^{99}c_0 + {}^{99}c_1(3 \times 4) + {}^{99}c_2(3 \times 4)^2 + \ldots\} - \{{}^{93}c_0 + {}^{93}c_1(9 \times 2) + {}^{93}c_2\ (9 \times 2)^2 \ldots\}$

$= \{1 + 99 \times 12 + {}^{99}c_2(12)^2 + \ldots\} - \{1 + 93 \times 18 + {}^{93}c_2(18)^2 \ldots\}$

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$= (99 \times 12 - 93 \times 18) + {}^{99}c_2(12)^2$
$+ {}^{99}c_3(12)^3 + 81 \times K$ (where k = Integer)
$= -486 + 144(99.49 + 9.98.97.2) + 81\ K$
$= -162 \times 3 + 8 \times 162(11 \times 49 + 11 \times 98 \times 97 \times 2) + 81\ K$

Now, we know that, Odd Number – Odd Number = Even number

So, K must be a even number. Thus 81 K must be a multiple of 162

So, $13^{99} - 19^{93} = -162 \times 3 + 8 \times 162(11 \times 49 + 11 \times 98 \times 97 \times 2) + 162\ m$
(Where m = Integer)
$= 162(-3 + 8(11 \times 49 + 11 \times 98 \times 97 \times 2) + m)$

Hence, $N = 13^{99} - 19^{93}$ is completely divisible by $r = 162$

26. Given expression : $\left(\frac{x^3}{y} - \frac{y^3}{x}\right)^{12}$

Let $(r + 1)^{th}$ term is independent from x.

$$(r+1)^{th} \text{ term} = {}^{12}c_r \left(\frac{x^3}{y}\right)^{12-r} \cdot \left(\frac{y^3}{x}\right)^r (-1)^r$$

As coefficient of $x = 0$,

$3(12 - r) - r = 0 \rightarrow r = 9$

Coefficient of term $(r = 9) = {}^{12}c_9(-1)^9 = -{}^{12}c_3$

Again, let $(t + 1)^{th}$ term is independent of y

$$(t+1)^{th} \text{ term} = {}^{12}c_t \left(\frac{x^3}{y}\right)^{12-t} \cdot \left(\frac{y^3}{x}\right)^t (-1)^t$$

As coefficient of $y = 0$, $t - 12 + 3t = 0$, $t = 3$

Coefficient of term $(t = 3) = {}^{12}c_3\ (-1)^3 = -{}^{12}c_3$

Now, Ratio of the coefficient $= \frac{-{}^{12}c_3}{-{}^{12}c_3} = 1$

27. Given Expression:

$$\left(1+\frac{1}{x}\right)^p (1+x)^q = \left(\frac{x+1}{x}\right)^p (1+x)^q$$

$$= \frac{(x+1)^{p+q}}{x^p} = x^{-p}(x+1)^{p+q}$$

Now, exponent of x in a term independent of variable $x = 0$

$\therefore$ Co-efficient of term independent of x in $x^{-p}(x + 1)^{p+q}$
= Co-efficient of x^p in $(x + 1)^{p+q}$

Expansion of $(x + 1)^{p+q} = {}^{p+q}c_0x^{p+q} + {}^{p+q}c_1x^{p+q-1} + ... + {}^{p+q}c_qx^{p+q-q} + ... {}^{p+q}c_{p+q}$

Now, Coefficient of $x^p = {}^{p+q}c_q$

Hence, coefficient of term independent of x in ${}^{p+q}c_q$

28. We have, $(1 - x - x^2 + x^3)^9$
$= (1 - x)^9\ (1 - x^2)^9$
$= (1 - 9c_1x + 9c_2x^2 - 9c_3x^3 + ... - 9c_9x^9)$
$\times (1 - 9c_1x^2 + 9c_2x^4 - 9c_3x^6 + ... - 9c_9x^{18})$

The terms which give x^6 are

$9c_6x^6 + 9c_2x^2.9c_2x^4 - 9c_4.x^4.9c_1.x^2 - 9c_3x^6$

Hence the coefficient of x^6 is

$9c_6 + 9c_2.9c_2 - 9c_4.9c_1 - 9c_3$

$$= \frac{9\times8x7}{1.2.3} + \frac{9\times8}{1.2}\times\frac{9\times8}{1.2} - \frac{9\times8x7x6}{4.3.2.1}\times9 - \frac{9\times8x7}{1.2.3}$$

$= 1296 - 1134 = 162.$

29. Given expression

$(1 - 3x^2 + 2x^3)^6 = 1 + a_1x + a_2x^2 + ... + a_{18}x^{18}$

Putting $x = 1$, we get

$0 = 1 + a_1 + a_2 + ... + a_{18}$ ...(1)

Putting $x = -1$, we get

$4096 = 1 - a_1 + a_2 - ... + a_{18}$ ...(2)

Adding (1) and (2), we get

$-4096 = 2(a_1 + a_3 + a_5 + ... + a_{17})$

$\therefore\ a_1 + a_3 + a_5 + ... + a_{17} = -2048$

30. Given expression : $(p + q)^{15}$

Now, $$\frac{t_r}{t_{r+1}} = \frac{{}^{15}c_{r-1}p^{16-r}q^{r-1}}{{}^{15}c_rp^{15-r}q^r}$$

$$= \frac{15!}{(r-1)!(16-r)!}\cdot\frac{r!(15-r)!}{15!}\cdot\frac{p}{q}$$

$$= \frac{r}{16-r}\cdot\frac{2}{3}$$

Now, $t_r \le t_{r+1}$ when $\frac{r}{16-r}\cdot\frac{2}{3} \le 1$

or $2r \le 3(16 - r)$

or $r \le \frac{48}{5}$

$\therefore$ for $r = 1, 2, 3 .... 9$ we get $t_{r+1} \ge t_r$

For $r = 10, 11, 12, 13, 14, ...$, we get, $t_r \ge t_{r+1}$

$\therefore\ t_1 < t_2 < t_3 < .... t_9 < t_{10} > t_{11} > t_{12} > ....$

$\therefore\ t_{10}$ is the greatest term

Greatest term $t_{10} = {}^{15}c_92^6.3^9 = {}^{15}c_63^92^6$

31. The given system of equation can be written in a single matrix equation:

$$\begin{bmatrix} 3\alpha & 6 & -6 \\ 12 & 6\alpha & -3 \\ 18 & 18 & 3\alpha \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$$

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The given system of equations will have unique solution if and only if the coefficient matrix is non-singular *i.e.* if

$$\begin{bmatrix} 3\alpha & 6 & -6 \\ 12 & 6\alpha & -3 \\ 18 & 18 & 3\alpha \end{bmatrix} \neq 0$$

$\Rightarrow 3\alpha(18\alpha^2 - 36) + 6(-54 - 36\alpha) - 6(216 - 90\alpha) \neq 0$

or $\quad 3(\alpha^3 + 11\alpha - 30) \neq 0$

$\Rightarrow \quad (\alpha^3 + 11\alpha - 30) \neq 0$

or $\quad (\alpha - 2)(\alpha^2 + 2\alpha + 15) \neq 0$

or $\quad \alpha \neq 2$

32. $\begin{bmatrix} 3 & 1+f(1) & 1+f(2) \\ 1+f(1) & 1+f(2) & 1+f(3) \\ 1+f(2) & 1+f(3) & 1+f(3) \end{bmatrix}$

$$= \begin{bmatrix} 1+1+1 & 1+m+n & 1+m^2+n^2 \\ 1+m+n & 1+m^2+n^2 & 1+m^3+n^3 \\ 1+m^2+n^2 & 1+m^3+n^3 & 1=m^4+n^4 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 1 & 1 \\ 1 & m & n \\ 1 & m^2 & n^2 \end{bmatrix} \times \begin{bmatrix} 1 & 1 & 1 \\ 1 & m & n \\ 1 & m^2 & n^2 \end{bmatrix}$$

$$= \begin{bmatrix} 1 & 1 & 1 \\ 1 & m & n \\ 1 & m^2 & n^2 \end{bmatrix}^2$$

$= [(1 - m)(1 - n)(m - n)]^2$ [Need to add one more step.]

So, $\quad a = 1$

33. $K(a)\,K(-b) = \begin{bmatrix} \cos a & -\sin a \\ \sin a & \cos a \end{bmatrix} \times \begin{bmatrix} \cos b & \sin b \\ -\sin b & \cos b \end{bmatrix}$

$$= \begin{bmatrix} \cos a.\cos b + \sin a.\sin b & \cos a.\sin b - \sin a.\cos b \\ \sin a.\cos b - \cos a \sin b & \sin a.\sin b + \cos a.\cos b \end{bmatrix}$$

$$= \begin{bmatrix} \cos(a-b) & -\sin(a-b) \\ \sin(a-b) & \cos(a-b) \end{bmatrix} = K(a - b)$$

Also, determinant of $K(a) = 1$ and 1 is cubic number. Hence, statements II and III are correct.

34. Let r be the common ratio, then

$$\begin{bmatrix} \log a_n & \log a_{n+1} & \log a_{n+2} \\ \log a_{n+3} & \log a_{n+4} & \log a_{n+5} \\ \log a_{n+6} & \log a_{n+7} & \log a_{n+8} \end{bmatrix}$$

$$= \begin{bmatrix} \log a_1 r^{n-1} & \log a_1 r^n & \log a_1 r^{n+1} \\ \log a_1 r^{n+2} & \log a_1 r^{n+3} & \log a_1 r^{n+4} \\ \log a_1 r^{n+5} & \log a_1 r^{n+6} & \log a_1 r^{n+7} \end{bmatrix}$$

$$= \begin{bmatrix} \log a_1 + (n-1)\log r & \log a_1 + n\log r & \log a_1 + (n+1)\log r \\ \log a_1 + (n+2)\log r & \log a_1 + (n+3)\log r & \log a_1 + (n+4)\log r \\ \log a_1 + (n+5)\log r & \log a_1 + (n+6)\log r & \log a_1 + (n+7)\log r \end{bmatrix}$$

$$= \begin{bmatrix} \log a_1 & \log a_1 & \log a_1 \\ \log a_1 & \log a_1 & \log a_1 \\ \log a_1 & \log a_1 & \log a_1 \end{bmatrix} + \begin{bmatrix} (n-1)\log r & (n)\log r & (n+1)\log r \\ (n+2)\log r & (n+3)\log r & (n+4)\log r \\ (n+5)\log r & (n+6)\log r & (n+7)\log r \end{bmatrix}$$

$$= 0 + \begin{bmatrix} (n-1)\log r & (n)\log r & (n+1)\log r \\ (n+2)\log r & (n+3)\log r & (n+4)\log r \\ (n+5)\log r & (n+6)\log r & (n+7)\log r \end{bmatrix}$$

$= 0 + 0 \qquad \left[\text{Apply } c_2 - c_2 - \frac{1}{2}c_1 - \frac{1}{2}c_3\right]$

35. We have,

$$k - rm - qn = 0$$
$$rk + pn - m = 0$$
$$qk + pm - n = 0$$

Since, k, m, n are not all zero. So, the equations will have a non-trivial solution.

Therefore,

$$\begin{bmatrix} 1 & -r & -q \\ r & -1 & p \\ q & p & -1 \end{bmatrix} = 0$$

$\Rightarrow 1(1 - p^2) + r(-r - pq) - q(pr + q) = 0$

$\Rightarrow p^2 + q^2 + r^2 + 2pqr = 1$

36. Here, $\Rightarrow Q = \begin{bmatrix} 3 & -2 & -1 \\ -4 & 1 & \beta \\ 2 & 0 & 1 \end{bmatrix}$

Also since, $Q = P^{-1} \Rightarrow P.Q = 1$

$$\Rightarrow \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 7 \\ -2 & -4 & -5 \end{bmatrix} \cdot \begin{bmatrix} 3 & -2 & -1 \\ -4 & 1 & \beta \\ 2 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\Rightarrow \begin{bmatrix} 1 & 0 & 2\beta+2 \\ 0 & 1 & 5+5\beta \\ 0 & 0 & -4\beta-3 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$\Rightarrow 2\beta + 2 = 0 \Rightarrow \beta = -1$

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37. For infinitely many solutions,

$D = 0$ and $D_1 = D_2 = D_3 = 0$

$$D = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 2 & 3 \\ 1 & 2 & \gamma \end{bmatrix} = 1(2\gamma - 6) - 1(\gamma - 3) + 1(2 - 2)$$

$$= 2\gamma - 6 - \gamma + 3 = \gamma - 3$$

Now $D = 0$, $\therefore \gamma - 3 = 0$, or $\gamma = 3$.

$$D_1 = \begin{bmatrix} 6 & 1 & 1 \\ 10 & 2 & 3 \\ \delta & 2 & 3 \end{bmatrix}$$

$$= 6(6 - 6) - 1(30 - 3\delta) + 1(20 - 2\delta)$$

$$= -30 + 3\delta + 20 - 2\delta = \delta - 10$$

As, $D_1 = 0 \therefore \delta = 0$

$$D_2 = \begin{bmatrix} 1 & 6 & 1 \\ 1 & 10 & 3 \\ 1 & \delta & 3 \end{bmatrix}$$

$$= 1(30 - 3\delta) - 6(3 - 3) + 1(\delta - 10)$$

$$= 30 - 3\delta + \delta - 10 = 20 - 2\delta$$

As, $D_2 = 0 \Rightarrow \delta = 10$

$$D_3 = \begin{bmatrix} 1 & 1 & 6 \\ 1 & 2 & 10 \\ 1 & 2 & \delta \end{bmatrix}$$

$$= 1(2\delta - 20) - 1(\delta - 10) + 6(2 - 2)$$

$$= 2\delta - 20 - \delta + 10 = \delta - 10$$

As, $D_3 = 0 \Rightarrow \delta = 10$

$\therefore$ For infinite solutions $\gamma = 3$ and $\delta = 10$

Now, $(\gamma + \delta)$ and $(\delta - \gamma)$ are $(3 + 10) = 13$ and $(10 - 3) = 7$. Here, 7 and 13 both are prime number.

38. For the given homogeneous system to have non-zero solution, determinant of the coefficient matrix should be zero, *i.e.*

$$\begin{bmatrix} 1 & 2a & a \\ 1 & 3b & b \\ 1 & 4c & c \end{bmatrix} = 0$$

$$\begin{bmatrix} 1 & 0 & a \\ 1 & b & b \\ 1 & 2c & c \end{bmatrix} = 0$$

[Applying $c_2 \to c_2 - 2c_3$]

$$\begin{bmatrix} 1 & 0 & a \\ 0 & b & b-a \\ 0 & (2c-b) & c-b \end{bmatrix} = 0$$

[Applying $R_2 \to R_2 - R_1$, and $R_3 \to R_3 - R_2$]

$b(c - b) - (b - a)(2c - b) = 0$

$bc - 2bc + 2ac - ab = 0 \Rightarrow 2ac = ab + bc$

On dividing both sides by abc, we get,

$$\frac{2}{b} = \frac{1}{a} + \frac{1}{c}$$

$\therefore$ a, b, c are in Harmonic progression.

39. Given equations : $x + 8ay - 2az = 0$, $x + 6by - 2bz = 0$ and $x + 4cy - 2cz = 0$

Since system of equation is consistent, we have

$$\Delta = \begin{bmatrix} 1 & 8a & -2a \\ 1 & 6b & -2b \\ 1 & 4c & -2c \end{bmatrix} = 0$$

Or, $1(-12bc + 8bc) + 8a(2c - 2b) - 2a(4c - 6b) = 0$

Or, $-4bc + 16ac - 16ab - 8ac + 12ab = 0$

Or, $bc - 2ac + ab = 0$ or $bc + ab = 2ac$,

$$\therefore \quad \frac{1}{a} + \frac{1}{c} = \frac{2}{b}$$

Thus a, b, c, are in H.P.

40. $$\Delta_k = \begin{bmatrix} \sin^2(n+1) & \sin^2(n^2) & \sin^2(n) \\ 2k-1 & c_k^{2n+1} & 1 \\ n^2-1 & 2^{2n} & n+1 \end{bmatrix}$$

$$\sum_{k=0}^{n} c_k = \begin{bmatrix} \sin^2(n+1) & \sin^2(n^2) & \sin^2(n) \\ \sum_{k=0}^{n} 2k-1 & \sum_{k=0}^{n} c_k^{2n+1} & \sum_{k=0}^{n} 1 \\ n^2-1 & 2^{2n} & n+1 \end{bmatrix}$$

$$= \begin{bmatrix} \sin^2(n+1) & \sin^2(n^2) & \sin^2(n) \\ n^2-1 & 2^{2n} & n+1 \\ n^2-1 & 2^{2n} & n+1 \end{bmatrix}$$

$$= 0$$

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CHAPTER

2

PROBABILITY

Probability measures how much chance is there for my expected result to happen.

Probability = (no. of favourable outcome)/(total no. of outcomes)

Sample space: Set of all possible outcomes of a random experiment is called Sample space. It is denoted by S.

Event: It is the set of favourable outcome.

Example: If you throw a coin and if you are looking for head, then head is the favourable outcome.

Mutually Exclusive events: Two events are said to be mutually exclusive if there is no common element between them.

Exhaustive events: The given events are Exhaustive if when I take the elements in those events forms the given sample space.

Addition Theorem of Probability

If A and B are any two events, then

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

If A, B and C are any three events, then

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(A \cap C) + (A \cap B \cap C)$$

Multiplication Theorem (Rule) of Probability

Let A and B be two events associated with a sample space S. Then,

$$P(A \cap B) = P(A) \cdot P(B/A) = P(B) \cdot P(A/B),$$

provided $P(A) \neq 0$ and $P(B) \neq 0$

If A, B and C are three events associated with a random experiment, then

$$P(A \cap B \cap C) = P(A).P(B/A).P(C/A \cap B)$$

Similarly, if $A_1, A_2 ...., A_n$ are n events related to a random experiment, then

$$P(A_1 \cap A_2 \cap A_3 \cap .... A_n) = P(A_1).P(A_2/A_1).P(A_3/A_1 \cap A_2) ..... P(A_n/A_1 \cap A_2 \cap A_3 \cap ....A_{n-1})$$

Probability of Independent Events

If A and B are independent events, then P(A/B) is precisely the same as P(A) since A is not affected by B, *i.e.* P(A/B) = P(A). Similarly, P(B/A) = P(B). Now by multiplication rule of probability, we have,

$$P(A \cap B) = P(A).P(B/A) = P(B).P(A/B)$$

$$\Rightarrow P(A \cap B) = P(A).P(B)$$

(Known as multiplication rule for independent events)

Conditional event (or dependent event) : If the probability of the happening of other is dependent or influenced by the previous happening, then other event is said to be dependent or conditional on one. It is denoted by A/B (A occurs after occurrence of B). The concept of dependent events gives rise to the concept of conditional probability.

Conditional Probability

Let A and B be two events, then the probability of the occurrence of A under the condition that B has already occurred and $P(B) \neq 0$, is called the conditional probability of A given B and is written as P(A/B).

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MULTIPLE CHOICE QUESTIONS

1. A coin is tossed twice. Then, the probability that at least one tail occurs is:

A. $\frac{1}{4}$ B. $\frac{1}{2}$

C. $\frac{1}{3}$ D. $\frac{3}{4}$

2. Let S be a sample space containing outcomes ω_1, ω_2, ω_3, ... ω_n *i.e.*, S = $\{\omega_1, \omega_2, ..., \omega_n\}$,

Then, which of the following is true?

I. $0 \le P(\omega_i) \le 1$ for each $\omega_i \in S$

II. $P(\omega_1) + P(\omega_2) + ... + P(\omega_n) = 1$

III. For any event A, $P(A) = \Sigma P(\omega_i)$, $\omega_i \in A$

A. Only I B. Only II

C. Only III D. All of these

3. Three dice are thrown together. The probability of getting a total of at least 6 is:

A. $\frac{101}{108}$ B. $\frac{103}{108}$

C. $\frac{105}{108}$ D. $\frac{107}{108}$

4. If A, B and C are three mutually exclusive and exhaustive events of an experiment such that 4P(A) = 2P(B) = P(C), then P(A) is equal to .... K .... . Here, K refers to:

A. $\frac{1}{7}$ B. $\frac{2}{7}$

C. $\frac{5}{7}$ D. $\frac{6}{7}$

5. In an essay competition, the odds in favour of competitors P, Q, R and S are 1 : 2, 1 : 3, 1 : 4 and 1 : 5 respectively. Then, the probability that one of them wins the competition, is:

A. $\frac{112}{120}$ B. $\frac{113}{120}$

C. $\frac{114}{120}$ D. $\frac{115}{120}$

6. A card is drawn from a well-shuffled deek of cards. The probability of getting a queen of club or king of heart is:

A. $\frac{1}{52}$ B. $\frac{1}{26}$

C. $\frac{1}{13}$ D. $\frac{1}{56}$

7. If A and B are two events such that P(A) = 0.42, P(B) = 0.48 and $P(A \cap B) = 0.16$, then $P(A \cup B)$ is equal to:

A. 0.11 B. 0.54

C. 0.52 D. 0.74

8. If A and B are mutually exclusive events, then

A. $P(A) \le P(\overline{B})$ B. $P(A) \ge P(\overline{B})$

C. $P(A) < P(\overline{B})$ D. None of these

9. If $P(B) = \frac{3}{4}$, $P(A \cap B \cap \overline{C}) = \frac{1}{3}$ and $P(\overline{A} \cap B \cap \overline{C}) = \frac{1}{3}$, then $P(B \cap C)$ equals:

A. $\frac{1}{12}$ B. $\frac{1}{6}$

C. $\frac{1}{15}$ D. $\frac{1}{9}$

10. If $2P(A) = P(B) = \frac{5}{13}$ and $P(A/B) = \frac{2}{5}$, then $P(A \cup B)$ is equal to:

A. $\frac{11}{26}$ B. $\frac{13}{25}$

C. $\frac{11}{24}$ D. $\frac{11}{21}$

11. If $P(A) = \frac{1}{2}$, $P(B) = 0$, then $P\left(\frac{A}{B}\right)$ is:

A. zero B. $\frac{1}{2}$

C. not defined D. 1

12. If A and B are two events and $A \ne \phi$, $B \ne \phi$, then:

A. $P\left(\frac{A}{B}\right) = P(A) \cdot P(B)$ B. $P\left(\frac{A}{B}\right) = \frac{P(A \cap B)}{P(B)}$

C. $P\left(\frac{A}{B}\right) \cdot P\left(\frac{B}{A}\right) = 1$ D. $P\left(\frac{A}{B}\right) = \frac{P(A)}{P(B)}$

13. If card is drawn from an ordinary pack of 52 cards and a gambler bets that, it is a spade or an ace. The odds against his winning this bet is:

A. 4 : 9 B. 9 : 4

C. 3 : 8 D. 8 : 3

14. If $P(A) = \frac{3}{10}$, $P(B) = \frac{2}{5}$ and $P(A \cup B) = \frac{3}{5}$, then $P\left(\frac{B}{A}\right) + P\left(\frac{A}{B}\right)$ equals to:

A. $\frac{1}{4}$ B. $\frac{1}{3}$

C. $\frac{5}{12}$ D. $\frac{7}{12}$

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15. Bag I contains 3 black and 2 white balls, bug II contains 2 black and 4 white balls. A bag and a ball is selected at random. The probability of selecting a black ball is:

A. $\frac{4}{15}$ B. $\frac{7}{15}$

C. $\frac{8}{15}$ D. None of these

16. Of cigarette smoking population 70% are men and 30% are women, 10% of these men and 20% of these women smoke Wills. The probability that a person seen smoking a Will to be men is:

A. $\frac{1}{5}$ B. $\frac{7}{13}$

C. $\frac{5}{13}$ D. $\frac{7}{10}$

17. An observed event B can occur after one of the three events A_1, A_2, A_3. If $P(A_1) = P(A_2) = 0.4$, $P(A_3) = 0.2$ and $P\left(\frac{B}{A_1}\right) = 0.25$, $P\left(\frac{B}{A_2}\right) = 0.4$, $P\left(\frac{B}{A_3}\right) = 0.125$, what is the probability of A_1 after observing B?

A. $\frac{1}{3}$ B. $\frac{6}{19}$

C. $\frac{20}{57}$ D. $\frac{2}{5}$

18. An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probabilities of an accident involving a scooter driver, car driver and a truck driver are 0.01, 0.03 and 0.15, respectively. One of the insured persons meets with an accident. The probability that the person is a scooter driver, is:

A. $\frac{1}{52}$ B. $\frac{3}{52}$

C. $\frac{15}{52}$ D. $\frac{19}{52}$

19. Suppose a girl throws a die. If she gets 1 or 2, she tosses a coin three times and notes the number of tails. If she gets 3, 4, 5 or 6, she tosses a coin once and notes whether a 'head' or 'tail' is obtained. If she obtained exactly one 'tail', what is the probability that she threw 3, 4, 5 or 6 with the die?

A. $\frac{5}{11}$ B. $\frac{6}{11}$

C. $\frac{7}{11}$ D. $\frac{8}{11}$

20. A drawer contains 50 bolts and 150 unts. Half of the bolts and half of the nuts are rusted. If one item is chosen at random, the probability that it is rusted or is a bolt, is:

A. $\frac{3}{8}$ B. $\frac{1}{2}$

C. $\frac{5}{8}$ D. None of these

21. A bag contains 3 red and 7 black balls. Two balls are selected at random without replacement. If the second selected ball is given to be red, the probability that the first selected ball is also red, is:

A. $\frac{4}{9}$ B. $\frac{2}{9}$

C. $\frac{9}{2}$ D. None of these

22. You are given a box with 20 cards in it. 10 of these cards have the letter I printed on them. The other ten have the letter T printed on them. If you pick up 3 cards at random and keep them in the same order, the probability of making the word IIT is:

A. $\frac{9}{80}$ B. $\frac{1}{8}$

C. $\frac{4}{27}$ D. $\frac{5}{38}$

23. A man is known to speak truth 3 out of 4 times. He throw a dics and reports that it is six. The probability that it is actually six is:

A. $\frac{3}{8}$ B. $\frac{1}{5}$

C. $\frac{3}{5}$ D. None of these

24. A bag contains 10 mangoes out of which 4 are rotten, two mangoes are taken out together. If one of them is found to be good, the probability that other is also good is:

A. $\frac{1}{3}$ B. $\frac{8}{15}$

C. $\frac{5}{18}$ D. $\frac{2}{3}$

25. In a certain town, 40% of the people have brown hair, 25 % have brown eyes and 15% have both brown hair and brown eyes. If a person selected at random from the town, has brown hair, the probability that he also has brown eyes is:

A. $\frac{1}{5}$ B. $\frac{3}{8}$

C. $\frac{1}{3}$ D. $\frac{2}{3}$

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26. The probabilities that a student passes in Mathematics, Physics and Chemistry are m, p and c, respectively. Of these subjects, the student has a 75% chance of passing in at least one, a 50% chance of passing in at least two, and a 40% chance of passing in exactly two. Which of the following relations are true?

A. $p+m+c=\frac{19}{20}$ B. $p+m+c=\frac{27}{20}$

C. $pmc=\frac{1}{10}$ D. $pmc=\frac{1}{4}$

27. The number of dissimilar terms in the expansion of $(a+b)^n$ is $n+1$, therefore number of dissimilar terms in the expansion of $(a+b+c)^{12}$ is:

A. 13 B. 39
C. 78 D. 91

28. If 'n' positive integer and three consecutive coefficient in the expansion of $(1+x)^n$ are in the ratio 6 : 33 : 110, then n is equal to:

A. 9 B. 6
C. 12 D. 16

29. The value of x in the expression $|x + x \log_{10x}|$ if the third term in the expansion is 1000000 is:

A. 10, $10^{-3/2}$ B. 100 or $10^{-3/2}$
C. 10 or $10^{-5/2}$ D. None of these

30. If x is so small that x^3 and higher powers of x may be neglected, then $\frac{(1+x)^{\frac{3}{2}}-\left[1+\frac{1}{2}x\right]}{(1+x)^{\frac{1}{2}}}$ may be approximated as:

A. $1-\frac{3}{8}x^2$ B. $3x+\frac{3}{8}x^2$

C. $-\frac{3}{8}x^2$ D. $\frac{x}{2}-\frac{3}{8}x^2$

31. The term independent of x in $(1+x)^m\left[1+\frac{1}{x}\right]^n$ is:

A. $m + n_{cm}$ B. $m + n_{cn}$
C. $m + n_{cm-n}$ D. None of these

32. The coefficient of x^4 in the expansion of $(1 + x + x^2 + x^3)^{11}$ is:

A. 990 B. 605
C. 810 D. None of these

33. If $(1 + x - 2x^2)^6 = 1 + a\ 1^x + a_2x^2 + ... + a_{12}x^{12}$, then $a_2 + a_4 + a_6 .... + a_{12}$

A. 21 B. 11
C. 31 D. None of these

34. If $P(A \cap B)=\frac{1}{2}$, $P(A \cap B)=\frac{1}{2}$ and 2P(A) = P(B) = P, then the value of P, is equal to:

A. $\frac{1}{2}$ B. $\frac{2}{3}$

C. $\frac{1}{4}$ D. $\frac{1}{3}$

35. A student is given a true false exam with 10 questions. If he gets 8 or more correct answers he passes the exam. Given that he guesses at the answer to each question, the probability that he passes the exam, is:

A. $\frac{6}{128}$ B. $\frac{9}{128}$

C. $\frac{7}{128}$ D. None of these

ANSWERS

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
D	D	B	A	C	B	D	A	A	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	B	B	D	B	B	C	A	D	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	D	A	C	B	B, C	D	C	C	D
31	**32**	**33**	**34**	**35**					
B	A	C	B	C					

EXPLANATORY ANSWERS

1. The sample space is S = {HH, HT, TH, TT}

Let E be the event of getting at least one tail

E = {HT, TH, TT}

∴ Required probability P

$$= \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

$$= \frac{n(E)}{n(S)} = \frac{3}{4}$$

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2. Let S be a sample space containing outcomes $\omega_1, \omega_2, \ldots \omega_n$, *i.e.*, $S = \{\omega_1, \omega_2, \ldots \omega_n\}$
If follows from the axiomatic definition of probability that

(*i*) $0 \le P(\omega_i) \le 1$ for each $\omega_i \in S$

(*ii*) $P(\omega_1) + P(\omega_2) + \ldots + P(\omega_n) = 1$

(*iii*) For any event A, $P(A) = \Sigma P(\omega_i)$ $\omega_i \in A$.

3. The total number of elementary events
$$= 6 \times 6 \times 6 = 216$$
Let A be the event of getting a total of at least 6.

Then, $\bar{A}$ denotes the event of getting a total of less than 6 *i.e.* 3, 4, 5.

$\therefore \quad \bar{A} = \{(1, 1, 1), (1, 1, 2), (1, 2, 1), (2, 1, 1), (1, 1, 3), (1, 3, 1), (3, 1, 1), (1, 2, 2), (2, 1, 2), (2, 2, 1)\}$

So, $n(\bar{A}) = 10$

$\therefore \quad P(\bar{A}) = \dfrac{10}{216}$

$\therefore \quad P(A) = 1 - P(\bar{A}) = 1 - \dfrac{10}{216} = \dfrac{103}{108}$

4. Let $4P(A) = 2P(B) = P(C) = p$,

which gives $P(A) = \dfrac{p}{4}$, $P(B) = \dfrac{p}{2}$ and $P(C) = p$

Now, since A, B, C are mutually exclusive and exhaustive events, we have,

$P(A) + P(B) + P(C) = 1 \Rightarrow p = \dfrac{4}{7}$

Hence, $\quad P(A) = \dfrac{p}{4} = \dfrac{1}{7}$

5. Let A, B, C and D be the events that the competitors P, Q, R and S respectively win the competition.

Then, $P(A) = \dfrac{1}{3}$, $P(B) = \dfrac{1}{4}$, $P(C) = \dfrac{1}{5}$ and $P(D) = \dfrac{1}{6}$

Since, only one competitors can win the competition. Therefore, A, B, C, D are mutually exclusive events.

$\therefore$ Required probability $= P(A \cup B \cup C \cup D)$
$$= P(A) + P(B) + P(C) + P(D)$$
$$= \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} = \frac{114}{120}$$

6. Here, $n(S) = 52$, $n(E_1) = 1$, $n(E_2) = 1$, $n(E_1 \cap E_2) = \phi$

$\therefore \quad P(E_1 \cup E_2) = P(E_1) + P(E_2) - P(E_1 \cap E_2)$
$$= \frac{1}{52} + \frac{1}{52} - 0 = \frac{1}{26}$$

7. Given, $P(A) = 0.42$, $P(B) = 0.48$ and $P(A \cap B) = 0.16$

$\therefore \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$$= 0.42 + 0.48 - 0.16$$
$$= 0.90 - 0.16 = 0.74$$

8. Given that, A and B are two mutually exclusive events.

Then, $\quad P(A \cup B) = P(A) + P(B) \quad [\because (A \cap B) = \phi]$

$$P(A) + P(B) \le 1$$
$$P(A) + 1 - P(\bar{B}) \le 1$$
$$P(A) \le P(\bar{B})$$

9. We have, $\quad P(\bar{A} \cap B \cap \bar{C}) = \dfrac{1}{3}$

$\Rightarrow \quad P((B \cap \bar{C}) \cap \bar{A}) = \dfrac{1}{3}$

$\Rightarrow \quad P(B \cap \bar{C}) - P((B \cap \bar{C}) \cap A) = \dfrac{1}{3}$

$\left[\because P(X \cap \bar{Y}) = P(X) - P(X \cap Y)\right]$

$\Rightarrow \quad P(B \cap \bar{C}) - P(A \cap B \cap \bar{C}) = \dfrac{1}{3}$

$\Rightarrow \quad P(B \cap \bar{C}) - \dfrac{1}{3} = \dfrac{1}{3}$

$\Rightarrow \quad P(B \cap \bar{C}) = \dfrac{2}{3}$

$\Rightarrow \quad P(B) - P(B \cap C) = \dfrac{2}{3}$

Now, $\quad P(B \cap C) = P(B) - \dfrac{2}{3} = \dfrac{3}{4} - \dfrac{2}{3} = \dfrac{1}{12}$

10. Given, $\quad 2P(A) = P(B) = \dfrac{5}{13}$

$\Rightarrow \quad P(A) = \dfrac{5}{26}$ and $P(B) = \dfrac{5}{13}$

Now, $\quad P\left(\dfrac{A}{B}\right) = \dfrac{P(A \cap B)}{P(B)}$

$\Rightarrow \quad \dfrac{2}{5} = \dfrac{P(A \cap B)}{\frac{5}{13}}$

$\Rightarrow \quad P(A \cap B) = \dfrac{2}{5} \times \dfrac{5}{13} = \dfrac{2}{13}$

Again, $\quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$$= \frac{5}{26} + \frac{5}{13} - \frac{2}{13}$$
$$= \frac{5 + 10 - 4}{26} = \frac{11}{26}$$

11. It is given that $P(A) = \dfrac{1}{2}$ and $P(B) = 0$

$$P\left(\frac{A}{B}\right) = \frac{P(A \cap B)}{P(B)} = \frac{P(A \cap B)}{0} = \infty$$

Therefore, $P\left(\dfrac{A}{B}\right)$ is not defined.

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12. If $A \neq \phi$ and $B \neq \phi$, then

$$P\left(\frac{A}{B}\right) = \frac{P(A \cap B)}{P(B)}$$

13. Let A be the event of getting a spade or an ace from a pack of 52 cards.

Then, total number of possible outcomes

$$= {}^{52}C_1 = 52$$

$\because$ There are 13 spade cards with 1 ace card of spade and three ace other than spade card.

$\therefore$ Number of favourable outcomes $= {}^{16}C_1 = 16$

$$\therefore \quad P(A) = \frac{16}{52} = \frac{4}{13}$$

Hence, odds against A are

$$P(\bar{A}) : P(A) = \frac{9}{13} : \frac{4}{13} = 9 : 4$$

14. Here, $P(A) = \frac{3}{10}$, $P(B)\frac{2}{5}$ and $P(A \cup B) = \frac{3}{5}$

$$P\left(\frac{B}{A}\right) + P\left(\frac{A}{B}\right) = \frac{P(B \cap A)}{P(A)} + \frac{P(A \cap B)}{P(B)}$$

$$= \frac{P(A) + P(B) - P(A \cup B)}{P(A)} + \frac{P(A) + P(B) - P(A \cup B)}{P(B)}$$

$$= \frac{\frac{3}{10} + \frac{2}{5} - \frac{3}{5}}{\frac{3}{10}} + \frac{\frac{3}{10} + \frac{2}{5} - \frac{3}{5}}{\frac{2}{5}} = \frac{\frac{1}{10}}{\frac{3}{10}} + \frac{\frac{1}{10}}{\frac{2}{5}} = \frac{1}{3} + \frac{1}{4} = \frac{7}{12}$$

15. Let E_1 = Bag I is selected

E_2 = Bag II is selected

and A = Black ball is drawn

Then, $P(E_1) = P(E_2) = \frac{1}{2}$, $P\left(\frac{A}{E_1}\right) = \frac{3}{5}$,

$$P\left(\frac{A}{E_2}\right) = \frac{2}{6},$$

$$\because \quad P(A) = P(E_1) \times P\left(\frac{A}{E_1}\right) + P(E_2) \times P\left(\frac{A}{E_2}\right)$$

$$= \frac{1}{2} \times \frac{3}{5} + \frac{1}{2} \times \frac{2}{6}$$

$$= \frac{3}{10} + \frac{1}{6} = \frac{9+5}{30} = \frac{14}{30} = \frac{7}{15}$$

16. Let E_1 and E_2 denote the cigarette smoking population of men and women, respectively.

Given, $P(E_1) = 0.7$, $P(E_2) = 0.3$

$$P\left(\frac{A}{E_1}\right) = 0.1, \; P\left(\frac{A}{E_2}\right) = 0.2$$

Using Baye's theorem,

$$P\left(\frac{E_1}{A}\right) = \frac{P(E_1)\, P\left(\frac{A}{E_1}\right)}{P(E_1) \times P\left(\frac{A}{E_1}\right) + P(E_2) P\left(\frac{A}{E_2}\right)}$$

$$= \frac{0.7 \times 0.1}{0.7 \times 0.1 + 0.3 \times 0.2}$$

$$= \frac{0.07}{0.07 + 0.06} = \frac{0.07}{0.13} = \frac{7}{13}$$

17. Required probability $= P\left(\frac{A_1}{B}\right)$

$$= \frac{P(A_1)\, P\left(\frac{B}{A_1}\right)}{P(A_1)\, P\left(\frac{B}{A_1}\right) + P(A_2) P\left(\frac{B}{A_2}\right) + P(A_3) P\left(\frac{B}{A_3}\right)}$$

$$= \frac{0.4 \times 0.25}{0.4 \times 0.25 + 0.4 \times 0.4 + 0.2 \times 0.125}$$

$$= \frac{0.1}{0.1 + 0.16 + 0.025} = \frac{0.1}{0.285} = \frac{20}{57}$$

18. Let $P(A) = P(\text{scooter}) = \frac{2000}{12000} = \frac{1}{6}$

$$P(B) = P(\text{car}) = \frac{4000}{12000} = \frac{1}{3}$$

and $P(C) = P(\text{truck}) = \frac{6000}{12000} = \frac{1}{2}$

Let E = Event that person meets with accident.

Then, $P\left(\frac{E}{A}\right) = \frac{1}{100}$, $P\left(\frac{E}{B}\right) = \frac{3}{100}$, $P\left(\frac{E}{C}\right) = \frac{15}{100}$

$\therefore$ Required probability

$$P\left(\frac{A}{E}\right) = \frac{P(A) \cdot P\left(\frac{E}{A}\right)}{P(A) \cdot P\left(\frac{E}{A}\right) + P(B) \cdot P\left(\frac{E}{B}\right) + P(C) \cdot P\left(\frac{E}{C}\right)}$$

$$= \frac{\frac{1}{6} \times \frac{1}{100}}{\frac{1}{6} \times \frac{1}{100} + \frac{1}{3} \times \frac{3}{100} + \frac{1}{2} \times \frac{15}{100}} = \frac{\frac{1}{6}}{\frac{1}{6} + 1 + \frac{15}{2}}$$

$$= \frac{\frac{1}{6}}{\frac{1+6+45}{6}} = \frac{1}{52}$$

19. Let E_1 be the event that the girl gets 1 or 2. E_2 be the event that the girl gets 3, 4, 5 or 6, and A be the event that the girl gets exactly a 'tail'.

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Then, $P(E_1) = \frac{2}{6} = \frac{1}{3}$

and $P(E_2) = \frac{4}{6} = \frac{2}{3}$

$P\left(\frac{A}{E_1}\right) = P$ (getting exactly one tail when a coin is tossed three times) $= \frac{3}{8}$

$P\left(\frac{A}{E_2}\right) = P$ (getting exactly a tail when a coin is tossed once) $= \frac{1}{2}$

Now, required probability

$$P\left(\frac{E_2}{A}\right) = \frac{P(E_2)\cdot P\left(\frac{A}{E_2}\right)}{P(E_1)\cdot P\left(\frac{A}{E_1}\right) + P(E_2)\cdot P\left(\frac{A}{E_2}\right)}$$

$$= \frac{\frac{2}{3}\cdot\frac{1}{2}}{\frac{1}{3}\cdot\frac{3}{8}+\frac{2}{3}\cdot\frac{1}{2}} = \frac{\frac{1}{3}}{\frac{1}{8}+\frac{1}{3}} = \frac{8}{11}$$

20. Let A : Item chosen a rusted.
B : Item chosen is bolt.
Here A and B are non – mutually exclusive events.
$A \cap B$: Item is a rusted bolt.
Total number of bolts = 50
$\therefore$ Number of rusted bolts = 25
Total number of nuts = 150
$\therefore$ Number of rusted nuts = 75
Total number of rusted items = 25 + 75 = 100

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$\frac{100}{200}+\frac{50}{200}-\frac{25}{200} = \frac{100+50-25}{200} = \frac{125}{200} = \frac{5}{8}.$$

21. Let 'A' = {a red ball is selected at first draw}
'B' = {a red ball is selected at second draw}
Then $P(A \cap B)$ = P (Red ball and Red ball)

$$= \frac{3}{10}\times\frac{2}{9} = \frac{1}{5}$$

P(B) = P (Red ball and Red ball or Black ball and Red ball)
= P (Red ball and Red ball) + P (Black ball and Red ball)

$$= \frac{3}{10}\times\frac{2}{9}+\frac{7}{10}\times\frac{3}{9} = \frac{3}{10}$$

$$\therefore P\left(\frac{A}{B}\right) = \frac{P(A\cap B)}{P(B)} = \frac{\frac{1}{5}}{\frac{3}{10}} = \frac{10}{3\times 15} = \frac{2}{9}.$$

22. Required probability
= P(I in Ist draw) × P(I in 2nd draw) × P(T in 3rd draw)

$$= \frac{{}^{10}c_1}{{}^{20}c_1}\times\frac{{}^{9}c_1}{{}^{19}c_1}\times\frac{{}^{10}c_1}{{}^{18}c_1}\times = \frac{10}{20}\times\frac{9}{19}\times\frac{10}{18} = \frac{5}{38}$$

23. Let A denotes the event that a six occurs and B the event that the man reports that it is a six.
Then the probability that it is actually a six is given by

$$P\left(\frac{A}{B}\right) = \frac{P(A\cap B)}{P(B)}$$

Now $P(A \cap B) = \frac{1}{6}\times\frac{3}{4} = \frac{3}{24}$

$$P(B) = P(A \cap B) + P(A \cap B)$$

$$= \frac{1}{6}\times\frac{3}{4}+\frac{5}{6}\times\frac{1}{4} = \frac{8}{24}$$

Hence $P\left(\frac{A}{B}\right) = \frac{\frac{3}{24}}{\frac{8}{24}} = \frac{3}{8}.$

24. Number of ways of selecting 2 good mangoes

$$= {}^6c_2 = 15$$

The number of ways that at least one of the two selected mangoes is to be good

$$= {}^6c_1 \times {}^9c_1 = 6 \times 9 = 54$$

Required probability $= \frac{15}{54} = \frac{5}{18}.$

25. $P(A) = \frac{40}{100}\cdot P(B) = \frac{25}{100}$

$P(A \cap B) = \frac{15}{100}$

$$P\left(\frac{B}{A}\right) = \frac{P(A\cap B)}{P(A)} = \frac{\frac{15}{100}}{\frac{40}{100}} = \frac{15}{40} = \frac{3}{8}.$$

26. According to the problem,

$$m + p + c - mp - mc - pc + mpc = \frac{3}{4} \quad ...(1)$$

$$mp\ (1 - c) + mc\ (1 - p) + pc\ (1 - m) = \frac{2}{5}$$

$$\text{or } mp + mc + pc - 3\ mpc = \frac{2}{5} \quad ...(2)$$

$$\text{Also, } pm + pc + mc - 2mpc = \frac{1}{2} \quad ...(3)$$

$$(2) \text{ and } (3) \Rightarrow mpc = \frac{1}{2}-\frac{2}{5} = \frac{1}{10}$$

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$\therefore \quad mp + mc + pc = \frac{2}{5} + \frac{3}{10} = \frac{7}{10}$

$\therefore \quad m + p + c = \frac{3}{4} + \frac{7}{10} - \frac{1}{10}$

$= \frac{15+14-2}{20} = \frac{27}{20}$

27. $(a + b + c)^{12} = [(a + b) + c]^{12}$

$= {}^{12}c_o\ (a + b)^{12} + {}^{12}c_1\ (a + b)^{11}c + \ldots + {}^{12}c_{12}c^{12}$

The R.H.S. contains, 13 + 12 + 11 + ... + 1 terms

$= \frac{13(13+1)}{2}$ = terms

Also no. of term in the expansion of $(a + b + c)^n$ is given by $n + {}^2c_2$.

Thus for $n = 12$; $n + {}^2c_2 = n + {}^{14}c_2 = \frac{14 \times 13}{2} = 91$.

28. Let $(r + 1)$th, $(r + 2)$th and $(r + 3)$th be three consecutive terms.

Then, ${}^nC_r : {}^nC_{r+1} : {}^nC_{r+2} = 6 : 33 : 110$

Now, $\frac{{}^nC_r}{{}^nC_{r+1}} = \frac{6}{33} = \frac{2}{11}$

$\Rightarrow \quad \frac{r+1}{n-r} = \frac{2}{11}$

$\Rightarrow \quad 2n - 2r = 11r + 11$

$\Rightarrow \quad 2n - 13r = 11 \quad ....(i)$

and, $\frac{{}^nC_{r+1}}{{}^nC_{r+2}} = \frac{33}{110} = \frac{3}{10}$

$\Rightarrow \quad \frac{r+2}{n-r-1} = \frac{3}{10}$

$\Rightarrow \quad 3n - 3r - 3 = 10\ r + 20$

$\Rightarrow \quad 3n - 13\ r = 23 \quad ...(ii)$

Solving (i) and (ii), we get $n = 12$.

30. (D)

31. We have,

$$(1+x)^m\left[1+\frac{1}{x}\right]^n = (1+x)^m\left[\frac{x+1}{x}\right]^n$$

$$= \frac{(1+x)^{m+n}}{x^n} = x^{-n}\ (1 + x)^{m+n}$$

$\therefore$ Required term independent of x = coefficient of x^0 in

$x^{-n}\ (1 + x)^{m+n}$ = coefficient of x^n in $(1 + x)^{m+n}$

$= m + n_{cn}$.

32. We have,

$(1 + x + x^2 + x^3)^{11} = (1 + x)^{11}\ (1 + x^2)^{11}$

$= (1 + 11c_1x + 11c_2x^2 + 11c_3x^3 + 11c_4x^4 + \ldots)$

$\times (1 + 11c_1x^2 + 11c_2x^4 + \ldots.)$

The terms, which give x^4 are:

1. $11c_2x^4 + 11c_2x^2.11c_1x^2 + 11c_4.x^4.1$

Hence the coefficient of x^4 is

$11c_2 + 11c_2 \times 11c_1 + 11c_4$

$= \frac{11\times10}{1.2} + \frac{11\times10}{1.2} \times \frac{11}{1} + \frac{11\times10\times9\times8}{4.3.2.1}$

$= 55 + 605 + 330 = 990.$

33. Given

$(1 + x - 2x^2)^6 = 1 + a\ 1^x + a_2x^2 + \ldots. + a_{12}x^{12}$

Putting $x = 1$, we get

$0 = 1 + a_1 + a_2 + \ldots + a_{12} \quad ...(1)$

Putting $x = -1$, we get

$64 = 1 - a_1 + a_2 - \ldots + a_{12} \quad ....(2)$

Adding (1) and (2), we get

$64 = 2(1 + a_2 + a_4 + \ldots.)$

$\therefore a_2 + a_4 + a_6 + a_{12} \ldots = 31$

34. $P(A \cap B) \Rightarrow P(A \cup B) = 1 - P(A \cup B)$

$\Rightarrow \quad \frac{1}{2} = 1 - P\ (A \cup B)$

$\Rightarrow \quad P(A \cup B) = \frac{1}{2}$

Also $\quad P(A \cup B) = \frac{1}{2}$

Now $\quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\therefore \quad \frac{1}{2} = \frac{p}{2} + p - \frac{1}{2}$

$\therefore \quad \frac{3p}{2} = 1\ ,\ \therefore\ P = \frac{2}{3}.$

35. n = total no. of ways = $2^{10} = 1024$.

Since each answer can be true or false.

And m = favourable number of ways.

$= 10c_8 + 10c_9 + 10c_{10}$

$= 45 + 10 + 1 = 56.$

Since to pass the exam, he must give 8 or 9 or 10 true answers.

Hence, $\quad p = \frac{m}{n} = \frac{56}{1024} = \frac{7}{128}.$

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CHAPTER

3

TRIGONOMETRY

TRIGONOMETRIC IDENTITY

An equation involving trigonometric functions which is true for all those angles for which the functions are defined is called a trigonometric identity.

Conditional Trigonometric Identities

If A + B + C = 180° (or π), or A, B, C are angles of a triangle.

Then,

(*a*) $\sin(A + B) = \sin(\pi - C) = \sin C$, etc.

(*b*) $\sin\left(\frac{A}{2}+\frac{B}{2}\right)=\sin\left(\frac{\pi}{2}-\frac{C}{2}\right)=\cos\frac{C}{2}$, etc

(*c*) $\sin A+\sin B+\sin C=4\cos\frac{A}{2}\cos\frac{B}{2}\sin\frac{C}{2}$

(*d*) $\cos A+\cos B+\cos C=1+4\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}$

(*e*) $\tan A + \tan B + \tan C = \tan A \tan B \tan C$

(*f*) $\cot A \cot B + \cot B \cot C + \cot C \cot A = 1$

(*g*) $\tan\frac{A}{2}\tan\frac{B}{2}+\tan\frac{B}{2}\tan\frac{C}{2}+\tan\frac{C}{2}\tan\frac{A}{2}=1$

Periodic Properties of Trigonometric Functions

(*a*) $\sin x$, $\cos x$, $\sec x$ and $\operatorname{cosec} x$ are periodic functions with fundamental period 2π.

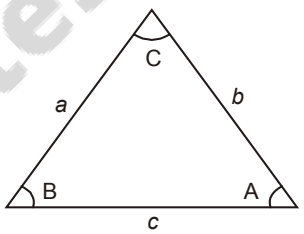
(*b*) $\tan x$ and $\cot x$ are periodic functions with fundamental period π.

(*c*) $|\sin x|$, $|\cos x|$, $|\tan x|$, $|\cot x|$, $|\text{sex } x|$, $|\operatorname{cosec} x|$ are periodic functions with fundamental period π.

(*d*) $\sin^n x$, $\cos^n x$, $\sec^n x$, $\operatorname{cosec}^n x$ are periodic functions with fundamental period 2π or π according as n is odd or even.

(*e*) $\tan^n x$ and $\cot^n x$ are periodic function with fundamental period π whether n is odd or even.

Properties of Triangle



(*a*) Sine Rule : $\frac{a}{\sin A}=\frac{b}{\sin B}=\frac{c}{\sin C}$

(*b*) Consine Rule : $\cos A=\frac{b^2+c^2-a^2}{2bc}$

(*c*) Projection formula

(*i*) $a = b \cos C + c \cos B$

(*ii*) $b = c \cos A + a \cos C$

(*iii*) $c = a \cos B + b \cos A$

(*d*) Tangent Rule:

$$\tan\left(\frac{B-C}{2}\right)=\frac{b-c}{b+c}\tan\left(\frac{B+C}{2}\right)=\frac{b-c}{b+c}\cot\frac{A}{2}$$

(*e*) Half angle formula:

(*i*) $\sin\frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}$

(*ii*) $\cos\frac{A}{2} = \sqrt{\frac{s(s-a)}{bc}}$

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(*iii*) $\tan\frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$

(*f*) Area of a triangle:

$$\Delta = \frac{1}{2}bc\sin A = \frac{1}{2}ca\sin B = \frac{1}{2}ab\sin C$$

Orthocentre of the Triangle and Pedal Triangle

(*a*) The distances of the orthocentre of the triangle from the vertices are 2R cos A, 2R cos B, 2R cos C and its distances from the sides are 2R cos B cos C, 2R cos C cos A, 2R cos A cos B.

(*b*) Circumradius of the pedal triangle = $\frac{R}{2}$

(*c*) Area of the pedal triangle = $2\Delta\cos A\cos B\cos C$.

(*d*) Circumcentre O, centroid G and orthocentre O′ are collinear and G divides OO′ in the ratio 1 : 2.

(*e*) Distance between the circumcentre O and the incentre I is

$$OI = R\sqrt{1-8\sin\frac{A}{2}\sin\frac{B}{2}\sin\frac{C}{2}}$$

Heights and Distances

(*a*) The angle of elevation or depression is the angle between the line of observation and the horizontal line according as the object is at a higher or lower level than the observer.

(*b*) The angle of elevation or depression is always measured from horizontal line through the point of observation.

Trigonometric Equations

The general solution of some trigonometrical equations

	Trigonometric equation	General solution
(*i*)	$\sin\theta = \sin\alpha$	$\theta = n\pi + (-1)^n\alpha,\quad n \in Z$
(*ii*)	$\cos\theta = \cos\alpha$	$\theta = 2n\pi \pm \alpha\quad n \in Z$
(*iii*)	$\tan\theta = \tan\alpha$	$\theta = n\pi + \alpha\quad n \in Z$
(*iv*)	$\sin^2\theta = \sin^2\alpha$	$\theta = n\pi \pm \alpha\quad n \in Z$
(*v*)	$\cos^2\theta = \cos^2\alpha$	$\theta = n\pi \pm \alpha\quad n \in Z$
(*vi*)	$\tan^2\theta = \tan^2\alpha$	$\theta = n\pi \pm \alpha\quad n \in Z$

Since all the trigonometrical ratios are periodic, the equations of the form $\sin\theta = k$, $\cos\theta = k$, or $\tan\theta = k$ etc., can have infinite number of angles satisfying it.

MULTIPLE CHOICE QUESTIONS

1. If (1 + sin A) (1 + sin B) (1 + sin C) = (1 − sin A) (1 − sin B) (1 − sin C), then each side is equal to:
A. ± sin A sin B sin C B. tan A tan B tan C
C. ± cot A cot B cot C D. ± cos A cos B cos C

2. If $T_n = \sin^2 5n° - \cos^2 5n°$, the value of $T_1 + T_2 + ... + T_{18}$ is:
A. 18 B. 1
C. 0 D. None

3. If $m\tan(\theta - 30°) = n\tan(\theta + 120°)$, then $\frac{m+n}{m-n}$ equals:
A. $2\cos 2\theta$ B. $\frac{1}{2}\cos 2\theta$
C. $\sin 2\theta$ D. $\frac{1}{2}\sin 2\theta$

4. If S = tan 9° − tan 27° − tan 63° + tan 81°, T = tan 9° + cot 9° − tan 27° − cot 27°, R = cosec 18° − cosec 54°, then
A. S = R = T B. S = R = 2T
C. 2S = R = T D. S = 2R = T

5. If H = $\frac{\cot 3x}{\cot x}$, then
A. $H \in \left[1, \frac{1}{2}\right]$ B. $H \notin \left[\frac{1}{3}, 3\right]$
C. $H \in \left[\frac{1}{3}, \frac{1}{2}\right]$ D. None

6. The greatest value of $\cos 2x + 3\sin x$ is:
A. $\sqrt{10}$ B. 9
C. $\frac{17}{8}$ D. $\frac{15}{4}$

7. The period of which of the functions is not $\frac{\pi}{2}$:
A. $|\cos 2x|$ B. $\sin^6 x + \cos^6 x$
C. $\sin 4x$ D. None

8. $\tan\theta + \tan 2\theta + \sqrt{3}\tan\theta\tan 2\theta = \sqrt{3}$ has how many solutions in the interval (0, 2π):
A. 2 B. 4
C. 6 D. 8

9. The general solution of $\sqrt{2}\sec\theta + \tan\theta = 1$ is:
A. $\theta = n\pi + \frac{\pi}{4}$ B. $\theta = 2n\pi - \frac{\pi}{4}$
C. $\theta = n\pi \pm \frac{\pi}{4}$ D. $\theta = n\pi + (-1)^n\frac{\pi}{4}$

10. If $e^{\cos x} - e^{-\cos x} - 4 = 0$, then which of the following is true?

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A. has two real solutions in $(0, \pi)$
B. has two real solutions in $\{0, 2\pi)$
C. has no real solution
D. has exactly one real solution

11. The solution of the equation $\cos^{58}x + \sin^{40}x = 1$

A. $x = n\pi$ B. $n = \frac{n\pi}{2}$

C. $x = \frac{n\pi}{2} \pm \frac{\pi}{4}$ D. None

12. If $32 \tan^8\theta = 2\cos^2\alpha - 3\cos\alpha$, and $3\cos 2\theta = 1$ the general value of θ is:

A. $\alpha = n\pi \pm \frac{\pi}{3}$ B. $\alpha = 2n\pi \pm \frac{2\pi}{3}$

C. $\alpha = \frac{n\pi}{2} \pm \pi$ D. None

13. $\cot^{-1}7 + \cot^{-1}8 + \cot^{-1}18 =$

A. $\tan^{-1}3$ B. $\cot^{-1}\frac{1}{3}$

C. $\sin^{-1}\left(\frac{1}{\sqrt{10}}\right)$ D. None

14. $\tan^{-1}\left(\frac{a-b}{1+ab}\right) + \tan^{-1}\left(\frac{b-c}{1+bc}\right) + \tan^{-1}\left(\frac{c-a}{1+ca}\right) =$

A. 0 B. $\tan^{-1}\left(\frac{a+b+c}{1-ab-bc-ca}\right)$

C. $\tan^{-1}(a + b + c)$ D. None

15. $\tan^{-1}\left(\frac{c_1x-y}{c_1y+x}\right) + \tan^{-1}\left(\frac{c_2-c_1}{1+c_2c_1}\right) + \tan^{-1}\left(\frac{c_3-c_2}{1+c_3c_2}\right) + \ldots$ n terms $= \tan^{-1}\frac{Y}{x} - \tan^{-1}(k)$ then k is equal to:

A. $\frac{1}{c_n}$ B. c_n

C. c_{n-1} D. $\frac{1}{c_{n-1}}$

16. The number of real solutions of the equation $\tan^{-1}(x - 1) + \tan^{-1}x = \tan^{-1}(x + 1) = \tan^{-1}(3x)$ is:
A. 0 B. 1
C. 2 D. 3

17. $\underset{n\to\infty}{\text{Lt}} \sum_{1}^{\infty} \tan^{-1}\left(\frac{1}{n^2+n+1}\right) =$
A. 0 B. 1

C. $\frac{\pi}{4}$ D. $\frac{\pi}{2}$

18. If $\cos^{-1}\left(\frac{x}{2}\right) + \cos^{-1}\left(\frac{y}{3}\right) = \theta$, the value of $9x^2 - 12xy \cos\theta + 4y^2$ is:
A. $9\sin^2\theta$ B. $36\sin^2\theta$
C. $18\cos^2\theta$ D. $\cos^2\theta$

19. If the angles of a triangle are in the ratio 3 : 4 : 5, the least and the greatest sides are in the ratio:
A. $\sqrt{3}-1:1$ B. $\sqrt{3}:2+\sqrt{3}$
C. $\sqrt{2}:1+\sqrt{3}$ D. $1:\sqrt{3}+1$

20. The angle of elevation of a ladder leaning against a wall is 60° and the foot of the ladder is 4.6 m away from the wall. The length of the ladder is:
A. 2.3 m B. 4.6 m
C. 7.8 m D. 9.2 m

ANSWERS

1	2	3	4	5	6	7	8	9	10
D	B	A	D	B	C	D	C	B	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
B	B	C	A	A	D	C	B	A	D

EXPLANATORY ANSWERS

1. Multiplying both sides by $(1 - \sin A)(1 - \sin B)(1 - \sin C)$, we have $(1 - \sin^2 A)(1 - \sin^2 B)(1 - \sin^2 C) = (1 - \sin A)^2 (1 - \sin B)^2 (1 - \sin C)^2$:

i.e., $\cos^2 A \cos^2 B \cos^2 C$

$= (1 - \sin A)^2 (1 - \sin B)^2 (1 - \sin C)^2$

$\Rightarrow (1 - \sin A)(1 - \sin B)(1 - \sin C)$

$= \pm \cos A \cos B \cos C$

$\therefore$ each side is equal to $\pm \cos A \cos B \cos C$

2. Here $T_n = -(\cos^2 5n° - \sin^2 5n°) = -\cos 10n°$

$T_1 + T_2 + \ldots + T_{18}$

$= -[\cos 10° + \cos 20° + \ldots + \cos 180°]$

$= -[\cos 10° + \cos 20° + \ldots + \cos 160° + \cos 170° + \cos 180°]$

$= [\cos 180°]$ $(\therefore \cos\theta + \cos(180 - \theta) = 0)$

$= -(-1) = 1.$

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3. $\frac{m}{n} = \frac{\tan(\theta+120°)}{\tan(\theta-30°)} = \frac{-\cot(\theta+30°)}{\tan(\theta-30°)}$

$\Rightarrow \frac{m}{n} = \frac{\cos(\theta+30°)\cos(\theta-30°)}{-\sin(\theta+30°)\sin(\theta-30°)}$

$\Rightarrow \frac{m}{n} = \frac{\cos^2\theta-\sin^2 30°}{\sin^2 30°-\sin^2\theta}$

Applying componendo and dividendo, we have

$\frac{m+n}{m-n} = \frac{\cos^2\theta-\sin^2\theta}{\cos^2\theta+\sin^2\theta-2\sin^2 30°} = 2\cos 2\theta.$

4. S = tan 9° − tan27° − tan63° + tan81°

= tan9° − tan27° − tan(90° − 27°) + tan (90° − 9°)

= tan9° − tan27° − cot27° + cot9°

= (tan9° + cot9°) − (tan27° + cot27°) (= T)

$= \left(\frac{\sin 9°}{\cos 9°}+\frac{\cos 9°}{\sin 9°}\right)-\left(\frac{\sin 27°}{\cos 27°}+\frac{\cos 27°}{\sin 27°}\right)$

$= \frac{\sin^2 9°+\cos^2 9°}{\sin 9°\cos 9°}-\left(\frac{\sin^2 27°+\cos^2 27°}{\sin 27°\cos 27°}\right)$

$= \frac{2}{\sin 18°}-\frac{2}{\sin 54°}$ (= 2R) $= \frac{2(\sin 54°-\sin 18°)}{\sin 18°\sin 54°}$

$= \frac{2.2\cos 36°\cdot\sin 18°}{\sin 18°\sin(90°-36°)} = \frac{4\cos 36°}{\cos 36°} = 4$

5. Let $y = \frac{\cot 3x}{\cot x} = \frac{\tan x}{\tan 3x} = \frac{\tan x(1-3\tan^2 x)}{3\tan x-\tan^3 x}$

$\Rightarrow (3 - \tan^2 x)y = 1 - 3\tan^2 x$

$\Rightarrow \tan^2 x = \frac{1-3y}{3-y}$

but $\tan^2 x > 0 \therefore \frac{1-3y}{3-y} > 0$

$\Rightarrow (3 - y), (1 - 3y) > 0$

(multiplying by $(3 - y)^2$ on both sides)

$(y - 3)(3y - 1) > 0$

$\Rightarrow y < \frac{1}{3}$ or $y > 3 \Rightarrow y \notin \left[\frac{1}{3}, 3\right]$

6. Let $\cos 2x + 3\sin x = y$, then

$y = 1 - 2\sin^2 x + 3\sin x$

$= 1-2\left\{\left(\sin x-\frac{3}{4}\right)^2-\frac{9}{16}\right\}$

$= \frac{17}{8}-2\left(\sin x-\frac{3}{4}\right)^2$

y is greatest, when $\left(\sin x-\frac{3}{4}\right)^2$ is least.

$\therefore$ for $\sin x = \frac{3}{4}$, we get the maximum value of y.

7. Note: (*i*) The period of $\cos ax$ or $\sin ax$ is $\frac{2\pi}{a}$

(*ii*) The period of $|\cos ax|$ or $|\sin ax|$ is $\frac{\pi}{a}$

Here the period of $|\cos 2x|$ is $\frac{\pi}{2}$ and period of $\sin 4x$ is $\frac{\pi}{2}$.

Also $\sin^6 x + \cos^6 x = (\sin^2 x + \cos^2 x)^3 - 3\sin^2 x\cos^2 x(\sin^2 x + \cos^2 x)$

$= 1-\frac{3}{4}(2\sin x\cos x)^2 = 1-\frac{3}{4}\sin^2 2x$

$= 1-\frac{3}{4}(1-\cos 4x) = \frac{1}{4}+\frac{3}{4}\cos 4x,$

which is a periodic function of period $\frac{\pi}{2}$.

8. $\tan\theta + \tan 2\theta = \sqrt{3}(1 - \tan\theta\tan 2\theta)$

$\Rightarrow \frac{\tan\theta+\tan 2\theta}{1-\tan\theta\tan 2\theta} = \sqrt{3}$

$\Rightarrow \tan 3\theta = \tan\frac{\pi}{3}.$

$\Rightarrow 3\theta = n\pi+\frac{\pi}{3}$

$\Rightarrow \theta = \frac{(3n+1)\pi}{9}$ for all $n \in Z$

for $n = 0, 1, 2, 3, 4, 5, \theta \in (0, 2\pi)$

9. We have $\frac{\sqrt{2}}{\cos\theta}+\frac{\sin\theta}{\cos\theta} = 1$

$\Rightarrow \cos\theta - \sin\theta = \sqrt{2}$

$\Rightarrow \frac{1}{\sqrt{2}}\cos\theta-\frac{1}{\sqrt{2}}\sin\theta = 1$

$\Rightarrow \cos\left(\theta+\frac{\pi}{4}\right) = 1 = \cos\theta$

$\Rightarrow \theta+\frac{\pi}{4} = 2n\pi$

$\Rightarrow \theta = 2n\pi-\frac{\pi}{4}$ for all $n \in Z$.

10. We have $(e^{\cos x})^2 - 4e^{\cos x} - 1 = 0$

$\Rightarrow e^{\cos x} = \frac{4\pm\sqrt{20}}{2} = 2\pm\sqrt{5}$

Since $e^{\cos x} > 0$, we have $e^{\cos x} = 2 + \sqrt{5}$

$\therefore \cos x = \log_e\left(2+\sqrt{5}\right) > 1$ and $2+\sqrt{5} > e$

Hence the given equation has no real solution.

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11. **Case I:** If $\cos^2 x < 1$, $\sin^2 x < 1$,

We have $(\cos^2 x)^{29} + (\sin^2 x)^{20} < \cos^2 x + \sin^2 x = 1$ not possible.

Case II: If $\cos^2 x = 1$, $\sin^2 x = 0$, then $x = n\pi$.

Case III: If $\sin^2 x = 1$, $\cos^2 x = 0$, then $x = n\pi \pm \frac{\pi}{2}$.

Thus combining Case (II) and Case (III),

We get the solution $x = \frac{n\pi}{2}, n \in Z$.

12. $\cos 2\theta = \frac{1}{3} \Rightarrow \frac{1-\tan^2\theta}{1+\tan^2\theta} = \frac{1}{3}$

$\tan^2\theta = \frac{1}{2} \Rightarrow \tan^8\theta = \frac{1}{16}$

$\therefore \quad 2\cos^2\alpha - 3\cos\alpha = 32\tan^8\theta = 2$

$\Rightarrow \quad 2\cos^2\alpha - 3\cos\alpha - 2 = 0$

$\Rightarrow (2\cos\alpha + 1)(\cos\alpha - 2) = 0$

$\Rightarrow \quad \cos\alpha = -\frac{1}{2} \quad (\because \cos\alpha \neq 2)$

$\Rightarrow \quad \alpha = 2n\pi \pm \frac{2\pi}{3}, n \in Z$

14. $\tan^{-1}a - \tan^{-1}b + \tan^{-1}(b) - \tan^{-1}c + \tan^{-1}c - \tan^{-1}a = 0$

15. $\tan^{-1}\left(\frac{c_1x-y}{c_1y-x}\right) + \tan^{-1}\left(\frac{c_2-c_1}{1+c_2c_1}\right) + \ldots + \tan^{-1}\left(\frac{c_n-c_{n-1}}{1+c_nc_{n-1}}\right)$

$= \tan^{-1}\left(\frac{\frac{x}{y}-\frac{1}{c_1}}{1+\frac{x}{y}\cdot\frac{1}{c_1}}\right) + \tan^{-1}\left(\frac{\frac{1}{c_1}-\frac{1}{c_2}}{1+\frac{1}{c_1}\cdot\frac{1}{c_2}}\right) + \ldots + \tan^{-1}\left(\frac{\frac{1}{c_{n-1}}-\frac{1}{c_n}}{1+\frac{1}{c_{n-1}}\cdot\frac{1}{c_n}}\right)$

$= \tan^{-1}\frac{x}{y} - \tan^{-1}\frac{1}{c_1} + \tan^{-1}\frac{1}{c_1} - \tan^{-1}\frac{1}{c_2} + \ldots + \tan^{-1}\frac{1}{c_{n-1}} \tan^{-1}\left(\frac{1}{c_n}\right)$

$= \tan^{-1}\frac{x}{y} - \tan^{-1}\left(\frac{1}{c_n}\right).$

16. $\tan^{-1}(x-1) + \tan^{-1}(x+1) = \tan^{-1}3x - \tan^{-1}x$

$\Rightarrow \tan^{-1}\left(\frac{(x-1)+(x+1)}{1-(x-1)(x+1)}\right) = \tan^{-1}\left(\frac{3x-x}{1+3x\cdot x}\right)$

$\Rightarrow \quad x(1+3x^2) = (2-x^2)x$

$\Rightarrow \quad x(4x^2-1) = 0$

$\Rightarrow \quad x = 0, x = \pm\frac{1}{2}$

17. $S_n = \sum_1^\infty \tan^{-1}\left(\frac{1}{n^2+n+1}\right)$

$= \sum_1^\infty \tan^{-1}\left(\frac{(n+1)-n}{1+(n+1)n}\right)$

$= \sum_1^\infty \left[\tan^{-1}(n+1) - \tan^{-1}n\right]$

$= [\tan^{-1}2 - \tan^{-1}1] + [\tan^{-1}3 - \tan^{-1}2] + \ldots + [\tan^{-1}(n+1) - \tan^{-1}n]$

$= \tan^{-1}(n+1) - \tan^{-1}(1)$

$= \tan^{-1}(n+1) - \frac{\pi}{4}$

$\therefore \underset{n\to\infty}{\text{Lt}} S_n = \underset{n\to\infty}{\text{Lt}} \left\{\tan^{-1}(n+1) - \frac{\pi}{4}\right\} = \frac{\pi}{2} - \frac{\pi}{4} = \frac{\pi}{4}$

18. Let $\cos^{-1}\left(\frac{x}{2}\right) = A$, $\cos^{-1}\left(\frac{y}{3}\right) = B$,

Thus $A + B = \theta$.

$\Rightarrow \quad \cos(A+B) = \cos\theta$

$\Rightarrow \cos A \cos B - \sin A \sin B = \cos\theta$

$\Rightarrow \quad \frac{x}{2}\times\frac{y}{3} - \cos\theta = \sqrt{1-\cos^2 A}\sqrt{1-\cos^2 B}$

$\Rightarrow \quad xy - 6\cos\theta = \sqrt{4-x^2}\sqrt{9-y^2}$

squaring both sides, we have

$x^2y^2 - 12xy\cos\theta + 36\cos^2\theta = (4-x^2)(9-y^2)$

$\Rightarrow \quad 9x^2 - 12xy\cos\theta + 4y^2 = 36(1-\cos^2\theta)$

$\Rightarrow \quad 9x^2 - 12xy\cos\theta + 4y^2 = 36\sin^2\theta$

19. Let $A = 3\theta$, $B = 4\theta$, $c = 5\theta$

$A + B + C = \pi \Rightarrow 12\theta = 180° \Rightarrow \theta = 15°$

thus the angles are $A = 45°$, $B = 60°$, $C = 75°$

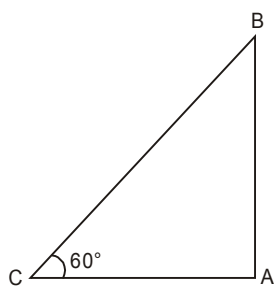
$\therefore$ a and c are the least and greatest sides opposite to the smallest and greatest angle A and C, respectively.

By sine rule,

$\frac{a}{c} = \frac{\sin A}{\sin C} = \frac{\sin 45°}{\sin 75°} = \frac{\sin 45°}{\sin(30°+45°)}$

$= \frac{2}{\sqrt{3}+1} = \frac{2(\sqrt{3}-1)}{(\sqrt{3}+1)(\sqrt{3}-1)} = \frac{\sqrt{3}-1}{1}$

20. Let AB be the wall and BC be the ladder.



Then, $\angle ACB = 60°$ and $AC = 4.6$ m.

$\frac{AC}{BC} = \cos 60° = \frac{1}{2}$

$\Rightarrow \quad BC = 2 \times AC = (2 \times 4.6)$ m $= 9.2$ m

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CHAPTER

4

CO-ORDINATE GEOMETRY

PAIR OF STRAIGHT LINES

An equation of the type

$$ax^2 + 2hxy' + by^2 = 0 \quad ...(1)$$

is a homogeneous equation of second degree.

[Note that the sum of the powers of x and y in every term is the same and equal to 2]

The homogeneous equation of the second degree always represents a pair of straight lines passing through the origin.

If $ax^2 + 2hxy + by^2 = 0$ represents the pair of lines $y = m_1x$ and $y = m_2x$. Then

$$ax^2 + 2hxy + by^2 = b(y - m_1x)(y - m_2x) \quad ...(2)$$

Comparing the coefficients we get

$$m_1 + m_2 = -\frac{2h}{b} \text{ and } m_1m_2 = \frac{a}{b} \quad ...(3)$$

If the equation $ax^2 + 2hxy + by^2 = 0$ represents the straight lines $y = m_1x$ and $y = m_2x$, then the acute angle θ, between the lines is given by

$$\tan\theta = \left|\frac{m_1 - m_2}{1 + m_1m_2}\right| = \left|\frac{2\sqrt{h^2 - ab}}{a + b}\right|$$

The equation of the pair of lines bisecting the angle between the lines given by $ax^2 + 2hxy + by^2 = 0$ is

$$\frac{x^2 - y^2}{a - b} = \frac{xy}{h} \text{ or } h(x^2 - y^2) - (a - b)xy = 0.$$

Important Results

(*a*) Two lines are coincident if $\tan\theta = 0$
i.e., if $h^2 - ab = 0$

(*b*) Two lines are perpendicular of $\tan\theta = \infty$
i.e., if $a + b = 0$

$\therefore$ The equation of a pair of perpendicular straight lines can be given by $ax^2 + 2hxy - ay^2 = 0$

[Substituting $b = -a$]

or $x^2 + 2pxy - y^2 = 0$, where $2p = \frac{2h}{a}$.

(*c*) If the lines given by the equation $ax^2 + 2hxy + by^2 = 0$ are equally inclined to axes, then the coordinate axes are the bisectors, *i.e.*, the equation of pair of bisector must be $xy = 0$. Therefore $h = 0$.

(*d*) If two pairs of straight lines are equally inclined to one another, then both must have the same pair of bisectors.

(*e*) Since coeff. of x^2 + coeff. of $y^2 = 0$. Therefore two bisectors are always perpendicular. (The original lines may or may not be perpendicular)

CIRCLE

If centre of the circle is (h, k) and radius is a then equation of circle will be $(x - h)^2 + (y - k)^2 = a^2$.

The general equation of circle is $x^2 + y^2 + 2gx + 2fy + c = 0$ whose centre is $(-g, -f)$ and radius is $\sqrt{g^2 + f^2 - c}$.

If the ends of diameter of circle and (x_1, y_1) and (x_2, y_2) then equation of circle will be $(x - x_1)(x - x_2) + (y - y_1)(y - y_2) = 0$.

The equation of tangent to the circle $x^2 + y^2 = a^2$ at the point (x_1, y_1) is $xx_1 + yy_1 = a^2$.

The equation of tangent to the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ at the point (x_1, y_1) is $xx_1 + yy_1 + g(x + x_1) + f(y + y_1) + c = 0$.

Line $y = mx + c$, will touch the circle $x^2 + y^2 = a^2$, if $c^2 = a^2(1 + m^2)$.

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CONIC SECTION
(Parabola, Ellipse and Hyperbola)

PARABOLA

The equation of Parabola is $y^2 = 4ax$, whose vertex is (0, 0) and focus is $(a, 0)$.

Equation of directrix is $x = -a$ and axis is $y = 0$

Length of latus rectum for all forms of parabola is $= 4a$.

Equation of tangent of parabola $y^2 = 4ax$ at the point (x_1, y_1) is:

$$yy_1 = 2a\,(x + x_1)$$

Line $y = mx + c$, will touch the parabola $y^2 = 4ax$ if $c = \frac{a}{m}$.

The equation of any tangent of parabola $y^2 = 4ax$ is $y = mx + \frac{a}{m}$ which touches the parabola at the point $\left(\frac{a}{m^2}, \frac{2a}{m}\right)$.

Equation of normal of parabola at the point (x_1, y_1) is $(y - y_1) = -\left(\frac{y_1}{2a}\right)(x - x_1)$.

Equation of normal to parabola at the point $(am^2, -2am)$ is

$$y = mx - 2am - am^3.$$

ELLIPSE

The equation of ellipse is $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, where $b^2 = a^2(1 - e^2)$, eccentricity (e), centre (0, 0), vertex $(\pm a, 0)$, foci $(\pm ae, 0)$ and equations of directrix are $x = \pm\left(\frac{a}{e}\right)$.

Latus rectum of ellipse $= \frac{2b^2}{a}$.

Equation of tangent of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, at the point (x_1, y_1) is $\frac{xx_1}{a^2} + \frac{yy_1}{b^2} = 1$

Line $y = mx + c$, will touch an ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, if

$$c^2 = a^2m^2 + b^2$$

Equation of any tangent of ellipse is:

$$y = mx + \sqrt{(a^2m^2 + b^2)}.$$

Equation of normal of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$, at the point (x_1, y_1) is $\frac{x - x_1}{\frac{x_1}{a^2}} = \frac{y - y_1}{\frac{y_1}{b^2}}$.

Equation of auxillary circle of ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \text{ is } x^2 + y^2 = a^2.$$

Equation of chord of contact of tangents drawn on ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ at the point (x_1, y_1) is

$$\frac{xx_1}{a^2} + \frac{yy_1}{b^2} = 1.$$

Equation of diameter of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is

$$y = -\left(\frac{b^2}{a^2m}\right)x$$

Conjugate diameter : $y = m_1x$ and $y = m_2x$ are conjugate diameters of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ if

$$m_1m_2 = -\left(\frac{b^2}{a^2}\right)$$

Equation of that chord of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ whose mid-point is (x_1, y_1) is:

$$\frac{xx_1}{a^2} + \frac{yy_1}{b^2} = \frac{x_1^2}{a^2} + \frac{y_1^2}{b^2}$$

HYPERBOLA

Let $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ ...(1)

be the equation of a hyperbola,

where $b^2 = a^2(e^2 - 1)$ ...(2)

(*a*) **Transverse Axis:** Intercept of the hyperbola on the axis (AA′) is called its transverse axis, the transverse axis, AA′ = $2a$.

(*b*) **Conjugate Axis:** Length BB′ = $2b$, on y-axis is called conjugate axis of the hyperbola.

[Note that the hyperbola does not intersect the y-axis].

(*c*) **Eccentricity:** $e = \sqrt{1 + \frac{b^2}{a^2}} = \sqrt{1 + \left(\frac{\text{conjugate axis}}{\text{transverse axis}}\right)^2}$

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(*d*) **Focal Difference:** Let $P(x_1, y_1)$ be any point on the hyperbola, then

$$SP = ePM = e\left(x_1 - \frac{a}{e}\right) = ex_1 - a$$

and $$S'P = ePM' = e\left(x_1 + \frac{a}{e}\right) = ex_1 + a$$

The difference of the focal distances

$$|S'P - SP| = 2a = \text{transverse axis}$$

$\therefore$ The difference of the focal distances of any point on the hyperbola is a constant, equal to transverse axis.

MULTIPLE CHOICE QUESTIONS

1. The straight line $(2x + 3y + 4) + \lambda(6x - y + 12) = 0$ will be parallel to y-axis, if the value of λ is:
A. 1 B. 2
C. 3 D. 4

2. If the portion of a straight line intercepted between the co-ordinate axes is bisected at (2, 2), then the equation of the line is:
A. $x + y = 4$ B. $x + 2y = 6$
C. $2x + y = 6$ D. $3x - y = 4$

3. The locus of a point, whose abscissae and ordinates are always equal, is:
A. $x - y = 0$ B. $x - y = 1$
C. $x + y = 0$ D. $x + y = 1$

4. If there is a triangle whose vertices are A(3, –5), B(7, 3) and C(–5, 5), then the equation $6x - y = 23$ represents
A. the line AB
B. The line joining the mid-points of BC and AC
C. the median through A
D. altitudes from A to BC

5. Area of the parallelogram formed by the lines $y = mx$, $y = mx + 1$, $y = nx$ and $y = nx + 1$ equals
A. $\frac{|m+n|}{(m-n)^2}$ B. $\frac{2}{|m+n|}$
C. $\frac{1}{|m+n|}$ D. $\frac{1}{|m-n|}$

6. The value of k so that the equation
$3y^2 - 8xy - 3x^2 - 29x + ky - 18 = 0$
represents a pair of straight lines is:
A. 3 B. –1
C. 1 D. 8

7. The lines given by the equation
$x^2 + 6xy + 9y^2 + 4x + 12y - 5 = 0$ are
A. perpendicular B. parallel
C. coincident D. None of these

8. The angle between the two straight lines represented by the equation
$6x^2 + 5xy - 4y^2 + 7x + 13y - 3 = 0$ is
A. $\tan^{-1}\frac{3}{5}$ B. $\tan^{-1}\frac{11}{2}$
C. $\tan^{-1}\frac{2}{11}$ D. $\tan^{-1}\frac{5}{3}$

9. The point of intersection of the straight lines given by the equation
$3y^2 - 8xy - 3x^2 - 29x + 3y - 18 = 0$ is
A. $\left(-\frac{3}{2}, -\frac{5}{2}\right)$ B. (1, –1)
C. (2, 1) D. (–1, 1)

10. The pair of straight lines joining the origin to the intersection of the straight line $y = mx + c$ and the curve $x^2 + y^2 = a^2$ are at right angles if:
A. $a^2(1 - m^2) = c^2$
B. $a^2(1 + m^2) = 2c^2$
C. $a^2(1 - m^2) = 2c^2$
D. $a^2(1 + m^2) = c^2$

11. If the pair of straight lines
$x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$
be such that each pair bisects the angle between the other pair, then:
A. $pq = 1$ B. $p = q$
C. $p + q = 0$ D. $pq = -1$

12. If a straight line touches both the circle $x^2 + y^2 = 2$ and the parabola $y^2 = 8x$, then its equation is:
A. $y = \pm(x + 1)$ B. $y = \pm(2x + 1)$
C. $y = \pm(x + 2)$ D. $y = \pm x$

13. The normal to the circle $(x - 2)^2 + y^2 = 4$ at the point (4, 0) meets the circle again at:
A. (0, 4) B. (0, 2)
C. (0, 0) D. (2, 0)

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14. The possible value of p for which the line $x \cos \alpha + y \sin \alpha = p$ is a tangent to the circle $x^2 + y^2 - 2qx \cos \alpha - 2qy \sin \alpha = 0$, is/are:
A. 0 and q
B. q and $2q$
C. 0 and $2q$
D. q

15. The equation $x^2 + y^2 + 2gx + 2fy + c = 0$ represents a circle of non-zero radius if
A. $g^2 + f^2 > c$
B. $g^2 + f^2 < c$
C. $g^2 + f^2 = c$
D. None of these

16. The length of the intercept made by the circle $x^2 + y^2 - 7x + 6 = 0$ on the x-axis is:
A. 5
B. 7
C. 6
D. –6

17. Consider the line $2x - y - 2 = 0$ and the circles $x^2 + y^2 - 6x + 2y + 5 = 0$ and $5x^2 + 5y^2 = 4$. The line is a tangent to:
A. the first circle but not to the second
B. the second circle but not to the first
C. Both the circles
D. Neither of the circles

18. If the two circles $(x - 1)^2 + (y - 3)^2 = r^2$ and $x^2 + y^2 - 8x + 2y + 8 = 0$ intersect in two distinct points, then
A. $r > 2$
B. $r < 2$
C. $r = 2$
D. None of these

19. If the circles $x^2 + y^2 + 2x + 2ky + 6 = 0$ and $x^2 + y^2 + 2ky + k = 0$ intersect orthogonally, then k is:
A. 2 or $-\frac{3}{2}$
B. –2 or $-\frac{3}{2}$
C. 2 or $\frac{3}{2}$
D. –2 or $\frac{3}{2}$

20. The equations of the tangents drawn from the origin to the circles $x^2 + y^2 - 2rx - 2hy + h^2 = 0$, are
A. $x = 1$
B. $y = 0$
C. $(h^2 - r^2)\, x - 2rhx = 0$
D. $(h^2 - r^2)\, x + 2rhy = 0$

21. The tangent to the circle $x^2 + y^2 = 5$ at (1, –2) touches the circle $x^2 + y^2 - 8x + 6y + 20 = 0$ at the point:
A. (2, –1)
B. (3, –1)
C. (4, –1)
D. (5, –1)

22. The length of the intercept made by the circle $3x^2 + 3y^2 + 4x + 2y + 1 = 0$ on the x-axis is:
A. $\frac{2}{3}$
B. $-\frac{2}{3}$
C. less than 1
D. more than –1

23. The focus of the parabola $x^2 + 8y = 0$ at:
A. (0, –2)
B. (0, 2)
C. (2, 0)
D. (–2, 0)

24. The eccentricity of the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$ is:
A. $\frac{9}{25}$
B. $\frac{5}{4}$
C. $\frac{25}{9}$
D. $\frac{4}{5}$

25. Consider the equation
$y^2 - 8x - 2y - 7 = 0$
and the following statements:
I. It represents a parabola.
II. Its vertex is (–1, 1).
III. Its focus is (0, 0).
IV. It has $x = -3$ as the directrix.
Of these statements:
A. I, III and IV are correct
B. I, II and III are correct
C. I, II and IV are correct
D. I, II, III and IV are correct

26. The locus of a variable point whose distance from (–2, 0) is $\frac{2}{3}$ times its distance from the line $x = -\frac{9}{2}$ is:
A. ellipse
B. parabola
C. hyperbola
D. None of these

27. Let E be the ellipse of $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and C be the circle $x^2 + y^2 = 9$. Let P and Q be the points (1, 2) and (2, 1) respectively, then
A. Q lies inside C bus outside E.
B. Q lies outside both C and E.
C. P lies inside both C and E.
D. P lies inside C but outside E.

28. The equation $2x^2 + 3y^2 - 8x - 18y + 35 = k$ represents:
A. no locus if $k > 0$
B. an ellipse if $k < 0$
C. a point if $k = 0$
D. a hyperbola if $k > 0$

29. Diameter of a circle which passes through the focus of an ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$, whose centre is at (0, 3) is:
A. 3
B. 12
C. 8
D. 2

30. The equation $y^2 - 2x - 2y + 5 = 0$ represents:
A. a circle with centre (1, 1).
B. a parabola with focus (1, 2).
C. a parabola with directrix $x = \frac{3}{2}$.
D. a parabola with directrix $x = -\frac{1}{2}$.

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ANSWERS

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
C	A	D	*	D	A	B	B	A	B
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
D	C	C	C	A	A	C	D	A	C
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
B	A	A	D	C	A	A	C	C	C

EXPLANATORY ANSWERS

2. Suppose the equation of the line is $\frac{x}{a}+\frac{y}{b}=1$

Since AB is bisected at (2, 2).

$\therefore \quad 2 = \frac{a+0}{2},\ 2 = \frac{0+b}{2}$

or $\quad a = 4,\ b = 4$

Hence, the equation of the line is

$$\frac{x}{4}+\frac{y}{4} = 1 \text{ or } x + y = 4$$

4. Equation of the line AB is

$$y - 3 = \frac{3+5}{7-3}(x-7)$$

or $\quad 2x - y = 11 \qquad (\neq 6x - y = 23)$

Equation of the line joining the mid-points of BC (1, 4) and AC (–1, 0) is

$$y - 0 = \frac{0-4}{-1-1}(x+1)$$

or $\quad 2x - y = -2 \qquad (\neq 6x - y = 23)$

Equation of the median through A is:

$$\frac{y+5}{x-3} = -\frac{1}{\frac{5-3}{-5-7}} = 6 \text{ or } 6x - y = 23 \text{ (same)}$$

5. Here $\quad y = \frac{m}{m-n}$ or $\frac{n}{n-m}$

Depending on which one of n or m is greater.

Area of parallelogram $= 2\times\left[\frac{1}{2}\times 1\times\frac{1}{|m-n|}\right] = \frac{1}{|m-n|}$.

17. The line $2x - y - 2 = 0$ will touch the circle

$$x^2 + y^2 - 6x + 2y + 5 = 0$$

If perpendicular distance from its centre (3, –1) on the line is equal to its radius $= \sqrt{9+1-5} = \sqrt{5}$

i.e., if $\quad \frac{|2\times 3-(-1)-2|}{\sqrt{4}+1} = \sqrt{5}$

i.e., if $\quad \frac{5}{\sqrt{5}} = \sqrt{5}$ which is true.

Similarly, for the second circle

$$\frac{|-2|}{\sqrt{4}+1} = \frac{2}{\sqrt{5}} \text{ which is true.}$$

18. Here, $c_1 = (1, 3)$, $r_1 = r$; $c_2 = (4, -1)$, $r_2 = 3$

In case they intersect in two distinct points, then

$$c_1c_2 < r_1 + r_2 \text{ and } c_1c_2 > r_1 - r_2$$

or $\quad 5 < r + 3$ and $5 > r - 3$

or $\quad r > 2$ and $r < 8$

i.e., $\quad 2 < r < 8$

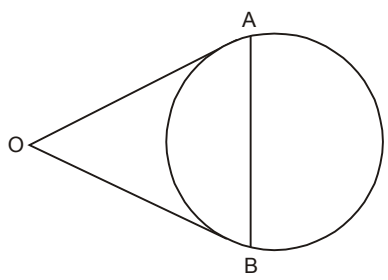
19. Since the units intersect orthogonally,

$\therefore\ 2 \times 1 \times 0 + 2 \times k \times k = 6 + k$

or $\quad 2k^2 = k + 6$ or $2k^2 - k - 6 = 0$

or $\quad (k - 2)(2k + 3) = 0$ or $k = 2,\ k = -\frac{3}{2}$

20. The joint equation of the pair of tangents OA and OB can be obtained by making the equation (*i*) of the circle homogeneous with the help of the equation (*ii*). Thus, we get it as:



$$x^2 + y^2 - 2(rx+hy)\cdot\frac{(rx+hy)}{h^2} + h^2\cdot\left(\frac{rx+hy}{h^2}\right)^2 = 0$$

or $\quad h^2(x^2 + y^2) = (rx + hy)^2$

or $\quad h^2x^2 + h^2y^2 = r^2x^2 + h^2y^2 + 2rhxy$

or $\quad x^2(h^2 - r^2) - 2rhx = 0 \quad \Rightarrow x = 0$

or $\quad x(h^2 - r^2) - 2rhy = 0$

21. The tangent to the circle,

$x^2 + y^2 = 5$ at (1, – 2) is $x(1) + y(-2) - 5 = 0$

or $\quad x - 2y - 5 = 0 \qquad ...(1)$

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Suppose it touches the circle

$x^2 + y^2 - 8x + 6y + 20 = 0$ at (x_1, y_1) ...(*i*)

Also, the equation of tangent at

(x_1, y_1) is $x(x_1 - 4) + y(y_1 + 3) - 4x_1 + 3y_1 + 20 = 0$ ...(*ii*)

Since (*i*) and (*ii*) represent the same lines

$$\frac{x_1 - 4}{1} = \frac{y_1 + 3}{-2} = \frac{-4x_1 + 3y_1 + 20}{-5}$$

Solving these, $x_1 = 3$, $y_1 = -1$.

22. Intersection of the circle $3x^2 + 3y^2 + 4x + 2y + 1 = 0$ with the x-axis ($y = 0$) is given by $3x^2 + 4x + 1 = 0$ or $(3x + 1)(x + 1) = 0$

$$\therefore \qquad x_1 = -\frac{1}{3},\ x_2 = -1$$

Hence, length of intercept on x-axis

$$= |x_1 - x_2| = \left|-\frac{1}{3} + 1\right| = \left|\frac{2}{3}\right| = \frac{2}{3}$$

23. The focus of the parabola $x^2 + 8y = 0$

or $\qquad x^2 = -8y = -(4 \times 2)y$

is at $\quad (0, -a) = (0, -2)$.

24. Eccentricity, e of the given ellipse with $a = 5$, $b = 3$ is given by,

$$b^2 = a^2(1 - e^2)$$

or $\qquad 9 = 25(1 - e^2)$ or $1 - e^2 = \dfrac{9}{25}$

or $\qquad e^2 = 1 - \dfrac{9}{25} = \dfrac{16}{25}$ or $e = \dfrac{4}{5}$.

25. $\qquad y^2 - 8x - 2y - 7 = 0$

or $\quad y^2 - 2y + 1 = 8x + 7 + 1 = 8x + 8$

or $\qquad (y - 1)^2 = 8(x + 1)$

which can be put as $Y^2 = 8X = 4 \times 2X$

where $\qquad Y = y - 1$, $X = x + 1$

This clearly represents a parabola, whose

(*a*) Vertex is at X = 0, Y = 0 or $x + 1 = 0$, $y - 1 = 0$ or $\qquad x = -1$, $y = 1$

(*b*) Focus is at X = 2, Y = 0 or $x + 1 = 2$, $y - 1 = 0$ or $\qquad x = 1$, $y = 1$

(*c*) Directrix is X = – 2 or $x + 1 = -2$ or $\qquad x = -3$

27. Since distance between P(1, 2) and centre of circle

$$C(0, 0) = \sqrt{(1-0)^2 + (2-0)^2} = \sqrt{5} < 9.$$

Therefore P lies inside the circle C.

Similarly, as $\sqrt{(2-0)^2 + (1-0)^2} = \sqrt{5} < 9$, therefore Q also lies inside the circle C.

Next, side for the ellipse $4x^2 + 9y^2 - 36 = 0$, at P(1, 2), $4(1)^2 + 9(2)^2 - 36 = 4 > 0$ at Q(2, 1), $4(2)^2 + 9(1)^2 - 36 = -11 < 0$, Q lies inside the ellipse and P lies outside E.

Hence, Q lies inside C but outside E.

28. When $\qquad k = 0$, the equation becomes

$$2x^2 + 3y^2 - 8x - 18y + 35 = 0$$

or $\qquad 2(x - 2)^2 + 3(y - 3)^2 = 0$

Since the sum of two positive numbers is zero,

$\therefore$ each must be zero.

or $\sqrt{2}(x-2) = 0$ and $\sqrt{3}(y-3) = 0$

$\Rightarrow \qquad x = 2,\ y = 3$

Hence, when $k = 0$, given equation represents a point, *viz*, (2, 3).

30. Given equation is $y^2 - 2x - 2y + 5 = 0$

or $y^2 - 2y + 1 = 2x - 4$ or $(y - 1)^2 = 2(x - 2)$

Shifting the origin to (2, 1), the equation becomes

$$Y^2 = 4 \cdot \frac{1}{2} X$$

which represents a parabola whose directrix is

$$X = -\frac{1}{2} \text{ or } x - 2 = -\frac{1}{2} \text{ or } x = \frac{3}{2}$$

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CHAPTER

5

CALCULUS

Calculus is the branch of mathematics that deals with continuous change. It helps us to understand the changes between the values which are related by a function. Calculus Math mainly focused on some important topics such as differentiation, integration, limits, functions, and so on.

LIMIT

If $f(x)$ approaches to a real number l, when x approaches to a *i.e.*, if $f(x) \to l$ when $x \to a$, then l is called the limit of the function $f(x)$. In symbolic form, it can be written as:

$$\lim_{x \to a} f(x) = l$$

LEFT HAND AND RIGHT HAND LIMIT

$$\text{LHL} = \lim_{x \to a^-} f(x) = l_1$$

$$\text{RHL} = \lim_{x \to a^+} f(x) = l_2$$

Formulae for Limits

(*a*) $\lim_{x \to 0} \frac{\sin x}{x} = 1 = \lim_{x \to 0} \frac{x}{\sin x}$

(*b*) $\lim_{x \to 0} \frac{\tan x}{x} = 1 = \lim_{x \to 0} \frac{x}{\tan x}$

(*c*) $\lim_{x \to 0} \frac{\sin^{-1} x}{x} = 1 = \lim_{x \to 0} \frac{x}{\sin^{-1} x}$

(*d*) $\lim_{x \to 0} \frac{\tan^{-1} x}{x} = 1 = \lim_{x \to 0} \frac{x}{\tan^{-1} x}$

(*e*) $\lim_{x \to 0} \frac{a^x - 1}{x} = \log_e a,\ a > 0$

(*f*) $\lim_{x \to 0} \frac{e^x - 1}{x} = 1$

(*g*) $\lim_{x \to 0} \frac{\log_e (1 + x)}{x} = 1$

(*h*) $\lim_{x \to a} \frac{x^n - a^n}{x - a} = na^{n-1}$

(*i*) $\lim_{x \to 0} (1 + kx)^{1/x} = e^k$, where k is any constant

(*j*) $\lim_{x \to \infty} \frac{\log_a (1 + x)}{x} = \log_a e,\ a > 0 \neq 1$

(*k*) $\lim_{x \to \infty} \frac{\sin x}{x} = \lim_{x \to \infty} \frac{\cos x}{x} = 0$

(*l*) $\lim_{x \to \infty} \cos x = 1$

CONTINUITY AT A POINT

A function $f(x)$ is continuous at a point $x = a$, were $a \in$ domain of $f(x)$, if

$$\lim_{x \to a^-} f(x) = f(a) = \lim_{x \to a^+} f(x)$$

where, $\lim_{x \to a^-} f(x)$ is Left Hand Limit (LHL) of $f(x)$ at $x = a$

$\lim_{x \to a^+} f(x)$ is Right Hand Limit (RHL) of $f(x)$ at $x = a$

and $f(a)$ is the value of $f(x)$ at $x = a$.

DIFFERENTIABILITY

Let $f(x)$ be defined at any point c in the interval (a, b). Then $f(x)$ is said to be differentiable at $x = c$ if the function has a derivative at this point, *i.e.*, if $f'(c)$ exists. Hence, if

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$\lim_{h\to 0}\frac{f(c+h)-f(c)}{h}$ exists, then the function $f(x)$ is called differentiable at point $x = c$.

For the existence of this limit it is necessary that when $h \to 0$, the *left-hand* and *right-hand* limits both must exist and they must be equal.

The Right Hand Derivative (RHD) of $f(x)$ at the point $x = c$ is defined as

$$Rf'(c) = \lim_{h\to 0^+}\frac{f(c+h)-f(c)}{h},\ h>0$$

Similarly, the Left Hand Derivative (LHD) of $f(x)$ at $x = c$ is defined as

$$Lf'(c) = \lim_{h\to 0^-}\frac{f(c+h)-f(c)}{h},\ h>0$$

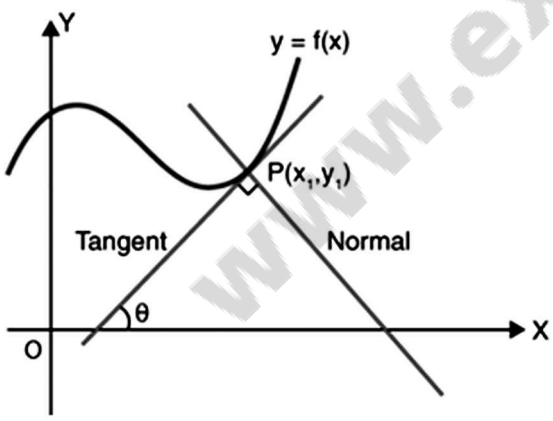
or $$Lf'(c) = \lim_{h\to 0}\frac{f(c-h)-f(c)}{-h},\ h>0$$

Hence, function $f(x)$ is differentiable at $x = c$ iff

$$Rf'(c) = Lf'(c).$$

TANGENT AND NORMAL LINES

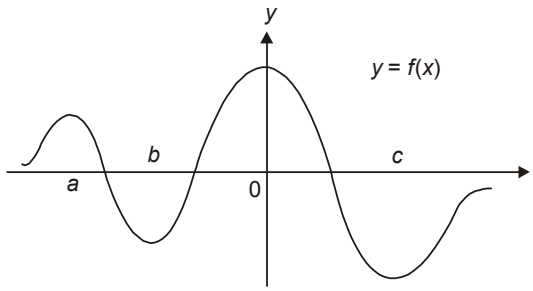
In calculus, the tangent line touches the curve at exactly one point and this line has the same slope as the curve at that point. The line which is perpendicular to the tangent line is called the normal line. These two lines can be shown as given in the below figure:



For a function $y = f(x)$, the slope of the tangent line is given by dy/dx.

MAXIMA AND MINIMA

Maxima and minima are known as the extrema of a function. Maxima and minima are the maximum or the minimum value of a function within the given set of ranges.



There are two types of maxima and minima that exist in a function, which are:

- Local Maxima and Minima
- Absolute or Global Maxima and Minima

A second-order derivative test for maxima and minima tests whether the slope is equal to 0 at the critical point $x = c(f'(c) = 0)$, at which point we find the second derivative of the function. Within the given range, if the second derivative of the function is present:

- **Local maxima :** If $f''(c) < 0$
- **Local Minima :** If $f''(c) > 0$
- **Test fails :** If $f''(c) = 0$

INTEGRATION

INTEGRATION BY SUBSTITUTION

Let f be a continuous function of u and u be a continuously differentiable function of x on $[a, b]$. Then

$$\int f(u)du = \int f(u(x))u'(x)\,dx$$

Integration by parts is the inverse of the product rule.

INTEGRATION BY PARTS

Let f and g be continuously differentiable functions on $[a, b]$. Then

$$\int_a^b f(x)g'(x)dx = f(x)g(x)\Big|_a^b - \int_a^b g(x)f'(x)dx$$

This rule is often written with differentials in the form $\int u\,dv = uv - \int v\,du.$

Standard Formulas for Indefinite Integration

(*a*) $\int x^n dx = \frac{x^{n+1}}{n+1} + c$

(*b*) $\int a^x dx = \frac{a^x}{lna} + c$

(*c*) $\int e^x dx = e^x + c$

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(*d*) $\int \frac{1}{x} dx = lnx + c$

(*e*) $\int \sin x\, dx = -\cos x + c$

(*f*) $\int \cos x\, dx = \sin x + c$

(*g*) $\int \sec^2 x\, dx = \tan x + c$

(*h*) $\int \text{cosec}^2 x\, dx = -\cot x + c$

(*i*) $\int \sec x \tan x\, dx = \sec x + c$

(*j*) $\int \text{cosec}\ x \cot x\, dx = -\text{cosec}\, x + c$

(*k*) $\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x + c$

(*l*) $\int \frac{1}{\sqrt{1-x^2}} dx = -\cos^{-1} x + c$

(*m*) $\int \frac{1}{1+x^2} dx = \tan^{-1} x + c$

(*n*) $\int \frac{1}{1+x^2} dx = -\cot^{-1} x + c$

(*o*) $\int \frac{1}{x\sqrt{x^2-1}} dx = \sec^{-1} x + c$

(*p*) $\int \frac{1}{x\sqrt{x^2-1}} dx = -\text{cosec}^{-1} x + c$

DIFFERENTIAL EQUATIONS WITH VARIABLE SEPARABLE

We know that the first order, first degree differential equation is of the form:

$$\frac{dy}{dx} = F(x, y) \qquad ...(i)$$

If F(x, y) is expressed as the product of $g(x)\ h(y)$, where $g(x)$ is the function of x and $h(y)$ is the function of y, then the differential equation is said to be of variable separable type. Thus, the differential equation (*i*) takes the form:

$$\frac{dy}{dx} = g(x).h(y) \qquad ...(ii)$$

If $h(y) \neq 0$, and separating the variables, equation (*ii*) becomes

$$(1/h(y))\ dy = g(x)\ dx \qquad ...(iii)$$

Now, integrate the equation (*iii*) on both sides, we get

$$\int (1/h(y))dy = \int g(x)dx \qquad ...(iv)$$

Hence, equation (*iv*) provides the solution for the differential equation in the form:

$$H(y) = G(x) + C$$

Where H(y) and G(x) are the antiderivatives of $1/h(y)$ and $g(x)$, respectively and C is called the arbitrary constant.

MULTIPLE CHOICE QUESTIONS

1. The rate of change of the area of a circle with respect to its radius r at r = 6 cm is:

A. 10 π B. 12 π
C. 8 π D. 11 π

2. For all real values of x, the minimum value of $\frac{1-x+x^2}{1+x+x^2}$ is:

A. 0 B. 1
C. 3 D. $\frac{1}{3}$

3. The maximum value of $\left[x(x-1)+1\right]^{\frac{1}{3}}, 0 \le x \le 1$ is:

A. $\left(\frac{1}{3}\right)^{\frac{1}{3}}$ B. $\frac{1}{2}$
C. 1 D. 0

4. On which of the following intervals is the function f given by $f(x) = x^{100} + \sin x - 1$ strictly decreasing?

A. (–1, 1) B. (0, 1)
C. $\left(\frac{\pi}{2}, \pi\right)$ D. $\left(0, \frac{\pi}{2}\right)$

5. A cylindrical tank of radius 10 m is being filled with wheat at the rate of 314 cubic metre per hour. Then the depth of the wheat is increasing at the rate of:

A. 1 m^3/h B. 0.1 m^3/h
C. 1.1 m^3/h D. 0.5 m^3/h

6. The slope of the tangent to the curve $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$ at the point (2, –1) is:

A. $\frac{22}{7}$ B. $\frac{6}{7}$
C. $\frac{7}{6}$ D. $\frac{-6}{7}$

7. The line $y = mx + 1$ is a tangent to the curve $y^2 = 4x$ if the value of m is:

A. 1 B. 2
C. 3 D. $\frac{1}{2}$

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8. The normal at the point (1, 1) on the curve $2y + x^2 = 3$ is:

A. $x + y = 0$ B. $x - y = 0$
C. $x + y + 1 = 0$ D. $x - y + 1 = 0$

9. The function $f : R \to R$ given by $f(x) = -|x - 1|$ is:

A. continuous as well as differentiable at $x = 1$
B. not continuous but differentiable at $x = 1$
C. continuous but not differentiable at $x = 1$
D. neither continuous nor differentiable at $x = 1$

10. The function $f(x) = \cot x$ is discontinuous on the set:

A. $\{x = n\pi : n \in Z\}$
B. $\{x = 2n\pi : n \in Z\}$
C. $\left\{x = (2n+1)\frac{\pi}{2};\ n \in Z\right\}$
D. $\left\{x = \frac{n\pi}{2};\ n \in Z\right\}$

11. The function $f(x) = \frac{x-1}{x(x^2-1)}$ is discontinuous at:

A. exactly one point
B. exactly two points
C. exactly three points
D. no point

12. If $f(x) = x^2 \sin\frac{1}{x}$, where $x \neq 0$, then the value of the function f at $x = 0$, so that the function is continuous at $x = 0$, is:

A. 0 B. -1
C. 1 D. None of these

13. The value of c in Rolle's theorem for the function $f(x) = x^3 - 3x$ in the interval $\left[0, \sqrt{3}\right]$ is:

A. 1 B. -1
C. $\frac{3}{2}$ D. $\frac{1}{3}$

14. If $y = \log\sqrt{\tan x}$, then the value of $\frac{dy}{dx}$ at $x = \frac{\pi}{4}$ is:

A. 0 B. 1
C. $\frac{1}{2}$ D. ∞

15. If $y = \sqrt{\sin x + y}$, then $\frac{dy}{dx}$ is equal to:

A. $\frac{\cos x}{2y-1}$ B. $\frac{\cos x}{1-2y}$
C. $\frac{\sin x}{1-2y}$ D. $\frac{\sin x}{2y-1}$

16. What is the value of the given limit, $\lim_{x\to 0}\frac{2x}{x}$?

A. 2 B. 0
C. $\frac{1}{2}$ D. $\frac{2}{3}$

17. The value of $\lim_{x\to 0}\frac{8^x - 4^x}{4x}$ is:

A. $\frac{1}{2}\ln 2$ B. $\frac{1}{4}\ln 2$
C. 0 D. ln 2

18. $\lim_{x\to\frac{\pi}{2}}\left[x\tan x - \frac{\pi}{2}\sec x\right] =$

A. 0 B. 1
C. -1 D. $\frac{\pi}{2}$

19. If $y = Ae^{5x} + Be^{-5x}$, then $\frac{d^2y}{dx^2}$ is equal to:

A. $25y$ B. $5y$
C. $-25y$ D. $15y$

20. $x = at^2$, $y = 2at$, then $\frac{d^2y}{dx^2}$ at $t = 2$ is:

A. $\frac{1}{4}$
B. $\frac{-1}{4}$
C. $\frac{1}{16a}$
D. $\frac{-1}{16a}$

ANSWERS

1	2	3	4	5	6	7	8	9	10
B	D	C	D	A	B	A	B	C	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	A	A	B	A	A	B	C	A	D

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EXPLANATORY ANSWERS

1. Area of circle (A) = πr^2

The rate of change of area w.r.t. its radius $r = \frac{dA}{dr}$

Now, A = πr^2

$\therefore \quad \frac{dA}{dr} = 2\pi \times 6$

$= 12\pi$ cm^2/radius.

2. Let $y = \frac{1 - x + x^2}{1 + x + x^2}$

$$\frac{dy}{dx} = \frac{(-1+2x)(1+x+x^2) - (1-x+x^2)(1+2x)}{(1+x+x^2)^2}$$

Numerator of $\frac{dy}{dx} = 2(x-1)(x+1)$,

$\therefore \frac{dy}{dx} = \frac{2(x-1)(x+1)}{(x^2+x+1)^2}$, $\frac{dy}{dx} = 0$ at $x = 1, -1$

At $x = 1$, $\frac{dy}{dx}$ changes sign from –ve to +ve

$\therefore$ y is minimum at $x = 1$

Minimum value of $\frac{1-x+x^2}{1+x+x^2} = \frac{1-1+1}{1+1+1} = \frac{1}{3}$.

3. Let $y = [x(x - 1) + 1]^{1/3}$

$\therefore \frac{dy}{dx} = \frac{(2x-1)}{3[x(x-1)+1]^{2/3}}$, $\frac{dy}{dx} = 0$ at $x = \frac{1}{2}$

$\frac{dy}{dx}$ changes sign from –ve to +ve at $x = \frac{1}{2}$

$\therefore$ y is minimum at $x = \frac{1}{2}$

Value of y at $x = 0$, $(0 + 1)^{1/3} = 1^{1/3} = 1$

Value of y at $x = 1$, $(0 + 1)^{1/3} = 1^{1/3} = 1$

$\therefore$ The maximum value of y is 1.

4. Let $f(x) = x^{100} + \sin x - 1$

$\therefore f(x) = 100\, x^{99} + \cos x$

(A) for (–1, 1) *i.e.*, $-1 < x < 1$, $-1 < x^{99} < 1$

$\Rightarrow -100 < 100\, x^{99} < 100$

Also $0 < \cos x < 1$

$\Rightarrow f'(x)$ can either be +ve or –ve on (–1, 1)

$\therefore f(x)$ is neither increasing nor decreasing on (–1, 1).

(B) For (0, 1) *i.e.*, $0 < x < 1$, x^{99} and $\cos x$ are both +ve

$\therefore f(x) > 0$

$\Rightarrow f(x)$ is increasing on (0, 1).

(C) For $\left(\frac{\pi}{2}, \pi\right)$ *i.e.*, $\frac{\pi}{2} < x < \pi$, x^{99} is +ve and $-1 < \cos x < 0$

$\therefore f'(x) > 0$

$\Rightarrow f(x)$ is increasing on $\left(\frac{\pi}{2}, \pi\right)$

(D) For $\left(0, \frac{\pi}{2}\right)$, *i.e.*, $0 < x < \frac{\pi}{2}$, x^{99} and $\cos x$ are both –ve

$\therefore f'(x) < 0$

$\Rightarrow f(x)$ is decreasing on $\left(0, \frac{\pi}{2}\right)$.

5. Let h be the height of the cylindrical tank at any instant.

Volume of cylindrical tank = $\pi r^2 h = \pi(10)^2 h$,

$\therefore v = 100\, \pi h$

Rate of change of volume

$\therefore \frac{dv}{dt} = 100\pi \frac{dh}{dt}$ ...(*i*)

The tank is filled at the rate of 314 cubic metre per hour *i.e.*,

$\frac{dv}{dt} = 314$ from (*i*) $314 = 100\pi \frac{dh}{dt}$

$\therefore \frac{dh}{dt} = \frac{314}{100\pi} = \frac{314}{100 \times 3.14} = 1$

Hence, the depth of the tank changes at 1 cubic m/h.

6. The curve is $x = t^2 + 3t - 8$, $y = 2t^2 - 2t - 5$ ...(*i*)

Put $x = 2$,

$\Rightarrow \quad (t + 5)(t - 2) = 0$

Put $t = 2$ in $y = 2t^2 - 2t - 5 = 8 - 4 - 5 = -1$

At $x = 2$, $y = -1$, $t = 2$

Differentiating (*i*)

$$\frac{dx}{dt} = 2t + 3$$

$$\frac{dy}{dx} = 4t - 2$$

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$\therefore \quad \dfrac{dy}{dx} = \dfrac{dy}{dt} \times \dfrac{dt}{dx}$

$= \dfrac{4t-2}{2t+3}$

At $t = 2$, $\quad \dfrac{dy}{dx} = \dfrac{4 \times 2 - 2}{2 \times 2 + 3}$

$= \dfrac{6}{7}.$

7. The equation of the curve is $y^2 = 4x$

Differentiating w.r.t. x

$\therefore \dfrac{dy}{dx} = \dfrac{4}{2y} = \dfrac{2}{y}$

Slope of tangent $= \dfrac{2}{y} = m$

$\therefore \; y = \dfrac{2}{m}$ ...(*i*)

(x_1, y_1) lies on $y^2 = 4x$, $y_1^2 = 4x_1$ ...(*ii*)

Equation of tangent at (x_1, y_1)

or $\quad y = mx + y_1 - mx_1$ ...(*iii*)

$y = mx + 1$ ...(*iv*)

Comparing (*iii*) & (*iv*)

$y_1 - mx_1 = 1$ ...(*v*)

from (*i*) & (*ii*) $\; m = \dfrac{2}{y_1}$

$x_1 = \dfrac{y_1^2}{4}$

$\therefore$ Put these values in (*v*)

or $\quad y_1 - \dfrac{y_1}{2} = \dfrac{y_1}{2} = 1$

$\therefore y_1 = 2$

$\therefore m = \dfrac{2}{y_1} = \dfrac{2}{2} = 1$

8. The equation of the curve $2y + x^2 = 3$

Differentiating,

$\therefore \quad \dfrac{dy}{dx} = -x$

$\dfrac{dy}{dx}$ at $(1, 1) = -1$ = slope of tangent

Since slope of normal $= \dfrac{-1}{\text{Slope of tangent}} = 1$

$\therefore$ The equation of the normal is

$y - y_1 =$ (slope of normal) $(x - x_1)$

$y - 1 = 1\,(x - 1)$

or $x - y = 0$.

9. We have,

$$f(x) = -|x-1| = \begin{cases} x-1, & \text{if } x \le 1 \\ -(x-1), & \text{if } x > 1 \end{cases}$$

At $x = 1$

$$\text{LHL} = \lim_{h \to 0} f(1-h)$$
$$= \lim_{h \to 0} (1-h) - 1$$
$$= 0$$
$$\text{RHL} = \lim_{h \to 0} f(1+h)$$
$$= \lim_{h \to 0} -(1+h-1)$$
$$= 0$$

$f(1) = 1 - 1 = 0$

$\therefore$ LHL = RHL = $f(0)$

$\Rightarrow f(x)$ is continuous everywhere

Now, at $x = 1$

$$\text{LHD} = \frac{d}{dx}(x-1) = 1$$

$$\text{RHD} = \frac{d}{dx}\{-(x-1)\} = -1$$

LHD $\neq$ RHD

$\therefore f(x)$ is not differentiable of $x = 1$.

10. We know that, $f(x) = \cot x$ is continuous in $R - \{n\pi : n \in Z\}$

Since, $\quad f(x) = \cot x = \dfrac{\cos x}{\sin x}$

[Since, $\sin x = 0$ at $\{n\pi, n \in Z\}$]

Hence, $f(x) = \cot x$ is discontinuous on the set $\{x = n\pi : n \in Z\}$.

11. We have,

$$f(x) = \frac{x-1}{x(x^2-1)}$$

$\therefore f(x)$ is discontinuous when $x(x^2 - 1) = 0$

$\Rightarrow \quad x = 0, x = \pm 1$

$\therefore f(x)$ is discontinuous

at $\quad x = 0, -1, 1$

i.e., exactly at three points.

12. $\because \; f(x) = x^2 \sin\left(\dfrac{1}{x}\right)$,

where $x \neq 0$

$\because \lim\limits_{x \to 0} f(x) = 0$

Hence, value of the function f at $x = 0$, so that it is continuous at $x = 0$ is 0.

13. $\because \quad f'(c) = 0 \qquad [\because f'(x) = 3x^2 - 3]$

$\Rightarrow \quad 3c^2 - 3 = 0$

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$\Rightarrow \quad c^2 = \frac{3}{3} = 1$

$\Rightarrow \quad c = \pm 1$

where $1 \in \left(0, \sqrt{3}\right)$

$\Rightarrow \quad c = 1.$

14. We have, $y = \log\sqrt{\tan x}$

$$\therefore \quad \frac{dy}{dx} = \frac{1}{\sqrt{\tan x}} \times \frac{1}{2\sqrt{\tan x}} \times \sec^2 x$$

$$\Rightarrow \quad \frac{dy}{dx} = \frac{\sec^2 x}{2\tan x}$$

$$\Rightarrow \quad \left.\frac{dy}{dx}\right|_{\text{at } x=\frac{\pi}{4}} = \frac{\left(\sqrt{2}\right)^2}{2\times 1} = \frac{2}{2} = 1.$$

15. $\because \quad y = (\sin x + y)^{1/2}$

$$\frac{dy}{dx} = \frac{1}{2}(\sin x + y)^{-1/2}.\frac{d}{dx}(\sin x + y)$$

$$= \frac{1}{2}.\frac{1}{(\sin x + y)^{1/2}}.\left(\cos x + \frac{dy}{dx}\right)$$

$$\Rightarrow \quad \frac{dy}{dx} = \frac{1}{2y}\left(\cos x + \frac{dy}{dx}\right) \quad [\because (\sin x + y)^{1/2} = y]$$

$$\Rightarrow \frac{dy}{dx}\left(1 - \frac{1}{2y}\right) = \frac{\cos x}{2y}$$

$$\Rightarrow \quad \frac{dy}{dx} = \frac{\cos x}{2y}.\frac{2y}{2y-1}$$

$$= \frac{\cos x}{2y-1}.$$

16. Given $\lim\limits_{x\to 0} \frac{2x}{x}$

Using L'Hospital's Rule, by differentiating both the numerator and denominator with respect to x,

$$\lim_{x\to 0} \frac{2}{1} = 2.$$

17. $\lim\limits_{x\to 0} \frac{8^x - 4^x}{4x} \left[\frac{0}{0} \text{ form}\right]$

Applying L'Hospital's Rule,

$$= \lim_{x\to 0} \frac{8^x \ln 8 - 4^x \ln 4}{4}$$

$$= \frac{1}{4}(\ln 8 - \ln 4) = \frac{1}{4}\ln\frac{8}{4}$$

$$= \frac{1}{4}\ln 2.$$

18. $\lim\limits_{x\to\frac{\pi}{2}} \left[x\tan x - \frac{\pi}{2}\sec x\right]$

$$= \lim_{x\to\frac{\pi}{2}} \left[\frac{x\sin x - \frac{\pi}{2}}{\cos x}\right] \quad \left(\frac{0}{0} \text{ form}\right)$$

By L'Hospital's Rule,

$$\lim_{x\to\frac{\pi}{2}} \left[\frac{x\cos x + \sin x}{-\sin x}\right] = -1$$

19. $y = Ae^{5x} + Be^{-5x}$

$$\Rightarrow \quad \frac{dy}{dx} = 5Ae^{5x} - 5Be^{-5x}$$

$$\Rightarrow \quad \frac{d^2y}{d^2x} = 25Ae^{5x} + 25Be^{-5x}$$

$$= 25y.$$

20. $\frac{dx}{dt} = 2at, \frac{dy}{dt} = 2a$

$$\frac{dy}{dx} = \frac{2a}{2at} = \frac{1}{t}$$

$$\frac{d^2y}{dx^2} = \frac{-1}{t^2} \times \frac{dt}{dx}$$

$$= \frac{-1}{t^2} \times \frac{1}{2at}$$

$$\left(\frac{d^2y}{dx^2}\right)_{x=2} = \frac{-1}{2a\times 2^3}$$

$$= \frac{-1}{16a}.$$

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CHAPTER

6

VECTORS

A vector is an object which has both magnitudes and direction. It is usually represented by an arrow which shows the direction ($\rightarrow$) and its length shows the magnitude. The arrow which indicates the vector has an arrowhead and its opposite end is the tail. It is denoted as $\rightarrow$ V.

MAGNITUDE AND DIRECTION OF VECTORS

Magnitude of a Vector

The magnitude of a vector $\overrightarrow{PQ}$ is the distance between the initial point P and the end point Q. In symbols the magnitude of $\overrightarrow{PQ}$ is written as $\left|\overrightarrow{PQ}\right|$.

or $\left|\overrightarrow{PQ}\right| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Direction of a Vector

The direction of a vector is the measure of the angle it makes with a horizontal line. One of the following formulas can be used to find the direction of a vector:

$\tan\theta = \frac{y}{x}$, where x is the horizontal change and y is the vertical change

or $\tan\theta = \frac{y_2 - y_1}{x_2 - x_1}$, where (x_1, y_1) is the initial point and (x_2, y_2) is the terminal point.

VECTOR ALGEBRA

Just like in usual algebra, we also perform arithmetic operations such as addition, subtraction, multiplication on vectors. However, in the case of multiplication, vectors have two terminologies, such as dot product and cross product.

The vector addition follows two important laws, which are:

1. Commutative Law: P + Q = Q + P
2. Associative Law : P + (Q + R) = (P + Q) + R
3. P – Q = P + (–Q)

Dot Product

The dot product is often called a scalar product. It is represented using a dot(.) between two vectors. The dot product for both the vectors is given by:

- P.Q. = |P| |Q| cos θ

  If P and Q are both in the same direction, *i.e.* θ = 0°, then
- P.Q. = |P| |Q|

  If P and Q are both orthogonal, *i.e.*, θ = 90°, then
- P.Q. = 0 [since cos 90° = 0]

Cross Product

A cross product is denoted by the multiplication sign(x) between two vectors. It is a binary vector operation, defined in a three-dimensional system.

It is represented by;

- $P \times Q = |P|\,|Q| \sin\theta$

Vector Algebra Formulas

Apart from the addition, subtraction and multiplication, there are some other formulas of vectors in algebra. They are:

- Let P(x, y, z) be a point. The position vector of P is $\vec{OP} = \vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ and the magnitude of this vector is given by $\left|\vec{OP}\right| = |\vec{r}| = \sqrt{x^2 + y^2 + z^2}$.

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- Suppose for any vector, r is the magnitude, (l, m, n) are the direction cosines and (a, b, c) are the direction ratios, then:

$$l = a/r,\ m = b/r,\ n = c/r$$

- Let $|\vec{a}|$ be any vector, then the unit vector in the direction of $|\vec{a}|$ is given by $\hat{a} = \dfrac{\vec{d}}{|\vec{d}|}$.
- The position vector of a point P dividing a line segment joining the points A and B whose position vectors are $|\vec{a}|$ and $|\vec{b}|$ respectively, in the ratio $m : n$ internally is given by $\dfrac{n\vec{d} + m\vec{b}}{m+n}$
- In the case of external division, the formula becomes:

$$\frac{m\vec{b} + n\vec{d}}{m-n}$$

- Matrix representation of the cross product of two vectors is given by:

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \end{vmatrix}$$

MULTIPLE CHOICE QUESTIONS

1. Magnitude of the vector $\vec{a} = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} + \frac{1}{\sqrt{3}}\hat{k}$ is:

A. 1 B. 1.5

C. 0.5 D. $\sqrt{3}$

2. Find the unit vector in the direction of vector $\overrightarrow{PQ}$, where P and Q are the points (1, 2, 3) and (4, 5, 6), respectively:

A. $\frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} - \frac{1}{\sqrt{3}}\hat{k}$ B. $\frac{1}{\sqrt{3}}\hat{i} - \frac{1}{\sqrt{3}}\hat{j} + \frac{1}{\sqrt{3}}\hat{k}$

C. $-\frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} + \frac{1}{\sqrt{3}}\hat{k}$ D. $\frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} + \frac{1}{\sqrt{3}}\hat{k}$

3. If $P_1(x_1, y_1, z_1)$ and $P_2(x_2, y_2, z_2)$ are any two points, then the vector joining P_1 and P_2 is the vector P_1P_2. Magnitude of the vector $\overrightarrow{P_1P_2}$ is:

A. $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 + z_1)^2}$

B. $\sqrt{(x_2 + x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$

C. $\sqrt{(x_2 - x_1)^2 + (y_2 + y_1)^2 + (z_2 - z_1)^2}$

D. $\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$

4. Find the scalar and vector components of the vector with initial point (2, 1) and terminal point (–5, 7).

A. –7 and 6; $7\hat{i}$ and $-6\hat{j}$

B. –7 and 6; $-7\hat{i}$ and $6\hat{j}$

C. 7 and 6; $7\hat{i}$ and $6\hat{j}$

D. –7 and –6; $-7\hat{i}$ and $-6\hat{j}$

5. Find a vector in the direction of the vector $5\hat{i} - \hat{j} + 2\hat{k}$ which has a magnitude of 8 units:

A. $\frac{40}{\sqrt{30}}\hat{i} - \frac{8}{\sqrt{30}}\hat{j} - \frac{16}{\sqrt{30}}\hat{k}$

B. $\frac{40}{\sqrt{30}}\hat{i} - \frac{8}{\sqrt{30}}\hat{j} + \frac{16}{\sqrt{30}}\hat{k}$

C. $-\frac{40}{\sqrt{30}}\hat{i} - \frac{8}{\sqrt{30}}\hat{j} + \frac{16}{\sqrt{30}}\hat{k}$

D. $\frac{40}{\sqrt{30}}\hat{i} + \frac{8}{\sqrt{30}}\hat{j} + \frac{16}{\sqrt{30}}\hat{k}$

6. Find $|\vec{a} \times \vec{b}|$, if $\vec{a} = 3\hat{i} + \hat{j} + 2\hat{k}$ and $\vec{b} = 2\hat{i} - 2\hat{j} + 4\hat{k}$

A. $17\sqrt{2}$ B. $19\sqrt{3}$

C. $8\sqrt{3}$ D. $19\sqrt{5}$

7. If $\vec{a}, \vec{b}$ and $\vec{c}$ are any three vectors then the correct expression for distributivity of scalar product over addition is:

A. $\vec{a} \cdot (\vec{b} + \vec{c}) \neq \vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c}$

B. $\vec{a} \cdot (\vec{b} + \vec{c}) > \vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c}$

C. $\vec{a} \cdot (\vec{b} + \vec{c}) = \vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c}$

D. $\vec{a} \cdot (\vec{b} + \vec{c}) < \vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c}$

8. Find the direction cosines of the vector $\hat{i} + 2\hat{j} + 3\hat{k}$

A. $\frac{1}{\sqrt{14}}, -\frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$ B. $-\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$

C. $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}$ D. $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, -\frac{3}{\sqrt{14}}$

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9. Find a unit vector perpendicular to each of $\vec{a}+\vec{b}$ and $\vec{a}-\vec{b}$, where $\vec{a}=3\hat{i}+2\hat{j}+2\hat{k}$ and $\vec{b}=\hat{i}+2\hat{j}-2\hat{k}$

A. $\pm\frac{2}{3}\hat{i}\pm\frac{2}{3}\hat{j}\mp\frac{1}{3}\hat{k}$ B. $\pm\frac{2}{3}\hat{i}\mp\frac{2}{3}\hat{j}\mp\frac{1}{3}\hat{k}$

C. $\pm\frac{2}{3}\hat{i}\pm\frac{2}{3}\hat{j}\pm\frac{1}{3}\hat{k}$ D. $\mp\frac{2}{3}\hat{i}\mp\frac{2}{3}\hat{j}\mp\frac{1}{3}\hat{k}$

10. Find the sum of the vectors $\vec{a}=\hat{i}-2\hat{j}+\hat{k}$, $\vec{b}=-2\hat{i}+4\hat{j}+5\hat{k}$ and $\vec{c}=\hat{i}-6\hat{j}-7\hat{k}$

A. $-4\hat{j}-\hat{k}$ B. $\hat{i}-4\hat{j}-\hat{k}$

C. $-\hat{i}+4\hat{j}-\hat{k}$ D. $-\hat{i}-4\hat{j}-\hat{k}$

11. Find the direction cosines of the vector joining the points A(1, 2, –3) and B(–1, –2, 1), directed from A to B.

A. $\frac{1}{3},-\frac{2}{3},\frac{2}{3}$ B. $-\frac{1}{3},\frac{2}{3},\frac{2}{3}$

C. $-\frac{1}{3},-\frac{2}{3},\frac{2}{3}$ D. $-\frac{1}{3},-\frac{2}{3},-\frac{2}{3}$

12. If a unit vector $\vec{a}$ makes angles $\frac{\pi}{3}$ with $\hat{i}\,\frac{\pi}{4}$ with $\hat{j}$ and an acute angle θ with $\hat{k}$, then find θ

A. $\frac{\pi}{10}$ B. $\frac{\pi}{5}$

C. $2\frac{\pi}{3}$ D. $\frac{\pi}{3}$

13. Write down a unit vector in XY-plane, making an angle of 30° with the positive direction of *x*-axis.

A. $-\frac{\sqrt{3}}{2}\hat{i}-\frac{1}{2}\hat{j}$ B. $\frac{\sqrt{3}}{2}\hat{i}-\frac{1}{2}\hat{j}$

C. $\frac{\sqrt{3}}{2}\hat{i}+\frac{1}{2}\hat{j}$ D. $-\frac{\sqrt{3}}{2}\hat{i}+\frac{1}{2}\hat{j}$

14. Find the angle between two vectors $\vec{a}$ and $\vec{b}$ with magnitudes $\sqrt{3}$ and 2, respectively, having $\vec{a}\cdot\vec{b}=\sqrt{6}$

A. $\frac{\pi}{3}$ B. $\frac{\pi}{2}$

C. $\frac{\pi}{5}$ D. $\frac{\pi}{4}$

15. If a unit vector $\vec{a}$ makes angles $\frac{\pi}{3}$ with $\hat{i}$, $\frac{\pi}{4}$ with $\hat{j}$ and an acute angle θ with $\hat{k}$, then the components of $\vec{a}$ are:

A. $\frac{1}{2},\frac{1}{\sqrt{2}},\frac{1}{3}$ B. $\frac{1}{3},\frac{1}{\sqrt{2}},\frac{1}{2}$

C. $\frac{1}{3},\frac{1}{\sqrt{3}},\frac{1}{2}$ D. $\frac{1}{2},\frac{1}{\sqrt{2}},\frac{1}{2}$

16. If *a* and *b* are two vectors such that $a\cdot b = 0$ and $a \times b = 0$, which one of the following is correct?

A. *a* is parallel to *b*

B. *a* is perpendicular to *b*

C. Either *a* or *b* is a null vector

D. None of the above

17. If the vectors $-i - 2xj - 3yk$ and $i - 3xj - 2yk$ are orthogonal to each other, what is the locus of the point (x, y)?

A. A straight line B. An ellipse

C. A parabola D. A circle

18. If *c* is the unit vector perpendicular to both the vectors *a* and *b*, what is another unit vector perpendicular to both the vectors *a* and *b*?

A. $c \times a$ B. $c \times b$

C. $-\frac{(a\times b)}{|a\times b|}$ D. $\frac{(a\times b)}{|a\times b|}$

19. For what value of *m* are the points with position vectors $10i + 3j$, $12i - 5j$ and $mi + 11j$ collinear?

A. – 8 B. 4

C. 8 D. 12

20. Magnitude of the vector

$$\vec{k}=\frac{2}{\sqrt{6}}\hat{i}-\frac{2}{\sqrt{6}}\hat{j}-\frac{1}{6}\hat{k}$$

A. $\sqrt{6}$ B. $\frac{2}{\sqrt{3}}$

C. $\frac{\sqrt{6}}{2}$ D. None of these

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	D	D	B	B	C	C	C	B	A
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
C	D	C	D	D	C	D	C	C	C

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EXPLANATORY ANSWERS

1. $\vec{a} = \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} + \frac{1}{\sqrt{3}}\hat{k}$, then

$$|\vec{a}| = \sqrt{\left(\frac{1}{\sqrt{3}}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2 + \left(\frac{1}{\sqrt{3}}\right)^2}$$

$$= \sqrt{\frac{1}{3} + \frac{1}{3} + \frac{1}{3}}$$

$$= \sqrt{\frac{3}{3}} = 1$$

2. $\overrightarrow{PQ} = 3\hat{i} + 3\hat{j} + 3\hat{k}$

$$\widehat{PQ} = \frac{\overrightarrow{PQ}}{|\overrightarrow{PQ}|} = \frac{3\hat{i} + 3\hat{j} + 3\hat{k}}{\sqrt{3^2 + 3^2 + 3^2}}$$

$$= \frac{3\hat{i} + 3\hat{j} + 3\hat{k}}{\sqrt{27}}$$

$$= \frac{3(\hat{i} + \hat{j} + \hat{k})}{3\sqrt{3}}$$

$$= \frac{1}{\sqrt{3}}\hat{i} + \frac{1}{\sqrt{3}}\hat{j} + \frac{1}{\sqrt{3}}\hat{k}$$

3. If $P_1(x_1, y_1, z_1)$ and $P_2(x_2, y_2, z_2)$ are any two points, then the vector joining P_1 and P_2 is the vector P_1P_2, then;

$$|\overrightarrow{P_1P_2}| = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

4. The scalar and vector components of the vector with initial point (2, 1) and terminal point (–5, 7) is given by: (–5 –2) *i.e.*, –7 and (7 – 1) *i.e.* 6. Therefore, the scalar components are –7 and 6, and vector components are $-7\hat{i}$ and $6\hat{j}$.

5. Let $\vec{a} = 5\hat{i} - \hat{j} + 2\hat{k}$

then, $8\hat{a} = 8 \cdot \frac{\vec{a}}{|\vec{a}|}$

$$= 8 \cdot \frac{5\hat{i} - \hat{j} + 2\hat{k}}{\sqrt{5^2 + (-1)^2 + 2^2}}$$

$$= \frac{8(5\hat{i} - \hat{j} + 2\hat{k})}{\sqrt{30}}$$

$$= \frac{40}{\sqrt{30}}\hat{i} - \frac{8}{\sqrt{30}}\hat{j} + \frac{16}{\sqrt{30}}\hat{k}$$

6. $$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 3 & 1 & 2 \\ 2 & -2 & 4 \end{vmatrix} = 8\hat{i} - 8\hat{j} - 8\hat{k}$$

$$\therefore \quad |\vec{a} \times \vec{b}| = \sqrt{8^2 + (-8)^2 + (-8^2)} = 8\sqrt{3}$$

7. If $\vec{a}, \vec{b}$ and $\vec{c}$ are any three vectors then the correct expression for distributivity of scalar product over addition is $\vec{a} \cdot (\vec{b} + \vec{c}) = \vec{a} \cdot \vec{b} + \vec{a} \cdot \vec{c}$

8. Let $\vec{a} = \hat{i} + 2\hat{j} + 3\hat{k}$, Then,

$$\hat{a} = \frac{\vec{a}}{|\vec{a}|} = \frac{\hat{i} + 2\hat{j} + 3\hat{k}}{\sqrt{1^2 + 2^2 + 3^2}}$$

$$= \frac{i + 2\hat{j} + 3\hat{k}}{\sqrt{14}}$$

Therefore, the D.C.'s of vector a are:

$$\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{3}{\sqrt{14}}.$$

9. It is given that:

$$\vec{a} = 3\hat{i} + 2\hat{j} + 2\hat{k} \text{ and } \vec{b} = \hat{i} + 2\hat{j} - 2\hat{k}$$

$$\therefore \quad \vec{a} + \vec{b} = 4\hat{i} + 4\hat{j} \text{ and } \vec{a} - \vec{b} = 2\hat{i} + 4\hat{k}$$

$$\therefore \quad (\vec{a} + \vec{b}) \times (\vec{a} - \vec{b}) = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 4 & 4 & 0 \\ 2 & 0 & 4 \end{vmatrix}$$

$$= 16\hat{i} - 16\hat{j} - 8\hat{k}$$

$$\Rightarrow \quad |(\vec{a} + \vec{b}) \times (\vec{a} - \vec{b})| = \sqrt{576} = 24$$

Therefore, the unit vector perpendicular to both the vectors $(\vec{a} + \vec{b})$ and $(\vec{a} - \vec{b})$ is given by:

$$= \pm\frac{(16\hat{i} - 16\hat{j} - 8\hat{k})}{24}$$

$$= \pm\frac{1}{3}(2\hat{i} - 2\hat{j} - \hat{k})$$

10. We have,

vectors $\vec{a} = \hat{i} - 2\hat{j} + \hat{k}, \vec{b} = -2\hat{i} + 4\hat{j} + 5\hat{k}$

and $\vec{c} = \hat{i} - 6\hat{j} - 7\hat{k}$

$$\Rightarrow \quad \vec{a} + \vec{b} + \vec{c} = \hat{i} - 2\hat{j} + \hat{k} + (-2\hat{i} + 4\hat{j} + 5\hat{k}) + \hat{i} - 6\hat{j} - 7\hat{k}$$

$$\Rightarrow \quad \vec{a} + \vec{b} + \vec{c} = 0\hat{i} - 4\hat{j} - \hat{k}$$

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11. We have: $\overrightarrow{AB} = -2\hat{i} - 4\hat{j} + 4\hat{k}$

then, $\widehat{AB} = \dfrac{\overrightarrow{AB}}{|\overrightarrow{AB}|}$

$$= \frac{-2\hat{i} - 4\hat{j} + 4\hat{k}}{\sqrt{(-2)^2 + (-4)^2 + 4^2}}$$

$$= \frac{-2\hat{i} - 4\hat{j} + 4\hat{k}}{\sqrt{36}}$$

$$= \frac{-2\hat{i}}{6} - \frac{4\hat{j}}{6} + \frac{4\hat{k}}{6}$$

$$= \frac{-1}{3}\hat{i} - \frac{2}{3}\hat{j} + \frac{2}{3}\hat{k}$$

Therefore, the D.C.'s of vector AB are given by:

$-\frac{1}{3}, -\frac{2}{3}, \frac{2}{3}$

12. Let, $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$,

It is given that

$$|\vec{a}| = 1$$

then,

$\Rightarrow \quad a_1^2 + a_2^2 + a_3^2 = 1$ ...(*i*)

$\therefore \quad \vec{a}\cdot\hat{i} = (a_1\hat{i} + a_2\hat{j} + a_3\hat{k})\cdot\hat{i}$

$\Rightarrow \quad |\vec{a}||\hat{i}|\cos\frac{\pi}{3} = a_1 \Rightarrow a_1 = \frac{1}{2}$

$\therefore \quad \vec{a}\cdot\hat{j} = (a_1\hat{i} + a_2\hat{j} + a_3\hat{k})\cdot\hat{j}$

$|\vec{a}||\hat{j}|\cos\frac{\pi}{4} = a_2 \Rightarrow a_2 = \frac{1}{\sqrt{2}}$

$\therefore \quad \vec{a}\cdot\hat{k} = (a_1\hat{i} + a_2\hat{j} + a_3\hat{k})\cdot\hat{k}$

$\Rightarrow \quad |\vec{a}||\hat{k}|\cos\theta = a_3 \Rightarrow a_3 = \cos\theta$

Putting these values in (1), we get

$$\frac{1}{4} + \frac{1}{2} + \cos^2\theta = 1$$

$\Rightarrow \quad \frac{3}{4} = 1 - \cos^2\theta \Rightarrow \sin^2\theta = \frac{3}{4}$

$\Rightarrow \quad \sin\theta = \frac{\sqrt{3}}{2} \Rightarrow \theta = 60°$

13. Let $\vec{r} = x\hat{i} + y\hat{j}$ be a unit vector in XY plane

$x = \frac{\sqrt{3}}{2}; y = \frac{1}{2}, \quad (\because |\vec{r}| = 1)$

$\therefore \quad \vec{r} = \frac{\sqrt{3}}{2}\hat{i} + \frac{1}{2}\hat{j}$ is the required vector.

14. $|\vec{a}| = \sqrt{3}, |\vec{b}| = 2, \vec{a}\cdot\vec{b} = \sqrt{6},$

$\Rightarrow \quad \vec{a}\cdot\vec{b} = |\vec{a}|\cdot|\vec{b}|\cos\theta$

$= 2\sqrt{3}\cos\theta$

$\Rightarrow \quad \cos\theta = \frac{1}{\sqrt{2}} \Rightarrow \theta = \frac{\pi}{4}$

15. Let $\vec{a} = a_1\hat{i} + a_2\hat{j} + a_3\hat{k}$, it is given that left $|\vec{a}| = 1$, then

$\Rightarrow \quad a_1^2 + a_2^2 + a_3^2 = 1$ ...(*i*)

$\therefore \quad \vec{a}\cdot\hat{i} = (a_1\hat{i} + a_2\hat{j} + a_3\hat{k})\cdot\hat{i}$

$\Rightarrow \quad |\vec{a}||\hat{i}|\cos\frac{\pi}{3} = a_1 \Rightarrow a_1 = \frac{1}{2}$

$\therefore \quad \vec{a}\cdot\hat{j} = (a_1\hat{i} + a_2\hat{j} + a_3\hat{k})\cdot\hat{j}$

$\Rightarrow \quad |\vec{a}||\hat{j}|\cos\frac{\pi}{4} = a_2 \Rightarrow a_2 = \frac{1}{\sqrt{2}}$

$\therefore \quad \vec{a}\cdot\hat{k} = (a_1\hat{i} + a_2\hat{j} + a_3\hat{k})\cdot\hat{k}$

$\Rightarrow \quad |\vec{a}||\hat{k}|\cos\theta = a_3 \Rightarrow a_3 = \cos\theta$

Putting these values in (*i*), we get

$$\frac{1}{4} + \frac{1}{2} + \cos^2\theta = 1$$

$\Rightarrow \quad \frac{3}{4} = 1 - \cos^2\theta \Rightarrow \sin^2\theta = \frac{3}{4}$

$\Rightarrow \quad \sin\theta = \frac{\sqrt{3}}{2} \Rightarrow \theta = 60°$

$\therefore \quad a_3 = \cos 60° = \frac{1}{2}$

$\Rightarrow \quad \vec{a} = \frac{1}{2}\hat{i} + \frac{1}{\sqrt{2}}\hat{j} + \frac{1}{2}\hat{k}$

16. If $a.b = 0 \Rightarrow a \perp b$

and $a \times b = 0 \Rightarrow a \parallel b$

But both conditions can't exist simultaneously. The one possible way for both conditions to exist simultaneously is that either of a and b is a null vector.

17. Let $a = -\hat{i} - 2x\hat{j} - 3y\hat{k}$

and $b = \hat{i} - 3x\hat{j} - 2y\hat{k}$

The both the vectors are orthogonal to each other, then

$$a\cdot b = 0$$

$\Rightarrow \quad (-\hat{i} - 2x\hat{j} - 3y\hat{k})\cdot(\hat{i} - 3x\hat{j} - 2y\hat{k}) = 0$

$\Rightarrow \quad -1 + 6x^2 + 6y^2 = 0$

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$\Rightarrow \qquad 6x^2 + 6y^2 = 1$

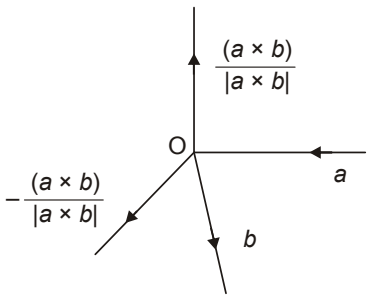
$\Rightarrow \qquad x^2 + y^2 = \frac{1}{6}$

Which is the equation of a circle.

18. If c is perpendicular to both vectors a and b, then

$$c = a \times b$$

But c is the unit vector.



Then, $c = \frac{a \times b}{|a \times b|}$ in the vertical upper direction and the other perpendicular unit vector c on both vectors a and b is:

$$c = -\frac{(a \times b)}{|a \times b|}$$

which is vertically below direction.

19. Let $\qquad OA = 10\hat{i} + 3\hat{j}$

$OB = 12\hat{i} - 5\hat{j}$

and $\qquad OC = m\hat{i} + 11\hat{j}$

Since, A, B and C are collinear.

We have, $\quad AB = \lambda BC$

$\Rightarrow \quad (OB - OA) = \lambda(OC - OB)$

$\Rightarrow \quad (2\hat{i} - 8\hat{j}) = \lambda\left\{(m-12)\hat{i} + 16\hat{j}\right\}$

On comparing the coefficients of $\hat{i}, \hat{j}$ and $\hat{k}$ we get

$\lambda(m - 12) = 2 \qquad ...(i)$

and $\qquad 16\lambda = -8$

$\Rightarrow \qquad \lambda = -\frac{1}{2}$

From Eq. (*i*),

$-\frac{1}{2}(m-12) = 2$

$\Rightarrow \qquad m - 12 = -4$

$\Rightarrow \qquad m = 8$

20. Magnitude of vector

$$|\vec{k}| = \sqrt{\left(\frac{2}{\sqrt{6}}\right)^2 + \left(-\frac{2}{\sqrt{6}}\right)^2 + \left(-\frac{1}{\sqrt{6}}\right)^2}$$

$$= \sqrt{\frac{4}{6} + \frac{4}{6} + \frac{1}{6}}$$

$$= \sqrt{\frac{9}{6}} = \sqrt{\frac{3}{2}} = \frac{\sqrt{6}}{2}$$

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CHAPTER

7

THREE DIMENSIONAL GEOMETRY

Direction Cosines: Let α, β, γ be the angles which a directed line makes with the positive directions of the axes of x, y and z respectively then $\cos\alpha$, $\cos\beta$, $\cos\gamma$ are called the direction cosines of the line.

The direction cosines are usually denoted by $< l, m, n >$. Then $l = \cos\alpha$, $m = \cos\beta$, $n = \cos\gamma$.

Direction Ratios: Let a, b, c be proportional to the d.c.'s l, m, n, then a, b, c are called the direction ratios.

Position of a Point in Terms of Radius Vector and d.c.'s: Let $P(x, y, z)$ be any point and $OP = r$. Then $\cos\alpha = x/r$, $\cos\beta = y/r$, $\cos\gamma = z/r$. Then x, y, z are direction ratios of OP and coordinates of P are $(r\cos\alpha, r\cos\beta, r\cos\gamma)$, *i.e.*, (lr, mr, nr).

Relation Between Direction Cosines:

$$OP^2 = [x^2 + y^2 + z^2]$$

$$\Rightarrow \quad r^2 = r^2(\cos^2\alpha + \cos^2\beta + \cos^2\gamma)$$

$$= r^2(l^2 + m^2 + n^2)$$

$$\therefore \quad l^2 + m^2 + n^2 = 1$$

D.R.'s and D.C.'s: Let a, b, c be d.r.'s and l, m, n the d.c.'s of a line, then

$$\frac{a}{l} = \frac{b}{m} = \frac{c}{n} = r \text{ (say)}$$

$$\therefore a^2 + b^2 + c^2 = r^2(l^2 + m^2 + n^2) = r^2$$

$$\therefore r = \sqrt{[a^2 + b^2 + c^2]}$$

$\therefore$ Direction cosines l, m, n are given by

$$l = \frac{a}{r}, m = \frac{b}{r}, n = \frac{c}{r}, \text{ where } r = \sqrt{[(a^2 + b^2 + c^2)]}$$

D.C.'s of Axes: Since the positive x-axes makes angle 0°, 90° with axes of x, y and z respectively, $\therefore$ d.c.'s of x-axes are 1, 0, 0. Similarly, for y and z-axes.

$\therefore$ D.C.'s of x-axis are 1, 0, 0
D.C.'s of y-axis are 0, 1, 0
D.C.'s of z-axis are 0, 0, 1

Direction Ratios of the Line Joining two Points: Let $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ be two points, then d.r.'s of AB are $x_2 - x_1$, $y_2 - y_1$, $z_2 - z_1$, and d.c.'s of AB are $\frac{1}{r}(x_2 - x_1)$, $\frac{1}{r}(y_2 - y_1)$, $\frac{1}{r}(z_2 - z_1)$ where $r = \sqrt{[\Sigma(x_2 - x_1)^2]}$.

Projection of a Line on Another Line: Let PQ be a line segment with $P(x_1, y_1, z_1)$ and $Q(x_2, y_2, z_2)$ and let L be a straight line whose d.c.'s are l, m, n. Note that l, m, n are d.c.'s of line L, not d.r.'s. Then the length of projection of PQ on the line L is

$$\text{Projection} = |l(x_2 - x_1)| + m(y_2 - y_1) + n(z_2 - z_1)|.$$

Angle Between Two Lines: Let θ be the angle between the lines with d.c.'s l_1, m_1, n_1 and l_2, m_2, n_2, then

$$\cos\theta = l_1l_2 + m_1m_2 + n_1n_2.$$

Also $\sin^2\theta = \Sigma(l_1m_1)^2$

Perpendicularity and Parallelism: Let the two lines have their d.c.'s given by l_1, m_1, n_1 and l_2, m_2, n_2 respectively then they are perpendicular if $\theta = 90°$ *i.e.*, $\cos\theta = 0$

$$\text{if } l_1l_2 + m_1m_2 + n_1n_2 = 0$$

Also the two lines are parallel if $\theta = 90°$, *i.e.*, $\sin\theta = 0$.

i.e., $\frac{l_1}{l_2} = \frac{m_1}{m_2} = \frac{n_1}{n_2}$

Example 1:

What is the angle between the lines whose direction cosines are proportional to (2, 3, 4) and (1, –2, 1), respectively?

A. 90° B. 60°
C. 45° D. 30°

Solution: (A) $l_1 = 2$, $l_2 = 1$, $m_1 = 3$, $m_2 = -2$, $n_1 = 4$, $n_2 = 1$

We know that,

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$\cos\theta = l_1l_2 + m_1m_2 + n_1n_2$

$\cos\theta = 2 \times 1 + 3 \times (-2) + 4 \times 1$

$\cos\theta = 0$

or $\theta = \frac{\pi}{2}$ or $90°$.

The Plane: A geometrical locus is a plane if it is such that if P and Q are any two points on the locus, then every point on the line PQ is also a point on the locus.

Equation of a Plane: The equation of every plane is of the first degree, *i.e.,* of the form $ax + by + cz + d = 0$, in which a, b, c are constants, where $a^2 + b^2 + c^2 \neq 0$ (*i.e.,* $a, b, c \neq 0$ simultaneously).

Planes Parallel to the Coordinate Planes:

(a) Equation of y-z plane is $x = 0$

(b) Equation of z-x plane is $y = 0$

(c) Equation of x-y plane is $z = 0$

(d) Equation of the plane parallel to x-y plane at a distance c(if $c > 0$, towards positive z-axis) is $z = c$. Similarly, planes parallel to y-z plane and z-x plane are $x = c$ and $y = c$ respectively.

Equation of Planes Parallel to the Axes: If $a = 0$, the plane is parallel to x-axis, *i.e.,* equation of the plane parallel to x-axis is

$$by + cz + d = 0$$

Similarly, equations of planes || to y-axis and || to z-axis are $ax + cz + d = 0$ and $ax + by + d = 0$, respectively.

Equation of Plane Through Origin:

Equation of plane passing through origin is $ax + by + cz = 0$.

Equation of a Plane Through a given Point: Let the plane $ax + by + cz + d = 0$ passes through the point (x_1, y_1, z_1), then $ax_1 + by_1 + cz_1 + d = 0$.

$\therefore$ Subtracting, we get $a(x - x_1) + b(y - y_1) + c(z - z_1) = 0$ which is the required equation.

Equation of a Plane in Intercept Form: Equation of the plane which cuts off intercepts a, b, c from the axes is

$$\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1.$$

Equation of a Plane in Normal Form: If the length of the perpendicular distance of the plane from the origin is p and direction cosines of this perpendicular are (l, m, n), then the equation of the plane is $lx + my + nz = p$.

Transformation of the Equation of a Plane to the Normal Form: To reduce any equation to the normal form, first write the constant term on the right-hand side and make it positive, then divide each term by $\sqrt{(a^2 + b^2 + c^2)}$, where a, b, c are coefficients of x, y and z respectively.

$$e.g., \frac{ax}{\pm\sqrt{(a^2+b^2+c^2)}} + \frac{by}{\pm\sqrt{(a^2+b^2+c^2)}} + \frac{cz}{\pm\sqrt{(a^2+b^2+c^2)}} = \frac{d}{\pm\sqrt{(a^2+b^2+c^2)}}$$

where + sign is to be taken if $d > 0$

and − sign is to be taken if $d < 0$.

Equation of a Plane Through Three Points: The equation of the plane through three non-collinear points (x_1, y_1, z_1), (x_2, y_2, z_2), (x_3, y_3, z_3) is

$$\begin{vmatrix} x & y & z & 1 \\ x_1 & y_1 & z_1 & 1 \\ x_2 & y_2 & z_2 & 1 \\ x_3 & y_3 & z_3 & 1 \end{vmatrix} = 0$$

Angle Between Two Planes: Consider two planes $ax + by + cz + d = 0$ and $a'x + b'y + c'z + d' = 0$.

Angle between these planes is the angle between their normals. Since direction ratios of their normals are a, b, c and a', b', c' respectively and θ, the angle between them is given by

$$\cos\theta = \frac{aa'+bb'+cc'}{\sqrt{(a^2+b^2+c^2)}\sqrt{(a'^2+b'^2+c'^2)}}$$

$\therefore$ Planes are perpendicular if $aa' + bb' + cc' = 0$ and they are parallel if $a/a' = b/b' = c/c'$.

Planes Parallel to a given Plane: Equation of a plane parallel to the plane $ax + by + cz + d = 0$ is $ax + by + cz + d' = 0$.

d' is to be found by other given condition.

Example 2:

What is the accute angle between the planes $x + y + 2z = 3$ and $-2x + y - z = 11$?

A. $\frac{\pi}{5}$ B. $\frac{\pi}{4}$

C. $\frac{\pi}{6}$ D. $\frac{\pi}{3}$

Solution: (D) We are given that the equation of planes are $x + y + 2z = 0$ and $-2x + y - z = 11$.

We know that the angle between two planes $a_1x + b_1y + c_1z + d_1 = 0$ and $a_2x + b_2y + c_2z + d_2 = 0$ is given by,

$$\cos\theta = \left|\frac{a_1a_2 + b_1b_2 + c_1c_2}{\sqrt{a_1^2+b_1^2+c_1^2}\sqrt{a_2^2+b_2^2+c^2}}\right|$$

Here,

$a_1 = 1$, $b_1 = 1$, $c_1 = 2$, $a_2 = -2$, $b_2 = 1$ and $c_2 = -1$

Therefore,

$$\cos\theta = \left|\frac{1\times(-2)+1\times1+2\times(-1)}{\sqrt{1+1+4}\sqrt{4+1+1}}\right|$$

$$\cos\theta = \left|\frac{-3}{\sqrt{6}\sqrt{6}}\right|$$

$$\cos\theta = \frac{3}{6}$$

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$$\cos\theta = \frac{1}{2}$$

$$\text{or} \quad \theta = \frac{\pi}{3}.$$

A Plane Through the Line of Intersection of Two given Planes: Consider two planes

$u = ax + by + cz + d = 0$ and

$v = a'x + b'y + c'z + d' = 0.$

The equation $u + \lambda v = 0$, λ a real parameter, represents the plane passing through the line of intersection of given planes and if planes are parallel, this represents a plane parallel to them.

Bisectors of Angles Between Two Planes: Let the equations of the two planes be

$ax + by + cz + d = 0$ and $a_1x + b_1y + c_1z + d = 0.$

Then equations of bisectors of angles between them are given by

$$\frac{ax+by+cz+d}{\sqrt{(a^2+b^2+c^2)}} = \pm \frac{a_1x+b_1y+c_1z+d_1}{\sqrt{(a_1^2+b_1^2+c_1^2)}}$$

Area of a Triangle: Let $A(x_1, y_1, z_1)$, $B(x_2, y_2, z_2)$, $C(x_3, y_3, z_3)$ be the vertices of a triangles ABC and l, m, n be the d.c.'s of the normal.

Let Δ_x = projection of Δ ABC on y-z plane $\Delta_x = \Delta.l$. Similarly,

Δ_y = projection of Δ ABC on z-x plane $\Delta.m$

Δ_z = projection of Δ ABC on x-y plane $\Delta.n$

$\therefore\ \Delta_x^2 + \Delta_y^2 + \Delta_2^2 = \Delta^2 (l^2 + m^2 + n^2) = \Delta^2.$

$\therefore\ \Delta = \sqrt{(\Delta_x^2 + \Delta_y^2 + \Delta_z^2)}.$

Also it is obvious that

$$\Delta_x = \frac{1}{2}\begin{vmatrix} y_1 & z_1 & 1 \\ y_2 & z_2 & 1 \\ y_3 & z_3 & 1 \end{vmatrix}, \ \Delta_y = \frac{1}{2}\begin{vmatrix} z_1 & x_1 & 1 \\ z_2 & x_2 & 1 \\ z_3 & x_3 & 1 \end{vmatrix}$$

$$\text{and } \Delta_x = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

Volume of a Tetrahedron: Volume of the tetrahedron with vertices $A(x_1, y_1, z_1)$, $B(x_2, y_2, z_2)$, $C(x_3, y_3, z_3)$ and $D(x_4, y_4, z_4)$ is given by

$$V = \frac{1}{6}\begin{vmatrix} x_1 & y_1 & z_1 & 1 \\ x_2 & y_2 & z_2 & 1 \\ x_3 & y_3 & z_3 & 1 \\ x_4 & y_4 & z_4 & 1 \end{vmatrix}$$

If $ax^2 + by^2 + cz^2 + 2fyz + 2gzx + 2hxy = 0$ represents a pair of planes, then the angle between the planes is given by

$$\tan\theta = \frac{2\sqrt{f^2+g^2+h^2-ab-bc-ca}}{a+b+c}$$

Straight Lines: A straight line in space is characterised by the intersection of two planes which are not parallel and therefore, the equation of a straight line is present as a solution of the system constituted by the equation of the two planes:

$a_1x + b_1y + c_1z + d_1 = 0$

$a_2x + b_2y + c_2z + d_2 = 0$

This form is also known as unsymmetrical form.

Some particular straight lines:

	Straight Lines	***Equation***
(i)	Through the origin	$y = mx,\ z = nx$
(ii)	x-axis	$y = 0,\ z = 0$
(iii)	y-axis	$x = 0,\ z = 0$
(iv)	z-axis	$x = 0,\ y = 0$
(v)	$\parallel$ to x-axis	$y = p,\ z = q$
(vi)	$\parallel$ to y-axis	$x = h,\ z = q$
(vii)	$\parallel$ to z-axis	$x = h,\ y = p$

Equation of a Straight Line in Symmetrical Form:

(a) *One point form:* Let $A(x_1, y_1, z_1)$ be a given point on the straight line and l, m, n the d.c.'s of the line, then its equation is

$$\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n} = r \text{ (say)}$$

It should be noted that P $(x_1 + lr,\ y_1 + mr,\ z_1 + nr)$ is a general point on this line at a distance r from the point $A(x_1, y_1, z_1)$, *i.e.*, AP = r. One should note that for AP = r, l, m, n must be d.c.'s not d.r.'s. If a, b, c are direction ratios of the line, then equation of the line is

$$\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n} = r, \text{ but here AP} \neq r.$$

(b) Equation of the line through two points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ is

$$\frac{x-x_1}{x_2-x_1} = \frac{y-y_1}{y_2-y_1} = \frac{z-z_1}{z_2-z_1}.$$

Example 3:

The line passing through (1, 2, 3) and having direction ratios given by <1, 2, 3> cuts the x-axis at a distance k from origin. What is the value of k?

A. 0 B. 1

C. 2 D. 3

Solution: (A) The equation of line which passes through (1, 2, 3) having direction ratios <1, 2, 3> is given by,

$$\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{3} = a \text{ (say)}$$

or $x - 1 = a$

$y - 2 = 2a,\ z - 3 = 3a$

$y = 2a + 2$ and $z = 3a + 3$

At x axis, $y = 0$ and $z = 0$

Therefore,

$2a + 2 = 0$ and $3a + 3 = 0$

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$a = -1$ and $a = -1$

Hence, $x = (-1) + 1 = 0$.

Angle Between a Line and a Plane: Let equations of the line and plane be

$$\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n},$$

and $ax + by + cz + d = 0$ respectively and θ be the angle which line makes with the plane. Then $(\pi/2 - \theta)$ is the angle between the line and the normal to the plane. So,

$$\sin\theta = \frac{al+bm+cn}{\sqrt{(a^2+b^2+c^2)}\sqrt{(l^2+m^2+n^2)}}$$

Line is parallel to plane if $\theta = 0$

i.e., if $al + bm + cn = 0$

Line is $\perp$ to the plane if line is parallel to the normal of the plane, *i.e.,* if $\frac{a}{l} = \frac{b}{m} = \frac{c}{n}$.

Condition in Order that the Line may Lie on the given Plane: The line $\frac{x-x_1}{l} = \frac{y-y_1}{m} = \frac{z-z_1}{n}$ will lie on the plane $Ax + By + Cz + D = 0$ if

(a) $Al + Bm + Cn = 0$ and

(b) $Ax_1 + By_1 + Cz_1 + D = 0$

Shortest Distance Between Two Skew Straight Lines: Shortest distance between two skew lines is perpendicular to both.

Magnitude and Equation to the Shortest Distance:

Ist method (Projection method): Suppose the equation of the lines are

$$\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n} \quad ...(1)$$

and $$\frac{x-\alpha'}{l'} = \frac{y-\beta'}{m'} = \frac{z-\gamma'}{n'} \quad ...(2)$$

Let λ, μ, ν, be d.c.'s of the shortest distance. Since shortest distance is perpendicular to each of the given lines, therefore $l\lambda + m\mu + n\nu = 0$; and $l'\lambda + m'\mu + n'\nu = 0$.

Now solving these, we get

$$\frac{\lambda}{mn'-m'n} = \frac{\mu}{nl'-n'l} = \frac{\nu}{lm'-l'm} = \frac{1}{\sqrt{\Sigma(mn'-m'n)^2}}$$

$$\therefore \quad \lambda = \frac{mn'-m'n}{\sqrt{\Sigma(mn'-m'n)^2}}, \ \mu = \frac{nl'-n'l}{\sqrt{\Sigma(mn'-m'n)^2}},$$

$$\nu = \frac{lm'-l'm}{\sqrt{\Sigma(mn'-m'n)^2}}$$

$P(\alpha, \beta, \gamma)$ is a point on line (1) and $Q(\alpha', \beta', \gamma')$ is a point on line (2). Shortest distance will be the projection of the line PQ, joining these points on the line whose d.c.'s are λ, μ, ν.

$\therefore$ Shortest distance $= (\alpha - \alpha')\lambda + (\beta - \beta')\mu + (\gamma - \gamma')\nu$

$$= \frac{(\alpha-\alpha')(mn'-m'n)+(\beta-\beta')(nl'-n'l)+(\gamma-\gamma')(lm'-l'm)}{\sqrt{\left\{\Sigma(mn'-m'n)^2\right\}}}$$

$$= \begin{vmatrix} \alpha-\alpha' & \beta-\beta' & \gamma-\gamma' \\ l & m & n \\ l' & m' & n' \end{vmatrix} \div \sqrt{\{\Sigma(mn'-m'n)^2\}}$$

Equation to the plane containing line (1) and the shortest distance is

$$\begin{vmatrix} x-\alpha & y-\beta & z-\gamma \\ l & m & n \\ \lambda & \mu & \nu \end{vmatrix} = 0 \quad ...(3)$$

Equation to the plane containing the line (2) and the shortest distance is

$$\begin{vmatrix} x-\alpha' & y-\beta' & z-\gamma' \\ l' & m' & n' \\ \lambda & \mu & \nu \end{vmatrix} = 0 \quad ...(4)$$

Equation (3) and (4) will represent the shortest distance between the given lines (1) and (2).

2nd method (Foot method): A point on (1) is $P(lr + \alpha, mr + \beta, nr + \gamma)$ and a point on (2) is

$Q(l's + \alpha', m's + \beta', n's + \gamma')$

If P and Q are the points of intersections of shortest distance with the given line, then PQ is perpendicular to both the lines. If λ, μ, ν be the d.r.'s of shortest distance, then

$\lambda = lr + \alpha - l's - \alpha'$, $\mu = mr + \beta - m's - \beta'$ and $\nu = nr + \gamma - n's - \gamma'$

$\therefore l\lambda - m\mu + n\nu = 0$ and $l'\lambda - m'\mu + n'\nu = 0$.

Solving these equations, we can find r and s and then P and Q.

Now, we can find S.D. which is PQ, its equation is the equation through P and Q.

3rd method (Vector method): Since l, m, n and l', m', n' are d.c.'s of the lines, unit vectors in their direction are

$\hat{e} = l\hat{i} + m\hat{j} + n\hat{k}$ and $= \hat{e}' = l'i + m'j + n'k$.

Let RS be the S.D., then $\overrightarrow{RS}$ is $\perp$ to both.

So, RS = projection of PQ on RS = $\frac{\overrightarrow{PQ}.(\hat{e}\times\hat{e}')}{|\hat{e}\times\hat{e}'|}$.

Sphere: A sphere is the locus of a point which remains at a constant disance from a fixed point. The constant distance is called the radius and the fixed point, the centre of the sphere.

Equation of a Sphere: Let (a, b, c) be the centre and r be the radius of a given sphere. Then the equation of the sphere is

$(x - a)^2 + (y - b)^2 + (z - c)^2 = r^2$.

General Equation of a Sphere: The equation $x^2 + y^2 + z^2 + 2ux + 2vy + 2wx + d = 0$

represents a sphere with centre at $(-u, -v, -w)$ and radius

$\sqrt{(u^2 + v^2 + w^2 - d)}$

if $u^2 + v^2 + w^2 - d > 0$.

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Sphere with a given Diameter: The equation of the sphere described on the segment joining points $A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$ as a diameter is

$$(x - x_1)(x - x_2) + (y - y_1)(y - y_2) + (z - z_1)(z - z_2) = 0$$

Equation of Sphere Through Four Points: Equation of the sphere passing through four non-coplanar points (x_1, y_1, z_1), (x_2, y_2, z_2), (x_3, y_3, z_3) and (x_4, y_4, z_4) is

$$\begin{vmatrix} x^2+y^2+z^2 & x & y & z & 1 \\ x_1^2+y_1^2+z_1^2 & x_1 & y_1 & z_1 & 1 \\ x_2^2+y_2^2+z_2^2 & x_2 & y_2 & z_2 & 1 \\ x_3^2+y_3^2+z_3^2 & x_3 & y_3 & z_3 & 1 \\ x_4^2+y_4^2+z_4^2 & x_4 & y_4 & z_4 & 1 \end{vmatrix} = 0$$

MULTIPLE CHOICE QUESTIONS

1. The ratio in which the line joining (2, 4, 5), (3, 5, –4) is divided by the Y-Z plane is
A. 2 : 3 B. 3 : 2
C. –2 : 3 D. 4 : –3

2. A straight line which makes an angle of 60° with each of y and z axes, is inclined with x-axis at an angle
A. 45° B. 30°
C. 75° D. 60°

3. The projection of line joining (3, 4, 5) and (4, 6, 3) on the line joining (–1, 2, 4) and (1, 0, 5) is
A. 4/3 B. 2/3
C. 8/3 D. 1/3

4. The coordinates of a point P are (3, 12, 4) with respect to the origin O. Then the direction cosines of OP are
A. 3, 12, 4
B. 1/4, 1/3, 1/2
C. 3/√(13), 1/√(13), 2/√(13)
D. 3/13, 12/13, 4/13

5. The graph of the equation $y^2 + z^2 = 0$ in three dimensional space is
A. x-axis B. y-axis
C. z-axis D. yz-plane

6. A line makes angles α, β, γ, δ with the four diagonals of a cube, then
$\cos^2 \alpha + \cos^2 \beta + \cos^2 \gamma + \cos^2 \delta$ has the value
A. 0 B. 2
C. 4/3 D. 5/3

7. The straight lines whose direction cosines are given by $al + bm + cn = 0$, $fmn + gnl + hlm = 0$ are perpendicular if
A. $\frac{f}{a}+\frac{g}{b}+\frac{h}{c} = 0$
B. $\sqrt{(a/f)} + \sqrt{(b/g)} + \sqrt{(c/h)} = 0$
C. $\sqrt{(af)} = \sqrt{(bg)} = \sqrt{(ch)}$
D. $\sqrt{(a/f)} = \sqrt{(b/g)} = \sqrt{(c/h)}$

8. A line segment (vector) has length 21 and direction ratios (2, –3, 6). If the line makes an obtuse angle with x-axis, the components of the line (vector) are
A. 6, – 9, 18 B. 2, – 3, 6
C. – 18, 27, – 54 D. – 6, 9, – 18

9. Direction cosines of the line which is perpendicular to the lines whose direction ratios are 1, – 1, 2 and 2, 1, – 1, are given by
A. [– 1/√(35), 5/√(35), 3/√(35)]
B. [– 1/√(35), – 5/√(35), 3/√(35)]
C. [1/√(35), 5/√(35), – 3/√(35)]
D. None of these

10. The angle between pair of lines whose direction ratios are 1, 1, 2 and √3 – 1, – √3 – 1, 4 is
A. 30° B. 45°
C. 60° D. 90°

11. If centroid of the tetrahedron OABC, where A, B and C are given by (a, 1, 2), (2, b, 1) and (3, 2, c) respectively, be (1, 2, 3), then distance of P(a, b, c) from origin is equal to
A. √(107) B. √(14)
C. √(107/4) D. None of these

12. The three lines drawn from O with direction ratios [1, – 1, k], [2, – 3, 0] and [1, 0, 3] are coplanar. Then k = ?
A. 1 B. 0
C. no such k exists D. None of these

13. The foot of the perpendicular from (0, 2, 3) to the line $\frac{x+3}{5}=\frac{y-1}{2}=\frac{z+4}{3}$ is
A. (–2, 3, 4) B. (2, – 1, 3)
C. (2, 3, – 1) D. (3, 2, – 1)

14. The equation of the plane passing through the point (– 2, – 2, 2) and containing the line joining the points (1, 1, 1) and (1, – 1, 2) is
A. $x + 2y - 3z + 4 = 0$
B. $3x - 4y + 1 = 0$
C. $5x - 2y - 3z - 17 = 0$
D. $x - 3y - 6z + 8 = 0$

15. If the plane $x - 2y + 3z = 0$ is rotated through a right angle about its line of intersection with the plane $2x + 3y - 4z - 5 = 0$, then the equation of plane in its new position is
A. $28x - 17y + 9z = 0$
B. $22x + 5y - 4z - 35 = 0$

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C. $25x + 17y + 52z - 25 = 0$
D. $x + 35y - 10z - 70 = 0$

16. If from a point P(a, b, c) perpendiculars PA,PB are drawn to YZ and ZX planes, then the equation of the plane OAB is
A. $bcx + cay + abz = 0$
B. $bcx + cay - abz = 0$
C. $bcx - cay + abz = 0$
D. $-bcx + cay + abz = 0$

17. A plane meets the coordinate axes in A, B, C and (α, β, γ) is the centroid of the Δ ABC. Then the equation of the plane is
A. $x/\alpha + y/\beta + z/\gamma = 3$
B. $x/\alpha + y/\beta + z/\gamma = 1$
C. $3x/\alpha + 3y/\beta + 3z/\gamma = 1$
D. $\alpha x + \beta y + \gamma z = 1$

18. Equation of the plane perpendicular to the plane $x - 2y + 5z + 1 = 0$ which passes through the points (2, – 3, 1) and (– 1, 1, – 7) is given by
A. $4x - 4y + z + 7 = 0$
B. $4x + 7y + 2z + 11 = 0$
C. $2x + y - z = 0$
D. None of these

19. The volume of the terahedron included between the plane $2x - 3y + 4z - 12 = 0$ and the three coordinate planes is
A. $3\sqrt{(29)}$ B. $6\sqrt{(29)}$
C. 12 D. None of these

20. Equation of the plane through P(2, 3 –1) at right angle to OP is
A. $2x + 3y - z = 14$ B. $2x + 3y - z = \sqrt{(14)}$
C. $2x + y - z = 14$ D. None of these

21. Equation of the plane that passes through the point (2, –3, 1) and is perpendicular to the line joining the points (3, 4, – 1) and (2, – 1, 5) is given by
A. $x + 5y - 6z + 19 = 0$ B. $x - 5y + 6z - 23 = 0$
C. $x + 5y - 6z = 19$ D. None of these

22. The coordinates of the point of intersection of the line $\frac{x+1}{1} = \frac{y+3}{3} = \frac{z+2}{-2}$ with the plane $3x + 4y + 5z = 5$ are
A. (5, 15, – 14) B. (3, 4, 5)
C. (1, 3, – 2) D. (3, 12, – 10)

23. The direction cosines of two lines at right angles are l_1, m_1, n_1 and l_2, m_2, n_2.
Then the d.c.'s of a line $\perp$ to both the given lines are
A. $m_1n_2 - m_2n_1,\ n_1l_2 - n_2l_1,\ l_1m_2 - l_2m_1$
B. $l_1 + l_2,\ m_1 + m_2,\ n_1 + n_2$
C. $l_1 - l_2,\ m_1 - m_2,\ n_1 - n_2$
D. None of these

24. The line $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ is parallel to the plane
A. $2x + y - 2z = 0$
B. $3x + 4y - 5z = 7$
C. $x + y + z = 2$
D. $2x + 3y + 4z = 0$

25. If the line $x = ay + b,\ z = cy + d$ and the line $x = a'y + b',\ z = c/y + d'$ are perpendicular, then
A. $aa' + bb' = 1$ B. $aa' + cc' = -1$
C. $aa' + bb' = 0$ D. None of these

26. The coordinates of the foot of the perpendicular from the point (1, 3, 4) upon the plane $2x - y + z = 0$ are
A. (1, 1, – 4) B. (4, – 3, 1)
C. (1, – 3, 4) D. (– 1, 4, 3)

27. The angle between the lines $x = 1$, $y = 2$ and $y = -1$ and $z = 0$ is
A. 90° B. 30°
C. 60° D. 0°

28. P is a fixed point (a, a, a) on a line through the origin equally inclined to the axes, then any plane through P $\perp$ to OP, makes intercepts on the axes, the sum of whose reciprocals is equal to
A. a B. $3/2a$
C. $3a/2$ D. None of these

29. The equations of the projection of the line
$$\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{3}$$
on the plane $x + y + z - 1 = 0$ are
A. $x + y + z - 1 = 0 = 2x - y - z + 3$
B. $x + y - z - 1 = 0 = x + 2y - z - 3$
C. $2x - y + 3z - 1 = 0 = x + y + z + 1$
D. $x + 2y - 3z = 0 = x + y + z - 1$

30. A straight line passes through the point (2, – 1, – 1). It is parallel to the plane $4x + y + z + 2 = 0$ and is perpendicular to the line $x/1 = y/(-2) = (z - 5)/1$. The equation of the straight line are
A. $(x - 2)/4 = (y + 1)/1 = (z + 1)/1$
B. $(x + 2)/4 = (y - 1)/1 = (z - 1)/3$
C. $(x - 2)/(-1) = (y + 1)/1 = (z + 1)/3$
D. $(x + 2)/(-1) = (y - 1)/1 = (z - 1)/3$

31. The distance of the point (3, 8, 2) from the line $\frac{x-1}{2} = \frac{y-3}{4} = \frac{z-2}{3}$ measured parallel to the plane $3x + 2y - 2z + 5 = 0$ is
A. 2 B. 3
C. 5 D. None of these

32. The angle between the lines in which the planes $3x - 7y - 5z = 1$, $5x - 13y + 3z + 2 = 0$ cut the plane $8x - 11y + 2z = 0$ is
A. $\pi/3$ B. π
C. $\pi/2$ D. $2\pi/3$

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33. The shortest distance between the lines

$$\frac{x-1}{2}=\frac{y-2}{3}=\frac{z-3}{4} \text{ and } \frac{x-2}{3}=\frac{y-4}{4}=\frac{z-5}{5} \text{ is}$$

A. 1/6 B. $1/\sqrt{6}$
C. $(1/\sqrt{3})$ D. 1/3

34. The image of the point (1, 3, 4) w.r.t. the plane $2x - y + z + 3 = 0$ is
A. (– 1, 4, 3) B. (– 3, 5, 2)
C. (1, 3, 4) D. None of these

35. A plane passes through a fixed point (a, b, c). The locus of the foot of the perpendicular drawn to it from the origin is
A. $x^2 + y^2 + z^2 + ax + by + cz = 0$
B. $x^2 + y^2 + z^2 - ax - by - cz = 0$
C. $x^2 + y^2 + z^2 + 2ax + 2by + 2cz = 0$
D. $x^2 + y^2 + z^2 + 2ax - 2by - 2cz = 0$

36. A sphere of constant radius $2k$ passes through the origin and meets the axis in A, B, C. The locus of the centroid of the tetrahedron OABC is
A. $x^2 + y^2 + z^2 = 4k^2$
B. $x^2 + y^2 + z^2 = k^2$
C. $2(x^2 + y^2 + z^2) = k^2$
D. None of these

37. The equation of the sphere with centre at (2, 3, – 4) and touching the plane
$2x + 6y - 3z + 15 = 0$ is
A. $x^2 + y^2 + z^2 - 4x - 6y + 8z - 20 = 0$
B. $x^2 + y^2 + z^2 + 4x - 6y - 8z - 20 = 0$
C. $x^2 + y^2 + z^2 - 4x - 6y + 8z + 20 = 0$
D. None of these

38. A sphere $x^2 + y^2 + z^2 = 9$ is cut by the plane $x + y + z = 3$. The radius of the circle so formed is
A. $\sqrt{6}$ B. $\sqrt{3}$
C. 3 D. 6

39. The plane $2x - 2y + z + 12 = 0$ touches the sphere $x^2 + y^2 + z^2 - 2x - 4y + 2z - 3 = 0$ at the point
A. (1, – 4, – 2) B. (– 1, 4, – 2)
C. (– 1, – 4, 2) D. (1, 4, – 2)

ANSWERS

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
C	A	A	D	A	C	A	D	A	C
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
D	A	C	D	B	B	A	B	C	A
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
A	C	A	A	B	D	A	D	A	C
31	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	
D	C	B	B	B	B	A	A	B	

EXPLANATORY ANSWERS

1. Let the required ratio be $\lambda : 1$.
Then the point is

$$\frac{3\lambda+2}{\lambda+1}, \frac{5\lambda+4}{\lambda+1}, \frac{-4\lambda+5}{\lambda}$$

It lies on YZ plane, so its x-coordinate = 0
i.e., $\lambda = -2/3$ $\therefore$ Ratio is – 2: 3
i.e., – 2 : 3 externally.

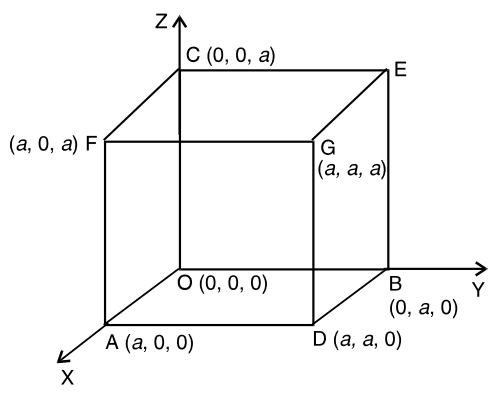
2. Let α be the angle. Then the d.c.'s of the line are $\cos\alpha$, 1/2, 1/2.
$\therefore \cos^2\alpha + 1/4 + 1/4 = 1$, *i.e.,* $\cos^2\alpha = 1/2$ or $\alpha = 45°$.

3. Direction ratios of the line joining (– 1, 2, 4) and (1, 0, 5) are 2, – 2, 1 so its d.c.'s are 2/3, – 2/3, 1/3.
$\therefore$ Length of projection of the line segment joining points (3, 4, 5) and (4, 6, 3)
$= |(1/3)[(4 - 3)2 + (6 - 4)(- 2) + (- 2)(1)]|$
$= |(1/3)[2 - 4 - 2]| = 4/3$.

4. $OP = \sqrt{(3^2 + 12^2 + 4^2)} = 13 = r$ (say)
Let d.c.'s of OP be l, m, n
$\therefore$ $x = lr, y = mr, z = nr$
$\Rightarrow$ $l = x/r, n = y/r, n = z/r,$
i.e., $l = 3/13, m = 12/13, n = 4/13$.

5. $y^2 + z^2 = 0 \Rightarrow y = 0, z = 0$.
In three dimensional space, $y = 0$, $z = 0$ represents x-z plane, x-y plane respectively whose intersection is x-axis.

6.



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The four diagonals of the cube are OG, AE, BF and DC.

The direction ratios of these diagonals are as follows:

d.r.'s of OG are $a - 0$, $a - 0$, $a - 0$, *i.e.*, a, a, a

d.r.'s of AE are $0 - a$, $a - 0$, $a - 0$, *i.e.*, $-a, a, a$

d.r.'s of BF are $a - 0$, $0 - a$, $a - 0$, *i.e.*, $a, -a, a$

d.r.'s of DC are $0 - a$, $0 - a$, $a - 0$, *i.e.*, $-a, -a, a$

Let d.r.'s of the given line be x, y, z.

Let given line makes angles $\alpha, \beta, \gamma, \delta$ with the diagonals OG, AE, BF and DC respectively.

Then $\cos\alpha = \dfrac{xa + ya + za}{\sqrt{a^2 + a^2 + a^2}\sqrt{x^2 + y^2 + z^2}}$

$= \dfrac{xa + ya + za}{\sqrt{3a^2}\sqrt{x^2 + y^2 + z^2}} = \dfrac{x + y + z}{\sqrt{3}\sqrt{x^2 + y^2 + z^2}}$

$\therefore \quad \cos^2\alpha = \dfrac{(x + y + z)^2}{3(x^2 + y^2 + z^2)}$

Similarly,

$$\cos^2\beta = \frac{(-x + y + z)^2}{3(x^2 + y^2 + z^2)}$$

$$\cos^2\gamma = \frac{(x - y + z)^2}{3(x^2 + y^2 + z^2)}$$

$$\cos^2\delta = \frac{(-x - y + z)^2}{3(x^2 + y^2 + z^2)}$$

Thus $\cos^2\alpha + \cos^2\beta + \cos^2\gamma + \cos^2\delta$

$= \dfrac{1}{3(x^2 + y^2 + z^2)}\,[(x + y + z)^2 + (-x + y + z)^2 + (x - y + z)^2 + (-x - y + z)^2]$

$= 4/3.$

7. From the first relation

$$n = -\frac{al + bm}{c}$$

Putting it in second relation

$$fm\left(-\frac{al + bm}{c}\right) + gl\left(-\frac{al + bm}{c}\right) + hlm = 0,$$

or $afml + bfm^2 + agl^2 + bglm - chlm = 0$,

$$ag\,\frac{l^2}{m^2} + \frac{l}{m}(af + bg - ch) + bf = 0 \qquad ...(1)$$

Now if l_1, m_1, n_1 and l_2, m_2, n_2 be direction cosines of two lines, then from (1)

$$\frac{l_1 l_2}{m_1 m_2} = \frac{bf}{ag},$$

[Since roots of (1) are l_1/m_1, l_2/m_2]

or $\dfrac{l_1 l_2}{f/a} = \dfrac{m_1 m_2}{g/b}$

Similarly, elimination of l will yield

$$\frac{m_1 m_2}{g/b} = \frac{n_1 n_2}{h/c}$$

$$\therefore \quad \frac{l_1 l_2}{f/a} = \frac{m_1 m_2}{g/b} = \frac{n_1 n_2}{h/c} = q \text{ (say)}$$

We know that the lines are perpendicular if

$l_1 l_2 + m_1 m_2 + n_1 n_2 = 0$,

i.e., if $(f/a)q + (g/b)q + (h/c)q = 0$,

i.e., if $f/a + g/b + h/c = 0$.

8. Let components of the vector (line segment) be a, b, c.

Then $a^2 + b^2 + c^2 = 21^2 = 441$

$$\frac{a}{2} = \frac{b}{-3} = \frac{c}{6} = \lambda \text{ (say)}$$

and $a < 0$

$\therefore \quad \lambda^2\,[4 + 9 + 36] = 441 \Rightarrow \lambda^2 = 9$

Since $a = 2\lambda < 0$, $\lambda = -3$

$\therefore$ Components are $-6, 9, -18$.

9. If l, m, n are the d.c.'s of the line which is perpendicular to the given lines, then

$1.l - 1.m + 2.n = 0$

and $2.l + 1.m - 1.n = 0$

$$\therefore \quad \frac{l}{1-2} = \frac{m}{4+1} = \frac{n}{1+2}$$

i.e., $\dfrac{l}{-1} = \dfrac{m}{5} = \dfrac{n}{3} = \dfrac{\sqrt{(l^2 + m^2 + n^2)}}{\sqrt{(1 + 25 + 9)}} = \dfrac{1}{\sqrt{35}}$

$\Rightarrow l = -1/\sqrt{(35)}$, $m = 5/\sqrt{(35)}$, $n = 3/\sqrt{(35)}$.

10. D.c.'s of the line are $1/\sqrt{6}$, $1/\sqrt{6}$, $2/\sqrt{6}$ and $(\sqrt{3} - 1)/2\sqrt{6}$, $(-\sqrt{3} - 1)2\sqrt{6}$, $4/2\sqrt{6}$

$\therefore \quad \sqrt{(1^2 + 1^2 + 2^2)} = \sqrt{6}$

and $\sqrt{[(\sqrt{3} - 1)^2 + (-\sqrt{3} - 1)^2 + 4^2]} = \sqrt{(24)} = 2\sqrt{6}$.

If θ is the angle between the lines then

$\cos\theta = l_1 l_2 + m_1 m_2 + n_1 n_2$

$$= \frac{1}{\sqrt{6}}\cdot\frac{\sqrt{3} - 1}{2\sqrt{6}} + \frac{1}{\sqrt{6}}\cdot\frac{-\sqrt{3} - 1}{2\sqrt{6}} + \frac{2}{\sqrt{6}}\cdot\frac{4}{2\sqrt{6}} = \frac{1}{2}$$

$\Rightarrow \quad \theta = 60°$.

11. Coordinates of the centroid, say G of tetrahedron OABC are

$$\left(\frac{0 + a + 1 + 2}{4}, \frac{0 + 2 + b + 1}{4}, \frac{0 + 3 + 2 + c}{4}\right)$$

i.e., $[(a + 3)/4, (b + 3)/4, (c + 5)/4]$.

If the centroid is (1, 2, 3) then

$(a + 3)/4 = 1$, $(b + 3)/4 = 2$, $(c + 5)/4 = 3$

$\Rightarrow \quad a = 1, b = 5, c = 7$

$\therefore$ Coordinates of P are (a, b, c), *i.e.*, (1, 5, 7)

$\therefore \quad PG = \sqrt{\{(1 - 1)^2 + (5 - 2)^2 + (7 - 3)^2\}} = 5.$

12. If lines are coplanar and l, m, n are d.c.'s of the normal on the plane, then

$1.l - 1.m + k.n = 0$

$2.l - 3.m + 0.n = 0$

$1.l + 0.m + 3.n = 0$

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$$\Rightarrow \quad \begin{vmatrix} 1 & -1 & k \\ 2 & -3 & 0 \\ 1 & 0 & 3 \end{vmatrix} = 0 \Rightarrow k = 1.$$

13. Any point on the given line is $(5r - 3, 2r + 1, 3r - 4)$. If it is the foot of the perpendicular from (1, 2, 3), then

$5(5r - 3 - 0) + 2(2r + 1 - 2) + 3(3r - 4 - 3) = 0$

i.e., $38r = 38$, *i.e.,* $r = 1$

$\therefore$ Foot of perpendicular is (2, 3, – 1).

14. Equation of a plane through (–2, –2, 2) is given by $a(x + 2) + b(y + 2) + c(z - 2) = 0$

It contains the line joining the points (1, 1, 1) and (1, –1, 2), so these points also lie in the plane.

$\therefore \quad 3a + 3b - c = 0,$

$3a + b + 0.c = 0$

$$\therefore \quad \frac{a}{1} = \frac{b}{-3} = \frac{c}{-6} = r \text{ (say)}$$

or $\quad a = r, b = -3r, c = -6r$

$\therefore$ Equation of the plane is

$x - 3y - 6z + 8 = 0.$

15. The equation of the given plane is

$x - 2y + 3z = 0$ ...(1)

Equation of plane through the line of intersection of plane (1) and plane $2x + 3y - 4z - 5 = 0$, can be taken as

$(x - 2y + 3z) + \lambda(2x + 3y - 4z - 5) = 0$

i.e., $(1 + 2\lambda)x + (-2 + 3\lambda)y + (3 - 4\lambda)z - 5\lambda = 0$ ...(2)

If angle between planes (1) and (2) is 90°, then

$1.(1 + 2\lambda) - 2.(-2 + 3\lambda) + 3.(3 - 4\lambda) = 0$

$\Rightarrow \quad \lambda = 7/8$

Putting in (2) the equation of the plane in the new position is $22x + 5y - 4z - 35 = 0$.

16. A and B, foot of perpendicular from P(a, b, c) to y-z plane and z-x plane, are given by A(0, b, c) and (a, 0, c). A plane through origin (0, 0, 0) is

$px + qy + rz = 0$ ...(1)

It passes through A and B, so

$0p + bq + cr = 0$

and $\quad ap + 0q + cr = 0$

$$\therefore \quad \frac{p}{bc} = \frac{q}{ac} = \frac{r}{-ab} = \lambda \text{ (say)}$$

$\therefore$ The equation of the plane OAB is

$bcx + cay - abz = 0.$

17. Let the equation of the plane be

$x/a + y/b + z/c = 1$ ...(1)

Plane (1) meets the axes at A(a, 0, 0), B(0, b, 0) and C(0, 0, c).

If (α, β, γ) is the centroid of the Δ ABC, then

$\alpha = (a + 0 + 0)/3,$

$\beta = (0 + b + 0)/3,$

$\gamma = (0 + 0 + c)/3$

i.e., $\quad a = 3\alpha, b = 3\beta, c = 3\gamma$

Putting in (1), the equation of the required plane is

$x/\alpha + y/\beta + z/\gamma = 3.$

18. Equation of a plane through (2, – 3, 1) is

$a(x - 2) + b(y + 3) + c(z - 1) = 0$ ...(1)

It passes through (– 1, 1, – 7), so

$-3a + 4b - 8c = 0$ ...(2)

It is perpendicular to the plane

$x - 2y + 5z + 1 = 0,$

so $\quad a - 2b + 5c = 0$ ...(3)

Solving (2) and (3), we get

$$\frac{a}{4} = \frac{b}{7} = \frac{c}{2} = \lambda$$

Putting these values of a, b, c in (1), equation of the required plane is

$4x + 7y + 2z + 11 = 0.$

19. Vertices of the tetrahedron are (0, 0, 0), (6, 0, 0), (0, – 4, 0), (0, 0, 3)

$$\therefore \quad \text{Volume} = \frac{1}{6}\begin{vmatrix} 0 & 0 & 0 & 1 \\ 6 & 0 & 0 & 1 \\ 0 & -4 & 0 & 1 \\ 0 & 0 & 3 & 1 \end{vmatrix} = 12.$$

20. Coordinates of the given point P are (2, 3, – 1)

OP is normal to the required plane so direction ratios of the normal to the plane are 2, 3, – 1.

Equation of the plane through P(2, 3, –1) is $a(x - 2) + b(y - 3) + c(z + 1) = 0$

Since, the direction ratios of the normal to the plane are 2, 3, – 1,

so, we have $a/2 = b/3 = c/(-1)$ and hence the equation of the required plane is

$2(x - 2) + 3(y - 3) - 1(z + 1) = 0$

or $\quad 2x + 3y - z = 14.$

21. Direction ratios of the line joining the point A(3, 4, – 1), B(2, – 1, 5) are

$3 - 2, 4 + 1, -1 - 5$, *i.e.,* 1, 5, – 6.

Equation of the plane through

P(2, –3, 1) is

$a(x - 2) + b(y + 3) + c(z - 1) = 0$ ...(1)

The plane is perpendicular to the line AB so the direction ratios of the normal to the plane (1) are 1, 5, – 6 and hence, we have

$$\frac{a}{1} = \frac{b}{5} = \frac{c}{-6},$$

therefore the equation of the required plane is

$1(x - 2) + 5(y + 3) - 6(z - 1) = 0.$

or $\quad x + 5y - 6z + 19 = 0.$

22. Equation of the line is

$$\frac{x+1}{1} = \frac{y+3}{3} = \frac{z-2}{-2} = r \text{ (say)} \quad ...(1)$$

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Any point on it can be written as

$(r - 1, 3r - 3, - 2r + 2)$

If this point is the point of intersection of the line (1) and plane

$3x + 4y + 5z = 5$ ...(2)

Then, this point should lie on the plane (2),

so $3(r - 1) + 4(3r - 3) + 5(- 2r + 2) = 5$

i.e., $5r - 5 = 5$ or $r = 2$

$\therefore$ Required point of intersection is (1, 3, – 2).

23. Let l, m, n be the direction cosines of the line $\perp$ to both. Therefore

$ll_1 + mm_1 + nn_1 = 0,$

and $ll_2 + mm_2 + nn_2 = 0$

$$\therefore \quad \frac{l}{m_1n_2 - m_2n_1} = \frac{m}{n_1l_2 - n_2l_1} = \frac{n}{l_1m_2 - l_2m_1}$$

$$= \frac{\sqrt{[l^2 + m^2 + n^2]}}{\sqrt{\Sigma(m_1n_2 - m_2n_1)^2}}$$

Now $l^2 + m^2 + n^2 = 1$ and

$\sqrt{\Sigma(m_1n_2 - m_2n_1)^2} = \sin\theta = \sin 90 = 1$

[$\because$ given lines are $\perp$]

$\therefore$ d.c.'s are

$m_1n_2 - m_2n_1,\ n_1l_2 - n_2l_1,\ l_1m_2 - l_2m_1.$

24. The line $\dfrac{x-\alpha}{l} = \dfrac{y-\beta}{m} = \dfrac{z-\lambda}{n}$ is parallel to the plane

$ax + by + cz + d = 0$

If the line is $\perp$ to the normal to the plane, *i.e.,*

$al + bm + cn = 0$

In this question, this condition is satisfied by the plane $2x + y - 2z = 0$.

25. The equation of the two lines can be written as

$$\frac{x-b}{a} = \frac{y-0}{1} = \frac{z-d}{c}$$

and $$\frac{x-b'}{a'} = \frac{y-0}{1} = \frac{z-d'}{c'}$$

$\therefore$ The lines are perpendicular if

$a.a' + 1.1 + c.c' = 0,$ *i.e.,* $aa' + cc' = - 1.$

26. Perpendicular to the plane is parallel to the normal to the plane, so d.r.'s of the line $\perp$ to the plane

$2x - y + z + 3 = 0$ are 2, – 1, 1

$\therefore$ Equation of $\perp$ drawn through the point (1, 3, 4) is

$$\frac{x-1}{2} = \frac{y-3}{-1} = \frac{z-4}{1} = r \text{ (say)}$$

Any point on it is $(2r + 1, - r + 3, r + 4)$. If this is the foot of the $\perp$, then it should lie on the plane.

$\therefore \quad 2(2r + 1) - (- r + 3) + (r + 4) + 3 = 0$

i.e., $6r + 6 = 0$, *i.e.,* $r = - 1$

So, foot of the perpendicular is (– 1, 4, 3).

27. The lines are

$$x = 1,\ y = 2, \text{ i.e., } \frac{x-1}{0} = \frac{y-2}{0} = \frac{z}{1}$$

and $y = - 1,\ z = 0$ *i.e.* $\dfrac{x}{1} = \dfrac{y+1}{0} = \dfrac{z}{0}$

$\therefore$ If θ is the angle between them, then

$\cos\theta = 0.1 + 0.0 + 1.0 = 0$

i.e., $\theta = 90°$.

28. Since the line is equally inclined to the axes, and passes through the origin, its direction cosines are 1, 1, 1. So its equation is

$$\frac{x}{1} = \frac{y}{1} = \frac{z}{1}$$

A point P on it is given by (a, a, a). So equation of the plane through

P(a, a, a) and $\perp$ to OP is

$1.(x - a) + 1.(y - a) + 1.(z - a) = 0$

[$\because$ OP is normal to the plane]

i.e., $x + y + z = 3a$

or $$\frac{x}{3a} + \frac{y}{3a} + \frac{z}{3a} = 1$$

Intercepts on axes are $3a, 3a, 3a$, whose reciprocals are $1/3a, 1/3a, 1/3a$

$\therefore$ Sum of reciprocals of these intercepts

$$= \frac{1}{3a} + \frac{1}{3a} + \frac{1}{3a} = \frac{3}{3a} = \frac{1}{a}.$$

29. The projection of the line

$$\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{3} \quad ...(1)$$

on the plane $x + y + z - 1 = 0$ ...(2)

is the line of intersection of the plane (2) and the plane perpendicular to the plane (2) and containing the line (1).

Now, equation of the plane through line (1) can be taken as

$A(x - 1) + B(y - 2) + C(z - 3) = 0$ ...(3)

where $2.A + 1.B + 3.C = 0$ ...(4)

If plane (3) is perpendicular to the plane (2), then

$1.A + 1.B + 1.C = 0$ ...(5)

from (4) and (5)

$\Rightarrow A/(- 2) = B/1 = C/1 = k$ (say).

$\therefore \quad A = - 2k, B = k, C = k$

Putting in (3), we get

$2x - y - z + 3 = 0$ ...(6)

Hence the required projection is given by planes (2) and (6).

30. Let a, b, c be the d.r.'s of the required line.

$\therefore$ Line is $\parallel$ to the plane $4x + y + z + 2 = 0$ and $\perp$ to the line $x/1 = y/(- 2) = (z - 5)/1$

$\therefore \quad 4a + 1.b + 1.c = 0$ ...(1)

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and $1.a - 2.b + 1.c = 0$ ...(2)

$\Rightarrow$ $a/3 = b/(-3) = c/(-9) = k$ (say)

$\therefore$ Equation of the required line is

$$\frac{x-2}{a} = \frac{y+1}{b} = \frac{z+1}{c}$$

i.e., $(x - 2)/3 = (y + 1)/(-3) = (z + 1)/(-9)$

i.e., $(x - 2)/(-1) = (y + 1)/1 = (z + 1)/3$.

31. Let the line through the point (3, 8, 2), say A and parallel to the plane

$3x + 2y - 2z + 5 = 0$ ...(1)

meet the line

$$\frac{x-1}{2} = \frac{y-3}{4} = \frac{z-2}{3} \quad ...(2)$$

at the point P $(1 + 2r, 3 + 4r, 2 + 3r)$

$\therefore$ d.r.'s of line AP are

$1 + 2r - 3, 3 + 4r - 8, 2 + 3r - 2$

i.e., $2r - 2, 4r - 5, 3r$

$\because$ AP is parallel to the plane (1)

$\therefore$ $3(2r - 2) + 2(4r - 5) - 2(3r) = 0 \Rightarrow r = 2$

$\therefore$ Coordinates of P are (5, 11, 8)

$\therefore$ Required distance = AP = 7.

32. Let l_1, m_1, n_1 and l_2, m_2, n_2 be the d.r.'s of the lines in which the planes

$3x - 7y - 5z = 1$ and $5x - 13y + 3z + 2 = 0$ cut the plane $8x - 11y + 2z = 0$, then

$3l_1 - 7m_1 - 5n_1 = 0$

$8l_2 - 11m_2 + 2n_2 = 0$

$\therefore$ $l_1/(-69) = m_1/(-46) = n_1/23$

and $5l_2 - 13m_2 + 3n_2 = 0$

$8l_2 - 11m_2 + 2n_2 = 0$

$\therefore$ $l_2/7 = m_2/14 = n_2/49$.

If θ is the angle between the two lines, then

$$\cos\theta = \frac{l_1l_2 + m_1m_2 + n_1n_2}{\sqrt{(l_1^2+m_1^2+n_1^2)}\sqrt{(l_2^2+m_2^2+n_2^2)}} = 0$$

$\therefore$ $\theta = \pi/2$.

33. Shortest distant between the lines

$$\frac{x-\alpha}{l} = \frac{y-\beta}{m} = \frac{z-\gamma}{n}$$

and $\dfrac{x-\alpha'}{l'} = \dfrac{y-\beta'}{m'} = \dfrac{z-\gamma'}{n'}$ is given by

$$\text{Shortest distant} = \begin{vmatrix} \alpha-\alpha' & \beta-\beta' & \gamma-\gamma' \\ l & m & n \\ l' & m' & n' \end{vmatrix} \div \sqrt{\sum(mn' - m'n)^2}$$

Here lines are $\dfrac{x-1}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4} = r$ (say)

and $\dfrac{x-2}{3} = \dfrac{y-4}{4} = \dfrac{z-5}{5} = s$ (say)

$\therefore$ $\sum(mn' - m'n)^2 = \sqrt{(-1)^2 + (2)^2 + (1)^2] = \sqrt{6}}$

$$\therefore \text{ Shortest distant} = \begin{vmatrix} 1 & 2 & 2 \\ 2 & 3 & 4 \\ 3 & 4 & 5 \end{vmatrix} \div \sqrt{6} = \frac{1}{\sqrt{6}}.$$

34. Equation of the line through A(1, 3, 4) are perpendicular to the plane

$2x - y + z + 3 = 0$ is

$$\frac{x-1}{2} = \frac{y-3}{-1} = \frac{z-4}{1} = r \quad \text{(say)}$$

Any point P on it is $(2r + 1, -r + 3, r + 4)$.

If this point is the image of (1, 3, 4), then mid-point of AP should lie on the plane.

$$\therefore 2\left(\frac{2r+1+1}{2}\right) - \left(\frac{-r+3+3}{2}\right) + \left(\frac{r+4+4}{2}\right) + 3 = 0$$

or $4r + 4 + r - 6 + r + 8 + 6 = 0$ or $r = -2$

$\therefore$ Image of (1, 3, 4) is (– 3, 5, 2).

35. Equation of plane through the point (a, b, c) is

$\alpha(x - a) + \beta(y - b) + \gamma(z - c) = 0.$ ...(1)

Equation of the perpendicular from origin (0, 0, 0) to this plane is

$$\frac{x}{\alpha} = \frac{y}{\beta} = \frac{z}{\gamma} = r \quad \text{(say)} \quad ...(2)$$

Let $P(x_1, y_1, z_1)$ be the foot of the perpendicular. Then it lies on (2) and plane (1), so

$x_1 = \alpha r, y_1 = \beta r, z_1 = \gamma r$

$$\therefore \frac{x_1}{r}(x_1 - a) + \frac{y_1}{r}(y_1 - b) + \frac{z_1}{r}(z_1 - c) = 0$$

i.e., $x_1^2 + y_1^2 + z_1^2 - ax_1 - by_1 - cz_1 = 0$

Hence locus of P is

$x^2 + y^2 + z^2 - ax - by - cz = 0.$

36. Let OA = a, OB = b and OC = c.

$\therefore$ Equation of sphere through O(0, 0, 0), A(a, 0, 0), B(0, b, 0), C(0, 0, c) is

$x^2 + y^2 + z^2 - ax - by - cz = 0$ ...(1)

Radius of this sphere

$= \sqrt{(a^2/4 + b^2/4 + c^2/4)} = 2k$

$\Rightarrow$ $a^2 + b^2 + c^2 = 16k^2$ ...(2)

If (f, g, h) is the centroid of the tetrahedron OABC, then $f = a/4$, $g = b/4$, $h = c/4$

i.e, $a = 4f$, $b = 4g$, $c = 4h$

Putting in (2), we get

$f^2 + g^2 + h^2 = k^2$

$\therefore$ Locus of centre (f, g, h) is $x^2 + y^2 + z^2 = k^2$.

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37. The centre of the sphere is given as (2, 3, – 4).

$\therefore$ Radius of the sphere

= length of perpendicular from the centre (2, 3, – 4) to the plane

$$2x + 6y - 3z + 15 = 0$$

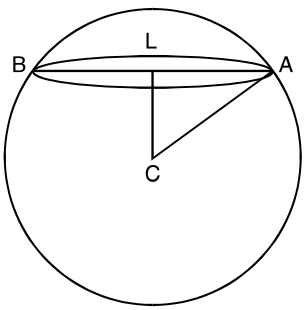
$$= \frac{2.2 + 6.3 - 3(-4) + 15}{\sqrt{[2^2 + 6^2 + (-3)^2]}} = 7$$

$\therefore$ The equation of the required sphere is

$$(x - 2)^2 + (y - 3)^2 + (z + 4)^2 = (7)^2$$

i.e., $x^2 + y^2 + z^2 - 4x - 6y + 8z - 20 = 0.$

38. For sphere $x^2 + y^2 + z^2 = 9$, centre C is (0, 0, 0) and radius CA = 3.



Now, CL = length of $\perp$ from C on plane

$$x + y + z = 3$$

$$= \frac{3}{\sqrt{(1+1+1)}} = \sqrt{3}$$

In Δ ACL, AL = $\sqrt{(CA^2 - CL^2)} = \sqrt{6}$.

39. Centre of the sphere

$x^2 + y^2 + z^2 - 2x - 4y + 2z - 3 = 0$ is

(1, 2, – 1) and radius is $\sqrt{(1 + 4 + 1 + 3)} = 3$

$\perp$ distance of centre from the plane

$2x - 2y + z + 12 = 0$

$= (2.1 - 2.2 - 1 + 12)/\sqrt{(4 + 4 + 1)} = 3$ = radius

$\therefore$ Plane touches the sphere.

Now point of contact is the foot of perpendicular drawn from the centre to the plane. Equation of line $\perp$ to the plane from centre (1, 2, – 1) is

$$\frac{x-1}{2} = \frac{y-2}{-2} = \frac{z+1}{1} = r \text{ (say)}$$

Any point on it is $(2r + 1, -2r + 2, r - 1)$

This should lie on the plane

$\therefore$ $2(2r + 1) - 2(-2r + 2) + (r - 1) + 12 = 0$

or $r = -1$

$\therefore$ Point of contact is (– 1, 4, – 2).

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CHAPTER

8

LINEAR PROGRAMMING

INTRODUCTION

Linear programming deals with the optimization (maximization or minimization) of a function of variables known as *objective function,* subject to a set of linear equalities and/or inequalities known as *constraints*. The objective function may be profit, cost, production capacity or any other measure of effectiveness, which is to be obtained in the best possible or optimal manner. The constraints may be imposed by different sources such as market demand, production processes and equipment, storage capacity, raw material availability, etc. By linearity is meant a mathematical expression in which the variables do not have powers.

Requirements for a Linear Programming Problem

All organizations, big or small, have at their disposal, men, machines, money and materials, the supply of which may be limited. If the supply of these resources were unlimited, the need for management tools like linear programming would not arise at all. Supply of resources being limited, the management must find the best allocation of its resources in order to maximize the profit or minimize the loss or utilize the production capacity to the maximum extent. However, this involves a number of problems which can be overcome by quantitative methods, particularly the linear programming.

Generally speaking, linear programming can be used for optimization problems if the following conditions are satisfied:

1. There must be a well defined objective function (profit, cost or quantities produced) which is to be either maximized or minimized and which can be expressed as a linear function of decision variables.
2. There must be constraints on the amount or extent of attainment of the objective and these constraints must be capable of being expressed as linear equalities or inequalities in terms of variables.
3. There must be alternative courses of action. For example, a given product may be processed by two different machines and problem may be as to how much of the product to allocate to each machine.
4. Another necessary requirement is that decision variables should be interrelated and non- negative. The non-negativity condition shows that linear programming deals with real life situations for which negative quantities are generally illogical.
5. As stated earlier, the resources must be in limited supply. For example, if a firm starts producing greater number of a particular product, it must make smaller number of other products as the total production capacity is limited.

Some Important Inferences

It is important to see what the assumption of linearity implies. Intuitively it means that powers of variables (*e.g.*, $x_{12}^3, x_{13}^{5/2}$), their products (*e.g.*, $x_{11}\ x_{12}$) and their combinations (*e.g.*, $a_{11}x_{11} + a_{12} \log x_{12}$) are not permissible in the objective function equation as well as constraints.

More generally, linearity can be characterised by certain *additive* and *multiplicative properties.* For example, if a machine processes job A in 5 hours and job B in 10 hours, then time taken to process both job A and B is 5 + 10 = 15 hours. This, however, is true only when the change-over time from Job A to B is negligible. Some processes may not behave this way. For instance, when several liquids of different chemical compositions are mixed, the resulting volume may not be equal to the sum of the volumes of the individual liquids. Here, the property of additivity does not hold.

The multiplicative property implies: If a product yields a profit of ₹ 10, the profit earned from the sale of 12 such

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products will be ₹ (10 × 12) = ₹ 120. This may not be always true because of quantity discounts. Further, even if the sale price is constant, the manufacturing cost per unit may vary with the number of units produced and so may vary the profit per unit. The real world situations may not be strictly linear. However, the assumed linearity represents their close approximation and provides very useful answers.

In most linear programming problems the decision variables are permitted to take any non-negative values that satisfy the constraints. However, there are problems wherein variables are restricted to have integral values only. Though such problems, strictly speaking, are not linear programming problems, they are frequently solved by linear programming techniques and the values are then rounded off to nearest integers to satisfy the constraints. This approximation, however, is valid only if the variables have large optimal values.

The objective function does not involve any constant term, *i.e.,* we do not write

$$\text{maximize (or minimize) } Z = \sum_{j=1}^{n} c_j x_j + c.$$

The reason for this is simple: the optimal values of x_j are just independent of any constant c. This constant c, if present, is ignored during the process of optimization and can be added to the optimal value of the objective function after the solution to the problem is obtained.

Mathematically, the constraints that restrict the decision variables to be non-negative do not differ from other constraints. However, since while solving the problems they are handled differently from the other constraints, they have been termed as *non-negativity restrictions* and the term *constraints* has been used to represent constraints other than the non-negativity restrictions and this terminology will be continued throughout the text.

Examples on the Applications of Linear Programming

In this section we illustrate the application of linear programming to various situations with the help of examples. The objective is to familiarize the reader with some of the areas where this technique may be applied. In these examples the stress is laid on the analysis of the situation and formulation of the L.P. model rather than its solution. The solution of such problems is discussed separately.

EXAMPLE 1. (Production Allocation Problem)

A firm produces three products. These products are processed on three different machines. The time required to manufacture one unit of each of the three products and the daily capacity of the three machines are given in the table below.

Table 1

Machine	*Time per unit (minutes)*			*Machine capacity (minutes/day)*
	Product 1	*Product 2*	*Product 3*	
M_1	2	3	2	440
M_2	4	—	3	470
M_3	2	5	—	430

It is required to determine the daily number of units to be manufactured for each product. The profit per unit for product 1, 2 and 3 is ₹ 4, ₹ 3 and ₹ 6 respectively. It is assumed that all the amounts produced are consumed in the market.

Formulation of Linear Programming Model

Step 1

From the study of the situation find the *key-decision* to be made. In this connection, looking for variables helps considerably. In the given situation key decision decides the extent of products 1, 2 and 3, as the extents are permitted to vary.

Step 2

Assume symbols for variable quantities noticed in step 1. Let the extents (amounts) of products, 1, 2 and 3 manufactured daily be x_1, x_2 and x_3 respectively.

Step 3

Express the *feasible alternatives* mathematically in terms of variables. Feasible alternatives are those which are physically, economically and financially possible. In the given situation feasible alternatives are sets of values of x_1, x_2 and x_3,

$$\text{where } x_1, x_2, x_3 \geq 0, \qquad ...(1)$$

since negative production has no meaning and is not feasible.

Step 4

Mention the *objective* quantitatively and express it as a linear function of variables. In the present situation, objective is to maximize the profit.

$$\textit{i.e.}, \text{ maximize} \quad Z = 4x_1 + 3x_2 + 6x_3. \qquad ...(2)$$

Step 5

Put into words the *influencing factors* or *constraints.* These occur generally because of constraints on availability (resources) or requirements (demands). Express these constraints also as linear equalities/inequalities in terms of variables.

Here, constraints are on the machine capacities and can be mathematically expressed as

$$\begin{aligned} 2x_1 + 3x_2 + 2x_3 &\leq 440, \\ 4x_1 + 0x_2 + 3x_3 &\leq 470, \\ 2x_1 + 5x_2 + 0x_3 &\leq 430. \end{aligned} \qquad ...(3)$$

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EXAMPLE 2. (Production Planning Problem)

A factory manufactures a product each unit of which consists of 5 units of part A and 4 units of part B. The two part A and B require different raw materials of which 120 units and 240 units respectively are available. These parts can be manufactured by three different methods. Raw material requirements per production run and the number of units for each part produced are given below.

Table 2

Method	*Input per run (units)*		*Output per run (units)*	
	Raw material 1	*Raw material 2*	*Part A*	*Part B*
1	7	5	6	4
2	4	7	5	8
3	2	9	7	3

Determine the number of production runs for each method so as to maximize the total number of complete units of the final product.

Formulation of Linear Programming Model

Step 1

The *key-decision* to be made is to determine the number of production runs for each method.

Step 2

Let x_1, x_2, x_3 represent the number of production runs for method 1, 2 and 3 respectively.

Step 3

Feasible alternatives are the sets of values of

$$x_1, x_2 \ \& \ x_3, \quad \text{where} \quad x_1, x_2, x_3 \geq 0, \qquad ...(1)$$

since negative number of production runs has no meaning and is not feasible.

Step 4

The objective is to maximize the total number of units of the final product. Now, the total number of units of part A produced by different methods is $6x_1 + 5x_2 + 7x_3$ and for part B is $4x_1 + 8x_2 + 3x_3$. Since each unit of the final product requires 5 units of part A and 4 units of part B, it is evident that the maximum number of units of the final product cannot exceed the smaller value of

$$\frac{6x_1 + 5x_2 + 7x_3}{5} \quad \text{and} \quad \frac{4x_1 + 8x_2 + 3x_3}{4}$$

Thus the objective is to maximize

$$Z = \text{Min}\left(\frac{6x_1 + 5x_2 + 7x_3}{5}, \frac{4x_1 + 8x_2 + 3x_3}{4}\right). \qquad ...(2)$$

Step 5

Constraints are on the availability of raw materials. They are, for

$$\text{raw material 1,} \quad 7x_1 + 4x_2 + 2x_3 \leq 120,$$

$$\text{and raw material 2,} \quad 5x_1 + 7x_2 + 9x_3 \leq 240. \qquad ...(3)$$

The above formulation violates the linear programming properties since the objective function is non-linear. (Linear relationship between two or more variables is the one in which the variables are directly and precisely proportional). However, the above model can be easily reduced to the generally acceptable linear programming format.

$$\text{Let } y = \text{Min}\left(\frac{6x_1 + 5x_2 + 7x_3}{5}, \frac{4x_1 + 8x_2 + 3x_3}{4}\right)$$

$$\text{It follows that} \quad \frac{6x_1 + 5x_2 + 7x_3}{5} \geq y$$

$$\text{and} \quad \frac{4x_1 + 8x_2 + 3x_3}{4} \geq y.$$

i.e., $6x_1 + 5x_2 + 7x_3 - 5y \geq 0,$

and $4x_1 + 8x_2 + 3x_3 - 4y \geq 0.$

EXAMPLE 3. (Advertising Media Selection Problem)

An advertising company wishes to plan its advertising strategy in three different media—television, radio and magazines. The purpose of advertising is to reach as large a number of potential customers as possible. Following data has been obtained from market survery:

Table 3

	Television	*Radio*	*Magazine I*	*Magazine II*
Cost of an advertising unit	₹30,000	₹20,000	₹15,000	₹10,000
No. of potential customers reached per unit	2,00,000	6,00,000	1,50,000	1,00,000
No. of female customers reached per unit	1,50,000	4,00,000	70,000	50,000

The company wants to spend not more than ₹ 4,50,500 on advertising. Following are the further requirements the must be met:

(*i*) at least 1 million exposures take place among female customers,

(*ii*) advertising on magazines be limited to ₹ 1,50,000,

(*iii*) at least 3 advertising units be bought on magazine I and 2 units on magazine II, and

(*iv*) the number oof advertising units on television and radio should each be between 5 and 10.

Formulate an L.P. model for the problem.

Formulation of Linear Programming Model

Step 1

The *key decision* to be made is to determine the number of advertising units to be bought in television, radio, magazine I and magazine II.

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Step 2

Let x_1, x_2, x_3, x_4 represent the number of these advertising units in television, radio, magazine I and magazine II respectively.

Step 3

Feasible alternatives are sets of values of x_1, x_2, x_3, x_4, where x_1, x_2, x_3, x_4, all ≥ 0.

Step 4

The *objective* is to maximize the total number of potential custome₹

i.e., maximize $Z = 10^5(2x_1 + 6x_2 + 1.5x_3 + x_4)$.

Step 5

Constraints are on the advertising budget:

$$30{,}000x_1 + 20{,}000x_2 + 15{,}000x_3 + 10{,}000x_4 \leq 4{,}50{,}000$$

or $30x_1 + 20x_2 + 15x_3 + 10x_4 \leq 450$

on number of female customers reached by the advertising campaign:

$$1{,}50{,}000x_1 + 4{,}00{,}000x_2 + 70{,}000x_3 + 50{,}000x_4 \geq 10{,}00{,}000$$

or $15x_1 + 40x_2 + 7x_3 + 5x_4 \geq 100$,

on expenses on magazine advertising:

$$15{,}000x_3 + 10{,}000x_4 \leq 1{,}50{,}000$$

or $15x_3 + 10x_4 \leq 150$,

on no. of units on magazines:

$$x_3 \geq 3,$$
$$x_4 \geq 2,$$

on no. of units on television:

$$5 \leq x_1 \leq 10,$$

on no. of units on radio:

$$5 \leq x_2 \leq 10.$$

GRAPHICAL METHOD

An LPP with only two variables presents a simple case, for which the solution can be derived using a graphical method. The graphical technique provides a pictorial representation of the solution and one gets insight into the basic concepts used in solving large L.P.P.

Working Procedure

To solve a linear programming problem graphically:

Step 1

Formulate the given problem as a linear programming problem.

Step 2

Plot the given constraints as equalities on $x_1 \sim x_2$ coordinate plane and determine the convex region formed by them.

Step 3

Determine the vertices of the convex region and find the value of objective function at each vertex. The vertex which gives the optimal (maximum or minimum) value of the objective function gives the desired optimal solution to the problem.

Otherwise, draw the dotted line through the origin representing the objective function with $z = 0$. As z is increased from zero, this line moves to the right remaining parallel to itself. We go on sliding this line (parallel to itself), till it is farthest away from the origin and passes through only one vertex of the convex region. This is the vertex where the maximum value of z is attained.

When it is required to minimize z, the value of z is increased till the dotted line passes through the nearest vertex of the convex region.

Example 1: Maximize $Z = 3x_1 + 4x_2$ ...(*i*)

subject to $4x_1 + 2x_2 \leq 80$ ...(*ii*)

$2x_1 + 5x_2 \leq 180$ ...(*iii*)

$x_1, x_2 \geq 0$ ...(*iv*)

Solution: Consider $x_1 - x_2$ coordinate system as shown in Fig. 1. The non-negativity restrictions (*iv*) imply that the values of x_1, x_2 lie in the first quadrant only.

We plot the lines $4x_1 + 2x_2 = 80$ and $2x_1 + 5x_2 = 180$.

Then any point on or below $4x_1 + 2x_2 = 80$ satisfies (*ii*) and any point on or below $2x_1 + 5x_2 = 180$ satisfies (*iii*). This shows that the desired point (x_1, x_2) must be somewhere in the shaded convex region OABC. This region is called the *solution space* or *region of feasible solutions* for the given problem. Its vertices are O(0, 0), A(20, 0), B(2.5, 35) and C(0, 36).

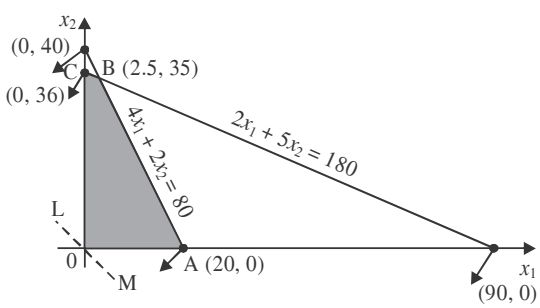

Fig. 1

The values of the objective function (*i*) at these points are

Z(O) = 0, Z(A) = 60, Z(B) = 147.5, Z(C) = 144.

Thus the maximum value of Z is 147.5 and it occurs at B. Hence the optimal solution to the problem is

$$x_1 = 2.5 \; x_2 = 35 \text{ and } Z_{max} = 147.5.$$

NOTE: Our aim is to find the point (or points) in the solution space which maximizes the profit function Z. To do this, we observe that on making Z = 0, (*i*) becomes $3x_1 + 4x_2 = 0$ which is represented by the dotted line LM through O. As the value of Z is increased, the line LM starts moving parallel to itself towards the right. Larger the value

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of Z, more will be the company's profit. In this way, we go on sliding LM till it is farthest away from the origin and passes through one of the corners of the convex region. This is the point where the maximum value of Z is attained. Just possible, such a line may be one of the edges of the solution space. In that case every point on that edge gives the same maximum value of Z.

Here Z_{max} is attained at B(2.5, 35). Hence the optimal solution is $x_1 = 2.5$, $x_2 = 35$ and $Z_{max} = 147.5$.

Example 2: Find the maximum value of $Z = 2x + 3y$ subject to the constraints: $x + y \le 30$, $y \ge 3$, $0 \le y \le 12$, $x - y \ge 0$, and $0 \le x \le 20$.

Solution: Any point (x, y) satisfying the conditions $x \ge 0$, $y \ge 0$ lies in the first quadrant only. Also since $x + y \le 30$, $y \ge 3$, $y \le 12$, $x \ge y$ and $x \le 20$, the desired point (x, y) lies within the convex region ABCDE (shown shaded in Fig. 2). Its vertices are A(3, 3), B(20, 3), C(20, 10), D(18, 12) and E(12, 12).

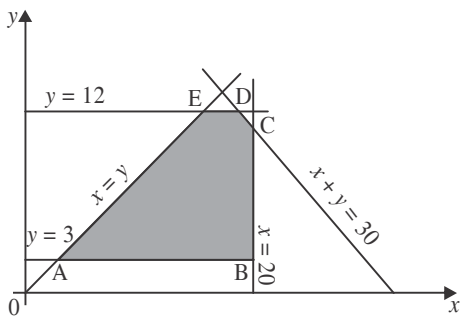

Fig. 2

The values of Z at these five vertices are Z(A) = 15, Z(B) = 49, Z(C) = 70, Z(D) = 72, and Z(E) = 60.

Since the maximum value of Z is 72 which occurs at the vertex D, the solution to the L.P.P. is $x = 18$, $y = 12$ and maximum Z = 72.

Example 3: A company manufactures two types of cloth, using three different colours of wool. One yard length of type a cloth requires 4 *oz* of red wool, 5 *oz* of green wool and 3 *oz* of yellow wool. One yard length of type B cloth requires 5 *oz* of red wool, 2 *oz* of green wool and 8 *oz* of yellow wool. The wool available for manufacture is 1000 *oz* of red wool, 1000 *oz* of green wool and 1200 *oz* of yellow wool. The manufacturer can make a profit of ₹ 5 on one yard of type A cloth and ₹ 3 on one yard of type B cloth. Find the best combination of the quantities of type A and type B cloth which gives him maximum profit by solving the L.P.P. graphically.

Solution: Let the manufacturer decide to produce x_1 yards of type A cloth and x_2 yards of type B cloth. Then the total income in rupees, from these units of cloth is given by

$$Z = 5x_1 + 3x_2 \qquad ...(i)$$

To produce these units of two types of cloth, he requires

red wool = $4x_1 + 5x_2$ oz,

green wool = $5x_1 + 2x_2$ oz,

and yellow wool = $3x_1 + 8x_2$ oz.

Since the manufacturer does not have more than 1000 oz of red wool, 1000 oz of green wool and 1200 oz of yellow wool, therefore

$$4x_1 + 5x_2 \le 1000 \qquad ...(ii)$$

$$5x_1 + 2x_2 \le 1000 \qquad ...(iii)$$

$$3x_1 + 8x_2 \le 1200 \qquad ...(iv)$$

Also $x_1 \ge 0$, $x_2 \ge 0$. ...(*v*)

Thus the given problem is to maximize Z subject to the constraints (*ii*) to (*v*).

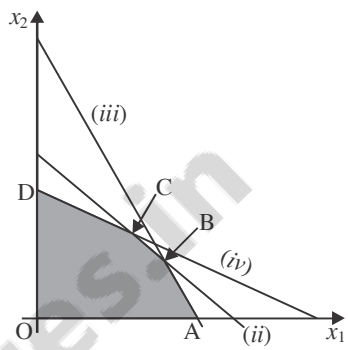

Fig. 3

Any point satisfying the condition (*v*) lies in the first quadrant only. Also the desired point satisfying the constraints (*ii*) to (*iv*) lies in the convex region OABCD (Fig. 3). Its vertices are O(0, 0), A(200, 0), B(3000/17, 1000/17), C(2000/17, 1800/17) and D(0, 150).

The values of Z at these vertices are given by Z(O) = 0, Z(A) = 1000, Z(B) = 1057.6, Z(C) = 905.8 and Z(D) = 450.

Since the maximum value of Z is 1058.8 which occurs at the vertex B, the solution to the given problem is $x_1 = 3000/17$, $x_2 = 1000/17$ and max. Z = 1058.8.

Hence the manufacturer should produce 176.5 yards of type A cloth 58.8 yards of type B cloth, so as to get the maximum profit of ₹ 1058.8.

Example 4: A company making cold drinks has two bottling plants located at towns T_1 and T_2. Each plant produces three drinks A, B and C and their production capacity per day is shown below:

Cold drinks	*Plant at*	
	T_1	T_2
A	6,000	2,000
B	1,000	2,500
C	3,000	3,000

The marketing department of the company forecasts a demand of 80,000 bottles of A, 22,000 bottles of B and 40,000 bottles of C during the month of June. The operating costs per day of plants at T_1 and T_2 are ₹ 6,000 and ₹ 4,000 respectively. Find (graphically) the number of days for which each plant must be run in June so as to minimize the operating costs while meeting the market demand.

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Solution: Let the plants at T_1 and T_2 be run for x_1 and x_2 days. Then the objective is to minimize the operation costs *i.e.*

$$\text{min. } Z = 6000x_1 + 4000x_2 \quad ...(i)$$

Constraints on the demand for the three cold drinks are:

for A, $6{,}000x_1 + 2{,}000x_2 \geq 80{,}000$

or $3x_1 + x_2 \geq 40$ ...(*ii*)

for B, $1{,}000x_1 + 2{,}500x_2 \geq 22{,}000$

or $x_1 + 2.5x_2 \geq 22$ ...(*iii*)

for C, $3{,}000x_1 + 3{,}000x_2 \geq 40{,}000$

or $x_1 + x_2 \geq 40/3$ ...(*iv*)

Also $x_1, x_2 \geq 0$ ...(*v*)

Thus the L.P.P. is to minimize (*i*) subject to constraints (*ii*) to (*v*).

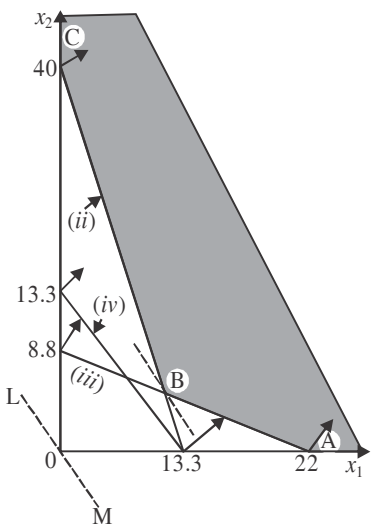

Fig. 4

The solution space satisfying the constraints (*ii*) to (*v*) is shown shaded in Fig. 4. As seen from the direction of the arrows, the solution space is unbounded. The constraint (*iv*) is dominated by the constraints (*ii*) and (*iii*) and hence does not affect the solution space. Such a constraint as (*iv*) is called the *redundant constraint.*

The vertices of the convex region ABC are A(22, 0), B(12, 4) and C(0, 40).

Values of the objective function (*i*) at these vertices are

Z(A) = 132000, Z(B) = 88,000, Z(C) = 160,000.

Thus the minimum value of Z is ₹ 88,000 and it occurs at B. Hence the solution to the problem is x_1 = 12 days, x_2 = 4 days, Z_{min} = ₹ 88,000.

Otherwise: Making Z = 0, (*i*) becomes $3x_1 + 2x_2 = 0$ which is represented by the dotted line LM through O. As Z is increased, the line LM moves parallel to itself, to the right. Since we are interested in finding the minimum value of Z, value of Z is increased till LM passes through the vertex nearest to the origin of the shaded region, *i.e.* B(12, 4).

Thus the operating cost will be minimum for x_1 = 12 days, x_2 = 4 days and Z_{min} = 6000 × 12 + 4000 × 4 = ₹ 88,000.

Remarks. The dotted line parallel to the line LM is called the *iso-cost line* since it represents all possible combinations of x_1, x_2 which produce the same total cost.

SIMPLEX METHOD

Solving as LPP Graphically, the region of feasible solutions was found to be convex, bounded by vertices and edges joining them. The optimal solution occurred at some vertex. If the optimal solution is not unique, the optimal points were on an edge. These observations also hold true for the general LPP *i.e.*, the essential problem of an LPP is that of finding the particular vertex of the convex region which corresponds to the optimal solution. The most commonly used method for locating the optimal vertex is the simplex method. This method consists in moving step-by-step from one vertex to the adjacent one of all the adjacent vertices, the one giving better value of objective function over that of preceding vertex, is chosen. This method of jumping from one vertex to the other is then repeated. As the number of vertices is finite, the simplex method leads to an optimal vertex in a finite number of steps.

The simplex method is primarily based on following two conditions:

1. Feasibility Condition: It ensures that if the starting solution is basic feasible, the subsequent will also be basic feasible.

2. Optimality Condition: It ensures that only improved solutions will be obtained.

Now, we shall elaborate the above terms in relation to the general linear programming problem in standard form, i.*e.*

Maximize $Z = c_1x_1 + c_2x_2 + ... + c_nx_n$

subject to $\sum_{j=1}^{n} a_{ij}x_j + s_i = b_i, = 1, 2, ... m$

and $x_j \geq 0$, $s_i \geq 0$, $j = 1, 2, ... n$.

(*i*) **Solution:** $x_1, x_2, ..., x_n$ is a solution of the general L.P.P., if it satisfies the constraint.

(*ii*) **Feasible solution:** $x_1, x_2, ... x_n$ is a feasible solution of the general L.P.P. if it satisfies both the constraints and the non-negativity restrictions. The set of all feasible solution is called the feasible region. A linear programme is said to be infeasible when the set is empty.

(*iii*) **Basic solution** is the solution of the *m* basic variables when each of the *n* non-basic variables is equated to zero.

(*iv*) **Basic feasible solution** is that basic solution which also optimizes the objective function and satisfying the constraint and non-negative criteria.

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(*v*) **Optimal solution** is that to basic feasible solution which also optimizes the objective function while satisfying constraints and non-negativity criteria.

(*vi*) **Non-degenerate basic feasible solution** is that basic feasible solution which contains exactly *m* non-zero basic variables. If any of the basic variables becomes zero, it is called a degenerate basic solution.

MULTIPLE CHOICE QUESTIONS

1. Using the Hungarian method, the optimal value of the assignment problem whose cost matrix is given by

5	23	14	8
10	25	1	23
35	16	15	12
16	23	11	7

is

A. 29 B. 52
C. 26 D. 44

2. Let a primal linear programming problem admit an optimal solution. Then the corresponding dual problem

A. does not have a feasible solution
B. has a feasible solution but does not have any optimal solution
C. does not have a convex feasible region
D. has an optimal solution

3. Consider the Linear Programming Problem

Max. $z = x_1 + 5x_2 + 3x_3$

subject to $2x_1 - 3x_2 + 5x_3 \le 3$

$3x_1 + 2x_3 \le 5$

$x_1, x_2, x_3 \ge 0$

Then the dual of this Linear Programming Problem

A. has a feasible solution, but does not have a basic feasible solution
B. has a basic feasible solution
C. has infinite number of feasible solution
D. has no feasible solution

4. The unit cost c_{ij} of producing product i at plant j is given by the matrix:

$$\begin{bmatrix} 14 & 12 & 16 \\ 21 & 9 & 17 \\ 9 & 7 & 5 \end{bmatrix}$$

The total cost of optimal assignment is

A. 20 B. 22
C. 25 D. 28

5. Consider the following Linear Programming Problem (LPP).

Minimize $z = 2x_1 + 3x_2 + x_3$

subject to $x_1 + 2x_2 + 2x_3 - x_4 + x_5 = 3$

$2x_1 + 3x_2 + 4x_3 + ... + x_6 = 6$

$x_i \ge 0, \ i = 1, 2, ... 6$

A non degenerate basic feasible solution $(x_1, x_2, x_3, x_4, x_5, x_6)$ is

A. (1, 0, 1, 0, 0, 0) B. (1, 0, 0, 0, 0, 7)
C. (0, 0, 0, 0, 3, 6) D. (3, 0, 0, 0, 0, 0)

6. If the cost matrix for an assignment problem is given by

$$\begin{bmatrix} a & b & c & d \\ b & c & d & a \\ c & d & a & b \\ d & a & b & c \end{bmatrix}$$

where $a, b, c, d > 0$ then the value of the assignment problem is

A. $a + b + c + d$
B. min $\{a, b, c, d\}$
C. max $\{a, b, c, d\}$
D. 4 min $\{a, b, c, d\}$

7. Consider the transportation problem given below. The bracketted elements in the table indicate a feasible solution and the elements on the left hand corner are the costs c_{ij}.

				a_i
2 (1)	5	1		1
1	3 (1)	4 (1)		2
b_j 1	1	1		3

A. this solution is a basic feasible solution
B. this solution can be made basic feasible
C. this is an optimal solution
D. the problem does not have an optimal solution

8. Which of the following is a correct statement?

A. If the primal problem is in its standard form, dual variables will be non-negatives.
B. Dual simplex method always leads to generate basic feasible solution.
C. Dual simplex method is applicable to an LPP, if initial basic feasible solution is not optimum.
D. If the number of primal variables is very small and the number of constraints is very large, then it is more efficient to solve the dual rather than the primal problem.

9. When we solve a system of simultaneous linear equations by using two-phase simplex method, the values of decision variables may be

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A. Positive
B. Negative
C. Non-negative
D. Positive or Negative

10. The primal LPP is
Max $z = 7x_1 - 3x_2$
subject to $x_1 + x_2 \geq 3,\ 8x_1 + 4x_2 \leq 16,$
$5x_1 + 3x_2 \geq 15,\ x_1, x_2 \geq 0$
then dual of this problem has
A. Unique feasible and optimal solution
B. No feasible solution
C. Infinite number feasible solution but not any optimal solution
D. Degenerate optimal solution

11. The LPP
Max $z = 2x_1 + 3x_2 + x_3$
subject to $-2x_1 + 3x_2 + 5x_3 \geq 5$
$-x_1 + 2x_2 + 3x_3 \leq 4$
$x_1, x_2, x_3 \geq 0$ has
A. Optimal solution
B. Unbounded solution
C. No feasible solution
D. No solution

12. If the primal problem is given by
Min $z = 2x_2 + 5x_3$
subject to $x_1 + x_2 \geq 2$
$2x_1 + x_2 + 6x_3 \leq 6$
$x_1 - x_2 + 3x_3 = 4$
$x_1, x_2, x_3 \geq 0$
then its dual is
A. Max $z' = 2w_1 + 6w_2 - 4w_3$
subject to $w_1 + 2w_2 - w_3 \leq 0$
$w_1 + w_2 + w_3 \leq 2$
$-6w_2 - 3w_3 \leq 5$
$w_1, w_2 \geq 0$ and w_3 unrestricted
B. Max $z' = 2w_1 - 6w_2 + 4w_3$
subject to $w_1 - 2w_2 + w_3 \leq 0$
$w_1 - w_2 - w_3 \leq 2$
$-6w_2 + 3w_3 \leq 5$
$w_1, w_2 \geq 0$ and w_3 unrestricted
C. Max $z' = 2w_1 - 6w_2 - 4w_3$
subject to $w_1 - 2w_2 - w_3 \leq 0$
$w_1 - w_2 + w_3 \leq 2$
$-6w_2 - 3w_3 \leq 5$
$w_1, w_2, w_3 \geq 0$
D. None of these

13. The primal LPP is
Max $z = 7x_1 - 3x_2$
subject to $x_1 + x_2 \geq 3,\ 8x_1 + 4x_2 \leq 16,$
$5x_1 + 3x_2 \geq 15,\ x_1, x_2 \geq 0$
Then dual of this problem has
A. Unique feasible and optimal solution
B. No feasible solution
C. Infinite number of feasible solution but not any optimal solution
D. Degenerate optimal solution

14. Consider the Linear Programming Problem
Maximize $z = 3x + 9y$
subject to $x + 4y \leq 8$
$x + 2y \leq 4,\ x, y \geq 0$
The maximum value of z is
A. 6 B. 15
C. 18 D. 21

15. Consider the following transportation problem

	A	B	C	D	**Demand**
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
Requirement	6	10	12	15	43

Then the optimal cost of the above problem is
A. 796 B. 804
C. 812 D. 820

16. The number of basic feasible solution of the LPP.
$2x_1 + 3x_2 - x_3 + 4x_4 = 8,$
$x_1 - 2x_2 + 6x_3 - 7x_4 = -3,$
$x_1, x_2, x_3, x_4 \geq 0$
with respect to objective function
Max $z = 2x_1 + 3x_2 + 4x_3 + 7x_4$
A. 2 B. 3
C. 4 D. 6

17. In the above problem, the value of z for the optimal solution
A. 25.4 B. 27.2
C. 28.9 D. 30.4

ANSWERS

1	2	3	4	5	6	7	8	9	10
A	D	B	D	C	A	B	D	D	C
11	**12**	**13**	**14**	**15**	**16**	**17**			
A	B	B	C	A	C	C			

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EXPLANATORY ANSWERS

1. The given assignment cost matrix is

5	23	14	8
10	25	1	23
35	16	15	12
16	23	11	7

Apply the Hungarian method (*i.e.* substracting the minimum cost of each row to the other element of the same row)

then

0	18	9	3
9	24	0	22
23	4	3	0
9	16	4	0

As the second column does not any zero, apply the Hungarian rule for second column, we get

~~0~~	14	9	3
9	20	~~0~~	22
23	~~0~~	3	0
9	12	4	~~0~~

i.e. Hence the optimal cost = 5 + 1 + 16 + 7 = 29.

3. The given LPP is

Maximum $Z = x_1 + 5x_2 + 3x_3$

Subject to $2x_1 - 3x_2 + 5x_3 \le 3$.

$3x_1 + 2x_3 \le 5$

x_1, x_2, x_3.

As the number of variables are 3 and the number of constraints are 2.

Hence the basic solution can be obtained by making any one of the three variables equating to zero.

Case I: When $x_1 = 0$

then the constraints becomes

$$-3x_2 + 5x_3 = 3$$

$$2x_3 = 5 \quad \Rightarrow \quad x_3 = \frac{5}{2}$$

i.e. $$-3x_2 + \frac{25}{2} = 3$$

or $$3x_2 = \frac{25}{2} - 3 = \frac{19}{2}$$

$$\Rightarrow \quad x_2 = \frac{19}{6}$$

i.e. the basic solution in this case is

$$x_1 = 0,\ x_2 = \frac{19}{6},\ x_3 = \frac{5}{2}.$$

Case II: When $x_2 = 0$, then the constraints become

$$2x_1 + 5x_3 = 3 \times 3$$

$$3x_1 + 2x_3 = 5 \times 2$$

$$\Rightarrow \quad (15 - 4)x_3 = 9 - 10$$

$$\Rightarrow \quad x_3 = \frac{-1}{11} \text{ (not a basic solution)}$$

Case III: When $x_3 = 0$, then the constraint becomes

$$2x_1 - 3x_2 = 3$$

$$3x_1 = 5 \quad \Rightarrow \quad x_1 = \frac{5}{3}$$

$$\Rightarrow \quad \frac{10}{3} - 3x_2 = 3 \quad \Rightarrow \quad x_2 = \frac{1}{9}$$

i.e. the basic solution in this case is

$$x_1 = \frac{5}{3},\ x_2 = \frac{1}{9},\ x_3 = 0$$

i.e. given LPP has basic feasible solution.

4. The given assignment cost matrix is

14	12	16
21	9	17
9	7	5

using the Hungarian method, (*i.e.* substracting the minimum cost of each row to the other element of the same row).

Then

2	0	4
12	0	8
4	2	0

(as the first column does not have any zero, apply the Hungarian rule for the first column, we get).

$\boxed{0}$	~~0~~	4
10	$\boxed{0}$	8
2	2	$\boxed{0}$

Hence the optimal assignment cost

= 14 + 9 + 5 = 28.

6. The given cost matrix of the assignment problem is

$$\begin{bmatrix} a & b & c & d \\ b & c & d & a \\ c & d & a & b \\ d & a & b & c \end{bmatrix}$$

if let a is the minimum among the $a, b, c, d,$ then apply the Hungarian method for the given cost matrix, we get

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$$\begin{bmatrix} 0 & b-a & c-a & d-a \\ b-a & c-a & d-a & 0 \\ c-a & d-a & 0 & b-a \\ d-a & 0 & b-a & c-a \end{bmatrix}$$

clearly all the rows and column consist exactly one zero element. Hence it will be the minimum cost matrix.

i.e. The optimal cost in this case

$$= a + a + a + a = 4a.$$

Similarly when b is the minimum among the $a, b, c, d,$

then by the Hungarian method, the optimal cost in this case $= b + b + b + b = 4b$.

i.e. The required optimal cost $= 4.\min\{a, b, c, d\}$.

12. The given primal problem is

$$\text{Min } Z = 2x_2 + 5x_3$$

Subject to
$$x_1 + x_2 \geq 2$$
$$2x_1 + x_2 + 6x_3 \leq 6$$
$$x_1 - x_2 + 3x_3 = 4.$$

As the given objective function is of minimization type. Hence all the constraint should be made to $\geq$ type.

i.e. The given primal problem can be changed to

$$\text{Min } Z = 0 \cdot x_1 + 2 \cdot x_2 + 5 \cdot x_3$$

Subject to
$$x_1 + x_2 \geq 2$$
$$-2x_1 - x_2 - 6x_3 \geq -6$$
$$x_1 - x_2 + 3x_3 \geq 4$$
$$-x_1 + x_2 - 3x_3 \geq -4.$$

Now converting the above primal into dual by duality principle then objective function is of maximization type.

i.e. $\text{Max } Z' = 2w_1 - 6w_2 + 4(w_3' - w_3'')$

Subject to
$$w_1 - 2w_2 + (w_3' - w_3'') \leq 0$$
$$w_1 - w_2 + (w_3' - w_3'') \leq 2$$
$$0.w_1 - 6w_2 + 3(w_3' - w_3'') \leq 5.$$

Writting $w_3 = w_3' - w_3''$ the above inequalities can be rewritten as $\max Z' = 2w_1 - 6w_2 + 4w_3$.

Subject to
$$w_1 - 2w_2 + w_3 \leq 0$$
$$w_1 - w_2 + w_3 \leq 2$$
$$-6w_2 + 3w_3 \leq 5$$

where $w_1, w_2 \geq 0$ and w_3 is unrestricted.

13. The given primal LPP is

$$\max Z = 7x_1 - 3x_2$$

subject to

$x_1 + x_2 \geq 3,\ 8x_1 + 4x_2 \leq 16,\ 5x_1 + 3x_2 \geq 15$

as primal LPP is of maximization type, converting all the inequalities into ($\leq$) type. We get

$$\max Z = 7x_1 - 3x_2$$

subject to
$$-x_1 - x_2 \leq -3$$
$$8x_1 + 4x_2 \leq 16$$
$$-5x_1 - 3x_2 \leq -15.$$

Now by the duality principle, we get

$$\text{Min } Z' = -3y_1 + 16y_2 - 15y_3$$

subject
$$-y_1 + 8y_2 - 5y_3 \geq 7$$
$$-y_2 + 4y_2 - 3y_3 \geq -3$$

for determining the basic solution, we make any one out of three equal to zero, case by case.

Case I: When $y_1 = 0$

then
$$8y_2 - 5y_3 = 7$$
$$4y_2 - 3y_3 = -3$$
$$\Rightarrow \quad -5y_3 + 6y_3 = 13$$
$$\Rightarrow \quad y_3 = 13$$
$$\Rightarrow \quad 8y_2 = 7 + 65 = 72$$
$$y_2 = \frac{72}{8} = 9.$$

i.e. $y_1 = 0,\ y_2 = 9,\ y_3 = 13.$

Case II: When $y_2 = 0$

then
$$-y_1 - 5y_3 = 7$$
$$-y_1 - 3y_3 = -3$$
$$\Rightarrow \quad -2y_3 = 10 \qquad y_3 = -5 \text{ (not basic)}$$

Case III: When $y_3 = 0$

$$-y_1 + 8y_2 = 7$$
$$-y_1 + 4y_2 = -3$$
$$\Rightarrow \quad 4y_2 = 10$$
$$y_2 = \frac{5}{2}$$
$$-y_1 + 10 = -3$$
$$\Rightarrow \quad y_1 = 13.$$

14. The given LPP is

$$\max Z = 3x + 9y$$

subject to
$$x + 4y \leq 8$$
$$x + 2y \leq 4$$
$$x, y \geq 0$$

Solution space is shown in the given by the shaded region of the plotted graph.

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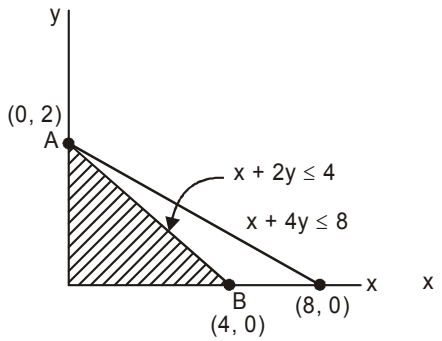

The optimum value of the objective function is obtained at the boundary of the region *i.e.* either at A(0, 2) or at B(4, 0).

Now at $Z(A) = 3.0 + 9.2 = 18$

and $Z(B) = 3.4 + 9.0 = 12$.

Hence the maximum value of Z is at the point A.

i.e. $Z_{max} = 18$.

15.

	A	B	C	D	Demand
I	21	16	25	13	11
II	17	18	14	23	13
III	32	27	18	41	19
	6	10	12	15	43

Apply the Vogel's Approximation method, for the initial basic feasible solution.

			(11)		
21	16	25	13	11	[3]
17	18	14	23	13	[3]
32	27	18	41	19	[9]
6	10	12	15	43	
[4]	[2]	[4]	[10]		

(6)					
17	18	14	23	13	[3]
32	27	18	41	19	[9]
6	10	12	4	32	
[15]	[9]	[4]	[18]		

		(4)		
18	14	23	7	[4]
27	18	41	19	[9]
10	12	4		
[9]	[4]	[18]		

(3)			
18	14	3	[4]
27	18	19	[9]
10	12		
[9]	[4]		

(7)	(12)	
27	18	19
7	12	

Hence the initial basic solution is given as

			(11)	
21	16	25	13	11
(6)	(3)		(4)	
17	18	14	23	13
	(7)	(12)		
32	27	18	41	19
6	10	12	15	

the optimal cost = 11 × 13 + 17 × 6 + 18 × 3 + 23 × 4 +27 × 7 + 12 × 18 = 796.

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CHAPTER

9

PASSAGE BASED MCQs

PASSAGE-1

A general election of Lok Sabha is a gigantic exercise. About 911 million people were eligible to vote and voter turnout was about 67%, the highest ever.

Let I be the set of all citizens of India who were eligible to exercise their voting right in general election held in 2019. A relation 'R' is defined on I as follows:

$R = \{(V_1, V_2) : V_1, V_2 \in I$ and both use their voting right in general election – 2019$\}$

1. Two neighbors X and Y $\in$ I. X exercised his voting right while Y did not cast her vote in general election – 2019. Which of the following is true?

A. $(X, Y) \in R$ B. $(Y, X) \in R$

C. $(X, X) \notin R$ D. $(X, Y) \notin R$

2. Mr. 'X' and his wife 'W' both exercised their voting right in general election-2019,

Which of the following is true?

A. both (X, W) and (W, X) $\in$ R

B. (X,W) $\in$ R but (W, X) $\notin$ R

C. both (X, W) and (W, X) $\notin$ R

D. (W, X) $\in$ R but (X, W) $\notin$ R

3. Three friends F_1, F_2 and F_3 exercised their voting right in general election-2019, then which of the following is true?

A. $(F_1, F_2) \in R$, $(F_2, F_3) \in R$ and $(F_1, F_3) \in R$

B. $(F_1, F_2) \in R$, $(F_2, F_3) \in R$ and $(F_1, F_3) \notin R$

C. $(F1,F_2) \in R$, $(F_2, F_2) \in R$ but $(F_3, F_3) \notin R$

D. $(F_1, F_2) \notin R$, $(F_2, F_3) \notin R$ and $(F_1, F_3) \notin R$

4. The above defined relation R is .....

A. Symmetric and transitive but not reflexive

B. Universal relation

C. Equivalence relation

D. Reflexive but not symmetric and transitive

5. Mr. Shyam exercised his voting right in General Election-2019, then Mr. Shyam is related to which of the following?

A. All those eligible voters who cast their votes

B. Family members of Mr.Shyam

C. All citizens of India

D. Eligible voters of India

PASSAGE-2

Sherlin and Danju are playing Ludo at home during Covid-19. While rolling the dice, Sherlin's sister Raji observed and noted the possible outcomes of the throw every time belongs to set {1, 2, 3, 4, 5, 6}. Let A be the set of players while B be the set of all possible outcomes.

A = {S, D}, B = {1, 2, 3, 4, 5, 6}

1. Let $R : B \to B$ be defined by $R = \{(x, y): y$ is divisible by $x\}$ is;

A. Reflexive and transitive but not symmetric

B. Reflexive and symmetric and not transitive

C. Not reflexive but symmetric and transitive

D. Equivalence

2. Raji wants to know the number of functions from A to B. How many number of functions are possible?

A. 6^2 B. 2^6

C. 6! D. 2^{12}

3. Let R be a relation on B defined by R = {(1, 2), (2, 2), (1, 3), (3, 4), (3, 1), (4, 3), (5, 5)}.

Then R is:

A. Symmetric B. Reflexive

C. Transitive D. None of these three

4. Raji wants to know the number of relations possible from A to B. How many numbers of relations are possible?

A. 6^2 B. 2^6

C. 6! D. 2^{12}

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5. Let R : B → B be defined by R = {(1, 1), (1, 2), (2, 2), (3, 3), (4, 4), (5, 5),(6, 6)}, then R is:

A. Symmetric
B. Reflexive and Transitive
C. Transitive and symmetric
D. Equivalence

PASSAGE-3

An organization conducted bike race under 2 different categories-boys and girls. Totally there were 250 participants. Among all of them finally three from Category 1 and two from Category 2 were selected for the final race. Ravi forms two sets B and G with these participants for his college project.

Let B = $\{b_1, b_2, b_3\}$ G = $\{g_1, g_2\}$ where B represents the set of boys selected and G the set of girls who were selected for the final race.

Ravi decides to explore these sets for various types of relations and functions.

1. Ravi wishes to form all the relations possible from B to G. How many such relations are possible?

A. 2^6 B. 2^5
C. 0 D. 2^3

2. Let R: B → B be defined by R = {(x, y): x and y are students of same sex}, Then this relation R is .....

A. Equivalence
B. Reflexive only
C. Reflexive and symmetric but not transitive
D. Reflexive and transitive but not symmetric

3. Ravi wants to know among those relations, how many functions can be formed from B to G?

A. 2^2 B. 2^{12}
C. 3^2 D. 2^3

4. Let R : B → G be defined by R = $\{(b_1, g_1), (b_2, g_2), (b_3, g_1)\}$, then R is .....

A. Injective
B. Surjective
C. Neither Surjective nor Injective
D. Surjective and Injective

5. Ravi wants to find the number of injective functions from B to G. How many numbers of injective functions are possible?

A. 0 B. 2!
C. 3! D. 0!

PASSAGE-4

Students of Grade 9, planned to plant saplings along straight lines, parallel to each other to one side of the playground ensuring that they had enough play area. Let us assume that they planted one of the rows of the saplings along the line $y = x - 4$. Let L be the set of all lines which are parallel on the ground and R be a relation on L.

Answer the following using the above information.

1. Let relation R be defined by R = $\{(L_1, L_2): L_1 \parallel L_2$ where L_1, L_2 € L} then R is ..... relation

A. Equivalence
B. Only reflexive
C. Not reflexive
D. Symmetric but not transitive

2. Let R = $\{(L_1, L_2) : L_1 \perp L_2$ where L_1, L_2 € L} which of the following is true?

A. R is Symmetric but neither reflexive nor transitive
B. R is Reflexive and transitive but not symmetric
C. R is Reflexive but neither symmetric nor transitive
D. R is an Equivalence relation

3. The function f : R → R defined by $f(x) = x - 4$ is .....

A. Bijective
B. Surjective but not injective
C. Injective but not Surjective
D. Neither Surjective nor Injective

4. Let f : R → R be defined by $f(x) = x - 4$. Then the range of $f(x)$ is .....

A. R B. Z
C. W D. Q

5. Let R = $\{(L_1, L_2) : L_1$ is parallel to L_2 and $L_1 : y = x - 4\}$ then which of the following can be taken as L_2?

A. $2x - 2y + 5 = 0$ B. $2x + y = 5$
C. $2x + 2y + 7 = 0$ D. $x + y = 7$

PASSAGE-5

Raji visited the Exhibition along with her family. The Exhibition had a huge swing, which attracted many children. Raji found that the swing traced the path of a Parabola as given by $y = x_2$.

Answer the following questions using the above information.

1. Let f : R → R be defined by $f(x) = x^2$ is .....

A. Neither Surjective nor Injective
B. Surjective
C. Injective
D. Bijective

2. Let f : N → N be defined by $f(x) = x^2$ is .....

A. Surjective but not Injective
B. Surjective
C. Injective
D. Bijective

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3. Let f : {1, 2, 3, ...} → {1, 4, 9, ...} be defined by $f(x) = x^2$ is .....

A. Bijective

B. Surjective but not Injective

C. Injective but Surjective

D. Neither Surjective nor Injective

4. Let : N → R be defined by $f(x) = x^2$. Range of the function among the following is .....

A. {1, 4, 9, 16, ...}

B. {1, 4, 8, 9, 10, ...}

C. {1, 4, 9, 15, 16, ...}

D. {1, 4, 8, 16, ...}

5. The function f : Z → Z defined by $f(x) = x^2$ is .....

A. Neither Injective nor Surjective

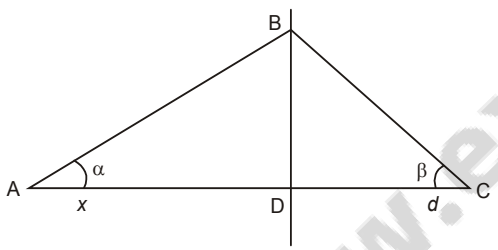
B. Injective

C. Surjective

D. Bijective

PASSAGE-6

Two men on either side of a temple of 30 meters high observe its top at the angles of elevation α and β respectively. (as shown in the figure below). The distance between the two men is $40\sqrt{3}$ meters and the distance between the first person A and the temple is $30\sqrt{3}$ meters.



Based on the above information answer the following:

1. ∠CAB = α =

A. $\sin^{-1}\left(\frac{2}{\sqrt{3}}\right)$ B. $\sin^{-1}\left(\frac{1}{2}\right)$

C. $\sin^{-1}(2)$ D. $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$

2. ∠CAB = α =

A. $\cos^{-1}\left(\frac{1}{5}\right)$ B. $\cos^{-1}\left(\frac{2}{5}\right)$

C. $\cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ D. $\cos^{-1}\left(\frac{4}{5}\right)$

3. ∠BCA = β =

A. $\tan^{-1}\left(\frac{1}{2}\right)$ B. $\tan^{-1}(2)$

C. $\tan^{-1}\left(\frac{1}{\sqrt{3}}\right)$ D. $\tan^{-1}\left(\sqrt{3}\right)$

4. ∠ABC =

A. $\frac{\pi}{4}$ B. $\frac{\pi}{6}$

C. $\frac{\pi}{2}$ D. $\frac{\pi}{3}$

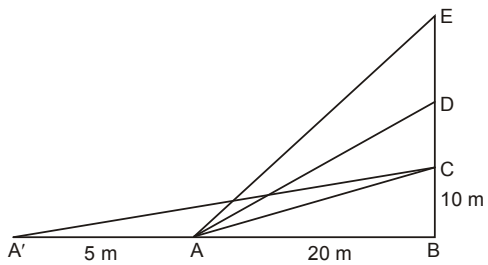
5. Domain and Range of $\cos^{-1}x =$

A. (–1, 1), (0, π) B. [–1, 1], (0, π)

C. [–1, 1], [0, π] D. $(-1,1)\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$

PASSAGE-7

The Government of India is planning to fix a hoarding board at the face of a building on the road of a busy market for awareness on COVID-19 protocol. Ram, Robert and Rahim are the three engineers who are working on this project. "A" is considered to be a person viewing the hoarding board 20 metres away from the building, standing at the edge of a pathway nearby. Ram, Robert and Rahim suggested to the firm to place the hoarding board at three different locations namely C, D and E. "C" is at the height of 10 metres from the ground level. For the viewer A, the angle of elevation of "D" is double the angle of elevation of "C" The angle of elevation of "E" is triple the angle of elevation of "C" for the same viewer. Look at the figure given and based on the above information answer the following:



1. Measure of ∠CAB =

A. $\tan^{-1}(2)$ B. $\tan^{-1}\left(\frac{1}{2}\right)$

C. $\tan^{-1}(1)$ D. $\tan^{-1}(3)$

2. Measure of ∠DAB =

A. $\tan^{-1}\left(\frac{3}{4}\right)$ B. $\tan^{-1}(3)$

C. $\tan^{-1}\left(\frac{4}{3}\right)$ D. $\tan^{-1}(4)$

3. Measure of ∠EAB =

A. $\tan^{-1}(11)$ B. $\tan^{-1}3$

C. $\tan^{-1}\left(\frac{2}{11}\right)$ D. $\tan^{-1}\left(\frac{11}{2}\right)$

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4. A′ Is another viewer standing on the same line of observation across the road. If the width of the road is 5 meters, then the difference between ∠CAB and ∠CA′B is:

A. $\tan^{-1}\left(\frac{1}{2}\right)$ B. $\tan^{-1}\left(\frac{1}{8}\right)$

C. $\tan^{-1}\left(\frac{2}{5}\right)$ D. $\tan^{-1}\left(\frac{11}{21}\right)$

5. Domain and Range of $\tan^{-1}x$ =

A. $R^{+},\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ B. $R^{-},\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$

C. $R,\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ D. $R,\left(0,\frac{\pi}{2}\right)$

PASSAGE-8

A manufacture produces three stationery products Pencil, Eraser and Sharpener which he sells in two markets. Annual sales are indicated below:

Market	Products (in numbers)		
	Pencil	***Eraser***	***Sharpener***
A	10,000	2000	18,000
B	6000	20,000	8,000

If the unit Sale price of Pencil, Eraser and Sharpener are ₹ 2.50, ₹ 1.50 and ₹ 1.00 respectively, and unit cost of the above three commodities are ₹ 2.00, ₹ 1.00 and ₹ 0.50 respectively, then,

Based on the above information answer the following:

1. Total revenue of market A
A. ₹ 64,000 B. ₹ 60,400
C. ₹ 46,000 D. ₹ 40,600

2. Total revenue of market B
A. ₹ 35,000 B. ₹ 53,000
C. ₹ 50,300 D. ₹ 30,500

3. Cost incurred in market A
A. ₹ 13,000 B. ₹ 30,100
C. ₹ 10,300 D. ₹ 31,000

4. Profit in market A and B respectively are
A. (₹ 15,000, ₹ 17,000)
B. (₹ 17,000, ₹ 15,000)
C. (₹ 51,000, ₹ 71,000)
D. (₹ 10,000, ₹ 20,000)

5. Gross profit in both market
A. ₹ 23,000 B. ₹ 20,300
C. ₹ 32,000 D. ₹ 30,200

PASSAGE-9

Amit, Biraj and Chirag were given the task of creating a square matrix of order 2. Below are the matrices created by them. A, B, C are the matrices created by Amit, Biraj and Chirag respectively.

$$A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix} B = \begin{bmatrix} 4 & 0 \\ 1 & 5 \end{bmatrix} C = \begin{bmatrix} 2 & 0 \\ 1 & -2 \end{bmatrix}$$

If $a = 4$ and $b = -2$, based on the above information answer the following:

1. Sum of the matrices A, B and C, A + (B + C) is:

A. $\begin{bmatrix} 1 & 6 \\ 2 & 7 \end{bmatrix}$ B. $\begin{bmatrix} 6 & 1 \\ 2 & 7 \end{bmatrix}$

C. $\begin{bmatrix} 7 & 2 \\ 1 & 6 \end{bmatrix}$ D. $\begin{bmatrix} 2 & 1 \\ 7 & 6 \end{bmatrix}$

2. $(A^T)^T$ is equal to:

A. $\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ B. $\begin{bmatrix} 2 & 1 \\ 3 & -1 \end{bmatrix}$

C. $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ D. $\begin{bmatrix} 2 & 3 \\ -1 & 1 \end{bmatrix}$

3. $(bA)^T$ is equal to:

A. $\begin{bmatrix} -2 & -4 \\ 2 & -6 \end{bmatrix}$ B. $\begin{bmatrix} -2 & 2 \\ -4 & -6 \end{bmatrix}$

C. $\begin{bmatrix} -2 & 2 \\ -6 & -4 \end{bmatrix}$ D. $\begin{bmatrix} -6 & -2 \\ 2 & 4 \end{bmatrix}$

4. AC-BC is equal to:

A. $\begin{bmatrix} -4 & -6 \\ -4 & 4 \end{bmatrix}$ B. $\begin{bmatrix} -4 & -4 \\ 4 & -6 \end{bmatrix}$

C. $\begin{bmatrix} -4 & -4 \\ -6 & 4 \end{bmatrix}$ D. $\begin{bmatrix} -6 & 4 \\ -4 & -4 \end{bmatrix}$

5. $(a + b)B$ is equal to:

A. $\begin{bmatrix} 0 & 8 \\ 10 & 2 \end{bmatrix}$ B. $\begin{bmatrix} 2 & 10 \\ 8 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 8 & 0 \\ 2 & 10 \end{bmatrix}$ D. $\begin{bmatrix} 2 & 0 \\ 8 & 10 \end{bmatrix}$

PASSAGE-10

Three schools DPS, CVC and KVS decided to organize a fair for collecting money for helping the flood victims. They sold handmade fans, mats and plates from recycled material at a cost of ₹ 25, ₹ 100 and ₹ 50 each respectively. The numbers of articles sold are given as:

School/Article	DPS	CVC	KVS
Handmade fans	40	25	35
Mats	50	40	50
Plates	20	30	40

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Based on the information given above, answer the following questions:

1. What is the total money (in Rupees) collected by the school DPS?
A. 700 B. 7,000
C. 6,125 D. 7875

2. What is the total amount of money (in Rs.) collected by schools CVC and KVS?
A. 14,000 B. 15,725
C. 21,000 D. 13,125

3. What is the total amount of money collected by all three schools DPS, CVC and KVS?
A. ₹ 15,775 B. ₹ 14,000
C. ₹ 21,000 D. ₹ 17,125

4. If the number of handmade fans and plates are interchanged for all the schools, then what is the total money collected by all schools?
A. ₹ 18,000 B. ₹ 6,750
C. ₹ 5,000 D. ₹ 21,250

5. How many articles (in total) are sold by three schools?
A. 230 B. 130
C. 430 D. 330

PASSAGE-11

On her birth day, Seema decided to donate some money to children of an orphanage home. If there were 8 children less, everyone would have got Rs.10 more. However, if there were 16 children more, everyone would have got Rs. 10 less. Let the number of children be x and the amount distributed by Seema for one child be y (in Rs.).
Based on the information given above, answer the following questions:

1. The equations in terms x and y are:
A. $5x - 4y = 40$, $5x - 8y = -80$
B. $5x - 4y = 40$, $5x - 8y = 80$
C. $5x - 4y = 40$, $5x + 8y = -80$
D. $5x + 4y = 40$, $5x - 8y = -80$

2. Which of the following matrix equations represent the information given above?
A. $\begin{bmatrix} 5 & 4 \\ 5 & 8 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$
B. $\begin{bmatrix} 5 & -4 \\ 5 & -8 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ 80 \end{bmatrix}$
C. $\begin{bmatrix} 5 & -4 \\ 5 & -8 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$
D. $\begin{bmatrix} 5 & 4 \\ 5 & -8 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 40 \\ -80 \end{bmatrix}$

3. The number of children who were given some money by Seema, is:
A. 30 B. 40
C. 23 D. 32

4. How much amount is given to each child by Seema?
A. ₹ 32 B. ₹ 30
C. ₹ 62 D. ₹ 26

5. How much amount Seema spends in distributing the money to all the students of the Orphanage?
A. ₹ 609 B. ₹ 960
C. ₹ 906 D. ₹ 690

PASSAGE-12

Two farmers Ramakishan and Gurucharan Singh cultivate only three varieties of rice namely Basmati, Permal and Naura. The sale (in rupees) of these varieties of rice by both the farmers in the month of September and October are given by the following matrices A and B.

September sales (in Rupees)

$$A = \begin{bmatrix} 10,000 & 20,000 & 30,000 \\ 50,000 & 30,000 & 10,000 \end{bmatrix} \begin{matrix} \text{Ramakishan} \\ \text{Gurucharan} \end{matrix}$$

October sales (in Rupees)

$$B = \begin{bmatrix} 5,000 & 10,000 & 6,000 \\ 20,000 & 10,000 & 10,000 \end{bmatrix} \begin{matrix} \text{Ramakishan} \\ \text{Gurucharan} \end{matrix}$$

1. The total sales in September and October for each farmer in each variety can be represented as ..... .
A. A + B B. A – B
C. A > B D. A < B

2. What is the value of A_{23}?
A. 10000
B. 20000
C. 30000
D. 40000

3. The decrease in sales from September to October is given by ..... .
A. A + B B. A – B
C. A > B D. A < B

4. If Ramkishan receives 2% profit on gross sales, compute his profit for each variety sold in October.
A. ₹ 100, ₹ 200 and ₹ 120
B. ₹ 100, ₹ 200 and ₹ 130
C. ₹ 100, ₹ 220 and ₹ 120
D. ₹ 110, ₹ 200 and ₹ 120

5. If Gurucharan receives 2% profit on gross sales, compute his profit for each variety sold in September.
A. ₹ 100, ₹ 200, ₹ 120
B. ₹ 1000, ₹ 600, ₹ 200
C. ₹ 400, ₹ 200, ₹ 120
D. ₹ 1200, ₹ 200, ₹ 120

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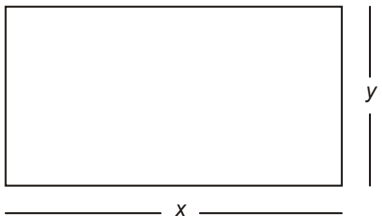
PASSAGE-13

Manjit wants to donate a rectangular plot of land for a school in his village. When he was asked to give dimensions of the plot, he told that if its length is decreased by 50 m and breadth is increased by 50 m, then its area will remain same, but if length is decreased by 10m and breadth is decreased by 20m, then its area will decrease by 5300 m^2.



Based on the information given above, answer the following questions:

1. The equations in terms of X and Y are
A. $x - y = 50,\ 2x - y = 550$
B. $x - y = 50,\ 2x + y = 550$
C. $x + y = 50,\ 2x + y = 550$
D. $x + y = 50,\ 2x + y = 550$

2. Which of the following matrix equation is represented by the given information
A. $\begin{bmatrix} 1 & -1 \\ 2 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 50 \\ 550 \end{bmatrix}$
B. $\begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 50 \\ 550 \end{bmatrix}$
C. $\begin{bmatrix} 1 & 1 \\ 2 & -1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 50 \\ 550 \end{bmatrix}$
D. $\begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix}\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -50 \\ -550 \end{bmatrix}$

3. The value of x (length of rectangular field) is
A. 150 m B. 400 m
C. 200 m D. 320 m

4. The value of y (breadth of rectangular field) is
A. 150 m B. 200 m
C. 430 m D. 350 m

5. How much is the area of rectangular field?
A. 60000 sq. m. B. 30000 sq. m.
C. 30000 m D. 3000 m

PASSAGE-14

The Relation between the height of the plant (y in cm) with respect to exposure to sunlight is governed by the following equation $y = 4x - \frac{1}{2}x^2$ where x is the number of days exposed to sunlight.

1. The rate of growth of the plant with respect to sunlight is ..... .
A. $4x - \frac{1}{2}x^2$ B. $4 - x$
C. $x - 4$ D. $x - \frac{1}{2}x^2$

2. What is the number of days it will take for the plant to grow to the maximum height?
A. 4 B. 6
C. 7 D. 10

3. What is the maximum height of the plant?
A. 12 cm B. 10 cm
C. 8 cm D. 6 cm

4. What will be the height of the plant after 2 days?
A. 4 cm B. 6 cm
C. 8 cm D. 10 cm

5. If the height of the plant is $\frac{7}{2}$ cm, the number of days it has been exposed to the sunlight is ..... .
A. 2 B. 3
C. 4 D. 1

PASSAGE-15

$P(x) = -5x^2 + 125x + 37500$ is the total profit function of a company, where x is the production of the company.

1. What will be the production when the profit is maximum?
A. 37500 B. 12.5
C. –12.5 D. –37500

2. What will be the maximum profit?
A. ₹ 38,28,125
B. ₹ 38281.25
C. ₹ 39,000
D. None

3. Check in which interval the profit is strictly increasing.
A. $(12.5, \infty)$
B. for all real numbers
C. for all positive real numbers
D. (0, 12.5)

4. When the production is 2units what will be the profit of the company?
A. 37500 B. 37,730
C. 37,770 D. None

5. What will be production of the company when the profit is ₹ 38250?
A. 15
B. 30
C. 2
D. data is not sufficient to find

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PASSAGE-16

A potter made a mud vessel, where the shape of the pot is based on $f(x) = |x - 3| + |x - 2|$, where $f(x)$ represents the height of the pot.

1. When $x > 4$ What will be the height in terms of x?
A. $x - 2$ B. $x - 3$
C. $2x - 5$ D. $5 - 2x$

2. Will the slope vary with x value?
A. Yes
B. No

3. What is $\frac{dy}{dx}$ at $x = 3$
A. 2
B. −2
C. Function is not differentiable
D. 1

4. When the x value lies between (2, 3) then the function is:
A. $2x - 5$ B. $5 - 2x$
C. 1 D. 5

5. If the potter is trying to make a pot using the function f(x) = [x], will he get a pot or not? Why?
A. Yes, because it is a continuous function
B. Yes, because it is not continuous
C. No , because it is a continuous function
D. No , because it is not continuous

PASSAGE-17

A Veterinary doctor was examining a sick cat brought by a pet lover. When it was brought to the hospital, it was already dead. The pet lover wanted to find its time of death. He took the temperature of the cat at 11.30 pm which was 94.6°F. He took the temperature again after one hour; the temperature was lower than the first observation. It was 93.4°F. The room in which the cat was put is always at 70°F. The normal temperature of the cat is taken as 98.6°F when it was alive. The doctor estimated the time of death using Newton law of cooling which is governed by the differential equation: $\frac{dT}{dt} \propto (T - 70)$, where 70°F is the room temperature and T is the temperature of the object at time t.

Substituting the two different observations of T and t made, in the solution of the differential equation $\frac{dT}{dt} - k(T - 70)$ where k is a constant of proportion, time of death is calculated.

1. State the degree of the above given differential equation.
2. Which method of solving a differential equation helped in calculation of the time of death?
A. Variable separable method
B. Solving Homogeneous differential equation
C. Solving Linear differential equation
D. all of the above
3. If the temperature was measured 2 hours after 11.30 pm, will the time of death change? (Yes/No)
4. The solution of the differential equation $\frac{dT}{dt} - k(T - 70)$ is given by,
A. $\log |T - 70| = kt + C$
B. $\log |T - 70| = \log |kt| + C$
C. $T - 70 = kt + C$
D. $T - 70 = kt\ C$

5. If $t = 0$ when T is 72, then the value of c is
A. −2 B. 0
C. 2 D. Log 2

PASSAGE-18

Polio drops are delivered to 50 K children in a district. The rate at which polio drops are given is directly proportional to the number of children who have not been administered the drops. By the end of 2nd week half the children have been given the polio drops. How many will have been given the drops by the end of 3rd week can be estimated using the solution to the differential equation $\frac{dy}{dx} = k(50 - y)$ where x denotes the number of weeks and y the number of children who have been given the drops.

1. State the order of the above given differential equation.
2. Which method of solving a differential equation can be used to solve $\frac{dy}{dx} = k(50 - y)$?
A. Variable separable method
B. Solving Homogeneous differential equation
C. Solving Linear differential equation
D. all of the above

3. The solution of the differential equation $\frac{dy}{dx} = k(50 - y)$ is given by,
A. $\log |50 - y| = kx + C$
B. $-\log |50 - y| = kx + C$
C. $\log |50 - y| = \log |kx| + C$
D. $50 - y = kx + C$

4. The value of c in the particular solution given that $y(0) = 0$ and $k = 0.049$ is.
A. log 50 B. log 1/50
C. 50 D. − 50

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5. Which of the following solutions may be used to find the number of children who have been given the polio drops?
   A. $y = 50 - e^{kx}$
   B. $y = 50 - e^{-kx}$
   C. $y = 50\ (1 - e^{-kx})$
   D. $y = 50\ (e^{-kx} - 1)$

PASSAGE-19

A coach is training 3 players. He observes that the player A can hit a target 4 times in 5 shots, player B can hit 3 times in 4 shots and the player C can hit 2 times in 3 shots

From this situation answer the following:

1. Let the target is hit by A, B: the target is hit by B and, C: the target is hit by A and C. Then, the probability that A, B and, C all will hit, is
   A. 4/5 B. 3/5
   C. 2/5 D. 1/5
2. Referring to (*i*), what is the probability that B, C will hit and A will lose?
   A. 1/10 B. 3/10
   C. 7/10 D. 4/10
3. With reference to the events mentioned in (*i*), what is the probability that 'any two of A, B and C will hit?
   A. 1/30 B. 11/30
   C. 17/30 D. 13/30
4. What is the probability that 'none of them will hit the target'?
   A. 1/30 B. 1/60
   C. 1/15 D. 2/15
5. What is the probability that at least one of A, B or C will hit the target?
   A. 59/60 B. 2/5
   C. 3/5 D. 1/60

PASSAGE-20

The reliability of a COVID PCR test is specified as follows: Of people having COVID, 90% of the test detects the disease but 10% goes undetected. Of people free of COVID, 99% of the test is judged COVID negative but 1% are diagnosed as showing COVID positive. From a large population of which only 0.1% have COVID, one person is selected at random, given the COVID PCR test, and the pathologist reports him/her as COVID positive.

Based on the above information, answer the following:

1. What is the probability of the 'person to be tested as COVID positive' given that 'he is actually having COVID?
   A. 0.001 B. 0.1
   C. 0.8 D. 0.9
2. What is the probability of the 'person to be tested as COVID positive' given that 'he is actually not having COVID'?
   A. 0.01 B. 0.99
   C. 0.1 D. 0.001
3. What is the probability that the 'person is actually not having COVID?
   A. 0.998 B. 0.999
   C. 0.001 D. 0.111
4. What is the probability that the 'person is actually having COVID given that 'he is tested as COVID positive'?
   A. 0.83
   B. 0.0803
   C. 0.083
   D. 0.089
5. What is the probability that the 'person selected will be diagnosed as COVID positive'?
   A. 0.1089 B. 0.01089
   C. 0.0189 D. 0.189

PASSAGE-21

In answering a question on a multiple choice test for class XII, a student either knows the answer or guesses. Let 3/5 be the probability that he knows the answer and 2/5 be the probability that he guesses. Assume that a student who guesses at the answer will be correct with probability 1/3. Let E_1, E_2, E be the events that the student knows the answer, guesses the answer and answers correctly respectively.

Based on the above information, answer the following

1. What is the value of $P(E_1)$?
   A. 2/5 B. 1/3
   C. 1 D. 3/5
2. Value of $P(E \mid E_1)$ is
   A. 1/3 B. 1
   C. 2/3 D. 415
3. $\sum_{k=1}^{k=2} P(E|E_k)P(E_k)$ equals
   A. 11/15 B. 4/15
   C. 1/5 D. 1
4. Value of $\sum_{k=1}^{k=2} P(E_k)$
   A. 1/3 B. 1/5
   C. 1 D. 3/5
5. What is the probability that the student knows the answer given that he answered it correctly?
   A. 2/11 B. 5/3
   C. 9/11 D. 13/3

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ANSWERS

PASSAGE-1

1	2	3	4	5
D	A	A	C	A

PASSAGE-2

1	2	3	4	5
A	A	D	D	B

PASSAGE-3

1	2	3	4	5
A	A	D	B	A

PASSAGE-4

1	2	3	4	5
A	A	A	A	A

PASSAGE-5

1	2	3	4	5
A	C	A	A	A

PASSAGE-6

1	2	3	4	5
B	C	D	C	C

PASSAGE-7

1	2	3	4	5
B	C	D	B	C

PASSAGE-8

1	2	3	4	5
C	B	D	A	C

PASSAGE-9

1	2	3	4	5
C	A	B	C	C

PASSAGE-10

1	2	3	4	5
B	A	C	D	D

PASSAGE-11

1	2	3	4	5
A	C	D	B	B

PASSAGE-12

1	2	3	4	5
A	A	B	A	B

PASSAGE-13

1	2	3	4	5
B	A	C	A	B

PASSAGE-14

1	2	3	4	5
B	A	C	B	D

PASSAGE-15

1	2	3	4	5
B	B	D	B	A

PASSAGE-16

1	2	3	4	5
C	A	C	C	D

PASSAGE-17

1	2	3	4	5
Degree is 1	A	No	A	D

PASSAGE-18

1	2	3	4	5
Order is 1	A	B	B	C

PASSAGE-19

1	2	3	4	5
C	A	D	B	A

PASSAGE-20

1	2	3	4	5
D	A	B	C	B

PASSAGE-21

1	2	3	4	5
D	B	A	C	C

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Reading Comprehension

Reading Comprehension is defined as the understanding of a passage or a text. It includes a passage followed by a few questions. The nature of comprehension asked in the examination are descriptive, narrative, explanatory, persuasive and argumentative and the word limit of passage is 250 to 300 words.

Basically, comprehension tests the reader's ability to understand the content as well as style and theme of the passage. It is meant to test the understanding powers and intellectual skills of a student.

Types of Passages

The passage could be of any one of the following types

(i) **Factual** A factual passage includes some facts about the physical aspects of a subject. It includes instructions, descriptions and reports. It helps the student to get a detailed view of the subject and develop a complete mental picture of a specific person, place, object or being.

(ii) **Discursive** A narrative passage includes argumentative, interpretative and persuasive text. Such passages may include opinions or feedback. It allows students to arrive at a conclusion through reasoning and understanding rather than intuition. It presents a balanced and objective approach towards the subject being discussed.

(iii) **Literary** A literary passage may include an extract from fiction, drama, biography, autobiography, travelogue, poetry etc.

(iv) **Narrative** Narrative passage is one of the easiest to identify as they are written in form of a story. Such passages includes bibliophile, novels, anecdotes, autobiographies, histories etc. These passages relate a series of events either real or imaginary or chronologically arranged information is provided to the readers.

Factual passage	▪ A set of facts ▪ Instructions ▪ Report ▪ Description	▪ Newspapers, magazines ▪ Brochures ▪ Reference books ▪ Encyclopaedias
Discursive passage	▪ Opinions ▪ Persuasive text ▪ Argumentative text ▪ Interpretative text	▪ Newspapers, magazines ▪ Reference books
Literary Passage	▪ Extract from fiction, drama, essay, biography, etc	▪ Novels ▪ Short stories ▪ Dramas ▪ Biographies ▪ Other literary books
Narrative Passage	▪ Sequence of events	▪ Imagined tale with flash backs or multiple timelines

Steps to Attempt Reading Comprehension

The following steps have to be attempted while reading comprehension

1. Read each and every line in the passage carefully. Reading the passage twice is always favourable as it helps in better understanding and makes it easier for a student to find answers. If the title of the passage is given, read it first as it gives the central insight of the passage.
2. Underline all the difficult words while reading the passage, as you might be tested on these words in the vocabulary questions.
3. Always give emphasis on the beginning and end of the passages. These paragraphs often hold the most important information of the passage.
4. While answering be sure that you've clearly understood the question. Answer must be relevant to the question.
5. Ensure that you answer the question according to the marks it carries. Subjective questions should be answered in complete sentences.

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6. Try to use your own language and modify the answer according to the question.
7. Answers should be based on information given/ inference derived from the information in the passage.
8. Make sure that you use the same tense in which the question has been asked.
9. In MCQ's analyse the questions and options carefully before selecting the correct option because some of the four options are often closely related.
10. Write the correct question number on each answer sheet to avoid mistakes.

Examples

Read the following passages carefully and answer the questions that follow.

Passage 1 (Factual)

The outer solar system is the name of the planets beyond the asteroid belt. These planets are called gas giants because they are made up of gas and ice.

The first stop of our tour is the fifth planet, Jupiter. Jupiter is bigger than three hundred Earths! It is made up of hydrogen and helium and a few other gases. There are violent wind storms that circle around Jupiter. The most famous storm is called the Great Red Spot. It has been churning for more than four hundred years already. At last count, Jupiter has sixty-three known moons and a faint ring around it too.

Next in our space neighbourhood comes Saturn. It is well-known for the series of beautiful rings that circle it. They are made up of tiny bits of frozen dirt and ice. Like Jupiter, Saturn is made up of mostly hydrogen and helium. It is smaller though, at only ninety-five times the size of Earth. Saturn has sixty-two moons.

The seventh planet, Uranus and its twenty-seven moons orbit very far from the sun. In addition to helium and hydrogen, Uranus atmosphere also contains ammonia ice and methane ice. It is a very cold planet, with no internal heat source. One of the strangest things about Uranus is that it is tipped over and orbits the sun on its side at a ninety-degree angle. The twenty-seven moons it has orbit from top to bottom, instead of left to right like our moon.

The eighth planet is Neptune. Like Uranus, it is made up of hydrogen, helium, ammonia ice and methane ice. But unlike Uranus, Neptune does have an inner heat source, just like Earth. It radiates twice as much heat as it receives from the sun. Neptune's most distinctive quality is its blue colour. Most of the information we know about it came from the Voyager 2 spacecraft passing close by it in 1989.

Pluto is the last and was considered a planet after its discovery in 1930. In 2006, Pluto was demoted and reclassified as a dwarf planet. Pluto exists in the Kuiper belt. That's just a fancy name for the band of rocks, dust and ice that lies beyond the gas giants. Scientists have found objects bigger than Pluto in this belt. Thus, the outer solar system has many secrets to explore.

1. When it is said that "Pluto was demoted and reclassified", it is meant that
(a) Pluto is no longer considered a planet
(b) Pluto was categorised as a different kind of planet
(c) Pluto was renamed
(d) Pluto was removed from our planetary system

2. The two gases which make up most of Jupiter and Saturn are ..... .
(a) hydrogen and ammonia
(b) hydrogen and methane
(c) hydrogen and helium
(d) None of the above

3. According to the passage, our planet is made up of gases and ice. Choose the option that lists the gases not found on the planets mentioned in the passage.
1. Ammonia 2. Methane
3. Oxygen 4. Hydrogen
5. Carbon
(a) 1 and 2 (b) 2 and 3
(c) 3 and 5 (d) 3 and 4

4. Based on your understanding of the passage, choose the option that gives the correct sequence of planet in the ascending order of moons.
1. Earth 2. Jupiter
3. Pluto 4. Uranus
5. Saturn
(a) 3,1, 4, 5,2 (b) 1,3,4 2,5
(c) 1,4,3,5,2 (d) 4,1,3,5, 2

5. The Kuiper belt is an area of rocks, dust, and ice that ..... .
(a) is between Jupiter and Saturn
(b) is beyond Pluto
(c) includes Pluto
(d) surrounds Saturn's rings

6. ..... is the name of a band of rocks, dust and ice lying beyond Neptune.
(a) Asteroid belt (b) Great red Spot
(c) Kuiper belt (d) Gas giants

7. Which of the following options list the planets without any internal heat source?
(a) Jupiter and Uranus (b) Earth and Neptune
(c) Saturn and Pluto (d) Jupiter and Saturn

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8. A synonym of 'faint' used in paragraph 2 is ..... .

(a) indistinct (b) slight
(c) muffled (d) unconscious

9. A synonym of 'circle' used in paragraph 3 is ..... .

(a) group (b) rotate (c) band (d) surround

10. A synonym of 'tipped' used in paragraph 4 is ..... .

(a) topped (b) tilted
(c) poured (d) presented

11. Pick the option showing the correct use of 'churning' as used in the passage.

(a) Programme-makers seem irresponsibly about churning out violence.
(b) The churning, pressing crowds made her feel claustrophobic.
(c) I had my driving test that morning and my stomach was churning.
(d) Guided by the churning within the planet, the crust of the Earth has been in a constant state of flux.

Passage 2 (Discursive)

Today's wars have little in common with the battles of the 19th century. The fighting has gradually moved from clearly defined battlefields to populated areas. Traditional war between armies of opposing states is an exception, while non-international conflicts have become the norm. Nowadays, civilians bear the brunt of armed conflicts.

International humanitarian law has adapted to this change. Appalled by the destruction and suffering caused by the Second World War, states agreed in the four Geneva Conventions of 1949 on comprehensive protection for those who are not or are no longer participating in hostilities— wounded and sick soldiers, prisoners of war and civilians. This cornerstone of international humanitarian law was supplemented in 1977 and 2005 by three additional protocols. The use of certain weapons, such as biological or chemical weapons, cluster munitions and anti-personnel mines is now widely outlawed. The law has placed barriers to protect the most vulnerable from the brutality of war. Its implementation has also seen a certain amount of progress, such as in the training of soldiers or in the prosecution of the worst war crimes, thanks in particular to the founding of the International Criminal Court (ICC).

Nevertheless, regular serious breaches of international humanitarian law are a cause of suffering. Underlying it all is our collective failure. The contracting states undertook in Article 1 — common to the four Geneva Conventions of 1949 — "to respect and to ensure respect" for these conventions "in all circumstances." International humanitarian law has, since its conception, lacked mechanisms for encouraging effective compliance. This impotence has often meant death and destruction for those affected by war.

Since the adoption of the first Geneva Convention 150 years ago, international humanitarian law has become a central pillar of the international legal order. Ultimately its provisions serve to protect our key characteristic as human beings: our humanity. This is an irrevocable right. It is based on the belief, forged over centuries and in all our cultures, according to which it is essential to lay down rules if we want to prevent wars from degenerating into barbarism. It is up to our generation to consolidate these achievements and to create an institutional framework to ensure these rules are respected. If it is to be fully effective, the law needs suitable instruments. Never in the history of humankind have we been closer to a solution than we are today.

1. How did the International humanitarian law change between 1977 and 2005?

(a) It abolished use of biological and chemical weapons
(b) It abolished use of cluster munitions
(c) It abolished use of anti-personnel mines
(d) All of the above

2. When and why were the Geneva Conventions adopted?

(a) 1949; to prevent wars from taking place
(b) 1977-2005; to preserve humanity during wars
(c) 1949; to preserve humanity during wars
(d) 100 years ago; to prevent wars from taking place

3. The International Humanitarian Law has led to

1. Ban of certain weapons
2. Protection of war countries
3. Providing treatment to the wounded
4. Prosecution of war crimes

(a) 1 and 2 (b) 3 and 4
(c) 2 and 3 (d) 1 and 4

4. Based on your understanding of the passage, choose the option that lists the correct sequence of the data in the passage.

1. The ICC supports the International Humanitarian Law in its functioning.
2. Humanity is the central basis of the International Humanitarian Law.
3. The International Humanitarian Law lacks mechanism of effective compliance.
4. There is a difference between traditional war and wars that take place today.

(a) 1,2,3,4 (b) 4,2,1,3
(c) 3,2,1,4 (d) 1,4,2,3

5. Which of the following have the contracting states undertaken in Article 1 in all circumstances?

(a) Ensure that the conventions are implemented.
(b) Affirm that the conventions will not be violated.
(c) To respect and to ensure respect for the conventions.
(d) None of the above

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6. The significant change that the Geneva Conventions of 1949 brought about was that the countries agreed to protect the people who were no longer fighting the war.

Which of the following categories of people did it include?

(a) Prisoners of war and civilians
(b) Wounded and sick soldiers
(c) Both (a) and (b)
(d) None of these

7. The International Humanitarian Law believes that.....

(a) Humanity is the central pillar of existence
(b) It is essential for all countries to follow it in all circumstances
(c) It is essential to lay down rules to prevent wars from degenerating
(d) The law needs sustainable instruments to be effective

8. What does the word 'irrevocable' mean in paragraph 4?

(a) irascible (b) unchangeable
(c) irreparable (d) irresponsive

9. Pick the option showing the correct use of 'cornerstone' as used in the passage.

(a) This study is the cornerstone of the whole research programme.
(b) The cornerstone of that ideology is the doctrine of judicial independence, to which we now turn.
(c) The prohibition of discrimination on grounds of nationality remains a cornerstone of unification.
(d) All of the above

10. The phrase 'bear the brunt' means

(a) Acting as a main force
(b) Suffer the worst
(c) Most deeply effected
(d) To absorb the attack

11. What does the word 'forged' mean in paragraph 4?

(a) imitated/fake (b) broken
(c) established (d) barricaded

Passage 3 (Literary)

Had Dr Johnson written his own life, in conformity with the opinion which he has given, that every man's life may be best written by himself; had he employed in the preservation of his own history, that clearness of narration and elegance of language in which he has embalmed so many eminent persons, the world would probably have had the most perfect example of biography that was ever exhibited.

Wherever narrative is necessary to explain, connect, and supply, I furnish it to the best of my abilities; but in the chronological series of Johnson's life, which I trace as distinctly as I can, year by year, I produce, wherever it is in my power, his own minutes, letters, or conversation, being convinced that this mode is more lively, and will make my readers better acquainted with him, than even most of those were who actually knew him, but could know him only partially; whereas there is here an accumulation of intelligence from various points, by which his character is more fully understood and illustrated.

Indeed I cannot conceive a more perfect mode of writing any man's life, than not only relating all the most important events of it in their order, but interweaving what he privately wrote, and said, and thought. Had his other friends been as diligent and ardent as I was, he might have been almost entirely preserved. As it is, I will venture to say that he will be seen in this work more completely than any man who has ever yet lived.

And he will be seen as he really was, for I profess to write, not his panegyric, which must be all praise, but his life; which, great and good as he was, must not be supposed to be entirely perfect. To be as he was, is indeed subject of panegyric enough to any man in this state of being; but in every picture there should be shade as well as light, and when I delineate him without reserve, I do what he himself recommended, both by his precept and his example, as quoted below.

"If the biographer writes from personal knowledge, and makes haste to gratify the public curiosity, there is danger lest his interest, his fear, his gratitude, or his tenderness, overpower his fidelity, and tempt him to conceal, if not to invent."

1. It can be inferred from the passage that Dr Johnson ..... .

(a) wrote many biographies
(b) wrote his own autobiography
(c) was against writing his autobiography
(d) did not want the author to write about him

2. Dr Johnson would probably have agreed that ..... .

(a) a biography tends to over-praise
(b) an autobiography is always misleading
(c) an autobiographer is the greatest authority on his own life
(d) All of the above

3. According to the passage, the author goes through the various letters, conversations and minutes to .....

(a) give a correct chronology of Johnson
(b) to illustrate Johnson's characteristics with utmost precision
(c) to write a perfect biography
(d) to present his thought in his works

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4. Based on your understanding of the passage, choose the option that lists the correct sequence of the data in the passage.

1. The author does not want to flatter Dr. Johnson.
2. Dr. Johnson was an expert biographer.
3. The author desires to interweave the personal life of Johnson with his works.
4. The author follows the recommendations of Dr. Johnson.

(a) 1,3,2,4 (b) 2,3,1,4
(c) 4,3,2,1 (d) 1,2,3,4

5. Whom does the author blame for his inability to preserve Dr. Johnson?

(a) Dr. Johnson's friends
(b) Dr. Johnson's family
(c) Dr. Johnson himself
(d) Cannot say

6. The author does not want to write a panegyric because

(a) he feels that it would not be a perfect biography
(b) he feels that it would harm dr. johnson's reputation
(c) he believes that dr. johnson was not perfect
(d) he believes that only dr. johnson's friends would do so

7. How can a person know more about Dr. Johnson?

(a) By talking to his friends
(b) By reading his letters and conversation
(c) By reading about his lectures
(d) By reading the biographies written by him

8. The word ..... is a synonym of 'panegyric' used in paragraph 4.

(a) eulogy (b) myth
(c) portrait (d) fame

9. When the author of the passage states that "in every picture there should be shade as well as light," he means to highlight

(a) Praise as well as criticism
(b) Flattery and flaws
(c) Good as well as bad qualities
(d) Highs and lows of life

10. In paragraph 1, the word ..... means 'preserved someone or something in an unalterable state'.

(a) perfect (b) preservation
(c) frozen (d) embalmed

11. In paragraph 4, the word ..... means 'describe or portray precisely'.

(a) perfectly (b) tilted
(c) delineate (d) precept

Passage 4 (Narrative)

Like their ancient toga-wearing counterparts, modern philosophers continue to disagree on the nature of freewill. Do we really have any control over the choices we make and the things we desire, and if so, to what degree?

Theories of freewill vary, but the ancient words of Plato still line up with our modern perceptions of temptation and willpower. The revered Greek philosopher argued that the human experience is one of constant struggle between the intellect and the body, between rationality and desire. Along these lines, true freedom is only achievable when willpower unchains us from bodily, emotional, instinctual slavery. You can find similar sentiments throughout world religions, most of which offer a particular and often difficult path to rise above our darker natures.

And science? Well, science mostly agrees with all of this. Willpower is all about overcoming your natural impulses to eat cupcakes, skip your morning workout, flirt with the waiter, hit the snooze alarm and check your e-mail during a funeral. Your willpower, however, is limited. If life were a video game, you'd see a glowing "willpower" or "ego" meter at the top of the screen next to your "life" meter. Successfully resist one temptation, and the meter depletes a little. The next temptation depletes the "willpower" meter even more, until there's nothing left at all.

Our modern scientific understanding of willpower in large part stems from a 1996 research experiment involving chocolate and radishes. Psychologist Roy Baumeister led a study in which 67 test subjects were presented with tempting chocolate chip cookies and other chocolate-flavored treats before a persistence-testing puzzle. Here's the catch: The researchers asked some of the participants to abstain from sweets and snack on radishes instead.

Baumeister's results told a fascinating story. The test subjects who resisted the sweet stuff in favor of radishes performed poorly on the persistence test. They simply didn't have the willpower left to resist slacking off.

The resulting paper, "Ego Depletion: Is the Active Self a Limited Resource?" inspired more than a thousand additional studies discussing everything from the influence of positive messages to the ego-sapping power of daily decisions.

Studies also show that cognitive capacity also affects our ability to hold out against temptation. Cognitive capacity is essentially your working memory, which you employ when resisting a temptation ... or holding a string of numbers in your head. A 1999 study from the University of Iowa professor Baba Shiv found that people tasked with remembering a two-digit number held out better than people remembering a seven-digit number when tempted with chocolate cake.

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1. What do you understand by 'freewill'?
   (a) The choices we make and the things we desire
   (b) The choices that philosophers force us to make
   (c) Our perception of temptation
   (d) Our ego

2. According to Plato, when is true freedom available?
   (a) When there is a struggle between the intellect and the body
   (b) When our willpower helps us to overcome our base instincts
   (c) When we desire that which we cannot achieve
   (d) When we have no control over our ego

3. In the second paragraph, what does the expression 'line up' signify?
   (a) Align with (b) Disagree with
   (c) Differ from (d) In discussion with

4. What is meant by 'cognitive capacity'?
   (a) Willpower
   (b) Our ego
   (c) Our ability to overcome temptation
   (d) The desire to give in to temptation

5. From the RC given above, find a synonym for 'respected'?
   (a) Cognitive (b) Temptation
   (c) Desire (d) Revered

Factual Passages

Read the following passages carefully and answer the questions that follow.

Passage 1

The kingdom of books is as vast as the universe, for there is no corner of it which they have left unexplored. There is no dearth of books on any topic, be it as simple as the composition of sodium nitrate or as intricate as the mechanism of a spacecraft. Books report the fruits of our research in various fields of knowledge, and spread our progressive view on matters which are of vital concern to our fellow beings.

In fact, no single product of human labour has been as helpful to the advancement of civilisation as books, which are written in all languages of the world and are decoratively placed in bookshelves in our homes and tastefully displayed in bookstall and libraries. If to Keats, works of ancient poets like

Homer were realms of gold from which he derived much joy as well as inspiration, to the modern lover of books, the labours of all geniuses, including those of Keats, are mines of inestimable intellectual wealth which he goes on exploring for the sake of his mental and spiritual advancement.

There was a time some five centuries back, when books as we know them today did not exist, and when there were few people who could read things written on stuff which certainly was not paper. At that time our ancestors used rocks, pillars and parchment with a view to recording and perpetuating their most important thoughts and achievements in the language they then understood.

Nowadays, the book-producing machinery gives to the works of every great scientific thinker, poet or philosopher the character of permanence, reproduces in attractive forms old and rare manuscripts and caters to the differing tastes of millions of people for whom book-reading is an extremely pleasant, intellectual exercise.

Moreover, the high percentage of literacy, the growth of libraries in towns and villages and the tendency of intellectuals to have their own private collection of useful books, have given birth to a number of big publishing houses with branches in many parts of the world and publications numbering thousands.

In recent years, paperbacks have begun to reveal their attraction for the reading public, and although they have not completely thrown into neglect the hard cover markets, they have appealed to people who would not have thought of buying books not so very long ago. These paperbacks are generally reprints of popular fiction or of established classics or translations from foreign works which are in constant demand at all bookstalls.

1. For the majority of people, book-reading is …… .
   1. an enjoyable intellectual exercise
   2. a boring job
   3. not interesting
   (a) Only 2 (b) Only 3
   (c) Only 1 (d) 2 and 3

2. Books are helpful for …… .
   1. reporting research results
   2. spread progressive view on vital matters
   3. advancement of civilisation
   4. studying for exams
   (a) 1 and 2 (b) 2 and 3
   (c) 1, 2 and 3 (d) Only 4

3. Which of the following have contributed to the growth of publishing houses?
   (a) High literacy
   (b) Growth of libraries
   (c) People's desire to have their own collection
   (d) All of the above

4. Which has been one of the most helpful product of human labour to the advancement of civilisation?
   (a) Books (b) Publishing houses
   (c) Paper (d) Spacecraft

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5. Popular paperbacks are generally reprints of ..... .
(a) popular fiction
(b) scientific researches
(c) spacecraft mechanism
(d) non fiction

6. Which of the following is/are not an advantage of paperbacks?
1. They are easily available.
2. They have overtaken hand cover market.
3. They appeal to people who would not have bought books otherwise.
4. They are durable.
(a) 1 and 2 (b) 3 and 4
(c) Only 3 (d) 1, 2 and 4

7. The book producing machinery has facilitated ..... .
(a) making printing easy
(b) providing permanence to the works of scientists, philosophers and thinkers
(c) printing paperbacks
(d) None of the above

8. The word ..... in para 2 means 'Ornamentally'.
(a) Fancifully (b) Tastefully
(c) Decoratively (d) None of these

9. 'Displeased' is an antonym of the word ..... in the passage.
(a) Appealed (b) Pleased
(c) Enjoyed (d) Delighted

10. The word ..... in the passage is an antonym of 'Retreat'.
(a) Advancement (b) Abandon
(c) Backward (d) March

Passage 2

There's no concept of good or bad food in nutrition science. What matters is the amount of food you consume, something that can be measured in terms of portion or size of serving. Portions and sizes vary from country to country and community to community. Large portions are commonly consumed in the advanced economies while smaller size portions are found mostly in developing economies of Africa and Asia.

Incidentally, portion sizes have undergone a considerable change over the years and continue to do so even today. The trend, in general, has been towards consuming larger and larger food portions (expanding waistlines are proof of this). The human mind seems to count the number of portions rather than the portion size.

For example, when people say they have only one *chapatti* for lunch or dinner, they rarely discuss its size. Short-term studies have also shown that people eat more when confronted with larger portion sizes.

A study at a restaurant setting showed that when pasta was served in different portion sizes on different days, people ate larger amounts on being served larger portions, regardless of the taste. Also, studies show that people do not adjust or eat less in subsequent meals if they have already had larger portions.

Technically a portion means the amount of food you choose to eat at one time – at a restaurant, from a package, or at home. A 'serving' size indicates the calories and nutrients in a certain serving listed under a product's 'nutrition facts' or a single unit or commonly regarded unit of food. The serving size is not the recommended amount to be eaten.

Sometimes, the portion size and serving size match; sometimes they don't. For example, one slice of bread equals one serving of bread. But the number of slices you eat would be the number of portions you have eaten, so if you have eaten two slices, you have consumed two portions.

So how do we recognise what's the right amount of food to eat on a regular basis? Learn to recognise standard serving sizes as they help you judge how much you are eating. It may also help to compare serving sizes to common objects.

1. How do portions and sizes vary?
(a) From country to country
(b) From community to community
(c) From developed economies to developing economies
(d) All of the above

2. According to the passage, what is central to the concept of nutritional science?
(a) Portions and sizes
(b) Nutritional value of food
(c) Calorie intake
(d) Variability of food items

3. According to the passage, which of the following statements are TRUE?
1. Portion sizes are increasing.
2. Developed economies have larger portions of food.
3. Portion varies from community to community only.
4. People adjust the size of meals regularly.
(a) 1 and 2 (b) 3 and 4
(c) 1 and 3 (d) 2 and 4

4. According to the passage, the problem with human mind is that it
(a) counts calories intake
(b) does not consider portion size
(c) prefers smaller portions
(d) wants everything in excess

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5. What shows that portion sizes are increasing?
   (a) A survey report
   (b) A study conducted at a restaurant
   (c) Expanding waistlines of people
   (d) Health disorders

6. What do people do in subsequent meals after they consume large portion sizes for one meal?
   (a) They skip the next meal
   (b) They eat less in the next meal
   (c) They do not eat less in subsequent meals
   (d) They count the calories they have consumed

7. According to the data given in the passage, which of the following is NOT CORRECT?
   (a) Africa and Asia have smaller portions of food.
   (b) Larger food portions means larger consumptions.
   (c) After larger food portions are consumed people opt for smaller portions.
   (d) Portion sizes always match.

8. The word 'confronted' as used in the passage, can be replaced by
   (a) challenged (b) addressed
   (c) faced (d) attacked

9. Pick the option showing the CORRECT use of 'serving' as used in the passage.
   (a) The number of prisoners serving life sentences has fallen.
   (b) He is eating one serving of pasta.
   (c) He is serving on a warship in the Pacific.
   (d) There was only one girl serving customers.

10. Which of the following words cannot replace regardless as used in the passage?
   (a) Despite (b) Notwithstanding
   (c) Whatever (d) Ignoring

11. What is the recommended amount of food to be eaten?
   (a) It is the portion size and not the serving size
   (b) It is the serving size and not the portion size
   (c) It is measured in terms of slices of bread
   (d) It is to be decided by the individual

Passage 3

Last week was spent glued to TV, watching India getting thrashed by a rejuvenated England at Lord's. Like most Indians, I too was dispirited by India's inability to live up to its reputation as the number one team. But at least there was the immense satisfaction of watching the match live and even listening to BBC's good-humoured Test Match Special on Internet radio.

It was such a change from my schooldays when you had to tune in to a crackling short wave broadcast for intermittent radio commentary.

Alternatively, we could go to the cinema, some three weeks after the match, to see a two-minute capsule in the Indian News Review that preceded the feature film.

It is not that there was no technology available to make life a little more rewarding. Yet, in 1971, when BS Chandrasekhar mesmerised the opposition and gave India its first Test victory at the Oval, there was no TV, except in Delhi.

Those were the bad old days of the shortage economy when everything, from cinema tickets to two-wheelers, had a black market premium. Telephones were a particular source of exasperation. By the 1970s, the telephone system in cities had collapsed. You may have possessed one of those heavy, black bakelite instruments but there was no guarantee of a dial tone when you picked up the receiver. The ubiquitous 'cable fault' would render a telephone useless for months on end.

What was particularly frustrating was that there was precious little you could do about whimsical public services. In the early 1980s, when opposition MPs complained about dysfunctional telephones, the then Communications Minister CM Stephen retorted that phones were a luxury and not a right. If people were dissatisfied, he pronounced haughtily, they could return their phones.

Inefficiency was, in fact, elevated into an ideal. When capital-intensive public sector units began running into the red, the regime's economists deemed that their performance shouldn't be judged by a narrow capitalist yardstick. The public sector, they pronounced, had to exercise 'social' choices. 'India', wrote Jagdish Bhagwati (one of the few genuine dissidents of that era), "suffered the tyranny of anticipated consequences from the wrong premises."

1. The narrator felt dispirited as his team ..... .
   (a) was the number one team of the world
   (b) could not perform as per people's expectations
   (c) could not play even 100 overs
   (d) performed like professionals

2. BS Chandrasekhar played a crucial role in making India register ..... .
   (a) its complaint to the match referee
   (b) itself as a Test playing team
   (c) its first Test win at the Oval
   (d) its humiliating loss at the Oval

3. How does the passage describe the telephone?
   1. Fashionable 2. Unpredictable
   3. Faulty 4. Luxury
   5. Whimsical
   (a) 1,2,3 (b) 2,3,4
   (c) 3,4,5 (d) 2 and 3

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4. Which of the following statements is CORRECT as per the passage?
   (a) The public services needed a revolution in the author's childhood.
   (b) There was a great transparency in public services.
   (c) The author of the passage as a grown up did not have access to technology.
   (d) The telephone lines were great during the author's childhood.

5. Telephones were a source of exasperation because ..... .
   (a) cable faults made telephones unusable
   (b) the telephone system in cities had collapsed
   (c) the telephone instruments were heavy
   (d) there was no guarantee of a dial tone when you picked up the receiver

6. The author calls his schooldays as 'bad old days' because ..... .
   (a) almost everything had a black market premium
   (b) things were too costly
   (c) his teachers would not distribute anything under welfare schemes
   (d) he could not get a handsome amount of pocket money

7. The problem with the public services as per the author was
   (a) inaccountability (b) inefficiency
   (c) corruption (d) haughtiness

8. The word in paragraph 2 which means the same as 'occurring at intervals' is ..... .
   (a) ubiquitous
   (b) exasperation
   (c) mesmerised
   (d) intermittent

9. Pick the option showing the CORRECT use of 'whimsical' as used in the passage.
   (a) Despite his kind and whimsical air, he was a shrewd observer of people.
   (b) The whimsical imagery of Martinez's work plays on colour and shape.
   (c) Love is whimsical and temperamental.
   (d) All of the above

10. In paragraph 6, the word ..... is the antonym of 'lowered'.
   (a) promoted (b) denigrated
   (c) elevated (d) deemed

11. Which word in the passage means same as 'Condensed version' ?
   (a) Elevated (b) Intermittent
   (c) Dispirited (d) Rejuvenated

Passage 4

A dance which is created or choreographed and performed according to the tenets of the *Natya Shastra* is called a classical dance. The two broad aspects of classical dancing are the *tandava* and the l*asya*. Power and force are typical of the *tandava*; grace and delicacy, of the *lasya*. *Tandava* is associated with Shiva, and *lasya* with Parvati. Dance which is pure movement is called *nritta*, and dance which is interpretative in nature is called *nritya*. The four main schools of classical dancing in India are Bharat Natyam, Kathakali, Manipuri and Kathak.

Bharatanatyam is the oldest and most popular dance form of India. Earlier, it was known by various names. Some called it *Bharatam*, some *Natyam*, some *Desi Attam* and some *Sadir*. The districts of Tanjore and Kanchipuram in Tamil Nadu were the focal points in the development of Bharat Natyam. It was danced as a solo performance by *devadasis* (temple dancers) on all auspicious occasions. Later, kings and rich people lent their patronage to it and it started shedding its purely sacred character.

The dancer is directed by the *natuvanar*, who is a musician and, invariably, a teacher. Another musician plays the cymbals. The music for Bharatsnatyam is from the Carnatic School of music. The *mridangam* (a drum), played on both sides with the hands, provides the rhythm.

The home of Kathakali is Kerala. Kathakali literally means 'story-play'. It combines music, dance, poetry, drama and mime. Its present form has evolved out of older forms such as *Ramanattam* and *Krishnanattam*.

Kathakali dance-dramas last from dusk to dawn. The artistes use elaborate costumes; mask-like make-up and towering head-dresses. The dancers are all males. Female roles are usually played by boys. There is no stage - a few mats are spread on the ground for the audience to sit on. The only 'stage-lighting' is a brass lamp fed with coconut oil.

Two singers provide the vocal music. The *chenda*, a large drum, which is beaten on one side with two slender curved sticks, is an integral part of the Kathakali performance. A metal gong, a pair of cymbals and another drum complete the orchestra. Besides providing the beat, they are also the means by which all the sound-effects are created.

1. What is the *Natya Shastra*?
   (a) A scientific study of classical dance
   (b) The science of dances
   (c) Shiva's sacred thread
   (d) None of the above

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2. When did Bharat Natyam start shedding its purely sacred character?
(a) When the devadasis stopped dancing
(b) When it was danced as a solo performance
(c) When kings and the rich patronised it
(d) When they used Carnatic music

3. Which of the following lists the elements not present in Kathakali?
1. Drama 2. Costume
3. Mime 4. Stage
5. Dance 6. Tabla
(a) 4 and 6 (b) 1,2,3
(c) 3,4,5 (d) 1 and 3

4. Bharatnatyam is most popular in
(a) Kerala (b) Tanjore
(c) Kanchipuram (d) Both (b) and (c)

5. Which two schools of classical dance are described in the passage?
(a) Bharatanatyam and Kathak
(b) Kathak and Kathakali
(c) Bharatanatyam and Kathakali
(d) Manipuri and Kathak

6. In which drama form the dancers are all males?
(a) Bharatanatyam (b) Kathakali
(c) Desi Attam (d) Lasya

7. Kathakali, it can be said is a, …… dance form.
(a) male dominated (b) female dominated
(c) stage performative (d) street performative

8. The phrase 'focal point' indicates
(a) origin
(b) popularity
(c) teaching center
(d) home to popular dancers

9. The word invariably in the passage denotes
(a) the temporary nature
(b) the unchanging nature
(c) the domination
(d) the usual

10. Pick the option showing the CORRECT use of 'serving' as used in the passage.
(a) She's got a beautiful slender figure.
(b) A slender hope still flickered within him.
(c) These claims are based on slender evidence.
(d) The builders have perched a light concrete dome on eight slender columns.

11. Which of the following words is the synonym of 'delicacy' in paragraph 1?
(a) Mouth-watering (b) Weakness
(c) Difficulty (d) Fineness

Passage 5

The power of our body to fight against various disease producing agents is known as defence mechanism. This defence mechanism depends upon various factors which can be categorised mainly into two types-common factors and special factors.

Amongst the common factors, the most important is the health of human beings. For keeping good health, one should take a nutritious balanced diet. A balanced diet is that which contains carbohydrates, fat, proteins, vitamins in proportionate amount.

The skin saves us against many micro-organisms producing diseases, provided that it is intact. In case there are cuts or abrasions on it, the micro-organisms penetrate the body through those cuts and abrasions and can cause diseases. Therefore, a cut or an abrasion should never be left open. In case there is no bandage available, it may be covered by a clean cloth.

Some bacteria reside on and inside the human body. They do not cause any disease and by their presence they do not allow disease-causing organisms to settle on those places. The human body secretes a variety of fluids, which are killers for disease causing micro-organisms. For instance, gastric juice (acidic in nature) secreted by our intestinal tract kills all organisms which enter our body through food.

There are a few automatic activities of our body known as 'reflex phenomenon or action', which protects the body against many infections. This reflex phenomenon includes sneezing, coughing and vomiting.

Fever is one of the most important constituents of the defence mechanism of our body. The organ which regulates the temperature of our body is known as hypothalamus and is situated in the brain. When micro-organisms after entering the body release toxic products and these reach the brain through blood, the hypothalamus starts increasing the temperature of the body and the person gets fever.

This fever is very useful for the human body because due to the increase of temperature, the micro-organisms which are the root cause of the problem get killed. We are living in an environment which is full of bacteria. Many of these bacteria can produce serious diseases, but all of us do not suffer from such diseases. It is due to a special power present in our body to fight these diseases, known as innate immunity.

In a nutshell, we can say that since nature has provided us with defence mechanism to fight against so many diseases, let us maintain it or rather increase it by way of immunisation.

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1. One should have a nutritious balanced diet to ..... .

1. keep healthy
2. ensure that recommendations of a dietician are followed
3. have essential items
4. enjoy all tastes

(a) Only 1 (b) Only 2
(c) Both 2 and 3 (d) Only 4

2. The defence mechanism of the human body ..... .

(a) checks body deterioration
(b) ensures wear and tear of the body
(c) saves us from depression
(d) protects us from diseases

3. The power of our body to fight against various diseases producing agents is called ..... .

(a) defence mechanism (b) health
(c) immunisation (d) fever

4. Why should a cut or abrasion never be left open?

1. It causes pain.
2. It causes itching.
3. Micro-organisms penetrate the body and can cause disease.
4. It grows deeper.

(a) Only 1 (b) Both 1 and 2
(c) Only 3 (d) Only 4

5. Reflex phenomenon includes ..... .

(a) sneezing (b) coughing
(c) vomiting (d) All of these

6. Which of the following statements is/are NOT TRUE as per the passage.

1. Hypothalamus is situated in liver.
2. The power to fight the diseases is called innate immunity.
3. Fever is one of the most important constituents of our defence mechanism.
4. We should never increase our defence mechanism by immunisation.

(a) Both 1 and 4 (b) Both 2 and 3
(c) Only 2 (d) Only 3

7. Few automatic activities of our body are known as ..... .

(a) immunity
(b) defence mechanism
(c) reflex action
(d) balanced diet

8. The word 'balanced diet' in para 2 means ..... .

(a) fair
(b) equitable
(c) varied type of food having nutritious value
(d) stable

9. Pick the option showing the CORRECT use of the word 'abrasion'.

(a) The abrasion is slow and steady.
(b) Nutan had a small abrasion on her knee.
(c) Abrasions are for one and all.
(d) I like abrasion very much.

10. The word ..... in para 6 means the same as poisonous.

(a) serious (b) toxic
(c) immunity (d) regulates

11. The word 'innate' means ..... .

(a) instinctive (b) intuitive
(c) inborn (d) acquired

Discursive Passages

Passage 6

These days, it is not unusual to see people listening to music or using their electronic gadgets while crossing busy roads or travelling on public transport, regardless of the risks involved. I have often wondered why they take such risks: is it because they want to exude a sense of independence, or is it that they want to tell the world to stop bothering them? Or is it that they just want to show how cool they are?

Whether it is a workman or an executive, earphones have become an inseparable part of our lives, sometimes even leading to tragicomic situations. The other day, an electrician had come to our house to fix something. We told him in detail what needed to be done. But after he left, I found that the man had done almost nothing. It later turned out that he could not hear our directions clearly because he had his earphones on.

Hundreds of such earphones addicts commute by the Delhi Metro every day. While one should not begrudge anyone their moments of privacy or their love for music, the fact is 'iPod oblivion' can sometimes be very dangerous. Recently, I was travelling with my wife on the Delhi Metro.

Since the train was approaching the terminus, there weren't too many passengers. In our compartment, other than us, there were only two women sitting on the other side of the aisle. And then suddenly, I spotted a duffel bag.

The bomb scare lasted for several minutes. Then suddenly, a youth emerged from nowhere and picked up the bag. When we tried to stop him, he looked at us, surprised. Then he took off his earpieces, lifted the bag, and told us that the bag belonged to him and that he was going to get off at the next station.

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We were stunned but recovered in time to ask him where he was all this while? His answer: he was in the compartment, leaning against the door, totally immersed in the music. He had no clue about what was going on around him. When he got off, earplugs in his hand, we could hear strains of the song.

1. The reason for people listening to music or using their electronic gadgets while crossing busy roads or travelling on public transport is that they ..... .
(a) do not want to be disturbed
(b) want to show how fashionable they are
(c) want to show their independence
(d) All of these

2. Why had the electrician done nothing?
(a) Because he hadn't heard them.
(b) Because he was listening to music.
(c) Because he was not interested in the job.
(d) Because he couldn't understand what needed to be fixed.

3. The electrician had ..... .
(a) done his job
(b) done almost nothing
(c) fixed the defective appliance
(d) understood what was to be done

4. Which of the following correctly lists the tone with which the author had written the passage?
1. Humorous 2. Sarcastic
3. Serious 4. Informative
5. Resentful
(a) 1 and 5 (b) 2 and 4
(c) 3 and 5 (d) 1 and 4

5. 'iPod Oblivion' can be defined as
(a) the popularity of music
(b) the carelessness of people in metro
(c) the carelessness of people while listening to music
(d) the forgetfulness of people

6. The author says that we should not resent people ..... .
(a) indulging in their love for music
(b) wanting privacy
(c) Both (a) and (b)
(d) Neither (a) nor (b)

7. The bomb scare happened because
(a) it is was battered bag (b) no one came to claim it
(c) it consisted of wires (d) it was suspicious looking

8. The passengers were stunned because ..... .
(a) the youth was careless
(b) the bag contained a bomb
(c) the youth had not been visible anywhere near the bag earlier
(d) None of the above

9. Pick the option showing the CORRECT use of 'stunned' as used in the passage.
(a) The animals are stunned before slaughter.
(b) The robber stunned the guard by banging him on the head.
(c) Many cinema-goers were stunned by the film's violent and tragic end.
(d) The impact of the ball had stunned her.

10. The word …… in the passage is an antonym of absorb.
(a) exude (b) bothering
(c) commute (d) stunned

11. The synonym of 'absorbed' used in paragraph 4 is ..... .
(a) recovered (b) immersed
(c) stunned (d) soaked

Passage 7

I was lucky, I found what I loved to do early in life. Woz and I started Apple in my parent's garage when I was 20. We worked hard and in 10 years Apple had grown into a $ 2 billion company with over 4000 employees. We had just released our finest creation - the Macintosh - a year earlier and I had just turned 30. And then I got fired. How can you get fired from a company you started? Well, as Apple grew, we hired someone, who I thought was very talented, to run the company and for the first year or so things went well. But then eventually we had a falling out. When we did, our Board of Directors sided with him. So at 30 I was out. What had been the focus of my entire adult life was gone and it was devastating.

I really didn't know what to do for a few months. I felt that I had let the previous generation of entrepreneurs down - that I had dropped the baton as it was being passed to me. But something slowly began to dawn on me: I still loved what I did. The turn of events at Apple had not changed that one bit. I had been rejected, but I was still in love. And so I decided to start over.

I didn't see it then, but it turned out that getting fired from Apple was the best thing that could have ever happened to me. It freed me to enter one of the most creative periods of my life. During the next 5 years, I started a company named NeXT and another company named Pixar. Pixar went on to create the world's first computer Animated Feature Film, Toy Story, and is now the most successful animation studio in the world. In a remarkable turn of events, Apple bought NeXT, I returned to Apple and the technology we developed at NeXT is at the heart of Apple's current renaissance.

I'm pretty sure none of this would have happened if I hadn't been fired from Apple. It was awful tasting medicine, but I guess the patient needed it. Sometimes life hits you in the head with a brick. Don't lose faith. I'm convinced that the only thing that kept me going was that I loved what I did. You've got to find what you love.

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1. What can be inferred from the line, "But something slowly began to dawn on me"?
   (a) He realised he still loved what he did.
   (b) He realised he was a public failure.
   (c) He realised that he had let down the other entrepreneurs.
   (d) He realised he wanted to return to Apple.

2. Getting fired from Apple was …… .
   (a) the worst thing that ever happened to the author
   (b) a planned decision
   (c) helpful to make him successful again
   (d) the best part of his life

3. Pixar is credited for
   1. being the first animation studio.
   2. creating the world's first computer animated movie.
   3. being a bigger company than Apple.
   4. buying NeXT.
   (a) 1 and 2 (b) Only 2
   (c) 2 and 3 (d) 3 and 4

4. Based on your understanding of the passage, choose the option that lists the CORRECT sequence of the incidents in the passage.
   1. The companies NeXT and Pixar were started.
   2. Apple grew into a $2 billion company with over 4000 employees.
   3. The Macintosh was released.
   4. The company named Apple was started in the narrator's parents' garage.
   (a) 4, 1, 2, 3 (b) 1, 2, 3, 4
   (c) 4, 3, 2, 1 (d) 1, 3, 2, 4

5. What is the contribution of NeXT?
   (a) It bought Apple.
   (b) It bought Pixar.
   (c) It is the biggest software company.
   (d) The technology developed at NeXT is central to Apple's success.

6. What was the awful tasting medicine?
   (a) Getting fired from Apple.
   (b) Success of Pixar.
   (c) Success of NeXT.
   (d) Apple's purchase of NeXT.

7. What does this passage try to convey?
   (a) You should always do what you love.
   (b) You should pursue a career which promises money.
   (c) You should not fight with your employees.
   (d) None of the above

8. Which of the following words in the passage is an antonym of 'ordinary'?
   (a) Extraordinary (b) Remarkable
   (c) Finest (d) Lucky

9. What is the meaning of the Phrase "dropped the baton"?
   (a) Dropped the rod
   (b) Feeling of depression
   (c) Not sure of future
   (d) Not living upto expectations

10. Pick the option showing the CORRECT use of 'falling out' as used in the passage.
   (a) The passengers came falling out when the bus went down the hill.
   (b) After falling out with her husband, she started living downstairs.
   (c) Many rocks and lava were falling out from the volcano.
   (d) Did you see people falling out from the pedestal?

11. Which of the following words in the passage is the synonym of 'innovative'?
   (a) Talented (b) Creative
   (c) Patient (d) Devastating

Passage 8

Recently a particular brand of noodles was found to contain inadmissible levels of harmful substances in it. But there is something else as important as the controversy about harmful substances. It is that instant noodles are not healthy for anybody, with or without lead and MSG. So we should have a simplified classification system and scale for junk versus healthy food.

Eating refined starch that is processed, dried and kept for months with the help of chemical preservatives is unlikely to be good for us. Its advertisements may be emotionally moving, the brand ambassador highly credible and the soupy noodles may taste good. But it is still not good for you.

Of course, the noodles won't kill you. Our diet today has plenty of other unhealthy things as well. For instance, almost all Indian sweets are unhealthy, as are many of our gravy 'delicacies'.

We have given up health benefits of food in favour of cost, convenience or taste. Such compromises are acceptable only up to an extent. However, if done in excess, they can lead to major health problems such as obesity, heart disease and diabetes.

How does one limit unhealthy food then? The problem comes when 'junk' is marketed as 'healthy'. Our advertising standards for food are extraordinarily lax. Junk food manufacturers not only hide the nature of their food, but also position their products as 'healthy' alternatives. Armed with advertisements of smiling mothers feeding bright-looking kids, we find junk being marketed as emotional nectar. Food, be it for nourishment or pleasure, has positive associations for us.

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Any food is good and the kind of food doesn't seem to matter. Perhaps this has developed from a time when India was poor and food was scarce. When we worked twelve hours a day in the fields, we could eat and burn as many calories as we wanted.

However, times have changed. Physical labour is reducing and we don't burn calories as easily. Hence, we need to monitor our food intake carefully. If a big part of our diet has to come from packaged food, we need to understand and label it accordingly.

This will increase awareness about what we are eating and, over sometime, incentivise us as well as manufacturers to move towards healthier foods.

A healthy society will lead to lower healthcare costs, improved productivity at work and a better quality of life for citizens.

1. Pick the statement that is TRUE as per the passage.
(a) Instant noodles are not tasty.
(b) All types of instant noodles are bad for health.
(c) Noodles are good for health.
(d) Instant noodles will slowly kill us.

2. The problem with advertisements of junk food is that …… .
1. they market junk food as healthy
2. they are only half correct
3. they show smiling mothers
4. they have misleading taglines
(a) Only 1 (b) Both 1 and 2
(c) Both 3 and 4 (d) Only 4

3. We have given up health benefits of food in favour of …… .
(a) cost (b) convenience
(c) taste (d) All of these

4. Our attitude towards food has its roots in the time when India …… .
(a) was a golden bird
(b) was poor and food was scarce
(c) when agriculture was predominant
(d) was a British colony

5. Consequences of a healthy society include …… .
(a) lower healthcare costs
(b) improved productivity at work
(c) better quality of life
(d) All of these

6. Which of the following statement is incorrect?
(a) All junk food are unhealthy.
(b) All instant noodles are unhealthy.
(c) Only the junk food in our diet is unhealthy.
(d) We compromise with food for its taste or convenience.

7. Why is it important to monitor our daily calories intake?
(a) Because physical labour has reduced.
(b) Because physical labour has increased.
(c) Because it is good for health.
(d) None of these

8. The word …… in para 2 is an antonym of 'coarse'.
(a) processed (b) credible
(c) refined (d) unlikely

9. The word 'delicacies' in para 3 is closest in meaning to …… .
(a) delicate food (b) nutritious food items
(c) costly foodstuffs (d) tasty foodstuffs

10. Pick the correct meaning of the word 'instant' as used in the passage.
(a) Happening immediately.
(b) An extremely short period of time.
(c) A particular point in time.
(d) Dried and can be prepared very quickly by adding hot water.

11. Pick the option showing the CORRECT use of the word 'incentivise'.
(a) I am glad to incentivise my friend Rohan.
(b) He took the incentivise to make his dream come true.
(c) The employees were incentivised to push the sales by the launch of the new rewards scheme.
(d) He incentivised a stone into a man.

Passage 9

If you're addicted to coffee and doctors warn you to quit the habit, don't worry and keep relishing the beverage, because it's not that bad after all! In fact, according to a new study, the steaming cup of java even beats fruits and vegetables as the primary source of antioxidants. A study by the University of Scranton states that coffee is the number one source of antioxidants in the American diet, and both caffeinated and decaf versions appear to provide similar antioxidant levels.

"Americans get more of their antioxidants from coffee than any other dietary source. Nothing else comes close to it.", said the study's lead researcher, Dr Joe Vinson, adding that high antioxidant levels in food and beverages don't necessarily translate into levels found in the body. Antioxidants in general have been linked to a number of potential health benefits, including protection against heart disease and cancer, but Vinson said that the benefits ultimately depend on how they are absorbed and utilised in the body.

The researchers analysed the antioxidant content of more than 100 different food items, including vegetables, fruits, nuts, spices, oils and common beverages.

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The data was compared to an existing US Department of Agriculture database on the contribution of each type of food item to the average estimated US per capita consumption. The results were surprising. Coffee came out on the top, on the combined basis of both antioxidants per serving size and frequency of consumption. It outranked popular antioxidant sources like tea, milk, chocolate and cranberries.

Of all the food and beverages studies, dates actually have the most antioxidants of all based solely on serving size, but since dates are not consumed at anywhere near the level of coffee, the drink comes as the top source of antioxidants, Vinson said. Besides keeping you alert and awake, coffee has been linked to an increasing number of potential health benefits, including protection against liver and colon cancer, type 2 diabetes and Parkinson's disease, according to some recently published studies.

The researchers, however, advised that one should consume coffee in moderation, because it can make you jittery and cause stomach pains.

1. On what basis does coffee rank as the top source of antioxidants?
(a) Due to its consumption
(b) A study by the University of Scranton
(c) Because it is a primary source
(d) Due to its potential health benefits

2. Why have dates not made it the top of antioxidant rich foods?
(a) Due to their serving size
(b) Due to their low consumption
(c) Due to their low antioxidant level
(d) None of the above

3. Potential health benefits of antioxidants include …… .
(a) protection against heart disease
(b) protection against cancer
(c) Both (a) and (b)
(d) Neither (a) nor (b)

4. Benefits of antioxidants depend on …… .
(a) the quantity in which it is present
(b) the way they are absorbed and utilised in the body
(c) Both (a) and (b)
(d) Neither (a) nor (b)

5. Other popular sources of antioxidants include ….. .
(a) tea (b) milk
(c) chocolate (d) All of these

6. Why are dates not considered as the highest source of antioxidants?
(a) They are not consumed everywhere
(b) They are not consumed in a quantity anywhere near to coffee
(c) They are not readily available
(d) They have less amount of antioxidants than coffee

7. Potential Health benefits of coffee include Protection against …… .
(a) liver and colon cancer (b) type 2 diabetes
(c) Parkinson's disease (d) All of these

8. Which of the following words in the first paragraph means the same as 'enjoying'?
(a) Delighting (b) Steaming
(c) Relishing (d) Tasting

9. Which of the following words in the second paragraph is the synonym of 'associated'?
(a) Absorbed (b) Linked
(c) Joined (d) Utilised

10. Which word in the passage means 'a molecule that inhibits oxidation'?
(a) protection (b) antioxidants
(c) oxidants (d) beverages

11. The word 'possibilities' means the same as the word …… given in the passage.
(a) actually (b) linked
(c) potential (d) frequency

Passage 10

It is said that everyone lives by selling something. What you can understand by this statement is that teachers live by selling knowledge, philosophers live by selling wisdom and priests earn their living by selling spiritual comfort. Though it may be possible to measure the value of material goods in terms of money, it is extremely difficult to estimate the true value of the services which people perform for us.

There are times when we would willingly give everything we possess to save our lives, yet we might grudge paying a surgeon a high fee for offering us precisely the same service. The conditions of society are such that skills have to be paid for in the same way that goods are paid for at a shop. Everyone has something to sell.

Tramps seem to be the only exception to this general rule. Beggars almost sell themselves as human beings to arouse the pity of passers-by. But real tramps are not beggars. They have nothing to sell and require nothing from others. In seeking independence, they do not sacrifice their human dignity.

A tramp may ask you for money but he will never ask you to feel sorry for him. He has deliberately chosen to lead the life he leads and is fully aware of the consequences. He may never be sure where his next meal is coming from, but he is free from the thousands of anxieties which afflict other people. His few material possessions make it possible for him to move from place to place with ease. By having to sleep in the open, he gets far closer to the world of nature than most of us ever do.

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He may hunt, beg or steal occasionally to keep himself alive; he may even, in times of real need, do a little work; but he will never sacrifice his freedom.

We often speak with contempt for tramps and put them in the same class as beggars. But how many of us can honestly say that we have not felt a little envious of their simple way of life and their freedom from any care in the world?

1. Which of the following is difficult to judge?
(a) The actual value of services given by people
(b) The actual value of material goods
(c) Both (a) and (b)
(d) Neither (a) nor (b)

2. Which of the following are not selling services?
(a) A surgeon (b) A teacher
(c) A priest (d) None of these

3. According to the passage, which of the following correctly lists the qualities of a tramp?
1. Anxious 2. Tranquil
3. Independent 4. Traveler
5. Beggarly
(a) 1 and 5 (b) 2 and 3
(c) 1,3,4 (d) 2,3,4

4. How is a beggar different from a tramp?
(a) A beggar sell but tramps don't.
(b) Beggars do not travel but tramps are always on the move.
(c) Beggars don't know when they will eat their next meal but tramps find a means to earn their meals.
(d) All of the above

5. What is the advantage of being a tramp?
(a) You sacrifice your dignity.
(b) You are free from the worries which burden normal persons.
(c) You are not sure where your next meal will be found.
(d) All of the above

6. What will a tramp never give up?
(a) His unemployment (b) His possessions
(c) His dignity (d) His worries

7. Why will a tramp not want you to feel sorry for him?
(a) It will cost him his dignity.
(b) He had made this choice.
(c) He wants to be self-sufficient.
(d) He wants to be free from worldly boundations.

8. Which of the following words is the synonym of 'estimate' in paragraph 1?
(a) Calculate (b) Evaluation
(c) Appraisal (d) Determine

9. Pick the option showing the CORRECT use of 'afflict' as used in the passage.
(a) There are two main problems which afflict people with hearing impairments.
(b) They return to afflict the living, so they have to be sent packing.
(c) You shall not afflict any widow or fatherless child.
(d) I wish you wouldn't afflict me with your constant complains.

10. Which word in paragraph 3 is the antonym of 'unconsciously'?
(a) Purposefully (b) Occasionally
(c) Deliberately (d) Specifically

11. Which word in passage means same as 'feel aggrieved about' ?
(a) Anxieties (b) Grude
(c) Spiritual (d) Envious

Literary Passages

Passage 11

Travel is a bug that was in me when I was born, probably inherited from my father. In 24 years of travelling widely through India, I have been most fascinated by those little islands that dot the Bay of Bengal off the East Coast of India. Yes, I am talking about the Andaman Islands. Andamans somehow seemed almost sinister, with images of being haunted, bleak and scary, until my parents actually returned from a trip to Port Blair and told us about these serene islands.

We immediately awaited the first opportunity to take a break and check them out. Finally, the D-Day came and we were all ready. We boarded the aircraft and, to our surprise, found that there were several empty seats. On enquiry, we learnt that all supplies to the Andamans including newspapers and meat go from the mainland, and so there is always more cargo and less people.

Port Blair airport is a small, old airport that was constructed in 1947. On my way to the hotel, I noticed that there are none of the usual auto-rickshaws that noisily wend their way through most Indian towns. There was only one traffic signal in the entire town and the roads were more up and down than level. This was all surprising for a person like me who has lived in the coastal towns of Chennai and Mumbai.

The colour of the sea was an unpolluted blue, a colour that I had not seen in any of the beaches in India. It was calm and beautiful. I was thrilled with the fact that we were going to spend 10 entire days there. All we had to do was sit in the open restaurant, look at the sea, enjoy the cool breeze and feel good.

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The Andaman Islands are a group of several islands, so most of our sightseeing was by boats. There are a total of more than 356 islands there. Even the oldest boatman, Rathnam, had seen only 200 of them. I figured that 10 days was surely not enough to get a full picture of this place, so I started to store every sight, every sound and every smell. The sound and light show at the jail sent a shiver down my spine. (This trip was before the movie 'Kalapani' was released). The realisation that those who fought for our independence had lived, struggled, suffered and even died here, left an impact.

1. One thing that left a major impact on the author was ..... .
(a) the serenity of the place
(b) the wholesome experience
(c) vastness of the islands
(d) the realisation that freedom fighters had lived, struggled and died there.

2. Pick the option that is NOT TRUE as per the passage.
1. The narrator liked travelling.
2. There were no empty seats in the aircraft.
3. The Port Blair Airport is small.
4. The Andaman Islands are a group of Islands.
(a) 1 and 2 (b) Only 2
(c) 3 and 4 (d) Only 4

3. What was the author's initial impression about the Andaman Islands?
(a) They were beautiful and serene.
(b) They were uninhabitable.
(c) They were sinister, haunted and scary.
(d) They were difficult to explore.

4. The airport at Port Blair was built in ..... .
(a) 1947 (b) 1847
(c) 1948 (d) 1940

5. Where are Andaman Islands located?
(a) In the Arabian Sea (b) In the Bay of Bengal
(c) In the Indian Ocean (d) In the Atlantic Ocean

6. How many islands constitute Andaman Islands?
(a) 200 (b) More than 356
(c) 350 (d) Less than 356

7. What is the historical significance of Andaman Islands?
1. They were centre of trade and commerce.
2. They have the maximum number of tribal population.
3. They were used as centre for scientific research.
4. They had the infamous Kalapani jail where freedom fighters were imprisoned by the British.
(a) Only 1 (b) 1 and 2
(c) 3 and 4 (d) Only 4

8. Pick the option showing the CORRECT use of the word 'boarded' as used in the passage.
(a) I was the last to board the tourist bus.
(b) I felt board when I went to Denmark.
(c) Einstein was boared in his school classes.
(d) Did you took my board today?

9. Which of the following words in the passage is the antonym of 'contaminated'?
(a) Unpolluted (b) Adulterated
(c) Cleaned (d) Unspoiled

10. What is the meaning of the phrase 'sent a shiver down my spine'?
(a) Feel very frightened (b) Feel very excited
(c) Feel very relaxed (d) None of these

11. The synonym of 'sinister' in the first paragraph is ..... .
(a) threatening (b) left side
(c) benign (d) good

Passage 12

A poor farmer lived with his wife and son in a small village. One day, exhausted by the heat, he lay down under the shadow of a tree to take a nap. All of a sudden he saw a giant cobra crawling out of an ant hill. The farmer thought to himself, "Surely this snake must be a deity guarding my field. So far I have not noticed it and that is why all my farming is in vain. Let me pay my respects to it now and worship it thereafter."

He then made up his mind, brought some milk in a bowl and placed it before the ant hill. He said aloud, "O lord guardian of my field! I did not know you dwell here. Please forgive me for not paying respects to you."

He left the milk bowl there and went back to his house. The next morning, he was surprised to see a gold coin in the bowl. Since then the farmer placed a bowl of milk every day and got back a gold coin the next morning. Soon the farmer became rich and happy.

One day the farmer had to go to a nearby city for a few days and so he directed his son to place the milk bowl near the ant hill every day. The son kept the milk bowl and left, only to find a gold coin the next day. He then thought to himself, "This ant hill must be full of gold coins: I'll kill the serpent and take all of them."

The next day, while placing the bowl of milk, the farmer's son struck the snake with a club. But the serpent escaped and bit him with its sharp fangs instead. He was dead at once. When the farmer returned, he learnt about his son's fate and grieved. The next morning, he took the bowl of milk and went to the ant hill.

The snake came out and said, "Your greed made you overlook even the loss of your son. Your son struck me in

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ignorance and I had bitten him to death. I cannot forget the blow on my head and you cannot forget the loss of your son. Hereafter, the friendship between us is not possible." The snake gave a costly coin and disappeared. The farmer returned home cursing the foolishness of his son.

1. Based on your understanding of the passage, choose the option that list the CORRECT sequence of the occurrence of incedents in the passage.

1. The farmer brought some milk in a bowl.
2. A giant cobra was seen by the farmer.
3. The farmer's son placed a bowl of milk near the ant hill.
4. The snake was struck with a club.

(a) 2, 4, 1, 3 (b) 2, 1, 3, 4
(c) 1, 2, 3, 4 (d) 4, 3, 2, 1

2. Pick the option showing the CORRECT use of the word 'directed' as used in the passage.

(a) The administrator has direct access to all the files on every computer.
(b) One's educational level has a direct effect on one's income.
(c) Which is the most direct route to Chandni Chowk?
(d) The Principal directed the teachers to make online videos for their students.

3. What did the farmer do to worship the cobra?

(a) Built a temple
(b) Performed a puja
(c) Put a bowl of milk
(d) Erected an idol of the cobra

4. What did the cobra give in return of the milk?

(a) A gold coin (b) A gold chain
(c) A gold ring (d) A gold axe

5. What did the farmer's son thought on seeing the gold coin?

(a) Someone else must be keeping the coin.
(b) The ant hill must be full of gold.
(c) The cobra is not friendly.
(d) None of the above

6. What did he do to get all the gold?

(a) He requested the cobra to give him all the gold.
(b) He stole all the gold from the ant hill.
(c) He tried to kill the cobra.
(d) None of the above

7. What message does this passage convey?

1. Greed never pays.
2. You should never befriend a cobra.
3. Humans and animals cannot be friends.
4. We should worship cobras.

(a) Only 1 (b) Both 1 and 2
(c) Only 3 (d) Only 4

8. The word 'deity' in para 1 means ..... .

(a) guard (b) sentry
(c) divine being (d) idol

9. The word 'exhausted' in para 1 is an antonym of ..... .

(a) started (b) finished
(c) fresh (d) invigorated

10. The word ..... in para 4 means the same as 'instructed'.

(a) ordered (b) directed
(c) commanded (d) kept

11. Pick the option that CORRECTLY lists the final feelings of the farmer.

1. Annoyance 2. Contentment
3. Repentance 4. Joy
5. Empathy

(a) 2 and 4 (b) 1 and 4
(c) 1 and 5 (d) 1 and 3

Passage 13

"Did you see that?" Joe said to his friend Bill.

"You're a great shooter!"

Bill caught the basketball and bounced it before throwing it again. The ball flew into the net.

"Bill, you never miss!" Joe said admiringly.

"Unless I'm in a real game," Bill complained.

"Then I miss all the time."

Joe knew that Bill was right. Bill performed much better when he was having fun with Joe in the school yard than he did when he was playing for the school team in front of a large crowd.

"Maybe you just need to practice more," Joe suggested.

"But I practice all the time with you!" Bill objected.

He shook his head. "I just can't play well when people are watching me."

"You play well when I'm watching," Joe pointed out.

"That's because I've known you since we were five years old," Bill said with a smile.

Joe nodded and understood, but he also had an idea. The next day Joe and Bill met in the school yard again to practice. After a few minutes, Joe excused himself. "Practice without me," Joe said to his friend. "I'll be back in a minute."

Joe hastened through the school building, gathering together whomever he could find—two students, a math teacher, two secretaries, and a janitor. When Joe explained why he needed them, everyone was happy to help. Joe reminded the group to stay quiet as they all went toward the school's basketball court. As Joe had hoped, Bill was still practicing basketball. He made five baskets in a row without noticing the people standing behind him.

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"Hey, Bill!" Joe called out finally. Bill turned. A look of surprise came over his face.

"I just wanted to show you that you could play well with people watching you," Joe said. "Now you'll have nothing to worry about for the next game!"

1. What would be the best title for the literary passage?
(a) Bill Joins the Team
(b) Practice Makes Perfect
(c) Bill Wins the Big Game
(d) Bill's Basketball Problem

2. What problem does Bill highlight about his basketball skills?
(a) He plays better in practice than he does during games.
(b) The school yard is not a good place to practice.
(c) Joe watches him too closely when he plays.
(d) His team loses too many games because of him.

3. Which of the following characteristics can you associate with Joe?
1. Kind 2. Confused
3. Encouraging 4. Friendly
5. Intelligent 6. Knowledgeable
(a) 1 and 3 (b) 2 and 6
(c) 4 and 5 (d) Both (a) and (c)

4. Why does Bill play well when Joe is watching him?
(a) He is comfortable with Joe.
(b) Joe tells him how to play better.
(c) He does not know that Joe is there.
(d) He wants to prove to Joe that he is a good player.

5. Why does Joe decide to gather a group of people?
(a) Because he wants more players for his team.
(b) Because he wants to help Bill feel less nervous.
(c) Because he wants to show them his talent.
(d) Because he wants more people to see the next game.

6. At the end of the story, all of the following people watch Bill practice EXCEPT
(a) Administrative staff
(b) a janitor
(c) a math teacher
(d) the basketball coach

7. Why does the group have to be quiet when they go to the basketball court?
(a) Because Joe is telling Bill what to do.
(b) Because they do not want Bill to know they were there.
(c) Because Bill likes to practice alone.
(d) Because the group needs to listen to Joe's instructions.

8. Which of the following words can replace the word 'complained' as used in the passage?
(a) Resented (b) Cribbed
(c) Lamented (d) Protested

9. Pick the option showing the CORRECT use of 'objected' as used in the passage.
(a) He stood up and objected in strong language.
(b) The director objected to the cuts ordered by the censor.
(c) She objected to this invasion of her personal space.
(d) All of the above

10. The word ..... in the given extract can be replaced by hurried.
(a) Hastened (b) Excused
(c) Bounced (d) Pointed

11. In what situation, bill can't play well?
(a) When its raining
(b) When many people are watching him
(c) When he has stomach ache.
(d) When some one cheats

Passage 14

Archimedes with his lever desired a place to stand that he might move the world of matter. [William Lloyd] Garrison with his paper, having found a place for his feet, demonstrated speedily his ability to push from its solid base the world of mind. His plan was very simple, viz., to reveal slavery as it then existed in its naked enormity, to the conscience of the North, to be "as harsh as truth and as uncompromising as justice." And so, week after week, he packed in the columns of the Liberator facts, the most damning facts, against slaveholders, their cruelty and tyranny. He painted the woes of the slaves as if he, too, had been a slave. For the first time the masters found a man who rebuked them as not before had they been rebuked. Others may have equivocated, but this man called things by their proper names, a spade, a spade, and sin, sin. Others may have contented themselves with denunciations of the sins and with excuses for the sinner, as a creature of circumstances, the victim of ancestral transgressions, but this man offered no excuses for the slave-holding sinner. Him and his sin he denounced in language, which the Eternal puts only into the mouths of His prophets.

It was, as he had said, "On this subject I do not wish to think, or speak, or write, with moderation." The strength and resources of his mother-tongue seemed to him wholly inadequate for his needs, to express the transcendent wickedness of slave-holding. All the harsh, the stern, the terrible and tremendous energies of the English speech he drew upon, and launched at slaveholders. Amid all of this excess of the enthusiast there was the method of a calculating mind. He aimed to kindle a conflagration because he had icebergs to melt. "The public shall not be imposed upon," he replied to one of his critics, "and men and things shall be called by their right names. I retract nothing, I blot out nothing. My language is exactly such as suits me; it will displease many, I know; to displease them is my intention."

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He was philosopher enough to see that he could reach the national conscience only by exciting the national anger. It was not popular rage, which he feared but popular apathy. If he could goad the people to anger on the subject of slavery he would soon be rid of their apathy. And so week after week he piled every sort of combustible material, which he was able to collect on board the Liberator and lighting it all, sent the fiery messenger blazing among the icebergs of the Union.

Slaveholders were robbers, murderers, oppressors; they were guilty of all the sins. At the same moment that the reformer denied their right of property in the slave, he attacked their character also, held them up in their relation of masters to the reprobation of the nation and of mankind as monsters of injustice and inhumanity. The tone which he held toward them, steadily, without shadow of change, was the tone of a righteous man toward the workers of iniquity. The indifference, the apathy, the pro-slavery sympathy and prejudice of the free States rendered the people of the North hardly less culpable.

1. According to the following sentence, what made William Lloyd Garrison different from other abolitionists?
(a) He went onto Southern plantations and freed slaves.
(b) He worked in Congress to pass abolitionist legislation.
(c) He didn't make any excuses in his writings and exposed the truth.
(d) He operated an underground railroad to help slaves escape to the North.

2. According to the passage, why was Garrison's language so strong?
(a) He had been a slave himself and wrote from experience.
(b) He saw himself as a sort of Prophet and his language was given to him by God.
(c) He feared having the people being angry with him.
(d) He felt like he was the only person talking about this topic.

3. All of the following statements are true about Garrison's intentions EXCEPT :
(a) He hoped that people would ignore his writings and keep owning slaves
(b) He wanted to provoke the national anger
(c) He attacked the character of the slave-owners, showing them to be monsters
(d) He wanted people to react so that they wouldn't be apathetic any more

4. Based on the context clues in the passage, what was the Liberator?
(a) A novel (b) A movie
(c) A train (d) A pamphlet

5. Garrison said that slaveholders were all of the following EXCEPT:
(a) generous (b) robbers
(c) murderers (d) Oppressors

6. Which of the following can be inferred from the sentence?
(a) Garrison thought that only the South was responsible for slavery.
(b) Garrison wanted slaves to rise up on their own and didn't think they needed any help.
(c) Garrison felt that people in the North were partially responsible because they were indifferent to the plight of the slaves.
(d) Garrison hated all white people.

7. What can be said about the works of Garrison?
(a) He writes scathing satires insulting the slave-owners.
(b) He writes as if he too had been a slave.
(c) His works show deep hatred for humankind.
(d) He writes for the independence of his nation.

8. The word "conflagration" is closest in meaning to
(a) fire (b) shipwreck
(c) mess (d) waterfall

9. The phrase "aimed to kindle" is most similar to:
(a) did not want to (b) worked against
(c) sat nearby (d) wanted to start

10. Pick the option showing the CORRECT use of 'goad' as used in the passage.
(a) "I want somebody very goad, very safe , to plant that gun, " he told Clemenza.
(b) The thought of exams next week is a great goad to the students to work hard.
(c) His opposition acted as a goad to her determination to succeed.
(d) All of the above

11. Which word in the passage is an antonym of 'wonderful'?
(a) Stern (b) Tremendous
(c) Terrible (d) None of these

Passage 15

Among the vast number of men who have thought fit to write down the history of their own lives, three or four have achieved masterpieces which stand out preeminently: Saint Augustine in his Confessions, Samuel Pepys in his Diary, Rousseau in his Confessions. It is among these extraordinary documents, and unsurpassed by any of them, that the autobiography of Benvenuto Cellini takes its place.

The life of himself which Cellini wrote was due to other motives than those which produced its chief competitors for first place in its class.

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St. Augustines aim was religious and didactic, Pepys noted down in his diary the daily events of his life for his sole satisfaction and with no intention that any one should read the cipher in which they were recorded. But Cellini wrote that the world might know, after he was dead, what a fellow he had been; what great things he had attempted, and against what odds he had carried them through. All men, he held, whatever be their condition, who have done anything of merit, or which verily has a semblance of merit, if so be they are men of truth and good repute, should write the tale of their life with their own hand. That he had done many things of merit, he had no manner of doubt. His repute was great in his day, and perhaps good in the sense in which he meant goodness; as to whether he was a man of truth, there is still dispute among scholars.

Of some misrepresentations, some suppressions of damaging facts, there seems to be evidence only too good-a man with Cellini's passion for proving himself in the right could hardly have avoided being guilty of such; but of the general trustworthiness of his record, of the kind of man he was and the kind of life he led, there is no reasonable doubt.

The period covered by the autobiography is from Cellini's birth in 1500 to 1562; the scene is mainly in Italy and France. Of the great events of the time, the time of the Reformation and the Counter-Reformation, of the strife of Pope and Emperor and King, we get only glimpses. The leaders in these events appear in the foreground of the picture only when they come into personal relations with the hero; and then not mainly as statesmen or warriors, but as connoisseurs and patrons of art. Such an event as the Sack of Rome is described because Benvenuto himself fought in it.

Much more complete is the view he gives of the artistic life of the time. It was the age of Michelangelo, and in the throng of great artists which then filled the Italian cities, Cellini was no inconsiderable figure. Michelangelo himself he knew and adored. Nowhere can we gain a better idea than in this book of the passionate enthusiasm for the creation of beauty which has bestowed upon the Italy of the Renaissance its greatest glory.

Very vivid, too, is the impression we receive of the social life of the sixteenth century; of its violence, of its zeal for fine craftsmanship, of its abounding vitality, its versatility and its idealism. For Cellini himself is an epitome of that century. This man who tells here the story of his life was a murderer - insolent, sensual, inordinately proud and passionate; but he was also a worker in gold and silver, rejoicing in delicate and subtle modelling of precious surfaces; a sculptor and a musician; and, as all who read his book must testify, a great master of narrative. Keen as was Benvenutos interest in himself, and much as he loved to dwell on the splendor of his exploits and achievements, he had little idea that centuries after his death he would live again, less by his statue of Perseus and his goldsmiths work than by the book which he dictated casually to a lad of fourteen, while he went about his work.

The autobiography was composed between 1558 and 1566, but it brings the record down only to 1562. The remainder of Cellini's life seems to have been somewhat more peaceful. He died at Florence, May 13, 1571, and was buried in The Church of the Annunziata in that city.

1. In the given passage, the author talks about
(a) Cellini's life
(b) Cellini's competitors
(c) Cellini's autobiography
(d) Cellini's literary works

2. What CANNOT be inferred from this passage?
(a) Most of Cellini's life was peaceful.
(b) Cellini's autobiography is not entirely truthful in all respects.
(c) Cellini was well-known during his day.
(d) Cellini's autobiography is full of self-love.

3. Which of the following lists the characteristics that can be associated with Cellini?
1. Narcissist 2. Courageous
3. Criminal 4. Artistic
5. Exploitative
(a) 1 and 2 (b) 3 and 4
(c) 4 and 5 (d) All of these

4. As described by the author, what is NOT true about Cellini's autobiography?
(a) It focuses on the political events of the time.
(b) It is one of the perfect example of a biography.
(c) It gives the reader insight into the artistic and social life of the 16th century.
(d) It tells us about Cellini's exploits and achievements.

5. Why does the author mention St. Augustine and Pepys?
(a) They were Cellini's competitors.
(b) They lived at the same time as Cellini.
(c) He compares their autobiographies to Cellini's.
(d) He compares their works to the works of Cellini.

6. What was Cellini's motive in writing his autobiography?
(a) to let other know what great things he had accomplished
(b) to teach his sculpture techniques
(c) to reach the optimum level of his own satisfaction
(d) to posit himself as a good man.

7. According to Cellini who should write autobiographies?
(a) Great men who can act as an inspiration.
(b) Great men who had accomplished great things.
(c) Great men who need to be remembered by the future generations.
(d) Great men who want to remind the world of their goodness.

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8. What do the words "these extraordinary documents" refer to?
   (a) Historical books
   (b) the autobiographies of St. Augustine, Pepys, and Rousseau
   (c) Cellini's autobiographies
   (d) All biographies

9. What is the meaning of the words "unsurpassed by" as used in the passage?
   (a) better than (b) cannot be compared to
   (c) equal to (d) unable to cross

10. Pick the option showing the CORRECT use of 'repute' as used in the passage.
   (a) His Wessex - wide repute was among them alone.
   (b) This repute seemed to give the new managers the confidence to approach their bosses as resources.
   (c) A mountaineer of repute, whether local or not, is conspicuous by his or her absence.
   (d) Are you acquainted if only by repute with a Mr. Landor who is a poet?

11. Which word in the passage is synonym of 'slight'?
   (a) Inconsiderable (b) Versatility
   (c) Vivid (d) Suppressions

Narrative Passages

Passage 16

Philosophy of Education is a label applied to the study of the purpose, process, nature and ideals of education. It can be considered a branch of both philosophy and education. Education can be defined as the teaching and learning of specific skills, and the imparting of knowledge, judgment and wisdom, and is something broader than the societal institution of education we often speak of.

Many educationalists consider it a weak and woolly field, too far removed from the practical applications of the real world to be useful. But philosophers dating back to Plato and the Ancient Greeks have given the area much thought and emphasis, and there is little doubt that their work has helped shape the practice of education over the millennia.

Plato is the earliest important educational thinker, and education is an essential element in "The Republic" (his most important work on philosophy and political theory, written around 360 B.C.). In it, he advocates some rather extreme methods: removing children from their mothers care and raising them as wards of the state, and differentiating children suitable to the various castes, the highest receiving the most education, so that they could act as guardians of the city and care for the less able. He believed that education should be holistic, including facts, skills, physical discipline, music and art.

Plato believed that talent and intelligence is not distributed genetically and thus is be found in children born to all classes, although his proposed system of selective public education for an educated minority of the population does not really follow a democratic model.

Aristotle considered human nature, habit and reason to be equally important forces to be cultivated in education, the ultimate aim of which should be to produce good and virtuous citizens. He proposed that teachers lead their students systematically, and that repetition be used as a key tool to develop good habits, unlike Socrates emphasis on questioning his listeners to bring out their own ideas. He emphasized the balancing of the theoretical and practical aspects of subjects taught, among which he explicitly mentions reading, writing, mathematics, music, physical education, literature, history, and a wide range of sciences, as well as play, which he also considered important.

During the Medieval period, the idea of Perennialism was first formulated by St. Thomas Aquinas in his work "De Magistro". Perennialism holds that one should teach those things deemed to be of everlasting importance to all people everywhere, namely principles and reasoning, not just facts (which are apt to change over time), and that one should teach first about people, not machines or techniques. It was originally religious in nature, and it was only much later that a theory of secular perennialism developed.

During the Renaissance, the French skeptic Michel de Montaigne (1533-1592) was one of the first to critically look at education. Unusually for his time, Montaigne was willing to question the conventional wisdom of the period, calling into question the whole edifice of the educational system, and the implicit assumption that university-educated philosophers were necessarily wiser than uneducated farm workers, for example.

1. What is the difference between the approaches of Socrates and Aristotle?
   (a) Aristotle felt the need for repetition to develop good habits in students; Socrates felt that students need to be constantly questioned
   (b) Aristotle felt the need for rote-learning; Socrates emphasized on dialogic learning
   (c) There was no difference
   (d) Aristotle emphasised on the importance of paying attention to human nature; Socrates emphasized upon science

2. Why do educationists consider philosophy a 'weak and woolly' field?
   (a) It is not practically applicable
   (b) Its theoretical concepts are easily understood
   (c) It is irrelevant for education
   (d) None of the above

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3. What do you understand by the term 'Perennialism', in the context of the given comprehension passage?
   (a) It refers to something which is of ceaseless importance
   (b) It refers to something which is quite unnecessary
   (c) It refers to something which is abstract and theoretical
   (d) It refers to something which existed in the past and no longer exists now

4. Were Plato's beliefs about education democratic?
   (a) He believed that only the rich have the right to acquire education
   (b) Yes
   (c) He believed that only a select few are meant to attend schools
   (d) He believed that all pupils are not talented

5. Why did Aquinas propose a model of education which did not lay much emphasis on facts?
   (a) Facts are not important
   (b) Facts do not lead to holistic education
   (c) Facts change with the changing times
   (d) Facts are frozen in time

Passage 17

"I Have a Dream" is a public speech delivered by American civil rights activist Martin Luther King Jr. during the March on Washington for Jobs and Freedom on August 28, 1963, in which he calls for an end to racism in the United States and called for civil and economic rights. Delivered to over 250,000 civil rights supporters from the steps of the Lincoln Memorial in Washington, D.C., the speech was a defining moment of the civil rights movement.

Beginning with a reference to the Emancipation Proclamation, which freed millions of slaves in 1863, King observes that: "one hundred years later, the Negro still is not free". Toward the end of the speech, King departed from his prepared text for a partly improvised peroration on the theme "I have a dream", prompted by Mahalia Jackson's cry: "Tell them about the dream, Martin!". In this part of the speech, which most excited the listeners and has now become its most famous, King described his dreams of freedom and equality arising from a land of slavery and hatred. Jon Meacham writes that, "With a single phrase, Martin Luther King Jr. joined Jefferson and Lincoln in the ranks of men who've shaped modern America". The speech was ranked the top American speech of the 20th century in a 1999 poll of scholars of public address.

1. What issues does Martin Luther King's speech address?
   (a) Continuation of racism
   (b) End to racism and civil and economic rights
   (c) Civil rights
   (d) Civil War

2. What pushes King to speak: "I have a dream"?
   (a) He reads out the Emancipation Proclamation
   (b) He is prompted by Mahalia Jackson
   (c) He is overwhelmed by the crowd
   (d) Licoln had asked him to give the speech

3. From the last paragraph, give one word for "to leave"
   (a) Departed (b) Proclamation
   (c) Improvised (d) Address

4. What is the name of Martin Luther King's famed speech?
   (a) The Emancipation Proclamation
   (b) An Improvisation
   (c) A Peroration
   (d) I Have a Dream

5. In front of whom does King speak?
   (a) The civil rights supporters
   (b) His friends
   (c) Lincoln
   (d) The Negroes

Passage 18

Today I Rabindranath Tagore complete eighty years of my life .As I look back on the vast stretch of years that lie behind me and see in clear perspective the history of my early development, I am struck by the change that has taken place both in my own attitude and in the psychology of my countrymen– a change that carries within it a cause of profound tragedy.

Our direct contact with the larger world of men was linked up with the contemporary history of the English people whom we came to know in those earlier days. It was mainly through their mighty literature that we formed our ideas with regard to these newcomers to our Indian shores. In those days the type of learning that was served out to us was neither plentiful nor diverse, nor was the spirit of scientific enquiry very much in evidence. Thus their scope being strictly limited, the educated of those days had recourse to English language and literature.

Their days and nights were eloquent with the stately declamations of Burke, with Macaulay's long-rolling sentences; discussions centered upon Shakespeare's drama and Byron's poetry and above all upon the large-hearted liberalism of the nineteenth-century English politics.

At the time though tentative attempts were being made to gain our national independence, at heart we had not lost faith in the generosity of the English race. This belief was so firmly rooted in the sentiments of our leaders as to lead them to hope that the victor would of his own grace pave the path of freedom for the vanquished.

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This belief was based upon the fact that England at the time provided a shelter to all those who had to flee from persecution in their own country. Political martyrs who had suffered for the honour of their people were accorded unreserved welcome at the hands of the English.

I was impressed by this evidence of liberal humanity in the character of the English and thus I was led to set them on the pedestal of my highest respect. This generosity in their national character had not yet been vitiated by imperialist pride. About this time, as a boy in England, I had the opportunity of listening to the speeches of John Bright, both in and outside Parliament. The large-hearted, radical liberalism of those speeches, overflowing all narrow national bounds, had made so deep an impression on my mind that something of it lingers even today, even in these days of graceless disillusionment.

1. **From the first paragraph, give a synonym for 'deep':**
   (a) Perspective (b) Profound
   (c) Tragedy (d) Psychology
2. **What helped the Indians to conceive of a notion of the Englishmen?**
   (a) Their advanced weaponry
   (b) Their literature
   (c) Their orders
   (d) Their administration
3. **Who could read and gain from English literature?**
   (a) The educated Indians
   (b) All the Indians
   (c) Only writers such as Rabindranath Tagore
   (d) None of the above
4. **From the third paragraph, give an antonym for 'victorious'**
   (a) Victor (b) Vanquished
   (c) Belief (d) Persecution
5. **Whose speeches did Tagore listen to, as a boy?**
   (a) Shakespeare (b) Byron
   (c) John Bright (d) Macaulay

Passage 19

Sportsmanship can be conceptualised as an enduring and relatively stable characteristic or disposition such that individuals differ in the way they are generally expected to behave in sports situations. In general, sportsmanship refers to virtues such as fairness, self-control, courage, and persistence, and has been associated with interpersonal concepts of treating others and being treated fairly, maintaining self-control if dealing with others, and respect for both authority and opponents. Sportsmanship is also looked at as being the way one reacts to a sport/game/player.

The four elements of sportsmanship are often shown being good form, the will to win, equity and fairness. All four elements are critical and a balance must be found among all four for true sportsmanship to be illustrated. These elements may also cause conflict, as a person may desire to win more than play in equity and fairness and thus resulting in a clash within the aspects of sportsmanship.

This will cause problems as the person believes they are being a good sportsman, but they are defeating the purpose of this idea as they are ignoring two key components of being sportsman like. When athletes become too self-centered, the idea of sportsmanship is dismissed.

Today's sporting culture, in particular the base of elite sport, places great importance on the idea of competition and winning and thus sportsmanship takes a back seat as a result.In most, if not all sports, sportsmen at the elite level make the standards on sportsmanship and no matter whether they like it or not, they are seen as leaders and role models in society.

Since every sport is rule driven, the most common offence of bad sportsmanship is the act of cheating or breaking the rules to gain an unfair advantage. A competitor who exhibits poor sportsmanship after losing a game or contest is often called a "sore loser", while a competitor who exhibits poor sportsmanship after winning is typically called a "bad winner". Sore loser behavior includes blaming others for the loss, not accepting responsibility for personal actions that contributed to the defeat, reacting to the loss in an immature or improper fashion, making excuses for the defeat, and citing unfavourable conditions or other petty issues as reasons for the defeat.

A bad winner acts in a shallow fashion after his or her victory, such as by gloating about his or her win, rubbing the win in the face(s) of the opponent(s), and lowering the opponent(s)'s self-esteem by constantly reminding the opponent(s) of "poor" performance in comparison (even if the opponent(s) competed well).

Not showing respect to the other team is considered to being a bad sportsman and could lead to demoralizing effects; as Leslie Howe describes: If a pitcher in baseball decides to pitch not to his maximum ability suggest that the batter is not at an adequate level, [it] could lead to the batter to have low self-confidence or worth.

1. **It is necessary to strike a balance between all the four elements of sportsmanship?**
   (a) No
   (b) Yes
   (c) Any 2 can be balanced
   (d) Only 1 is sufficient

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2. Why has sportsmanship taken a backseat today?
   (a) Due to lack of balance between the elements
   (b) Due to the emphasis on winning
   (c) Due to drug abuse
   (d) None of the above

3. If one does not accept responsibility for one's defeat, one is called a:
   (a) Sore loser
   (b) Bad winner
   (c) Good sportsman
   (d) Prudent sportsman

4. From the last paragraph, give the opposite of the word 'deep':
   (a) Competitor (b) Pitch
   (c) Immature (d) Shallow

5. When does the spirit of sportsmanship die?
   (a) When the sportsman becomes too self-centered
   (b) When the player loses the will to play
   (c) When the sportsman behaves badly
   (d) None of the above

Passage 20

Artificial Intelligence (AI), sometimes called machine intelligence, is intelligence demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. In computer science AI research is defined as the study of "intelligent agents": any device that perceives its environment and takes actions that maximize its chance of successfully achieving its goals. Colloquially, the term "artificial intelligence" is applied when a machine mimics "cognitive" functions that humans associate with other human minds, such as "learning" and "problem solving".

The scope of AI is disputed: as machines become increasingly capable, tasks considered as requiring "intelligence" are often removed from the definition, a phenomenon known as the AI effect, leading to the quip, "AI is whatever hasn't been done yet". For instance, optical character recognition is frequently excluded from "artificial intelligence", having become a routine technology. Capabilities generally classified as AI as of 2017 include successfully understanding human speech, competing at the highest level in strategic game systems (such as chess and Go), autonomous cars, intelligent routing in content delivery network and military simulations.

Artificial intelligence was founded as an academic discipline in 1956, and in the years since has experienced several waves of optimism, followed by disappointment and the loss of funding (known as an "AI winter"), followed by new approaches, success and renewed funding.

For most of its history, AI research has been divided into subfields that often fail to communicate with each other. These sub-fields are based on technical considerations, such as particular goals (e.g. "robotics" or "machine learning"), the use of particular tools ("logic" or artificial neural networks), or deep philosophical differences. Subfields have also been based on social factors (particular institutions or the work of particular researchers).

The traditional problems (or goals) of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception and the ability to move and manipulate objects. General intelligence is among the field's long-term goals. Approaches include statistical methods, computational intelligence, and traditional symbolic AI.

Many tools are used in AI, including versions of search and mathematical optimization, artificial neural networks, and methods based on statistics, probability and economics. The AI field draws upon computer science, mathematics, psychology, linguistics, philosophy and many others.

1. What is the AI winter?
   (a) Loss of funding for AI projects
   (b) Non-functioning AI systems
   (c) Absence of research labs
   (d) None of the above

2. Are sub-fields based only on social factors?
   (a) No
   (b) Yes
   (c) They are based on machine learning
   (d) None of the above

3. Learning and problem solving by machines is a colloquial way of understanding artificial intelligence?
   (a) Yes
   (b) No
   (c) Artificial intelligence means acquiring knowledge through books
   (d) It cannot be defined colloquially

4. Are autonomous cars an example of AI?
   (a) Yes
   (b) No
   (c) As of 2017, they are
   (d) None of the above

5. Does AI only draw on technology and mathematics?
   (a) Yes
   (b) No
   (c) It also draws upon psychology
   (d) It only draws upon linguistics

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Practice Exercise

Directions (Passage Nos. 1-50) *Read the following passage carefully and answer the questions that follow with the help of given alternatives.*

Passage 1

1. Human beings are in the process of dramatically reshaping the Earth's ecosystems. As far back as the 19th century, some scientists have noted that the current era is defined mainly by the impact of human activity. Now, there is an emerging consensus among Earth scientists that we have indeed entered a new period of geological time, the Anthropocene epoch.
2. Scientists who study the history of the Earth usually divide geological time according to major changes to the biology and climate of the Earth. For instance, the ancient Cambrian period, some 500 million years ago, is distinguished by a sudden explosion in the diversity of life, including the emergence of the ancestors of many modern species. More recently, the Pleistocene epoch, which ended about ten thousand years ago, is notable for the glaciers that swept over much of the Earth. The new Anthropocene epoch would be distinguished from all earlier times in Earth's history by the dramatic impacts of human activity on the Earth.
3. Though Earth scientists debate exactly when the Anthropocene began, there is a clear consensus that human changes to the environment are real and extreme. For one, many life forms have become, and are becoming, extinct as a result of human activity. For this reason, some palaeontologists argue that the human impacts of the Anthropocene began at the end of the last Ice Age, around ten thousand years ago. The fossil record indicates that around that time, many large animals, such as woolly mammoths and giant sloths, went extinct shortly after humans arrived in their ranges. Their sudden disappearance suggests that habitat destruction and overhunting by humans may have contributed to their demise. Indeed, many large animals, like elephants and gorillas, are endangered for those same reasons today.
4. The pace of human-caused extinctions has only increased in the past several hundred years. The growth and spread of human populations, caused by advances in seafaring technology and agriculture, has led to overexploitation of fragile ecosystems, introduction of invasive species, and pollution, causing many extinctions. Scientists have estimated the rate of extinction by studying the fossil record, monitoring existing species, and using statistical models to estimate the number of undiscovered species that have been lost. Estimates vary, but most scientists believe that diverse species are going extinct at hundreds or thousands of times the natural rate. The International Union for the Conservation of Nature (IUCN), for instance, has found that, of species surveyed on its "Red List", about a fifth of all mammals and reptiles and nearly a third of amphibians are in danger of extinction.
5. This ongoing rapid loss of species has been described as a mass extinction, as severe as the event that wiped out the dinosaurs 65 million years ago. To some ecologists, this steep decline in biodiversity suggests that the Anthropocene epoch began in the 17th and 18th centuries, when the rate of extinction shot up dramatically.
6. Human activity is also altering the climate as a whole. Since the Industrial Revolution of the 18th and 19th centuries, humans have significantly altered the atmosphere by mining and burning fossil fuels such as coal, oil, and natural gas. Some by-products of the use of these fuels, such as carbon dioxide, are greenhouse gases that trap solar energy on Earth. To assess the impact of these greenhouse gases on the Earth, scientists have had to investigate the history of the Earth's climate. Ice cores, samples of ice layers that have trapped atmospheric chemicals over time, have supplied scientists with millennia of year-by-year information about greenhouse gas concentrations and atmospheric temperature.
7. Evidence from ice cores clearly shows that the Industrial Revolution brought about a sudden jump in carbon dioxide in the atmosphere, along with an increase in temperatures. A scientific consensus exists that this ongoing rise in temperatures has resulted in warming of the oceans, rising sea levels, and more frequent extreme weather events. Thus, some climatologists propose that the Anthropocene's onset occurred with the Industrial Revolution and its effects on Earth's atmosphere.

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8. Whenever the Anthropocene is judged to have begun, its impact is undeniable. Human activity has changed the face of the planet; the global ecosystem has been and is being reshaped, the composition of the atmosphere has been altered, and even weather patterns are changing in response to human activity. The consequences of these changes will affect life on Earth for millions of years to come, leaving a mark of human activity that may well outlive humanity itself.

1. The main purpose of the passage is to
(a) respond to controversial claims made by rival scientists.
(b) argue for potential solutions to the problems posed by climate change.
(c) describe human impacts on the Earth's environment.
(d) account for recent changes in global biodiversity.

2. "..... there is a clear consensus." Pick the option in which the meaning of consensus is not the same as it is in the passage.
(a) He was the first to break the consensus and criticise the proposal.
(b) The question of when the troops should leave would be decided by consensus.
(c) Consensus politics places a high value on existing political institutions.
(d) Failure to arrive at a consensus over the issue raised the spectre of legal action.

3. Based on your understanding of the passage, choose the option that lists the correct sequence of the process that has lead to the present times.
1. Glaciers swept over the planet
2. Dramatic impact of human activity
3. Explosion of diversity of life
4. Extinction of woolly mammoths
5. Introduction of invasive species

(a) 1, 3, 5, 4, 2 (b) 2, 4, 3, 5, 1
(c) 3, 1, 4, 2, 5 (d) 1, 2, 3, 4, 5

4. The author's tone of writing in this passage is that of
(a) an uncertain scientist
(b) a concerned observer
(c) a jaded sceptic
(d) a dejected defeatist

5. The purpose of the second paragraph is to
(a) provide a broad description of the Earth's history.
(b) compare the current geological epoch to the Cambrian period.
(c) describe the origins of the majority of the Earth's biodiversity.
(d) explain how scientists divide geological time.

6. Based on the passage, the relationship between carbon dioxide and ice cores is that
(a) carbon dioxide is extracted from ice cores to fuel industrial processes.
(b) carbon dioxide destroys ice cores, leading to a loss of a source of information.
(c) ice cores can be studied to track changes in atmospheric carbon dioxide levels.
(d) ice cores remove carbon dioxide from the atmosphere, reducing its effects on the climate.

7. Pick the option showing the CORRECT use of the word 'propose'.
(a) The applicants propose a dual test in respect of the powers of compulsory acquisition.
(b) He formally proposed to his childhood friend.
(c) I tried to propose a truce between my friends but they kept cutting me off while I spoke.
(d) Before a Branch can become official, it must propose a constitution, and establish a bank account.

8. Pick the option that correctly states what DOES NOT happen as a result of human activity.
(a) Emergence of invasive species
(b) Creation of the Red List
(c) Emergence of the modern species
(d) Extreme weather events

9. The passage most strongly suggests that.
(a) the recent increase in the extinction rate occurred as a result of human-caused climate change.
(b) all extinctions currently taking place result from human activity.
(c) some life forms are going extinct before being discovered by humans.
(d) modern extinctions are destroying the biodiversity generated in the Cambrian period.

10. Which word in the passage is an antonym of 'disagreement'?
(a) Undeniable (b) Consequences
(c) Extinction (d) Consensus

Passage 2

1. When you grow up in a place where it rains five months a year, wise elders help you to get acquainted with the rain early. They teach you that it is ignorant to think that it is the same rain falling every day. Oh no, the rain is always doing different things at different times. There is rain that is gentle, and there is also rain that falls too hard and damages the crops. Hence, the prayer for the sweet rain that helps the crops to grow.
2. The monsoon in the Naga hills goes by the native name, khuthotei (which means the rice-growing season). It lasts from May to early or mid-October. The local residents firmly believe that Durga Puja in October announces the end of rain. After that, one

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might expect a couple of short winter showers, and the spring showers in March and April. Finally, comes the "big rain" in May; proper rainstorms accompanied by heart-stopping lightning and ear-splitting thunder.

I have stood out in storms looking at lightning arc across dark skies, a light-and-sound show that can go on for hours.

3. This is the season when people use the word sezuo or suzu to refer to the week-long rains, when clothes don't dry and smell of mould, when fungus forms on the floor and when you can't see the moon or the stars because of the rainclouds. But you learn not to complain. Rain, after all, is the farmer's friend and brings food to the table. Rituals and festivals centre around the agricultural rhythm of life, which is the occupation of about 70 percent of the population.
4. The wise learn to understand its ways. I grew up hearing my grandfather say, "It's very windy this year. We'll get good rain." If the windy season was short and weak, he worried there might not be enough rain for the crops. I learned the interconnectedness of the seasons from childhood, and marvelled at how the wind could bring rain. Another evening, many rainy seasons ago, my paternal aunt observed the new moon and worried, "Its legs are in the air, we're in for some heavy rain." She was right. That week, a storm cut off power lines and brought down trees and bamboos.
5. Eskimos boast of having a hundred names for snow. Norwegians in the north can describe all kinds of snow by an equal amount of names: pudder, powder snow, wet snow, slaps, extra wet snow, tight snowfall, dry snow, and at least 95 more categories of snow. Likewise, in India we have names and names for rain. Some are common, some are passing into history.
6. The rains are also called after flowering plants and people believe that the blossoming of those plants draws out rain. Once the monsoons set in, field work is carried out in earnest and the work of uprooting and transplanting paddy in flooded terrace fields is done. The months of hard labour are June, July and August. In August, as the phrogu plant begins to bloom, a rain will fall. This August rain, also called phrogu, is a sign that the time for cultivation is over. If any new grain seeds are sown, they may not sprout; even if they do sprout, they are not likely to bear grain. The rain acts as a kind of farmer's almanac.
7. The urban population of school-goers and office-goers naturally dislikes the monsoon and its accompanying problems of landslides, muddy streets and periodic infections. For non-farmers, the month of September can be depressing, when the rainfall is incessant and the awareness persists that the monsoons will last out till October. One needs to have the heart of a farmer to remain grateful for the watery days, and be able to observe— from what seems to the inexperienced as a continuous downpour — the many kinds of rain.

   Some of the commonly known rain-weeks are named after the plants that alternately bloom in August and September. The native belief is that the flowers draw out the rain.
8. Each rain period has a job to fulfil: October rain helps garlic bulbs to form, while kumunyo rain helps the rice bear grain. Without it, the ears of rice cannot form properly. End October is the most beautiful month in the Naga hills, as the fields turn gold and wild sunflowers bloom over the slopes, all heralding the harvest. Prayers go up for protecting the fields from storms, and the rains to retreat because the grain needs to stand in the sun and ripen. The cycle nears completion a few weeks before the harvest, and the rain does retreat so thoroughly from the reaped furrows that the earth quickly turns hard. The months of rain become a distant memory until it starts all over again.

1. **The rains are called after flowering plants because**

(a) heavy rains kill plants.
(b) flowers grow in the rainy season.
(c) it is believed that the plants bring the rain.
(d) flowers grow all the year round.

2. **"…. some are passing into history." Pick the option in which the meaning of 'passing' is not the same as it is in the passage.**

(a) The pain increased until Julie was near passing out.
(b) The funeral attendant was passing out tissues to all of the crying guests.
(c) Dust drifted down the road from a passing car.
(d) All of the above

3. **Based on your understanding of the passage, choose the option that lists the correct sequence of the rain on the basis of month in which it starts to when it ends.**

1. January 2. October 3. May
4. August 5. April

(a) 3,2,4,1,5 (b) 3,4,2,1,5
(c) 1,3,2,4,5 (d) 5,3,1,2,4

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4. The rain is like a calendar for farmers because
(a) it tells them when to sow and when to harvest.
(b) it tells them the birthdays of their children.
(c) each month has a time for plantation.
(d) different kinds of rain tell different things.

5. People who live in cities don't like rain because
(a) it brings mud and sickness with it.
(b) they are not bothered about the farmers.
(c) they don't like the plants that grow during the rain.
(d) going shopping becomes difficult.

6. Pick the option showing the CORRECT use of the word 'earnest'.
(a) In life's earnest battle they only prevail, who daily march onward and never say fail.
(b) It is my earnest promise that you use this money to continue you study of music.
(c) He was in deadly earnest.
(d) As an earnest of my good intentions I will work overtime this week.

7. The narrator says that the people in the Naga hills have agricultural rhythm of life. This means that
(a) they are mostly farmers.
(b) their rituals and festivals are influenced by agriculture.
(c) their lifestyle revolves around agriculture.
(d) All of the above

8. Pick the option that correctly lists the feelings of the writer with reference to rain in Naga hills.

1. Satisfying	2. Nostalgic
3. Enlightening	4. Disillusioning
5. Awe	6. Amusing
(a) 1,2,5	(b) 3,4,5
(c) 1,2,3	(d) 4,5,6

9. People pray asking the rain to retreat because
(a) the fungus and mould need to dry.
(b) children don't get a chance to play.
(c) the crops need the sun and heat to ripen.
(d) they like to pray.

10. Which word in the passage means same as calendar?
(a) Khuthfei (b) Almanac
(c) Downpour (d) Kumunyo

Passage 3

1. Once an organ donor's family gives its consent and the organs are matched to a recipient, medical professionals are faced with the onerous challenge of transporting organs while ensuring that the harvested organ reaches its destination in the shortest possible time. This is done in order to preserve the harvested organs and involves the police and especially the traffic police department.
2. The traditional method of transporting organs by road is referred to as a 'green corridor'. This process entails police escorting an ambulance, so as to move around traffic–usually a specific traffic lane is chosen and all signals on the route stay green to ensure it to reach its destination in the shortest possible time. A 'green corridor' is a route cleared and cordoned off by the traffic police to ensure the smooth and steady transportation of harvested organs, on most occasions, to those awaiting a life-saving transplant. Organs tend to have a very short preservation time, such as the heart, which has to be harvested and transplanted within four hours or the lungs, which can be preserved for only six hours once they are harvested.
3. The first green corridor in India was created by the Chennai Traffic Police in September, 2008 when they accomplished their task of enabling an ambulance to reach its destination within 11 minutes during peak hour traffic. That organ saved a nine year old girl whose life depended on the transplant.
4. Similarly, such green corridors have been created by Traffic Police of various cities such as Pune, Mumbai, Delhi NCR, etc. Personnel are stationed at selected points to divert, control and clear the traffic giving way to the ambulance. Apart from this, a motorcade of police vehicles accompanies the ambulance ensuring that it does not face any problems. Delhi Traffic Police provided a green corridor from IGI Airport to the Institute of Liver and Biliary Sciences in Vasant Kunj for transportation of a liver. The distance of 14 kms was covered in 11 minutes.
5. Experts point out the lack of a robust system to transport organs to super-speciality hospitals in least possible time. The National Organ and Tissue Transplant Organisation (NOTTO), the country's apex organ donation agency, is now framing a proposal to airlift cadaver organs and will send a report to the Union Health Ministry. "Cadaver organs have a short life and so transplant should be done within a few golden hours." Director (NOTTO) expressed. "Therefore, we are preparing a proposal for airlifting organs at any given moment."
6. Most States do not have enough well-trained experts to retrieve or perform transplant procedures. Also, there is an acute shortage of advanced healthcare facilities to carry out a transplant. So, it is referred to other big centres in Metropolitan cities. Organs retrieved from Aurangabad, Indore, Surat, Pune are sent to Mumbai as these cities do not have super-speciality healthcare centres, informed officials.

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7. "In India, about fifty thousand to one lakh patients are suffering from acute heart failure and need heart transplant at any point of time. In a private set up, a heart transplant costs ₹ 15-20 lakhs, which is followed up by post-operative medication of about ₹ 30,000 per month lifelong."

1. The first green corridor in India was created in
(a) New Delhi (b) Chennai
(c) Mumbai (d) Pune

2. "clear the traffic....."Pick the option in which the meaning of 'clear' is the same as it is in the passage.
(a) As he said these words, his tones, so clear and reverent, became mystical and inward.
(b) Rain comes after sunshine, and after a dark cloud, a clear sky.
(c) The clear and lively illustrations are in full colour.
(d) May I clear the plates off the table?

3. Based on your understanding of the passage, choose the option that lists the correct sequence of the process.
1. Harvesting the organ
2. Clearing and diverting traffic
3. Airlifting, if required
4. Allocating police vehicles with the ambulance
5. Stationing of personnels
(a) 1,3,5,2,4 (b) 1,4,3,2,5
(c) 1,3,4,5,2 (d) 1,3,4,2,5

4. The writer says that cadaver organs have a very short life. By cadaver he means
(a) artificial (b) diseased
(c) preserved (d) corpse

5. The organisation which is framing a proposal to airlift cadaver organs is
(a) Union Health Ministry.
(b) Regional Organ and Tissue Transplant Organisation.
(c) National Organ and Tissue Transplant Organisation.
(d) State Organ and Tissue Transplant Organisation.

6. The onerous task that the author is talking about in para 1 is
(a) finding organ donors.
(b) finding doctors capable of performing transplants.
(c) to carry the harvested organ in the shortest possible time.
(d) to arrange the requisite facilities for the transplant

7. Pick the option showing the CORRECT use of the word 'cordoned'.
(a) The entire region has been cordoned off by civil-defense workers, making Kalapana a brand-new wasteland.
(b) Mr. Froebel counseled that young children should play in nature, cordoned off from construction sites.
(c) All over town, bridges were closed and ferry service interrupted resulting in downtown streets cordoning.
(d) All of the above

8. Most of the people do not go for heart transplant as
(a) it is very risky.
(b) it is very painful.
(c) it may cause death of the recipient.
(d) the cost is prohibitive.

9. Which of the following is NOT a problem faced in transplant procedures?
(a) Lack of trained professionals
(b) Expensive treatment
(c) Less time of organ transplantation
(d) Shortage of transplant centres

10. Heart retrieved from a body is alive for only
(a) two hours (b) three hours
(c) four hours (d) five hours

Passage 4

1. The windless night filled our ears with unaccustomed silence and the foul dryness of our mouths aggravated the discomfort of our sleepless bodies as we tried to ease the agony of our thirst. Then breathlessly, we watched the gathering clouds obscure the stars and it began to rain with a steady downpour. Slowly the water in the pipe from the canopy ran clear and we filled our empty cans and spare plastic bags, our bellies and our mouths until we could not force down another drop. Suddenly, everything had changed from the shadow of the spectre of death to the joyful prospect of life and all by a shower of rain. We had water!

2. Douglas, lazily watching the dispersing clouds, suddenly sat up with a start, pointing excitedly. "A ship! A ship! It's a ship!" We all crowded to the door of the raft, staring in the direction of his pointing finger; a cargo vessel of about 6000 tonnes was approaching us on a course that would bring her within 3 miles of us. "Get out the flares", I said hoarsely, "and pass them to me in the dinghy. They all see us better from there."

3. Three miles was a fair distance, but on a dull day such as this, against a background of rain, they should see us easily. I clambered into the dinghy and Douglas passed me the rockets and hand flares; my hands trembled as I ripped open a parachute rocket flare and, with a mute appeal to the thing to fire, struck the igniter on the fuse.

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It sputtered and hissed, then roared off on a trajectory high above the raft, its pinkish magnesium flare slowly spiralling downwards leaving a trail of smoke in the sky. They couldn't fail to see it. I waited a moment or two, watching for the ship to alter course, then struck a hand flare, holding it high above my head. The blinding red light was hot to hold and I pointed it away from the wind to ease my hand, the red embers of the flare dropping into the dinghy; as it went out, I struck another, smoke from the first now a rising plume in the sky; surely they must see that! I waited a little, my hands trembling.

4. However, the ship sailed on, slowly disappearing behind a rain shower and, when she reappeared, her hull was half obscured by the horizon. My shoulders drooped. "We daren't use another", I said. "They won't see it now and we have to keep something for the next one."

5. I surveyed the empty flare cartons bitterly, and the one smoke flare which was damp and wouldn't work; then something happened to me in that instant that, for me, changed the whole aspect of our predicament. If these poor bloody seamen couldn't rescue us, then we would have to make it on our own. The word from now on was, 'survival', not 'rescue', or 'help' or dependence of any kind, just survival. We would live for three months or six months from the sea, but "We would get these boys to land" as Lyn had said, and we would do it ourselves if there was no other way.

6. Towards late afternoon, we felt an unusually hard bump on the raft floor and we found ourselves gazing at the large scaly head of a turtle. The day before I would have said, "Leave it, we can't manage that", but now things were different. "We'll have this one", I said. "Let's get it aboard the dinghy." The turtle's flippers had become entangled in the sea anchor line, so, first passing a rope from the dinghy under the raft, we made it fast to one of the back flippers, then carefully avoiding the searching beak, freed the turtle from the sea anchor rope and towed it around the raft to the *Ednamair*. With a bump and a thrashing of claws, the reptile lay on its back in the bottom of the dinghy.

7. I plunged the knife into the leathery skin of the neck. Deep red blood spurted into the bottom of the dinghy and gradually, the beak and flippers ceased thrashing as the beast died. Twenty-four hours previously, I would not have had the stomach for such a bloody business, but the laws of survival applied and the first principle, "The fittest survive, the weakest go to the wall", had now become our way of life. We would struggle and endure and, if our reflexes were not as swift as the animals and fish around us, we had to be cunning and improve with practice.

1. The author killed the turtle as
(a) he liked to hunt
(b) he was feeling angry
(c) he was hungry and had nothing to eat
(d) he wanted to prove that he was brave

2. "the foul dryness of our mouths aggravated…." Pick the option in which the meaning of 'aggravated' is the same as it is in the passage.
(a) His bad temper was aggravated by his headache.
(b) If he aggravated me any more I shall hit him.
(c) He aggravated a neck injury while playing for Derby County.
(d) The disorder aggravated by the economic depression of the 1930s.

3. Based on your understanding of the passage, choose the option that lists the correct sequence of the feelings felt by the narrator.
1. Hope
2. Discomfort
3. Despair
4. Resilience
5. Anger

(a) 1,3,5,2,4
(b) 2,1,3,5,4
(c) 3,1,2,4,5
(d) 5,2,3,1,4

4. The containers were filled with the rainwater as they
(a) wanted to play with water
(b) did not have any work and wanted to pass their time
(c) had to give the water to the men in the cargo vessel
(d) were thirsty and also wanted to save water for the future

5. Why did the narrator feel bitter?
(a) Because they could not be saved
(b) Because the things that would have got them noticed were not useful anymore
(c) Because they were tired and hungry
(d) Both (a) and (b)

6. The flares were used by the author to
(a) get light as it was getting dark
(b) cook the food
(c) heat the water
(d) get the attention of the other ship so that they could be rescued

7. The author's shoulders drooped when the cargo ship reappeared as
(a) he felt tired
(b) he realised that there was no chance of the cargo ship spotting them as it was very far off
(c) he was ill
(d) Douglas was not obeying his orders

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8. **Pick the option showing the CORRECT use of the word 'spectre'.**

(a) The spectre of unemployment was always on his mind.
(b) The dread spectre of civil war looms over the country.
(c) These weeks of drought have once again spectred widespread famine.
(d) Was he a spectre returning to haunt her?

9. **Pick the option that correctly states what DID NOT happen after the writer fired the hand flares.**

(a) The ship disappeared away.
(b) The embers of the flare burned the writer
(c) The remaining rockets and flares got damp
(d) A feeling of bitterness engulfed the writer

10. **The turtle bumped into the author's boat as**

(a) it did not see the boat
(b) its flippers got entangled in the sea anchor line
(c) the boat was going too fast while the turtle was swimming slowly
(d) the turtle was asleep and the boat hit it

11. **What does Douglas handed over to the narrator when he climbed dinghy?**

(a) Rockets (b) Hand flares
(c) Both (a) and (b) (d) None of these

Passage 5

1. Even before you are aware of it, retirement is around the corner and with it comes a sense of apprehension, trepidation and maybe a sense of anticipation. The first few days when you acquire the status of a Senior Citizen are full and the consequences of retirement have yet to sink in. A month passes and time hangs heavily, and in a sense you feel lost, but a change in attitude can alter all that. The Indian government has given many concessions to Senior Citizens and it would do you good if you focused on the advantages rather than the disadvantages. Even at a personal level, you can think of it as a new beginning rather than an end of a phase. Look around you, wake up to the things around you, have a new perspective and find time for all those things that you earlier wanted to do but could never get done.
2. Books and reading are all time favourite hobbies to indulge in. In India, subjects such as astrology, tarot reading and palm reading have attracted many. So serious do these Senior Citizens become that you would never guess they were novices. Heated discussions, as well as debates on politics and religion have also engrossed quite a few. Then there is this small segment which focuses on economy and finance. Many Indians who have never taken investment seriously start reading business magazines, and catch up on bullish and bearish trends in the market. Surprisingly, many of them become prudent about investment and offer a lot of advice to the so-called tyros. Listening to music, attending music festivals, and participating in musical activities, help to turn the focus from retirement to aesthetics. Many philanthropic Indians have been known to devote their attention to social causes and have been known to form clubs, which volunteer to help people. The sense of deep satisfaction that one gets from this is absolutely incomparable. Developing a passion for sports and evoking an interest in everything around you keeps you mentally healthy and emotionally fit.
3. There is a decline in mental abilities as one ages and this is mostly an offshoot of certain pathological changes in the human brain. While senior citizens become more mature in judgment, the ability to recall things declines. Doing crossword puzzles, solving things mentally and a conscious effort to relate and recall can greatly alleviate this decline. Aging is only in the mind: you are as old as you want to be. Reading spiritual books and committing the Saint Kabir's *shlokas* to memory is a wonderful exercise for the human brain, for it emphasises the fact that nothing, no matter however difficult, is unconquerable. A positive attitude and a desire to learn as many new things as possible is the key to a full and happy life. Many computer institutes in India conduct computer courses for Senior Citizens and they are able to use the Internet, send e-mails all over the world, store information relating to investments and handle their bank accounts. There are limited job openings for Senior Citizens but, ideally, they should take a job only if they have to.
4. Exercise, yoga and meditation keep Senior Citizens in good physical condition, as then they are less prone to ailments, which tend to dog their footsteps once they have crossed 60. Physical conditioning augurs emotional and mental well-being. Exercise tones muscles, improves circulation of blood, reduces stress and wards off depression. Joints remain flexible, the risk of arteriosclerosis is reduced, and muscle and bone loss is drastically reduced. In India, many old people have taken to doing pranayama on a regular basis.
5. For Senior Citizens, this is a period of growth and the proper time to attain the riches that life has to offer. This is the time in their lives when they can live their lives the way they actually want to. The

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concessions they are entitled to make it actually worth being a Senior Citizen. Airlines offer discounted fares and the Indian railways offer a discount on all tickets. There are separate queues for Senior Citizens at the post office, railway counters and some buses even have seats reserved for them. It all boils down to one thing - it can actually be quite appealing to be a Senior Citizen once you look at yourself with esteem and have confidence in your abilities. Eat healthily, exercise, sleep well and extract every ounce of the elixir that life has to offer.

1. Within the first few days of retirement, the retired person acquires
(a) the status of being a Senior Citizen
(b) the status of being lonely
(c) another post in the same department
(d) a feeling of enjoyment

2. "with it comes a sense of apprehension…." Pick the option in which the meaning of 'apprehension' is the same as it is in the passage.
(a) She was almost sick with excitement and apprehension.
(b) He watched the election results with some apprehension.
(c) I feel a certain apprehension about my interview tomorrow.
(d) All of the above

3. Based on your understanding of the passage, choose the option that lists the correct sequence of information given in the passage.
1. There are special provision made by the government for senior citizens.
2. Old people must see life with a new perspective after retirement.
3. The ability to recall declines with old age.
4. There are limited job opening for senior citizens.

(a) 1,2,3,4 (b) 2,3,4,1
(c) 3,4,1,2 (d) 4,3,2,1

4. The all time favourite hobby which Senior Citizens indulge in is
(a) swimming (b) books and reading
(c) sleeping (d) playing indoor games

5. The tone used by the author in the given passage is
(a) satisfying (b) amusing
(c) inspiring (d) informative

6. The person who devotes his attention to social causes and works as a volunteer to help people is called a
(a) misanthropist (b) philanthropist
(c) recluse (d) philanderer

7. The reason for the decline in mental abilities of Senior Citizens is
(a) aging
(b) retirement
(c) pathological changes in the brain
(d) loss of physical stamina

8. Pick the option showing the CORRECT use of the word 'novices'.
(a) Both are completely geared to novices, with plenty of other distractions if walking the plank doesn't suit.
(b) Many of the clubs cater for novices as well as for established performers.
(c) The grooms and novices led away the horses, and wheeled away the light carriage into the grange court for housing.
(d) A course of classes on firing and driving steam trains is being offered to complete novices.

9. The importance of the Kabir Shlokas as mentioned in the passage is
(a) it gives peace of mind.
(b) it keeps one busy.
(c) it teaches that nothing is unconquerable.
(d) it boosts and maintains memory.

10. Which of the following is not mentioned as an activity that old people can indulge in?
(a) Learning a Language (b) Going to musin fests
(c) Charity (d) Exercising

Passage 6

1. We have entered a new world. The fall of the Berlin wall put an end to the bipolar world and gave birth to hope for freedom and prosperity. There were many States that gained their independence. Most adopted the democratic model, which corresponds to our shared political values. Globalisation has further enhanced these changes. It offers extraordinary opportunities to individuals who are in a position to seize them; easier access to information, speedier communications and unimpeded travels. But it also develops new forms of vulnerabilities; a financial crisis can run from Thailand to Russia via Latin America. Epidemics spread faster and further, be it mad cow's disease or bird flu.
2. Therefore, our destiny is no longer shaped within safe frontiers but on an international scale. Given the extent of these changes, we must define our world's new principles of organisation. In this endeavour for a new order, India has a major role to play. First, because it is an example of dynamism and energy. Our country is one of youth; 33 per cent of the population is under the age of 15.

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You are aware of the tremendous asset and the immense responsibility that this represents. A young population is a guarantee of imagination, renewal, awakening and hope. But it is also a challenge in terms of education, health and training.

3. India has been able to make the most of globalisation and has gained a pivotal role. It provides the example of an economy which has allied dynamism and equilibrium. The past year offers the two-fold satisfaction of a spectacular 7.5 per cent growth rate and inflation under control. Thanks to the size and dynamism of its domestic market, it can project itself into the future with confidence.
4. India is now the biggest international service provider in information technologies, and this at a time when the Western countries are experiencing a real shortage of manpower in this very field. A scientific power, India, today, is also a key player in space research. Thanks to the excellence of the Indian Space Research Organisation, it is in the forefront of technologies for launchers and the construction of satellites.
5. This economic vitality has developed on the basis of a strong concern for social justice. In the face of inequalities that still remain and could be increasing, India has given priority to poverty reduction, job creation and support of the agricultural sector. Our country has shown that economic growth and concern for the greater good are not incompatible.
6. India, however, does not only offer an economic model. It stands as an example for nations that show due respect for cultural identities. This represents a major challenge, as globalisation has inherent in it a two-fold risk. First of all, there is the risk of domination of certain forms of thinking, and of certain ways of life and expression. The diversity of cultures, religions, traditions and memories is an essential component of the richness of our world. If we are not careful, it could die one day.
7. Then there is the risk of confrontation of identities. Lack of respect for what people stand for can nurture claims of nationalists and fundamentalists. The more an identity feels threatened, the more it tends to be inward looking, rejects diversity and finally gives in to confrontation. These are the patterns that we saw in action in the worst post cold war confrontations, from the explosion of the Balkans to the genocide in the Rwanda.
8. With 18 official languages and over 1652 dialects, India is at the forefront of cultural diversity. It is a proof that openness to the outside world and preservation of its own roots can go hand in hand. The movement of exchange between cultures must not lead to silencing the polyphony of voices arid view.
9. In the heart of its democracy, India has been able to define an identity respectful of each and everyone's specificity. It is home to one of the largest Muslim communities of the world, with over 170 million believers. The religious patchwork of India offers to each minority, whether it be the 27 million Christians, the 21 million Sikhs or the Buddhists, Jains and Parsis, the possibility of keeping alive their own religious beliefs in harmony with the Indian identity.
10. This original and exemplary synthesis is difficult to achieve. Your will to promote democracy is undoubtedly the strongest political message of the Indian nation. At the heart of the new world geography lies the democratic challenge.
11. Thanks to you, we know that the size of the population, that the force of history and tradition is not an obstacle. India is a proof that the universality of Human Rights is a realistic emotion. It shows us that State Secularism can be reconciled with the vigour of identities and beliefs.

1. The extraordinary opportunities globalisation offers to individuals includes

(a) shortage of manpower
(b) a hope for freedom and prosperity
(c) ruination due to a financial crisis
(d) easier access to information

2. "In this endeavour for a new order…." Pick the option in which the meaning of 'order' is the same as it is in the passage.

(a) The office telephones were all out of order.
(b) What do you suggest I order?
(c) The files are arranged in alphabetical order .
(d) The new order seems to be technically flawed.

3. Based on your understanding of the passage, choose the option that lists the correct sequence of information given in the passage.

1. India is at the forefront of cultural diversity.
2. India gained a pivotal role in globalisation.
3. Fall of Berlin wall.
4. India has become the biggest international service provider.

(a) 1,4,2,3 (b) 3,2,1,4
(c) 3,2,4,1 (d) 3,1,2,4

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4. Pick the option that correctly states the fact that is NOT present in the passage.
(a) India has been able to define an identity respectful of each and everyone's specificity.
(b) India has shown that economic growth and concern for the great good are compatible.
(c) Western countries lack manpower.
(d) The young population of India poses massive challenges for it.

5. The economic growth rate of India during the past year has been
(a) 15 per cent (b) 7.5 per cent
(c) 33 per cent (d) None of these

6. The basis of the development of the economic vitality in India is
(a) showing due respect for cultural identities
(b) dominance of certain forms of thinking
(c) a strong concern for social justice
(d) All of the above

7. Pick the option showing the CORRECT use of the word 'vitality'.
(a) You have to admire the sheer vitality of his performance.
(b) Hothouse plants do not possess exuberant vitality.
(c) The cream will restore youth and vitality to your skin.
(d) All of the above

8. When an identity feels threatened, it
(a) ultimately reacts with a hostile reaction
(b) develops lack of respect for others
(c) keeps alive its own religious beliefs
(d) tries to dominate other identities

9. The author of the given passage is appreciating India for
(a) becoming pivotal in globalisation.
(b) becoming the biggest International service provider.
(c) maintaining its cultural diversity.
(d) creating opportunities for employment.

10. Find out the word from the passage that is correct synonym of 'ideal'.
(a) Vitality (b) Vigour
(c) Exemplary (d) Confrontation

Passage 7

1. According to some estimates, if we could compile the amount of food, land, water and energy used to raise the 10 billion animals slaughtered each year for meat, we could use those resources to feed every single starving person on earth. The majority of these resources are depleted by concentrated animal feeding operations (CAFOs). CAFOs are factory farms that mass produce livestock but, in the process, harm animals, the environment, and humans.
2. It is true that these farming methods provide an abundant source of food and employ thousands of workers across the country. However, CAFOs should be placed under more stringent restrictions because of their unfair treatment of animals and the harm they do to both the environment and humans.
3. One of the key controversies surrounding factory farms is animal rights. Factory farms raise livestock indoors, as opposed to allowing the animals to graze in fields and pastures. The farmers favour this overcrowded environment because it maximises profits. Providing less space for the animals costs less money; filling pens to their maximum capacity ensures that no space is wasted. Consequently, animal pens are often so small that larger animals cannot lie down or turn around. In some cases, these small cages are beneficial for more than just maximising capacity: calves, for instance, do not gain muscle mass in this environment. This keeps their meat more tender, which makes it more attractive to consumers.
4. Livestock in CAFOs are often found living in their own urine and faeces, stimulating the spread of diseases, such as avian flu, foot and mouth disease and mad cow disease, among other animals on the farm. In order to combat this, farmers must give the animals antibiotics. In many cases, however, antibiotics are used for disease prevention instead of treatment.
5. In addition to being used to combat the spread of diseases, antibiotics are also commonly used to encourage faster growth in livestock. This overuse increases the risk of livestock developing immunity to antibiotics, ironically making animals even more susceptible to disease. After being digested, these antibiotics are released back into the environment in the form of milk, meat, and waste, which can affect the people who eat these products or the environment that absorbs them.
6. CAFOs also negatively impact the environment in the form of air and water pollution. Factory farms contribute to air pollution issues in the USA through the release of toxic gases and vapours as well as by burning fossil fuels to run farm machinery.
7. These farms also have notable consequences for the environment in terms of water pollution. One characteristic of CAFOs that creates water pollution is the presence of a lagoon. Lagoons are artificial storage basins where animal excrement is

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temporarily contained; periodically, farmers flush this waste into ditches or nearby bodies of water. This waste combines with runoff from fertilised fields to pollute the water sources surrounding CAFOs. It adds excess nutrients, pathogens, veterinary pharmaceuticals, heavy metals, and excreted hormones to the water sources. Such pollutants not only affect aquatic life, but can lead to severe impacts on human health.

8. Another negative environmental impact of factory farms is resource depletion. Factory farming uses more land than any other agricultural or industrial enterprise in the country. CAFOs consume a great deal of resources in terms of grain, energy and land. There are far more efficient ways of using these resources to feed people. For instance, it has been estimated that the grain used to feed livestock in the USA alone could feed up to 800 million people in one year.

   By contrast, the production of livestock in CAFOs is a wasteful use of energy. While both chicken meat and soyabeans are good sources of protein, producing equivalent amounts of protein from chicken meat and soyabeans does not require equivalent amounts of energy: chicken meat production consumes 14 times more energy than soyabean production. Consequently, grain and energy supplies should be used more efficiently to produce food sources other than livestock.

9. In order to combat the unfair treatment of animals and the risks to environmental and human health, CAFOs should be placed under stricter guidelines. One such regulation would force factory farms to adhere to air and water quality protection standards from which they have previously been exempted, such as those set forth by the Clean Water Act. Enforcing these standards would lead to banning environmental hazards such as waste lagoons, which in turn would reduce environmental pollution and human health liabilities.

10. Some have suggested that due to these environmental and human health concerns, factory farms should be banned outright. Advocates for CAFOs, however, argue that factory farming allows for lower production costs that translate into lower food prices for consumers.

    Organic and free-range products, they argue, do not allow for the large-scale production of livestock; prices for meat, eggs and dairy products would increase, should the country shift towards organic products. Although this would be an inconvenience to consumers, a price increase would encourage people to eat a diet of less meat.

11. This cultural change would assist in solving the broader resource crisis as fewer grain, energy and land resources would be needed to support smaller-scale production. Better treatment of animals and more responsible environmental practices would protect humans more from infectious diseases and the effects of air and water pollution, a benefit everyone should embrace.

1. The primary purpose of the passage is to
(a) persuade readers that CAFOs should be more strictly regulated
(b) dissuade from the use of antibiotics for disease prevention in animals
(c) educate readers about the pros and cons of CAFOs
(d) suggest economic alternatives to CAFOs, such as organic farming and soyabean production

2. "Farmers flush…." Pick the option in which the meaning of 'flush' is the same as it is in the passage.
(a) His words brought a warm flush to her face.
(b) The river is flush with rain.
(c) Flush out the pipes with cold water after adding the cleaning powder.
(d) She felt a sudden flush of anger.

3. Based on your understanding of the passage, choose the option that lists the correct sequence of information given in the passage.
1. CAFO's are a waste of energy
2. CAFO's are violating animal rights.
3. Farm machinery adds to environmental pollution.
4. CAFO's use many antibiotics to prevent animal diseases.
5. One must shift towards organic products.

(a) 1,3,2,4,5 (b) 2,4,3,1,5
(c) 2,3,4,5,1 (d) 5,4,3,2,1

4. We can infer that animals raised on CAFOs live indoors because
(a) they require less space than animals raised outside
(b) some of them produce more appealing meat
(c) they are less expensive to maintain
(d) All of the above

5. …… is not the reason for CAFOs having a negative impact on the environment.
(a) Animal waste polluting water sources near factory farms
(b) Exhaust from farm machinery
(c) Antibiotics entering the human food supply through animal products
(d) Animals living in overcrowded environments waste energy

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6. The statistic that …… strengthens the author's argument in para 9.

(a) people eating meat from CAFOs develop less high blood pressure and heart conditions

(b) CAFOs adhering to air and water quality protection standards report a 30% reduction in profits

(c) a town near an animal waste lagoon reported only half the respiratory illnesses after the lagoon was shut down

(d) the Clean Water Act was enacted in 1948 and expanded in 1972

7. Pick the option showing the INCORRECT use of the word 'liabilities'.

(a) It is fully insured to meet potential liabilities.

(b) He wants to know the precise amount of the liabilities he is taking over.

(c) The company has liabilities to its employees.

(d) What are the liabilities for dismissal?

8. The objection in para 10 that …… is not countered in the passage by the author.

(a) not everyone wants to be a vegetarian

(b) if CAFOs move toward producing more organic products, food prices will go up

(c) the increase in food prices will reduce consumption of meat

(d) it is illegal to ban CAFOs on the basis of current laws

9. Pick the option that correctly states the option that DOES NOT support the authors argument.

(a) CAFO should not be blamed for the increasing health and environmental concerns.

(b) Organic farming should be adopted by farmers of the CAFO.

(c) A stringent check must be maintained on the CAFO to make sure that the standards and qualities are maintained.

(d) Animal rights should be the central concern of the CAFO's.

10. According to passage, which of the following are the good source of protein?

(a) Chicken meat (b) Soyabeans

(c) Both (a) and (b) (d) Fruit Juices

Passage 8

1. It is not uncommon for close synonyms to be understood to share the same meaning. For instance, the difference between words such as 'hard' and 'difficult' goes tragically unnoticed. One may employ one or the other with complete indifference, postulating no discrepancy between them. In general this is well and good; most people lack the excessive concern to quibble over such trifles. Nevertheless, for those of us with ample compulsiveness (and time), it is of significant value to comprehend such nuances.

2. For instance, take the following sentences :

   (a) The test was hard. (b) The test was difficult.

   Is the difference between these synonyms readily apparent? Is there a noticeable difference between them at all? Indeed, these questions are valid and warrant an answer. For, what would be the point of having multiple words with exactly the same meaning? No, that would be superfluous, the English language being far too economical.

3. While many close synonyms share similar, if not the same, dictionary definitions, the feeling, or mood, they convey is utterly singular. Although a dictionary can provide information about word meanings, pronunciations, etymologies, inflected forms, derived forms etc, it cannot communicate how it feels to use a word.

4. So, if there is indeed a difference between words such as 'hard' and 'difficult', what is it? To begin with, 'hard' is pragmatic and realistic, firmly grounded in reality. It is a utilitarian word that gets the job done and doesn't apologise for its brusque, uncouth nature. On the other hand, 'difficult' is eloquent and refined. It is civilised, willing to expend the effort necessary to appear urbane. Why, the mere difference in sonic quality between them is striking enough. 'Hard' makes a quick, unassuming sound, having a single syllable (voiced under certain inflections, it can even come across as harsh), while 'difficult' is more lengthy and melodic, its number of syllables totalling three times that of its counterpart.

5. Furthermore, 'hard' is more likely to be used in casual, informal circumstances, or to communicate an idea 'on the go' or simply to 'get it out' as the sayings go. It is used without pretence, and does not maintain a feeling of being overly concerned. In terms of daily usage, 'hard' may be employed by an exhausted brick mason when posed with the question, "How was your day?" Conversely, 'difficult' may be used by a military General upon explaining to his or her superior the progression of a particularly taxing campaign.

6. Similar to 'hard' and 'difficult', the words 'weird' and 'strange' are also close synonyms, and may seemingly be used interchangeably. Take, for instance, the following sentences:

   (a) Sea monkeys are weird.

   (b) Sea monkeys are strange.

   Contrary to popular belief, these sentences are not tautologous. So how do they differ? Their dictionary definitions are nearly identical, so the difference does not lie there. Rather, the difference involves

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the feeling, or mood, that these words convey. Notice that while 'weird' and 'strange' both have only one syllable, the latter has a remarkably distinguished feel. Similar to 'hard', 'weird' conveys a more basic, a more crude, sentiment. Something 'weird' is crass or gross, and is typically undesirable. No one wants to be associated with something 'weird'. If trying to impress someone, one probably doesn't want to be categorised among the 'weird'.

7. On the other hand, if something is labelled as 'strange', it is not necessarily bad. Rather, something 'strange' is simply abnormal, or unusual, a deviation from what is expected. This distinction between 'weird' and 'strange' is so pronounced that the latter can be used as a euphemism for the former in certain situations. For instance, notice how a simple substitution is able to make the following sentence less offensive: "Your mother's cookies taste weird." compared to "Your mother's cookies taste strange." In the former sentence, the speaker sounds as though he or she is insulting your mother's cookies, stating that they taste bad. In the latter sentence, however, the speaker sounds as though the cookies simply taste different, or unusual, compared to what he or she is used to, the difference owing to the innocuous addition of too much flour, perhaps.

8. Granted, the notion that close synonyms can be used interchangeably is prevalent among English speakers. And alas, the dictionary, the text purported to be responsible for clarifying such issues, is of little assistance. In the end, it is left to us, the speakers of the language, those actively responsible for maintaining its sustenance and generation, to understand how these words make us feel and what mood we are inclined to attach to them. Using the examples and insights described above, one may come to recognise these subtle, yet crucial, differences.

1. The word 'hard' is more likely to be used
(a) to communicate an idea 'on the go'
(b) to convey the feeling of not being much concerned
(c) in casual, informal circumstances
(d) All of the above

2. "….to quibble over such trifles" Pick the option in which the meaning of 'quibble' is the same as it is in the passage.
(a) She's only introducing this as a quibble.
(b) His main weakness is to quibble over unimportant things.
(c) The only quibble about this book is the lack of colour illustrations.
(d) She pretended to quibble with a phrase or two, then looked questioningly to her mother.

3. What is the common understanding of close synonyms?
(a) They have the same meaning.
(b) They are used in different contexts.
(c) They are used in different tones.
(d) They are superfluous.

4. The word 'hard' is
(a) pragmatic and realistic
(b) eloquent and refined
(c) lengthy and melodic
(d) All of the above

5. Which of the problem is correct regarding dictionaries as per the passage?
(a) Dictionaries gives us the history of the usage of the word.
(b) Dictionaries does not tell how it feels to use the word.
(c) Dictionaries tell us the root word of all words.
(d) Both (b) and (c)

6. The difference between the words 'weird' and 'strange' is
(a) the number of syllables they have
(b) the commonality of their usage
(c) the number of letters each word has
(d) the feeling, or mood, that these words convey

7. The word 'weird' conveys the sentiment of
(a) deviating from the expected
(b) something basic, crude and undesirable
(c) being unusual
(d) None of the above

8. Pick the option showing the INCORRECT use of the word 'uncouth'.
(a) He would become dreadful, hideous, and uncouth.
(b) Others see us as overly materialistic, somewhat uncouth and lacking in social graces.
(c) An earthy, uncouth an innocent girl was rest to peace.
(d) The chapter was very long, and consisted entirely of names, uncouth and difficult to pronounce.

9. Which of the following is CORRECT according to the passage?
(a) Even synonyms are different.
(b) Words take contextual meaning.
(c) Synonyms are approximately similar in meaning.
(d) All of the above

10. Which word in passage is a correct antonym of 'Insufficient'?
(a) Superfluous
(b) Eloquent
(c) Crucial
(d) Prafmatic

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Passage 9

1. Post-traumatic stress disorder (PTSD) is a severe anxiety disorder that affects millions of people around the world. Individuals can develop PTSD after experiencing any event that results in psychological trauma. Symptoms of PTSD involve flashbacks to the traumatic event, nightmares, obsessive behaviour, anger, insomnia, difficulty concentrating, and hyper-vigilance.
2. Individuals who suffer from PTSD can experience significant difficulties in social relationships, have lower self-esteem, and have trouble maintaining employment. People with PTSD experience a higher risk of committing suicide, developing a drug addiction, and suffering from alcoholism. Although PTSD can affect any individual, military veterans are especially susceptible to this debilitating affliction. Furthermore, within this population, women are more than twice as likely as men to develop PTSD. Studies have also shown that former service women who do develop PTSD experience more severe symptoms than their male counterparts. Recent changes made by the United States Department of Veterans Affairs have improved treatment options for female veterans living with PTSD, but there is still more that needs to be done.
3. Although studies investigating precisely why women are more likely than men to experience PTSD have not yet been completed, some experts have theorised that low unit cohesion is a major factor. Unit cohesion, defined as the mutual bonds of friendship and support among members of a military unit, is thought to be helpful in reducing the incidence of developing PTSD.
4. According to recent surveys compiled by US Army researchers, increased unit cohesion emerged as the most important factor determining whether soldiers developed suicidal thoughts. Women are more likely than men to experience low unit cohesion for a variety of reasons. One of the most obvious factors is the relative paucity of females in the military; currently, women make up only 20% of the armed forces. Pervasive male prejudice against women is another factor that can diminish unit cohesion for female soldiers. Because women are less likely than men to experience unit cohesion while serving in the military, women are less likely to develop the social support structures that will help prevent them from developing PTSD, depression, or other serious mental health problems.
5. Another issue at play is the stigma amongst military personnel that asking for help for mental health issues makes one 'weak'. A recent Department of Defence study of returning combat troops shows that only 1 in 6 veterans acknowledged themselves to be suffering from symptoms of PTSD, and 3 out of 5 veterans were convinced that their comrades and commanding officers would lose confidence in them if they sought treatment for mental health issues.
6. For women, this hesitation to self-identify as a sufferer of PTSD could be even greater; historically, female soldiers have struggled to be counted as equals to men on the battlefield. Women, stereotypically considered to possess less emotional fortitude than men, may be unwilling to admit that they are suffering from PTSD lest they appear to conform to this stereotype. Unfortunately for those who do not seek help, when PTSD goes untreated, it is very likely to worsen over time.
7. Another challenge is that until very recently, treatment for PTSD has been more difficult for women than men to obtain. Before rule changes were enacted in 2010, only veterans who encountered direct combat experience qualified to receive disability payments for PTSD. Because very few women are placed on the front lines, very few were eligible to receive free treatment for PTSD. However, recent regulation changes have ended these stipulations, allowing women who serve in any capacity to be eligible for benefits.
8. Even if female veterans are eligible for these benefits, the quality of the care a wartime PTSD sufferer receives can vary widely. The United States Department of Veterans Affairs (VA) pays disability benefits to service men and women who have been diagnosed with PTSD and also provides these individuals with free health care.
9. But while mental health counselling that comes directly from VA doctors is completely free to veterans, there are often long waiting lists for those who need to be evaluated or treated. Therapy provided by non-VA professionals may not be covered by health insurance. Access to mental health professionals who have been specially trained to treat wartime PTSD is often difficult for those not living near major urban centres.
10. Perhaps the biggest impediment to achieving quality treatment for women suffering from wartime PTSD is a lack of research. While both the VA and independent agencies have completed hundreds of studies researching the prevention of

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and treatment for PTSD amongst general military populations, there have been no studies completed that solely target women.

11. Before adequate care can be provided, there must be greater understanding about the root causes of this issue as it affects women specifically. On both the research level and the policy level, more must be done to help the women who have sacrificed so much for their country.

1. The primary purpose of the passage is to …… .
(a) inform readers about the likely warning signs of PTSD among military veterans
(b) persuade government officials to increase funding for PTSD treatment centres in non-urban areas
(c) explain why military veterans are more likely than civilians to develop PTSD
(d) educate readers about the problem of insufficient treatment available for female veterans with PTSD

2. "….members of a military unit" Pick the option in which the meaning of 'unit' is NOT the same as it is in the passage.
(a) The unit has insufficient armament with which to do battle.
(b) The control unit decoded the 18 bits.
(c) The present perfect is covered in Unit 8.
(d) The man is in the hospital's intensive care unit.

3. Based on your understanding of the passage, choose the option that lists the correct sequence of information given in the passage.
1. The United States Department of Veterans provides medical help to its militants.
2. A symptom of PTSD is, difficulty in concentrating.
3. Women suffer from acute PTSD.
4. PTSD is common amongst military veterans.
5. There is a stigma amongst military personnel asking for medical help.

(a) 2,4,3,5,1 (b) 1,3,2,4,5
(c) 3,2,4,1,5 (d) 4,2,3,5,1

4. Females develop PTSD more frequently than males because
(a) women may face negative stereotypes in the military
(b) women experience lower unit cohesion than men
(c) males tend to develop stronger social bonds during their service time
(d) All of the above

5. The statement that …… gives the author's correct opinion about the status of mental health care provided for female veterans.
(a) although the VA has not done enough, state and independent agencies have made up for government deficiencies
(b) the amount of care provided has improved over the past few years, but it is still insufficient
(c) The VA and other government agencies have tried to provide mental health care for female veterans, but most of them refuse to seek treatment
(d) the US government has done almost nothing to help

6. The quality of the care a wartime PTSD sufferer receives is difficult …… .
(a) because suitably trained professionals are available
(b) the root causes of this issue are well-known and researched
(c) for those not living near major urban centres
(d) All of the above

7. Pick the option showing the INCORRECT use of the word 'impediment'.
(a) The main impediment to growth was a lack of capital.
(b) He also had a speech impediment.
(c) Shortage of money was not the only impediment to higher education.
(d) None of the above

8. Based on information in the passage, it can be concluded that the author
(a) believes that advocating for a cause can lead to change
(b) has conducted studies on PTSD among veterans
(c) is a mental health care professional
(d) does not believe women should be allowed to serve in the military

9. Which of the following does not prevent PTSD?
(a) Bonds of friendship (b) Mental support
(c) Diary entry (d) Less prejudice

10. Find out the word from the passage which is similar of 'obstacle'?
(a) vigilance (b) affliction
(c) diminish (d) impediment

Passage 10

1. The basic task of a manager is to control workers and get the maximum amount of work out of them. There are two main ways of making workers produce more. One is to extend the working hours. The other is to increase the amount that is produced within a given time period. Machinery helps to increase production, but it also creates the danger that eventually machines will replace workers. Both Marx and Mahatma Gandhi saw mechanisation as a danger to employment.

2. Another way of increasing output is by organising work. An American called Frederick Winslow Taylor invented a new system in the 1890s, which he called 'Scientific Management'. It is also known as Taylorism, or industrial engineering. Under his

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system, all work was broken down into its smallest repetitive elements, and divided between workers. Workers were timed with the help of stopwatches and had to fulfil a certain target every day.

3. Production was further speeded up by the introduction of the assembly line. Each worker sat along a conveyor belt and assembled only one part of the final product. The speed of work could be set by adjusting the speed of the conveyor belt. During the 1980s, there was an attempt to shift away from this system of direct control to indirect control, where workers are supposed to motivate and monitor themselves. But often we find that the old Taylorist processes survive.
4. Workers in textile mills, which are one of the oldest industries in India, often described themselves as extensions of the machine. Ramcharan, a weaver who had worked in the Kanpur cotton mills since the 1940s, said, "You need energy. The eyes move, the neck, the legs and the hands, each part moves. Weaving is done under a continuous gaze-one cannot go anywhere, the focus must be on the machine. When four machines run, all four must move together, they must not stop."
5. The more mechanised an industry gets, the fewer people are employed, but they too have to work at the pace of the machine. For instance, in Maruti Udyog Ltd, two cars roll off the assembly line every minute. Workers get only 45 minutes rest in the entire day-two tea breaks of 7 ½ minutes each and one lunch break of half an hour. Most of them are exhausted by the age of 40 and take voluntary retirement.
6. While production has gone up, the number of permanent jobs in the factory has gone down. The firm has outsourced all services such as cleaning and security, as well as the manufacture of parts. The parts suppliers are located around or near the factory and send the parts every two hours, or just-in-time. Outsourcing and just-in-time keeps costs low for the company, but the workers are very tense, because if the supplies fail to arrive, their production targets get delayed and, when they do arrive, the workers have to work faster to keep up. No wonder they get exhausted.
7. Now let us look at the services sector. Software professionals are middle class and well educated. Their work is supposed to be self-motivated and creative. But it is also subject to Taylorist labour processes. 10 to 12 hours is an average workday, and it is not uncommon for employees to stay overnight in the office (known as a 'night out'), when faced with a project deadline. Long working hours are central to the industry's work culture.
8. As a result of these working hours, in places like Bengaluru, Hyderabad and Gurgaon, where many IT firms or call centres are located, shops and restaurants have also changed their working hours, and are open late. If both husband and wife work, then children have to be put in crèches. The joint family, which was supposed to have disappeared with industrialisation, seems to have re-emerged, as grandparents are roped in to help with children.
9. One important debate going on is whether industrialisation and the shift to services and knowledge-based work like IT leads to greater skills in society. We often hear the phrase 'knowledge economy' to describe the growth of IT in India. But how do you compare the skills of a farmer who has the skills to grow many hundreds of crops relying on his or her understanding of the weather, the soil and the seeds, with the knowledge of a software professional? Both are skilled but in different ways. The famous sociologist, Harry Braverman, argues that the use of machinery actually deskills workers. For instance, whereas earlier, architects and engineers had to be skilled draughtsmen, now the computer does a lot of the work for them.

1. Machinery creates the danger that
(a) it will extend the working hours of workers
(b) it may cause loss due to high cost
(c) ultimately machines will replace workers and cause unemployment
(d) faults in the machines may reduce production

2. "The firm…." Pick the option in which the meaning of 'firm' is NOT the same as it is in the passage.
(a) The firm openly traded in arms.
(b) No human can repel a firm hope.
(c) The firm needs more people of your calibre.
(d) We subcontracted the work to a small engineering firm.

3. Based on your understanding of the passage, choose the option that lists the correct sequence of information given in the passage.
1. Machinery deskills workers.
2. Joint family systems have come back.
3. Mechanisation promotes unemployment.
4. Assembly line speeded the production.
5. Mahatma Gandhi was against mechanisation

(a) 1,2,3,4,5 (b) 2,3,4,1,5
(c) 3,4,1,2,5 (d) 5,4,3,2,1

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4. On the assembly line, each worker
   (a) was given a boring job
   (b) speeded up the work
   (c) was timed with a stopwatch
   (d) assembled only one part of the final product

5. Which of the following is CORRECT regarding Taylorism?
   (a) Taylorism organised activities leading to greater production.
   (b) Taylorism broke down work into smaller units.
   (c) Taylorism promotes the use of assembly line.
   (d) Taylorism made everything time-driven.

6. Workers in textile mills described themselves as …… .
   (a) being subjected to mental tension
   (b) extensions of the machine
   (c) toys in the hands of the management
   (d) always moving with the machine

7. …… keeps costs low for Maruti Udyog Ltd.
   (a) The tension in the workers
   (b) Parts supplies failing to arrive
   (c) Short breaks for lunch and tea
   (d) Outsourcing and just-in-time

8. Pick the option showing the CORRECT use of the word 'roped'.
   (a) The baggage was properly roped up and conveyed to the airport.
   (b) They roped him to a tree.
   (c) Denise roped me into selling tickets.
   (d) The stairs were roped off.

9. The joint family seems to have re-emerged because
   (a) grandparents are needed to look after children
   (b) IT leads to greater skills in society
   (c) children have to be put in crèches
   (d) shops and restaurants are open late

10. Who argues that machinery is responsible for deskilling workers?
   (a) Taylor (b) Harry Braverman
   (c) Mahatma Gandhiji (d) Karl Marx

Passage 11

"A principal fruit of friendship," Francis Bacon wrote in his timeless meditation on the subject, "is the ease and discharge of the fulness and swellings of the heart, which passions of all kinds do cause and induce." For Thoreau, friendship was one of life's great rewards. But in today's cultural landscape of muddled relationships scattered across various platforms for connecting, amidst constant debates about whether our Facebook "friendships" are making us more or less happy, it pays to consider what friendship actually is. That's precisely what CUNY philosophy professor Massimo Pigliucci explores in Answers for Aristotle: How Science and Philosophy Can Lead Us to A More Meaningful Life (public library), which also gave us this provocative read on the science of what we call "intuition."

Philosophers and cognitive scientists agree that friendship is an essential ingredient of human happiness. But beyond the dry academic definitions — like, say, "voluntary interdependence between two persons over time, which is intended to facilitate socio-emotional goals of the participants, and may involve varying types and degrees of companionship, intimacy, affection and mutual assistance"— lies a body of compelling research that sheds light on how, precisely, friendship augments happiness.

The way friendship enhances well-being, it turns out, has nothing to do with quantity and everything to do with quality — researchers confirm that it isn't the number of friends (or, in the case of Facebook, "friends").

1. Name one change effected in the present situation which hassled to a re-thinking of the concept of friendship
   (a) Bacon and Thoreau's theories are no longer available to read
   (b) The arrival of social media on the scene
   (c) There is more interest in the sciences
   (d) Friendships are not possible in the real world anymore, due to over-competition

2. Friendship leads to happiness. Is it true?
   (a) Yes, researches have proven that friendship does lead to happiness
   (b) No, there is no relationship between friendship and happiness
   (c) Friends cannot make each other happy
   (d) One needs to find one's happiness alone, with peace of mind

3. Did Pigluicci's book discuss intuition too?
   (a) No, it only discussed friendship
   (b) It explained science and philosophy
   (c) It discusses Aristotle's theories
   (d) Yes

4. Is the quality of friends important?
   (a) No, it is important to have more number of friends, quality does not matter
   (b) No, number of comments on social networking sites is important, not the quality of friends
   (c) Yes, it matter
   (d) No, quality comes automatically with quantity

5. As per the first, paragraph what are the debates about?
   (a) They are centered around whether our Facebook friends are helping us become more or less happy
   (b) There are no debates around friendship
   (c) The quality of comments of social media is debatable
   (d) Thoreau and Aristotle's thinking is at loggerheads

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Passage 12

The Indian Space Research Organisation (ISRO, /ˈISROʊ/) is the space agency of the Government of India headquartered in the city of Bangalore. Its vision is to "harness space technology for national development while pursuing space science research and planetary exploration".

Formed in 1969, ISRO superseded the erstwhile Indian National Committee for Space Research (INCOSPAR) established in 1962 by the efforts of independent India's first Prime Minister, Jawaharlal Nehru, and his close aide and scientist Vikram Sarabhai. The establishment of ISRO thus institutionalized space activities in India. It is managed by the Department of Space, which reports to the Prime Minister of India.

ISRO built India's first satellite, Aryabhata, which was launched by the Soviet Union on 19th April 1975. It was named after the Mathematician Aryabhata. In 1980, Rohini became the first satellite to be placed in orbit by an Indian-made launch vehicle, SLV-3. ISRO subsequently developed two other rockets: the Polar Satellite Launch Vehicle (PSLV) for launching satellites into polar orbits and the Geosynchronous Satellite Launch Vehicle (GSLV) for placing satellites into geostationary orbits. These rockets have launched numerous communication satellites and earth observation satellites. Satellite navigation systems like GAGAN and IRNSS have been deployed. In January 2014, ISRO successfully used an indigenous cryogenic engine in a GSLV-D5 launch of the GSAT-14.

ISRO sent a lunar orbiter, Chandrayaan-1, on 22nd October 2008 and a Mars orbiter, Mars Orbiter Mission, on 5th November 2013, which successfully entered Mars orbit on 24th September 2014, making India the first nation to succeed on its first attempt to Mars, and ISRO the fourth space agency in the world as well as the first space agency in Asia to successfully reach Mars orbit. On 18th June 2016 ISRO successfully set a record with a launch of 20 satellites in a single payload, one being a satellite from Google. On 15th February 2017, ISRO launched 104 satellites in a single rocket (PSLV-C37) and created a world record. ISRO launched its heaviest rocket, Geosynchronous Satellite Launch Vehicle-Mark III (GSLV-Mk III), on 5th June 2017 and placed a communications satellite GSAT-19 in orbit. With this launch, ISRO became capable of launching 4 ton heavy satellites.

1. Is the ISRO a private organisation?
(a) No, it is a government organization
(b) Yes, it is a private organization
(c) It used to be a government organization but not anymore
(d) It is a non-functional entity

2. The ISRO only launches other nations' satellites?
(a) Yes, it generates revenue through launching foreign satellites only
(b) No, it is involved in space and planetary exploration
(c) It deals with geographical spaces on earth
(d) It searches for aliens

3. India still uses foreign-made satellite launch vehicles?
(a) No, it has its own satellite launch vehicles
(b) Yes
(c) Only India's first satellite – Aryabhata – was launched by the Soviet Union
(d) None of the above

4. From the third paragraph, choose a word which is closest in meaning to 'assistant':
(a) Scientist (b) Aide
(c) Independent (d) Institutionalised

5. Who was Aryabhata, according to the third paragraph?
(a) A scientist (b) A mathematician
(c) India's prime minister (d) The head of ISRO

Passage 13

The Indian Army is the land-based branch and the largest component of the Indian Armed Forces. The President of India is the Supreme Commander of the Indian Army, and it is commanded by the Chief of Army Staff (COAS), who is a four-star general. Two officers have been conferred with the rank of field marshal, a five-star rank, which is a ceremonial position of great honour. The Indian Army originated from the armies of the East India Company, which eventually became the British Indian Army, and the armies of the princely states, which finally became the national army after independence. The units and regiments of the Indian Army have diverse histories and have participated in a number of battles and campaigns across the world, earning a large number of battle and theatre honours before and after Independence.

The primary mission of the Indian Army is to ensure national security and national unity, defending the nation from external aggression and internal threats, and maintaining peace and security within its borders. It conducts humanitarian rescue operations during natural calamities and other disturbances, like Operation Surya Hope, and can also be requisitioned by the government to cope with internal threats. It is a major component of national power alongside the Indian Navy and the Indian Air Force. The army has been involved in four wars with neighbouring Pakistan and one with China. Other major operations undertaken by the army include: Operation Vijay, Operation Meghdoot and Operation Cactus.

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Apart from conflicts, the army has conducted large peace time exercises like Operation Brasstacks and Exercise Shoorveer, and it has also been an active participant in numerous United Nations peacekeeping missions including those in: Cyprus, Lebanon, Congo, Angola, Cambodia, Vietnam, Namibia, El Salvador, Liberia, Mozambique and Somalia.

The Indian Army has a regimental system, but is operationally and geographically divided into seven commands, with the basic field formation being a division.

It is an all-volunteer force and comprises more than 80% of the country's active defence personnel. It is the 2nd largest standing army in the world, with 1,237,117 active troops and 960,000 reserve troops.

The army has embarked on an infantry modernisation programme known as Futuristic Infantry Soldier As a System (F-INSAS), and is also upgrading and acquiring new assets for its armoured, artillery and aviation branches.

1. Is the chief of army a five-star general?
(a) Yes
(b) No, he is a four-star general
(c) No, the field marshal is the five-star general
(d) No, the chief of army is the president

2. What is the basic field formation in the Indian army?
(a) The regiment
(b) The division
(c) The infantry
(d) Aviation

3. Is the Indian army involved in any peace-making efforts?
(a) no, it only involves itself in conflict situations
(b) It helps in rebuilding cities ravaged by wars
(c) Yes, it does involve itself in peace-making efforts
(d) It does not enter into conflict zones

4. Is the Indian army the only component of national power?
(a) Yes
(b) No, national power is a combination of the army, the navy and the air force
(c) No, the navy is the only component
(d) No, all national power lies in the hands of the government

5. Is the Indian army an 'all-volunteer' force?
(a) No it is compulsory for every Indian above the age of 18 to join the army
(b) Yes it is
(c) No, only the air force is all voluntary
(d) No, the navy is all-voluntary

Passage 14

Born on Jan 12, 1863 in an affluent Bengali family, Narendra Natha Datta was a precocious child who was what we call nowadays, an all-rounder, excelling in music, studies and athletics. His father Vishwanatha Datta was a well-known attorney. However, he took the spiritual route instead and introduced Hinduism to the world in 1893 when he spoke at the World's Parliament of Religion (probably one of the most epic things any Indian has done abroad!).

The historic speech was given on September 11, 1893 by Swami Vivekananda. Here's the full text of his opening and closing address:

Sisters and Brothers of America,

It fills my heart with joy unspeakable to rise in response to the warm and cordial welcome which you have given us. I thank you in the name of the most ancient order of monks in the world; I thank you in the name of the mother of religions, and I thank you in the name of millions and millions of Hindu people of all classes and sects.

My thanks, also, to some of the speakers on this platform who, referring to the delegates from the Orient, have told you that these men from far-off nations may well claim the honor of bearing to different lands the idea of toleration. I am proud to belong to a religion which has taught the world both tolerance and universal acceptance.

We believe not only in universal toleration, but we accept all religions as true. I am proud to belong to a nation which has sheltered the persecuted and the refugees of all religions and all nations of the earth. I am proud to tell you that we have gathered in our bosom the purest remnant of the Israelites, who came to Southern India and took refuge with us in the very year in which their holy temple was shattered to pieces by Roman tyranny. I am proud to belong to the religion which has sheltered and is still fostering the remnant of the grand Zoroastrian nation. I will quote to you, brethren, a few lines from a hymn which I remember to have repeated from my earliest boyhood, which is every day repeated by millions of human beings: "As the different streams having their sources in different paths which men take through different tendencies, various though they appear, crooked or straight, all lead to Thee."

The present convention, which is one of the most august assemblies ever held, is in itself a vindication, a declaration to the world of the wonderful doctrine preached in the Gita: "Whosoever comes to me, through whatsoever form, I reach him; all men are struggling through paths which in the end lead to me." Sectarianism, bigotry, and its horrible descendant, fanaticism, have long possessed this beautiful earth.

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1. What was Vishwanatha Datta's profession?
   (a) Attorney (b) Spiritual leader
   (c) Teacher (d) None of the above

2. Who spoke at the World's Parliament of Religion?
   (a) Narendra Nath Datta (b) Swami Vivekananda
   (c) Both (d) None of these

3. Give the opposite of the word "Occident" from the second passage of the speech.
   (a) Delegate (b) Universal
   (c) Orient (d) Toleration

4. In the phrase: "all lead to Thee", to whom does the word 'Thee' refer?
   (a) All religions
   (b) The delegates present
   (c) Universal brotherhood and peace
   (d) God

5. In the phrase: "I am proud to belong to a nation" – what nation is the speaker referring to?
   (a) India (b) Southern India
   (c) Rome (d) America

Passage 15

What is immediately needed today is the establishment of a World Government or an International Federation of Mankind. It is the utmost necessity of the world today, and all those persons who wish to see all human beings happy and prosperous naturally feel it keenly. Of course, at times, we all feel that many of our problems of our political, social and cultural life would come to an end if there were one Government all over the world. Travellers, businessmen, seekers of knowledge and teachers of righteousness know very well that great impediments and obstructions are faced by them, when they pass from one country to another, exchange goods, get information and make an effort to spread their good gospel among their fellowmen.

In the past religious sects divided one set of people against another, colour of the skin or construction of the body set one against the other. But today when philosophical light has exploded the darkness that was created by religious differences and when the scientific knowledge has falsified the theory of social superiority and when modern inventions have enabled human beings of all religious views and of all races and colours to come in frequent contact with one another, it is the governments of various countries that keep people of one country apart from those of another. They create artificial barriers, unnatural distinctions, unhealthy isolation, unnecessary fears and dangers in the minds of common men who by their nature want to live in friendship with their fellowmen. But all these evils would cease to exist if there were one government all over the world.

1. What is the urgent need of the world today?
   (a) The establishment of an international economic order
   (b) The establishment of a world government
   (c) The creation of a cultured international social order
   (d) The raising of an international spiritual army

2. What was the factor that set one man against another?
   (a) Material prosperity of certain people in the midst of grinding poverty
   (b) Superior physical strength of some persons
   (c) Colour of the skin or construction of the body
   (d) Psychological barriers

3. Which of the following problems has not been mentioned in the passage as likely to be solved with the establishment of a World Government?
   (a) Social problems (b) Political problems
   (c) Cultural problems (d) Economic problems

4. What do the government of various countries do to keep people of one country apart from those of another?
   (a) They create artificial barriers
   (b) They create unnatural distinctions
   (c) They foster unhealthy isolation
   (d) All of the above

5. What divide/divides people of one country against another?
   (a) Different religions
   (b) Different languages
   (c) Material advancement of few nations with imperialistic learnings
   (d) Government of various countries

Passage 16

The function of education is to prepare young people to understand the whole process of life. The end of education is not merely to pass some examinations and get a job and earn one's livelihood. If education is to make people understand life, then surely life is not merely a job or an occupation; life is something extraordinarily wide and profound, it is a great mystery, a vast realm in which we function as human beings. If we prepare ourselves only to earn a livelihood, we shall miss the whole point of life. To understand life is much more important than to get a degree or pass an examination for a job.

Life, with all its subtleties, is such a vast expanse. It has its extraordinary beauty, its sorrows and joys. It also has its hidden things of the mind such as envies, ambitions, passions, fears, fulfilment and anxieties. The birds, the flowers, the flourishing trees, the heavens, the stars, the rivers and the fishes therein all this is life. When we are young, we must seek and find out what life is all about.

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Thus, we cultivate intelligence with the help of education. Intelligence is the capacity to think freely, without fear, without a formula, so that we begin to discover for ourselves what is real and what is true.

Anyone who is gripped with fear will never be intelligent. Most of us have fear in one form or another. Where there is fear there is no intelligence. Thus, what education should do is to help us understand the need of freedom. Unless we are free we will not understand the whole process of living. When we are free we have no fear. We do not imitate but we discover.

1. What is effect of fear on humans?
(a) We are not able to develop our intelligence
(b) We think freely
(c) We see the vast expanse of life
(d) We understand life's great mystery

2. The aim of education is to make us realise the need of
(a) freedom (b) passing examinations
(c) jobs (d) understanding science

3. When we are young we should
(a) seek the meaning of life
(b) study and get a degree
(c) try for a good job
(d) study science

4. Education helps us realise the
(a) way to develop our career
(b) need for good health
(c) meaning of fear
(d) necessity of freedom

5. The passage is about
(a) education (b) freedom
(c) intelligence (c) livelihood

Passage 17

Traditional Indian values must both be viewed both from the angle of an individual and from that of a geographically delimited agglomeration of people or groups enjoying a common system of leadership which we call the 'State'. Indian State's special feature is the peaceful, coexistence of social groups of various historical provenances which mutually adhere in a geographical, economic and political sense, without ever assimilating to each other in social terms, in ways of thinking, or even in language.

Modern Indian law will determine certain rules, especially in relation to the regime of the family, upon the basis of how the loin-cloth is tied, or how the turban is worn, for this may identify the litigants as members of a regional group and therefore, as participants in its traditional law, though their ancestors left the region three or four centuries earlier. The use of the word 'State' above must not mislead us.

There was no such thing as a conflict between the individual and the State, atleast before foreign governments became established, just as there was no concept of state 'sovereignty' or of any church-and-state dichotomy.

Modern Indian 'secularism' has an admittedly peculiar feature : it requires the state to make a fair distribution of attention amongst all religions. These blessed aspects of India's famed tolerance (Indian kings so rarely persecuted religious groups that the exceptions prove the rule) at once struck the Portuguese and other European visitors to the West Coast of India in the sixteenth century and the impression made upon them in this and other ways gave rise, at one remove, to the basic Constitution of Thomas More's Utopia.

There is little about Modern India that strikes one at once as Utopian : but the insistence upon the inculcation of norms and the absence of bigotry and institutionalised exploitation of human or natural resources are two very different features which link the realities of India and her tradition with the essence of all Utopians.

1. Which of the following is a special feature of the Indian State?
(a) Peaceful co-existence of people under a common system of leadership
(b) Peaceful co-existence of social-groups of different historical provenances attached to each other in a geographical, economic and political sense
(c) Social integration of all groups
(d) Cultural assimilation of all social groups

2. The author uses the word 'State' to highlight
(a) antagonistic relationship between the state and the individual throughout the period of history
(b) absence of conflict between the state and the individuals upto a point in time
(c) the concept of state sovereignty
(d) dependence on religion

3 Which one is the peculiar feature of modern Indian 'secularism'?
(a) No discrimination on religious considerations
(b) Total indifference to religion
(c) No space for social identity
(d) Disregard for social law

4 The basic construction of Thomas More's Utopia was inspired by
(a) Indian tradition of religious tolerance
(b) persecution of religious groups by Indian rulers
(c) social inequality in India
(d) European perception of Indian state

5 What is the striking feature of modern India?
(a) Replica of Utopian State
(b) Uniform laws
(c) Adherence to traditional values
(d) Absence of Bigotry

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Passage 18

Taylorism is a variation on the theme of efficiency; it is a late-19th-and-early-20th-century instance of the larger recurring theme in human life of increasing efficiency, decreasing waste, and using empirical methods to decide what matters, rather than uncritically accepting pre-existing ideas of what matters.

Taylor system is a theory of management that analyses and synthesises workflows, improving labour productivity. The core ideas of the theory were developed by Frederick Winslow Taylor in the 1880s and 1890s, and were first published in the monographs, shops management (1905) and The Principles of Scientific Management (1911).

Frederick Taylor believed that decisions based upon tradition and rules of thumb should be replaced by precise procedures developed after careful study of an individual at work. Its application is contingent on a high level of managerial control over employee work practices. Thus, it is a chapter in the larger narrative that also includes, for example, the folk wisdom of thrift, time and motion study, Fordism, and lean manufacturing.

In management literature today, the greatest use of the concept of Scientific Management (or Taylorism) is as a contrast to a new, improved way of doing business.

It overlapped considerably with the efficiency movement, which was the broader cultural echo of scientific management's impact on business managers specifically. In political and sociological terms, Taylorism can be seen as the division of labour pushed to its logical extreme, with a consequent de-skilling of the worker and dehumanisation of the workplace.

1. Scientific management is a theory of management
(a) that promotes the rule of thumb
(b) that promotes the democratic pattern in industrial organisation
(c) that analyses and synthesises workflows, improving labour productivity
(d) that promotes the unity of command within the organisation

2. Frederick Taylor believed that
(a) decisions based upon tradition and rules of thumb should be replaced by precise procedures developed after careful study of an individual at work.
(b) decisions based upon precise procedures developed after careful study of an individual at work should be replaced by tradition and rules of thumb
(c) strict discipline should be applied at the workplace
(d) workers should be treated as a means of productivity like machine

3. Taylorism is based on
(a) decreasing efficiency, increasing waste, and using empirical methods to decide what matters, rather than uncritically accepting pre-existing ideas of what matters
(b) increasing efficiency, decreasing waste, and using empirical methods to decide what matters, rather than uncritically accepting pre-existing ideas of what matters
(c) decreasing efficiency, increasing waste and using traditional methods for day-to-day decision.
(d) decreasing efficiency, increasing waste, and applying completely democratic pattern within the organisation.

4. Scientific management
(a) overlapped considerably with the efficiency movement, which was the broader cultural echo of scientific management's impact on business managers specifically
(b) overlapped considerably with the effectiveness movement which was the broader cultural echo of scientific management's impact on business managers specifically
(c) overlapped considerably with the democatic movement, which was the broader cultural echo of scientific management's impact on business managers specifically
(d) overlapped considerably with the autocratic pattern, which was the broader cultural echo of scientific management's impact on business managers specifically

5. In political and sociological terms,
(a) overlapped considerably with the efficiency movement, which was the broader cultural echo of scientific management's impact on business managers specifically
(b) Taylorism can be seen as the division of labour pushed to its democratic pattern, with a consequent de-skilling of the worker and dehumanisation of the workplace.
(c) Taylorism can be seen as the division of labour pushed to its democratic pattern, with a perfect skilling of the worker and humanisation of the workplace.
(d) Taylorism can be seen as the division of labour pushed to its logical extreme, with a consequent de-skilling of the worker and dehumanisation of the workplace.

Passage 19

Human resource planning is strategy for acquisition, utilisation, improvement and preservation of the human resources of an enterprise. The objective is to provide right personnel for the right work and optimum utilisation of the existing human resources. It puts the objectives of the organisation on paper and plans into the number and kind of personnel needed to accomplish those objectives. Thus, HRP involves determination of future manpower needs to help management in being upbeat. Manpower planning starts with examining the overall objectives of the organisation. In fact, manpower plan should be integrated into the overall objectives.

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The number of employees required to perform various operations will be derived from the objectives of the organisation. Overall objectives of the organisation have to be understood in order to draw a good manpower plan. Manpower demand is the number of people required to handle the present jobs.

Forecasting the demand for manpower is the process of estimating the future quantity and quality of employees required. For instance, in a retail organisation, the manpower demand is forecasted based on the work to be performed in every retail store. Obviously the long-term corporate plans, budgets and annual plans would become basis for forecasting the demand for labour. Supply forecast is also known as manpower inventory.

The objective of preparing manpower inventory is to find out the number and quality of manpower available within the organisation to employ in various jobs identified in the organisation. Development of supply of manpower data relating to present human resources in terms of components, number, designations and department wise should be developed. Here potential losses in the existing manpower should be considered.

The loss of manpower arises out of voluntary retirements, deaths, retirements, dismissals, layoffs, disablement due to ill health, accidents and other losses occurring due to poor attitude and low commitment to the organisation. Gap analysis is the process of identifying the difference in the estimated number of employees and actual number of employees available in the organisation. This enables to determine the quantity and quality of manpower needed. This gap reveals the number of personnel to be recruited to fill the gaps.

1. Forecasting the demand for manpower
(a) is the process of estimating the future quantity and quality of employees required
(b) is the process of calculating current workforce engaged in different operations in the organisation
(c) is the process of estimating the critical situations, that may occur during the production process
(d) is the process of analysing the performance of the workers engaged in the organisation is past years

2. According to this passage,
(a) the number of employees required to perform various operations will be determined by the government
(b) the number of employees required to perform various operations will be derived from the objectives of the organisation
(c) the number of employees required to perform various operations will be derived from the market forces
(d) the number of employees required to perform various operations will be determined by the Trade Unions

3. Supply forecast is also known as
(a) manpower inventory (b) manpower analysis
(c) manpower planning (d) manpower forecasting

4. The objective of preparing manpower inventory is
(a) to find out the number and quality of manpower prescribed by government and other industrial regulating agencies
(b) to find out the number and quality of manpower required for future operations in the organisation
(c) to find out the number and quality of manpower available in the market
(d) to find out the number and quality of manpower available within the organisation to employee in various jobs identified in the organisation.

5. Gap analysis is the process of
(a) identifying the total of the estimated number of employees and actual number of employees available in the organisation
(b) identifying the difference in the estimated number of employees and actual number of employees available in the labour market
(c) identifying the difference in the estimated number of employees and actual number of employees available in the organisation
(d) identifying the required number of employees and actual number of employees available in the organisation

Passage 20

'Desertification' is a term used to explain a process of decline in the biological productivity of an ecosystem, leading to total loss of productivity. While this phenomenon is often linked to the arid, semi-arid and sub-humid ecosystems, even in the humid tropics, the impact could be most dramatic. Impoverishment of human-impacted terrestrial ecosystems may exhibit itself in a variety of ways, such as accelerated erosion as in the mountain regions of the country, salinisation of land as in the semi-arid and arid 'green revolution' areas of the country, for example, in Haryana and Western Uttar Pradesh, and site quality decline– a common phenomenon due to general decline in tree cover and monotonous monoculture of rice/wheat across the Indian plains.

A major consequence of deforestation is that it relates to adverse alterations in the hydrology and related soil and nutrient losses. The consequences of deforestation invariably arise out of side degradation through erosive losses. Tropical Asia, Africa and South America have the highest levels of erosion.

The already high rates for the tropics are increasing at an alarming rate (For example, through the major river systems, such as the Ganga and the Brahmaputra in the Indian context), due to deforestation and ill-suited and

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management practices subsequent to forest clearing. In the mountain context, the declining moisture retention of the mountain context, the declining moisture retention of the mountain soils, drying up of the underground springs and smaller rivers in the Himalayan region could be attributed to drastic changes in the forest cover.

An indirect consequence is drastic alteration in the upland-lowland interaction, mediated through water. The current concern the tea planter of Assam has is about the damage to tea plantations due to frequent inundation along the flood-plains of Brahmaputra, and the damage to tea plantation and the consequent loss in tea productivity is due to rising level of the river bottom because of siltation and the changing course of the river system.

The ultimate consequences of site desertification are soil degradation, alteration in available water and its quality, and the consequent decline in food, fodder and fuel-wood yields essential for the economic well-being of rural communities.

1. According to the passage, which of the following are the consequences of decline in forest cover?

1. Loss of topsoil
2. Loss of smaller rivers
3. Adverse effect on agricultural production
4. Declining of groundwater

Select the correct answer using the code given below

(a) 1, 2 and 3 (b) 2, 3 and 4
(c) 1 and 4 (d) 1, 2, 3 and 4

2. Which of the following is/are the correct inference/inferences that can be made from the passage?

1. Deforestation can cause changes in the course of rivers.
2. Salinisation of land takes place due to human activities only.
3. Intense monoculture practice in plains is a major reason for desertification in Tropical Asia, Africa and South America.

Select the correct answer using the code given below.

(a) Only 1
(b) Both 1 and 2
(c) Both 2 and 3
(d) None of the above is a correct inference

3. With reference to 'desertification' as described in the passage, the following assumptions have been made:

1. Desertification is a phenomenon is tropical areas only.
2. Deforestation invariably leads to floods and desertification.

Which of the above assumptions is/are valid?

(a) Only 1 (b) Only 2
(c) Both 1 and 2 (d) Neither 1 nor 2

4. Which of the following depicts the passage after going through the paragraph?

(a) Decline in the biological loss of productivity
(b) Total loss of the productivity of soil.
(c) Combining (a) and (b)
(d) None of the above

5. Which of the following sums up the site desertification of the soil?

(a) Soil degradation
(b) Alternation in available water
(c) Consequent decline in food and fodder
(d) All the above

Passage 21

The previous decade has reversed the presumptions about development and more than anything else, it has made it difficult to decide what is in store during the next decade. However, there are some things about which one can make claims with some confidence.

Firstly, education, health and productive employment are the decisive factors for development and impartiality. We believe that all these are the results of rapid economic development and to achieve these ends, development only can generate resources. In the present form, it will be best to view it as a better reason than as a result of development. In fact, in every case of successful development, the evaluation of previous reforms in education, technical skills, health, existence and productive tasks are included.

Secondly, technical ability is a vital resource and explains the high ratio of development in production and trade as compared to ratios of development in more traditional factors, such as natural resources or capital formation. There is no requisite capability in research. In fact, industrial momentum in a factory of farm is more important than the presence of a research organisation.

Thirdly, essentially required environment also cannot be ignored for a long time period, which is next only to the issue of disarmament in the list of international issues. At the national level, there has been a definite rise in ignorance towards the environment due to development.

In the context of India, at least two immediate factors increase the ratio mentioned above. The first one of these is the rise in population level. By giving momentum to expansion of population and the workforce, human resources development has achieved synergistic importance. An increase in population is also a factor but is not the most important one, which delineated environmental decay in rural and urban areas.

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Second, as a large country, we cannot make an independent place for ourselves in the global system without developing appropriate ability for the development of one's self-respect. In order to achieve this objective, the achievement of technical skills is a decisive step.

So far, we have taken human resource development, technical and environmental issues as supporting factors of the main part of the plan. Along with the expansion of quality of basic infrastructure and targets of production (tonnes of steel and kilowatt hours of electricity), other targets of capacity (kilometers) and other targets (number of schools and students, number of electrified villages), known techniques, full use of natural resources and maximum possible use of available financial resources have been emphasised upon.

1. According to this passage, what has been considered to be the most important by us out of the following?
(a) Basic facilities and increase in the number of achieved targets.
(b) Ideal use of available natural resources.
(c) Maximum use of available financial resources.
(d) All of the above

2. According to the author of the passage, whose effect, out of the following is felt at the national level?
(a) Expansion of workforce of high quality
(b) Lack of care and activism for the protection of environmental resources
(c) Continuous decay of technical potentialities in urbanised countries
(d) Emphasis on a slower pace of disarmament as compared to disarmament in other nations

3. According to the author of the passage, which of the following factors is of synergistic importance?
(a) Population growth
(b) Workforce
(c) Human resource development
(d) None of the above

4. Which of the following areas has not been included among various 'targets' mentioned in the passage?
(a) Maximum use of financial resources
(b) Electricity production
(c) Population growth
(d) Number of schools and children

5. Which of the following can be the most suitable title of the passage?
(a) Potential obstacles in economic development.
(b) Main factors of development.
(c) Targets in development process.
(d) Role of population growth in development.

Passage 22

Though top leaders of the nationalist movement were the policy makers, the immediate day-to-day leadership was provided by the middle-class intellectuals. The rural origin of the industrial labour force together with rampant illiteracy and their simplistic docility attracted social workers, mainly drawn from the middle-class intellectuals. They had an obvious advantage. Not being employees, the leaders were free from fear of victimisation and immune towards the risks of leadership. Being generally well educated, they had a better perspective and sense of organisation. They could see the issue in broader context. They belonged to a higher social plane than the workers and with good education intellectual development comparable to the best among the employers they could meet the employers on their own plane and carry on negotiations on an equal footing.

According to Royal Commission on Labour in India, 'the effect of this surge was enhanced by the political turmoil which added to the prevailing feelings of unrest and assured to provide willing leaders of a trade union movement'. But outside leadership had led to the politicisation of the movement.

Politicisation of the labour movement in India contributed both to its strength and weakness. While economic hardship was present all along as a latent force, the major impetus for growth of unionism was primarily provided by major political currents, particularly the movement for national independence.

For the zeal and the organising ability, which the leaders of the nationalist movement brought to bear upon the Indian. Trade Union Movement, it would not have gained the dimensions and the position it had by 1909 within a decade of its formal start.

1. Leadership to Trade Union was provided by middle-class intellectuals in India because
(a) they were the active participants in the nationalist movement.
(b) they were literates among the workers.
(c) they were able to negotiate with employers on equal terms.
(d) the workers did not want any one among them to be their leader.

2. During the early years, Trade Union Movement gained greater dimensions because
(a) the workers accepted outside leaders
(b) it started along with the independence movement
(c) the leaders were well educated with broad perspectives
(d) the leaders were devoted to the welfare of workers

3. The word 'surge' in the passage means
(a) decrease (b) support
(c) increase (d) slowness

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4. What could be the reason for workers not coming forward to take up the leadership in Trade Union Movement in the early years?
(a) Lack of time (b) Illiteracy
(c) Fear of victimisation (d) Risk in leadership

5. According to the passage, which of the following leadership primarily led to the politicisation of the movement?
(a) Inside leadership (b) Outside leadership
(c) Both (a) and (b) (d) Illiterate leadership

Passage 23

For years the managerial philosophers had called management's attention to its total responsibility. They indications of a moral oughtness we there, they stressed. As Stewards for stockholders, managers had a prime to the employees, the customers, and the community–along with their well-recognised responsibility to the owners.

By and large, these early pronouncements apparently fell on deaf ears. By the mid-thirties, however, heartening signs began to appear. In 1937, for example, Raymond Moley declared that while management remained legally and ethically a primary agent of the investors, its secondary responsibility to the public and labour had become relatively greater.

Four years later, Roger D Lapham asserted that in the narrow sense of the past, management had been considered solely responsible to its ownership–its stockholders–but there was a growing conviction that in the broader sense management's duty to its customers, to the public, and to its employees came first.

By 1951, this view was well established, and Frank Abraham's writing in the Harvard Business Review enunciated the new philosophy when he indicated that the job of management was to conduct the affairs of the enterprise in such a way as to maintain an equitable balance among the claims of the variously interested group. In the mid-sixties and early seventies, we have again recognised changes in philosophy that reflect management's gradual assumption of its moral and social obligation of good corporate citizenship.

We see it, for example, in management's assuming its social responsibility by cooperating with the federal government in withholding goods from countries if those goods would jeopardise our national security; in maintaining prices at a level consistent with a healthy economy, not raising them to a point considered critically inflationary; in training the unemployed; in cleaning up city ghettos; and in recognising and acting upon pollution problems. More examples could be cited, but the point of the broadened view taken by management of its total responsibility has been made.

1. Raymond Moley advocated management's responsibility to
(a) owners of organisation only
(b) owners and employees only
(c) owners, public and labour
(d) owners, public, labour and customers

2. Which of the following is not a part of corporate social responsibility?
(a) Controlling prices of prevent inflation
(b) Training of employees
(c) Acting upon pollution related problems
(d) Jeopardising the security of nation

3. Corporate social responsibility comprises of
(a) Moral obligations of an organisation
(b) Social obligations of an organisation
(c) Moral and social obligations of an organisation
(d) None of the above

4. Abraham is of the opinion that
(a) it is difficult to satisfy variously interested groups
(b) job management is to conduct affairs of enterprise
(c) there should be a balance among the interested groups
(d) None of the above

5. In view of Lapham, management must take care of
(a) investors only
(b) stockholders and employees only
(c) stockholders, public and customers only
(d) stockholders, customers, public and employees

Passage 24

Modern biotechnology, especially, the creation of Genetically Modified (GM) crops is often presented as a magical solution or universal panacea for the problems of poverty, inadequate nutrition and even environmental degradation across the world. Conversely, there are people who present the picture of tech-generated monster and major human health hazards being created by science. Many of the technological changes currently being utilised in agriculture can have unforeseen consequences, and their safety and future viability are far from secure.

The reality, as always, is far more complex than either of these two extremes. Even today, the total food production in the world is adequate to feed the hungry of the world. The problems is rather one of unequal distribution, a large part of the population of developing countries engaged in agriculture, face many problems, such as lack of infrastructure, poor or unstable market access, volatile input and output prices, etc.

These issues cannot be addressed by biotechnology as their solution is a far cry. It is true that transgenic plants can offer a range of benefits (more effective pest resistance of seeds and crops through genetically controlled methods and leads to improved yield), which are above and beyond those that emerged from more traditional innovations.

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A basic question, of course, is whether the new GM technology is safe, and whether this is absolutely crucial since the effect may only be known much later. The jury is still very much out on this matter and the controversy does not appear to resolve quickly. The trouble is that most governments in developing countries have relatively low food and beverage regulatory standards and public systems for monitoring and surveillance of such standards are either poor or non-existent. This leaves them open for entry and even dumping of a range of agricultural products of new technology, which may not pass the regulatory standards in more developed countries.

1. Which of the following is true in context of the passage?
(a) Genetically modified crops have been universally recognised as a solution to poverty and environmental degradation.
(b) The only way to improve the deficit in food requirement and food production in world is by adapting genetically modified crops.
(c) Genetically modified crops produce more yield as compared to yield from traditional methods.
(d) Taking advantage of the absence of regulatory standards, scientists have been dumping new products in the market without appropriate approval.

2. Choose the word/group of words which is most similar in meaning to open in the context of the passage?
(a) Vulnerable (b) Capable
(c) Threatened (d) Uncertain

3. Choose the word/group of words which is most opposite in meaning to VOLATILE as used in the passage?
(a) Never-ending (b) Valuable
(c) Irreversible (d) Stable

4. The author of the given passage seems to be definitely
(a) suggesting the use of traditional methods of agriculture as against biotechnological by developing countries owing to their poor regulatory standards.
(b) in favour of utilising biotechnology as a tool for the alleviation of poverty in the world.
(c) urging the policy markers to improve infrastructural facilities so that farmers can maximize the benefits of genetically modified crops.
(d) unconvinced of the long-term effects and rationale for immediate requirement of genetically modified products

5. Why, according to the author, is genetic modification of crops not an answer to the problem of hunger in the world?
1. People being highly doubtful of the long-term effects of genetically modified crops of not buy the products grown by such methods.
2. The problem of hunger in the world is not due to inadequate production of food but due to unequal distribution of it.
3. Many developing countries have banned genetically modified products as developed countries have been using such countries as dumping groups for new genetically modified products.

(a) Only (1) (b) Only (2)
(c) Both (2) and (3) (d) Both (1) and (3)

Passage 25

It should be remembered that the Nationalist Movement in India, like all nationalist movements was essentially a bourgeois movement. It represented the natural historical stage of development and to consider it or to criticise it, as a Working Class Movement is wrong.

Gandhi represented that movement and the Indian masses in relation to the movement to a supreme degree and he became the voice of Indian people to that extent. The main contribution of Gandhi to India and the Indian masses has been through the powerful movements that he launched through the National Congress.

Through nation-wide action, he sought to mould the millions and largely succeeded in doing so. He changed them from a demoralised, timid and hopeless mass, bullied and crushed by every dominant interest and incapable of resisting tyranny, and capable of united action and sacrifice for a larger cause.

Gandhi made people think of political and economic issues and every village and every bazaar hummed with argument and debate on the new ideas and hopes that filled the people.

That was an amazing psychological change. The time was ripe for it, of course, and circumstances and world conditions worked for this change. However, a great leader was necessary to take the advantage of those circumstances and conditions. Gandhi was that leader and he released many bonds that imprisoned and disabled our minds and none of us who experienced it can ever forget that great feeling of release and exhilaration that came over the Indian people.

Gandhi has palyed a revolutionary role of greatest importance in India because he knew how to make the most of the objective conditions and could reach the heart of the masses, whereas groups with a more advanced ideology functioned largely in air because they did not fit in with those conditions and could, therefore, not evoke any substantial response from the masses.

It is perfectly true the Gandhi, functioning in nationalist plane, did not think in terms of the conflict of classes, trying to compose their differences. However, the actions he indulged in and taught the people have inevitably

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raised mass consciousness tremendously the made social issues vital. Gandhi and the Congress must be judged by the policies they pursued and the action they indulged in. But behind this, personality counts and colours those policies and activities. In case of very exceptional people like Gandhi, the question of personality becomes especially important in order to understand and appraise him. To us, he represented the spirit and honour of India, the yearning of her sorrowing millions to be rid of their innumerable burdens and an insult to him by the British Government or others was as insult to India and her people.

1. Which one of the following is true of the given passage?
(a) The passage is a critique of Gandhi's role in Indian movement for independence.
(b) The passage hails the role of Gandhi in India's freedom movement.
(c) The author is neutral on Gandhi's role in India's freedom movement.
(d) It is an account of Indian National Congress's support to the Working Class Movement.

2. The change that the Gandhian movement brought among the Indian masses was
(a) physical (b) cultural
(c) technological (d) psychological

3. To consider the Nationalist Movement or to criticise it as a Working Class Movement was wrong because it was a
(a) historical movement
(b) voice of the Indian people
(c) bourgeois movement
(d) movement represented by Gandhi

4. Gandhi played a revolutionary role in India because be could
(a) preach morality
(b) reach the hearts of Indians
(c) see the conflict of classes
(d) lead the Indian National Congress

5. Groups with advanced ideology functioned in air as they did not fit in with
(a) objective conditions of masses
(b) the Gandhian ideology
(c) the class consciousness of the people
(d) the difference among masses

Passage 26

It is no longer enough for us to talk about providing for universal access to education. Making available schooling facilities is an essential prerequisite, but it is insufficient to ensure that all children attend school and participate in the learning process. The school may be there, but children may not attend or they may drop out after a few months.

Through school and social mapping, we must address the entire gamut of social, economic, cultural and indeed linguistic and pedagogic issues, factors that prevent children from weaker sections and disadvantaged groups, as also girls, from regularly attending and complementing elementary education. The focus must be on the poorest and most vulnerable since these groups are the most disempowered and at the greatest risk of violation or denial of their right to education.

The right to education goes beyond free and compulsory education to include quality education for all. Quality is an integral part of the right to education.

If the education process lacks quality, children are being denied their right. The Right of Children to Free and Compulsory Education Act lays down that the curriculum should provide for learning through activities, exploration and discovery. This places an obligation on us to change our perception of children as passive receiver of knowledge and to move beyond the convention of using textbooks as the basis of examinations. The teaching-learning process must become stress-free and a massive programme for curricular reform should be initiated to provide for child-friendly learning system, that is more relevant and empowering. Teacher accountability systems and processes must ensure that children are learning and that their right to learn in a child-friendly environment is not violated. Testing and assessment systems must be reexamined and redesigned to ensure that these do not force children to struggle between school and tuition centres, and bypass childhood.

1. Which one of the following does depict the school in the best possible manner?
(a) Through school and school mapping.
(b) The focus must be on the poorest sections of society.
(c) Both (a) and (b)
(d) None of the above

2. According to the passage, which of the following is/are of paramount importance under the Right to Education?
1. Sending of children to school by all parents.
2. Provision of adequate physical infrastructure in schools.
3. Curricular reforms for developing child-friendly learning system.

Select the correct answer using the codes given below.
(a) Only 1 (b) 1 and 2
(c) Only 3 (d) None of these

3. With reference to the above passage, the following assumptions have been made:
1. The Right to Education guarantees teacher's accountability for the learning process of children.

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2. The Right to Education guarantees 100% enrolment of children in the schools.
3. The Right to Education intends to take full advantage of demographic dividend.

Which of the above assumption(s) is/are valid?

(a) Only 1 (b) 2 and 3
(c) Only 3 (d) 1, 2 and 3

4. According to the passage, which one of the following critical in bringing quality in education?

(a) Ensuring regular attendance of children as well as teachers in school.
(b) Giving pecuniary benefits to teachers to motivate them.
(c) Understanding the socio-cultural background of children.
(d) Inculcating learning through activities and discovery.

5. What is the essential message in this passage?

(a) The Right to Education now is a fundamental right
(b) The Right to Education enables the children of poor and weaker sections of the society to attend schools.
(c) The Right to Free and Compulsory Education should include quality education for all.
(d) The government as well as parents should ensure that all children attend schools.

Passage 27

Some religious leaders have taught that man is made up of a body and soul, but they have been silent about intellect. Their followers try to feed to the body to earth and save the soul from perdition after death-but they neglected the claims of the mind. Bread for the body and virtue for the soul, these are regarded as indispensable requisites of human welfare. Nothing is said about knowledge and education.

Thus, Jesus Christ spoke of feeding the hungry, healing the sick and converting the sinners, but he never taught the duty of teaching an ignorant and increasing scientific knowledge. He himself was not a well-educated man and intellectual pursuits were beyond his horizon.

Gautama Buddha also laid stress on morality, meditation and asceticism, but he did not attach great importance to history, science, art or literature. St. Ambrose deprecated scientific studies and wrote, 'To discuss the nature and position of the earth does not help us in our hope for life to come'. St. Basil said very frankly and foolishly, 'It is not a matter of interest to us whether the earth is a sphere, a cylinder or a disc'.

Thomas Carlyle also followed the Christian tradition and declared that he honoured only two kinds of men and no third, i.e., the manual labourer and the religious teacher. He forgot the scientist, the scholar and the artist. The cynics of Greece despised education at last.

1. What have the religious teachers taught in the past?

(a) That man is made up of body only.
(b) That man is made up of soul only.
(c) That man is made up of bubbles.
(d) That man is made up of body and soul together.

2. According to the passage, what is food for the soul?

(a) Bread (b) Virtue
(c) Vice (d) Education

3. The following philosophers are mentioned in the paragraph.

1. Jesus 2. Gautama Buddha
3. St. Ambrose 4. Thomas Carlyle
5. St. Basil

Which of the following depicts the correct order as they appear in the paragraph?

(a) (1), (2), (3), (4) and (5)
(b) (1), (3), (4), (5) and (2)
(c) (1), (2), (3), (5) and (4)
(d) (2), (1), (3), (4) and (5)

4. Intellectual pursuits have been neglected because

1. They are unnecessary and superfluous.
2. They make people dwarf.
3. They lead people to hell.

(a) Only (1) is correct
(b) Only (2) is correct
(c) Only (3) is correct
(d) Only (1) and (2) are correct

5. The style of the passage is

(a) Narrative (b) Expository
(c) Critical (d) Analytical

Passage 28

A great deal of the world's work is neither producing material things nor altering the things that Nature produces, but doing services of one sort or another.

Thoughtless people are apt to think a brickmaker more of a producer than a clergyman. When a village carpenter makes a gate to keep cattle out of a field of wheat, he has something solid in his hand which he can claim for his own until the farmer pays him for it. But when a village boy makes a noise to keep the birds off, he has nothings to show, though the noise is just as necessary as the gate.

The postman does not make anything ..... The policeman does not make anything ..... The doctor makes pills sometimes; but that is not his real business, which is to tell you when you ought to take pills, and what pills to take, unless indeed he has the good sense to tell you not take them at all, and you have the good sense to believe him, when he is giving you good advice instead of bad. The lawyer does not make anything substantial ..... They are all in service.

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1. Thoughtless people think a brickmaker more of a producer than a clergyman because
   (a) a clergyman is an idler
   (b) a brickmaker produces something solid which he can keep with him till he gets its price
   (c) a brickmaker, being physically stronger than a clergyman, can naturally produce more
   (d) he cannot understand the philosophical lectures of the clergyman

2. According to the author of the passage, a large number of persons :
   (a) are producing material things
   (b) are altering the things that Nature produces
   (c) are doing nothing in particular
   (d) offer services

3. The writer thinks that :
   (a) both the doctor and the patient are sensible when one makes pills and the other buys them
   (b) the doctor is sensible and the patient is insensible
   (c) the doctor is insensible and the patient is insensible
   (d) both the doctor and the patient make sense when the doctor tells not to take the pills and the patient believes him

4. The writer's description of the doctor's business :
   (a) strengthens the main argument of the passage because the doctor's business is to make pills
   (b) is irrelevant to the main argument of the passage
   (c) weakens the main argument of the passage
   (d) illustrates the difference between producing something and offering a service

5. The word 'substantial' in the passage means
   (a) of no importance (b) of considerable importance
   (c) of no value (d) of low price

Passage 29

Since the world has become industrialised, there has been an increase in the number of animal species that have either become extinct or have neared extinction. Bengal tiger, for instance, which once roamed the jungle in vast numbers, now number only 2300 and by the year 2025 their population is estimated to be down to zero. What is alarming about the case of Bengal tiger is that this extinction will have been caused almost entirely by poachers who according to some sources, are not interested in material gain but in personal gratification. This is an example of the callousness that is part of what is causing the problem of extinction. Animals like the Bengal tiger, as well as, those belonging to other endangered species, are a valuable part of the world's ecosystem. International laws protecting these animals must be enacted to ensure their survival, and the survival of our planet. Countries around the world have begun to deal with the problem in various ways. Some countries, in order to circumvent the problem, have allocated large amount of land to animal reserves. They then charge admission fees to help defray the costs of maintaining the parks, and they often must also depend on world organisations for support. With the money get, they can invest in equipment and patrols to protect the animals. Another solution that is an attempt to stem the tide of animal extinction is an international boycott of products made from endangered species. This seems fairly effective, but it will not, by itself, prevent animals from being hunted and killed.

1. What is the author's main concern in this passage ?
   (a) Problems of industrialisation
   (b) The Bengal tiger
   (c) Endangered species
   (d) Callousness of man

2. According to the passage, poachers kill for :
   (a) material gain
   (b) personal satisfaction
   (c) Both (a) and (b)
   (d) None of the above

3. Which of the following words is closest in meaning to the bold word 'alarming'?
   (a) Serious (b) Dangerous
   (c) Distressing (d) Frightening

4. Certain species are becoming extinct because of :
   (a) industrialisation
   (b) poaching
   (c) love of products made from them
   (d) All of the above

5. The Phrase 'Stem the tide' means :
   (a) save (b) stop
   (c) touch (d) spare

Passage 30

Many people believe that science and religion are contrary to each other. But this notion is wrong. As a matter of fact, both are complementary to each other. The aim of both these institutions is to explain different aspects of life, universe and human existence. There is no doubt that the methods of science and religion are different. The method of science is observation, experimentation and experience. Science takes its recourse to progressive march towards perfection; the rules of religion are faith, intuition and spoken word of the enlightened; in general, while science is inclined towards reason and rationality, spiritualism is the essence of religion.

In earlier times when man appeared on earth, he was over-awed at the sight of violent and powerful aspects of nature. In certain cases, the usefulness of different natural objects of nature overwhelmed man.

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Thus began the worship of forces of nature-fire, the sun, the rivers, the rocks, the trees, the snakes, etc. The holy scriptures were written by those who had developed harmony between external nature and their inner self. Their object was to ennoble, elevate and liberate the human spirit and mind. But the priestly class took upon itself the monopoly of scriptural knowledge and interpretation to its own advantage. Thus the entire human race was in chains. Truth was flouted and progressive, liberal and truthful ideas or ideas expressing doubt and skepticism were suppressed and their holders punished. It was in these trying circumstances, the science emerged as a saviour of mankind. But its path was not smooth and safe. The scientists and free thinkers were tortured. This was the fate of Copernicus, Galileo, Bruno and others. But, by and by science gained ground.

1. Why does man worship the force of nature?
(a) The holy scriptures advocate the worship of forces of nature
(b) The worship elevates and liberates the human spirit and mind
(c) The worship makes man believe in faith and intuition
(d) Forces of nature reach us spiritualism

2. Which of the following statements is true in the context of the passage?
(a) Science and religion are antagonistic to each other
(b) Science encourages worshipping of nature
(c) Religion is essential for external peace and harmony
(d) Regimental religion was replaced by scientific principles

3. According to the passage, science and religion both :
(a) rely on the spoken word of the enlightened
(b) emerged out of the fear of man
(c) emerged from the desire of man to worship the forces of nature
(d) employ different methods of enquiry

4. Why is it said in the passage that, 'science emerged as a saviour of mankind'?
(a) Many great thinkers contributed to the progress of science
(b) Science takes recourse to progressive march towards perfection
(c) Science is inclined towards reason and rationality
(d) Man was bound in chains by religious orthodoxy

5. Which of the following statements is not true in the context of the passage?
(a) Man worships the forces of nature
(b) Methods of science and religion are different
(c) Regimental religion got degenerated into orthodoxy
(d) Galileo and Bruno were disciples of Copernicus

Passage 31

The conservative is not an extreme individualist. He may be willing to concede numerous arguments of the unqualified individualists, for his own respect, for the dignity of the individual is not surpassed by that of any man. Yet, he cannot agree to the full implications of individualism, which is based so he thinks, on an incorrect appraisal of man, society, history, and government. In his own way, the individualist is as much a perfectionist as the Socialist, and with perfectionism the conservative can have no truck.

In particular, the conservative refuses to go all the way with economic individualism. His distrust of unfettered man, his recognition to groups, his sense of the complexity of the social process, his recognition of the real services that government can perform– all these sentiments make it impossible for him to subscribe to the dogmas and shibboleths of economic individualism : laissez-faire, the negative state, enlightened self-interest, the law of supply and demand, the profit motive. The conservative may occasionally have kind word for each of these notions, but he is careful to qualify his support by stating other, more important social truths. For example, he does not for a moment deny the prominence of the profit motive, but he insists that it be recognised for the selfish thing it is and be kept within reasonable, socially imposed limits.

1. The conservative is
(a) a perfectionist (b) an economist
(c) a socialist (d) None of these

2. The conservative is against Economic Individualism for all the following reasons except:
(a) he does not trust free men
(b) he believes in the authority of the government
(c) he believes in groups
(d) he feels that social processes are important

3. The author mentions all the following catchwords of economic individualism except:
(a) free trade (b) the profit motive
(c) balance of trade (d) the negative state

4. Which of the following words can replace the bold word 'truck' ?
(a) Dealing (b) Bargain
(c) Debate (d) Transport

5. Which of the following statements is true ?
(a) The socialist and the individualist tend to be broadly similar in their views
(b) The conservative believes that profit motive originates in selfishness
(c) The conservative is also an extreme individualist
(d) None of the above

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Passage 32

All great thinkers live and move on a high plane of thought. It is only there, they can breathe freely. It is only in contact with spirits like themselves they can live harmoniously and attain that serenity which comes from ideal companionship.

The studies of all great thinkers must range along the highest altitudes of human thought. I have always thought that the strongest argument in favour of the Baconian theory was, that no man, however, indubitable his genius, could have written the play and sonnets that have come down to us under Shakespeare's own name who had not the liberal education of Bacon.

The magnificent ideals that have ever haunted the human mind and given us our highest proofs of a future immortality by reason of the impossibility of their fulfillment here, are splintered into atoms by contact with life's realities. Hence, comes our sublime discontent. A habitual mediation on the vast problems that underline human life and are knit into human destinies-thoughts of immortality, of the littleness of mere man, of the greatness of man's soul, of the splendor of the universe that are invisible to the ordinary traffickers in the street, as the vastness of St. Peter's is to the spinder that weaves her web in a corner of the dome-these things do not fit men to understand the average human being, or tolerate with patience the sordid wretchedness of the unregenerated masses.

It is easy to understand, therefore, why such thinkers fly to the solitude of their own thoughts, or the silent companionship of the immortals and if they care to present their views in prose or verse to the world, that these views take a sombre and melancholy setting from 'the pale caste of thought' in which they were engendered.

1. Great thinkers are content to live
(a) amidst crises of civilisations
(b) in lofty thoughts with exceptional calm
(c) at high altitudes in order to be away from society
(d) with complexities of and find solutions to them

2. Why do great thinkers love solitude?
(a) To be in pursuit of the ideal in the company of immortals
(b) To spend time in peace
(c) Because they are misanthropists
(d) Because the world is unhealthy for them

3. Immortality is the crucial idea constantly being explored by
(a) Ordinary traffickers
(b) Great thinkers
(c) Gods who appear to the thinkers
(d) Scientists

4. Baconian liberal education is
(a) a lofty and ideal fantasy
(b) instrumental in making human being rule over their destiny
(c) an engagement with the intricacies of the day-to-day life
(d) equivalent to ancient ideas of sublimity

5. According to the passage, our sublime discontent is due to
(a) realisation of our lack of contact with God
(b) acute sense of loneliness in a hostile world
(c) possibility of immortality through some channels to God and inability to get hold of it
(d) the contrast between the ideals in great literature and their opposite in the real life

Passage 33

There is a common thread running through the unravelling of India's statistical system. A modern economy with sound institutions is characterised by timely dissemination of credible data. A long-term policy needs an empirical basis and issues of veracity of data will influence investment decisions. In a country with a large population of youth, data on national development, especially in core sectors like agriculture, industry, health, education and employment, will be critical. Here comes the role of National Statistical Commission, a body created to establish standards.

Questioning the data veracity is a global phenomenon. The official narrative is always questioned by the people on the other side of the fence. Dissemination of economic data is essential to reach out to the public who lived their reality. Lack of data will adversely impact the quality of national policies. India must start strengthening institutions such as the Central Statistical Commission.

These institutions must be granted autonomy and insulated from external interferences. Enhanced operational autonomy will make their work credible. An indicator of operational autonomy is their ability to stick to a dissemination calendar regardless of what the data indicates.

1. What is important for a modern economy?
(a) A common thread
(b) Dissemination of credible data
(c) Unravelling of statistical system
(d) Selective distribution of data

2. What is the work of National Statistical Commission?
(a) Establishing standards
(b) Questioning data veracity
(c) Questioning official narrative
(d) Supporting the public perception

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3. What does the passage ultimately suggest to National Statistical Commission?
   (a) Restricting policy decisions
   (b) Critically examining data veracity
   (c) Stick to a calendar of data dissemination
   (d) Support development in core sectors

4. Investment decision are impacted by
   (a) youth population
   (b) national development
   (c) issues of data veracity
   (d) establishment of national institutes

5. How can the quality of national policies be improved?
   (a) By living in reality
   (b) By supporting external interferences
   (c) By controlling autonomous institutions
   (d) By enhanced operational freedom

Passage 34

Perhaps what bothered the media in 1970s was the shift in liberty being suggested. For centuries, journalists had operated on the basis of negative liberty, or freedom from external restraints. Suddenly, however, the thrust was positive freedom, a freedom for pursuit of some predetermined goals. This new social responsibility seems grounded on a school of thought that sees negative liberty as insufficient and ineffective, somewhat like telling people they are free to walk without first making sure they are not crippled.

Who better than government is able to provide humanity with appropriate means?

Government, even a democratic government, is seen by social responsibility adherents as the only force strong enough to guarantee effective operation of freedom. This does not mollify observers who find social responsibility to be only slightly disguised version of authoritarianism. Media philosopher John Merrill has been one of the most outspoken critics of the theory.

To him, the proposition that pluralism of ideas should be governmentally mandated is ludicrous. Journalists, he says, must retain their freedom to make their own news and editorial judgements. Even well-intentioned attempts by outside groups seeking media improvement are self-serving, and inevitably lessen the autonomy of journalists, Merrill maintains. This leads us to the issue of media autonomy.

1. What was the basis of the operation of journalists earlier?
   (a) Freedom of limited choices
   (b) Social responsibility
   (c) Free from outside pressure
   (d) Government control

2. According to John Merrill, seeking improvement in media, is
   (a) appropriate (b) well-intentioned
   (c) inevitable (d) self-serving

3. The passage critically analyses
   (a) operation of journalists
   (b) mandate for government
   (c) social responsibility theory of media
   (d) regimented autonomy of journalists

4. Some scholars consider social responsibility aspect of media as
   (a) negative freedom (b) pluralism
   (c) democratisation of media (d) authoritarianism

5. Positive freedom means
   (a) grounded thought
   (b) pursuing certain set goals
   (c) freedom with conditions
   (d) providing identified means

Passage 35

Michelangelo is famous for having successfully interpreted the human body. His great achievement is that of the painting of David whose hands reach out as a sign of human capability and potential. It is assumed that the time he lived was ripe for exchange of knowledge, development in science and matured enough to advance the horizon of investigation in all fields. Renaissance humanism stressed on a serious rethink on the nature of art that focussed on accurate details. In painting and sculpture, artists focussed on not so casual but verifiable and minute details. Michelangelo's paintings are no exception to it. In a study published in the journal of the Royal Society of Medicine, a group of surgeons are of the opinion that the great master was "afflicted by an illness involving his joints." They have used his portraits as evidence to argue their view. During his life, he complained of what he felt to be 'gout'. Later he complained of his sore and stiff hands which the doctors would find to be natural for someone who was engaged in handmade art. The doctors found corroboration of those claims in portraits of the artist that show a hanging left hand with both degenerative and non-degenerative changes. They attribute the pain not just to arthritis, but to the stress of hammering and chiselling and note that though the master was seen hammering days before his death at an old age, he did not write or sign his own letters before his death. In recent times, there have been attempts to diagnose famous artists with diseases that were not known during their time. This practice has raised many questions, especially on the issue of ethics in research. It is also inferred from authentic analysis that Michelangelo persisted in his work until his last days. This theory would emphasise that his artistic subject defied his physical infirmities.

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1. What generalisation do people subscribe to?
   (a) Establishing facts by DNA tests
   (b) Inferring the essence of character from famous people's handwriting
   (c) Carbon dating of the hair of celebrities to draw conclusion on their physical structure
   (d) To retroactively diagnose famous artists and public figures of conditions that were not prevalent during their time

2. Renaissance painting in Europe was sceptical of
   (a) the obsessive medieval method of accuracy
   (b) the classical simplicity and lack of control
   (c) the case and decorative excess of earlier art
   (d) expressionist technique

3. The controversy that the passage above refers to is whether
   (a) Michelangelo worked under duress
   (b) Michelangelo could contain his physical infirmity by artistic excellence
   (c) Michelangelo submitted to disease
   (d) Michelangelo survived different diseases before pursing art

4. Michelangelo lived during a time that lets us know that
   (a) human aspirations are limitless and open to new vistas of knowledge
   (b) cross cultural exchange in ideas is the only way for human progress
   (c) it is progress of science and anatomy that contributes to civilisations exclusively
   (d) human beings possess language which is the only key to knowledge

5. What actually may be concluded from the above passage?
   (a) Physical infirmities do dissuade people with capabilities from excelling
   (b) Excellence in any form triumphs over extraneous factors including physical ailments
   (c) Michelangelo's gout and other ailments lessened his efficiency
   (d) The diseases Michelangelo faced were due to constant hammering

Passage 36

A business will usually go through a clear set of stages that will make up its organisational life cycle. These stages include introduction, early growth, continuous growth, maturity and decline. The first stage, the introduction stage, is the start-up phase where a business decides what its core strengths and capabilities are and starts selling its product or service. At this early stage, the founder or founders will be a part of every aspect of the daily process of the business.

The main goal at this stage is to take off to a good start and make a place in the market. The next stage, the early growth phase, aims at increased sales and more development. The focus at this stage remains on the original product or service but the effort is to increase the market share and venture into related products or services.

The main goal is to move the founder to a more managerial role so more time is spent on managing and building the business. At this stage, documents and policies need to be developed so any member of the organisation can see the business any time.

The third stage, the continuous growth stage, requires a systematic structure and more formal relationships among its participants. At this stage, the resource requirements of the business need careful handling.

The focus is on the expansion of the business, keeping in mind its core strength and capability. A formal organisational structure and a clear delegation plan are important at this stage. At the fourth stage of maturity, a business often slows down as the level of innovative energy may have become weak and the formal structures may have become obstacles. A lot of care is required to prevent decline.

1. The resource requirements of a business need careful handling at which stage?
   (a) Fourth (b) First
   (c) Third (d) Second

2. Venturing into related products and services does not mean that a business will
   (a) ignore the original product
   (b) move the founder: to a more managerial role
   (c) delegate more responsibilities
   (d) ignore the related products and services

3. The founder of a business does not move to a more managerial role at which stage?
   (a) Early growth stage
   (b) Maturity stage
   (c) Decline stage
   (d) Start up stage

4. The slowing down of a business can happen if
   (a) there is a decline in the market share
   (b) the level of innovative energy weakens
   (c)the managerial roles are not clear
   (d) the level of investment declines

5. When will a business create its place in the market?
   (a) At maturity (b) At introduction
   (c) At early growth (d) At late growth

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Passage 37

An important difference between human beings and animals is the property of language. Animals have a rudimentary information process but this process does not have the sophistication and complexity of human language.

If two dogs communicate, they pass on information but they can't discuss details the way humans can. While humans are blessed to possess the language faculty, most of the time they don't utilise it to its greatest potential.

Perhaps this is because human beings tend to react rather than respond. And a lot of the message of languages is lost in this reaction.

In the daily use of language, people forget the complex process involved in order to put even one word in place. The wonder of this process lies in the fact that it is involuntary in nature, the whole set of chain processes right from the command in the brain to the forming of words from the message required to the movement of the vocal chords and corresponding movements in the lungs and mouth takes place within seconds. Perhaps the whole suggestion of 'think before you speak', may lead to a silent world! In the world of daily interaction, language becomes a marker and a means of projecting identity.

The people around us identify us with a certain style of using language and unknowingly, each language user follows this style by habit. It is not a bad idea to record one's spoken communication from time to time, as this will assist in removing any unwanted elements that the speech may be expressing. Similarly, it is a good idea to step back once in a while and read one's written communication objectively.

1. **The world will become a silent place if people will think**
(a) too much (b) before listening
(c) before responding (d) before speaking

2. **The process of language is a wonder because it is**
(a) a reaction (b) a response
(c) smooth (d) involuntary

3. **Which of the following forms is assumed by the language style of a person?**
(a) A reaction (b) A habit
(c) A response (d) A thought

4. **When human beings react rather than respond**
(a) they lose the message (b) they lose control
(c) they become emotional (d) they can't speak

5. **Animals do not possess language because**
(a) the power of speech is missing
(b) the life breath is missing
(c) the level of complexity is missing
(d) the information-sharing is missing

Passage 38

Geography seeks to understand the physical and human organisation of the surface of the Earth. In the field of geography, inter-related themes are frequently seen. These are scale, pattern and process. Scale is defined as the level of structure or organisation at which a phenomenon is studied. Pattern is defined as the variation observed in a phenomenon studied at a particular scale. The third theme, process, further connects the first two. Process is defined as the description of how the factors that affect a phenomenon act to produce a pattern at a particular scale. For instance, when a passenger on an aircraft looks out of the window, the view changes according to the scale.

At the global scale when the aircraft maintains its height, he can see the chunks of clouds in all their pattern, the sun or the moon, as per the time. When the aircraft loses a little height, passengers can see the land and water masses in their different colours and the shape of land masses. At the continental scale, the passengers can see the shapes of the land features and how they are distributed. The pattern emerges as the variation of land and water and the proportion of each. Looking carefully, passengers can note how each land mass aligns with the others and how each mountain bears the signs of the process through which it emerged.

The processes in a geography change in a regular and repetitive manner. One instance of this is the annual solar cycle of the sun and the earth. Most systems in nature display time cycles that are organised in a rhythm of their own as these time cycles and natural processes are always active, the environment of the earth is always in a state of dynamism. This environmental change is not only the result of natural process but also the result of human activity. Physical geography works towards understanding the interaction between man and nature and also the results of this interaction in order to manage global climate change better.

1. **The time cycles of the system of nature follow their own**
(a) path (b) rhythm
(c) process (d) cycle

2. **The view seen by a passenger looking out of the window of an aircraft; will be affected by the**
(a) process (b) pattern
(c) scale (d) rhythm

3. **Physical geography studies the results of the interaction between man and nature in order to**
(a) understand global climate change
(b) study the impact of man's activities on nature
(c) address the issue of global climate change
(d) reduce man-animal conflict

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4. In geography, pattern studies the variation observed in a phenomenon at
(a) a particular scale (b) any scale
(c) every scale (d) most scale

5. The alignment of a landmass with other elements can be seen by a passenger on a flight on a
(a) global scale (b) continental scale
(c) local scale (d) time scale

Passage 39

One of the findings of the research into successful leadership is the fact that respect is always a two-way street. No matter how powerful you are, no matter what your experience, skills and accomplishments, you will not be respected by others if you consistently treat them disrespectfully. Friendliness i.e., treating others politely and showing interest in them-is a way of showing your respect for other people and in return they respect you. If as a manager you are respected, preventive maintenance strategy will be accepted as a sincere attempt to resolve problems rather than a mean-spirited attempt to cause problems.

As important as friendliness is, I want to make sure you are not mislead into believing that friendliness will replace or correct poor management. I have seen effective managers who did not use this friendliness element but could have been more effective if they did use it. I have seen very friendly managers who were ineffective because they were not doing effective management things. In other words, managers who intervene effectively in a friendly way are always more effective than managers who intervene effectively in a non-friendly way. Maintaining a friendly relationship is another part of maintaining work performance. It also helps you avoid having people try to hurt you because they do not like you. It might save your life.

1. According to the passage, friendliness in management terms implies
(a) making management effective
(b) making management ineffective
(c) replacing poor management
(d) correcting ineffective management

2. The central idea of the passage is
(a) friendliness improves the work-ethos
(b) friendliness avoids change of feeling hurt
(c) friendliness is necessary for management
(d) friendliness is a negative factor for management

3. The passage highlights which of the following feature of a successful leadership?
(a) Reciprocity of the leader
(b) Least concern for relationship by the leader
(c) Independence of the leader
(d) Dependence of the leader

4. What is reported in respect of successful leadership?
(a) Respect depends on the accomplishments of the leader
(b) Respect comes out of respect
(c) Respect depends on the skills of the leadership
(d) Respect depends on experience of the leadership

5. The preventive maintenance strategy used by a respected manager will mean to the subordinates.
(a) An attempt to become sincere.
(b) An attempt to become mean-spirited.
(c) An attempt to resolve problems.
(d) An attempt to cause problems.

Passage 40

If India has to develop her internal strengths, the nation has to focus on the technological imperatives, keeping in mind three dynamic dimensions : the people, the overall economy and the strategic interests. These technological imperatives also take into account a 'fourth' dimension, time, an offshoot of modern day dynamism in business, trade and technology that leads to continually shifting targets.

We believe that technological strengths are especially crucial in dealing with this fourth dimension underlying continuous change in the aspirations of the people, the economy in the global context and the strategic interests. The progress of technology lies at the heart of human history. Technological strengths are the key to creating more productive employment in an increasingly competitive market place and to continually upgrade human skills.

Without a pervasive use of technologies, we cannot achieve overall development of our people in the years to come. The direct linkages of technology to the nation's strategic strengths are becoming more and more clear, especially since 1990s. India's own strength in a number of core areas still puts it in a position of reasonable strength in geo-political context.

Any nation aspiring to become a developed one needs to have strengths in various strategic technologies and also the ability to continually upgrade them through its own creative strengths. For people-oriented actions as well, whether for the creation of large scale productive employment or for ensuring nutritional and health security for people or for better living conditions, technology is the only vital input.

The absence of greater technological impetus could lead to lower productivity and wastage of precious natural resources. Activities with low productivity or low value addition, in the final analysis hurt the poorest most. The technological imperatives to lift our people to a new life and to a life they are entitled to is important.

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India, aspiring to become a major economic power in terms of trade and increase in GDP, cannot succeed on the strength of turnkey projects designed and built abroad or only through large-scale imports of plant and machinery, equipment and know how. Even while being alive to the short-term realities, medium and long-term strategies to develop core technological strengths within our industry are vital for envisioning a developed India.

1. Envisioning a developed India requires
(a) focus on short-term projects
(b) development of core technological strengths
(c) aspiration to become a major economic player
(d) dependence upon projects designed abroad

2. Absence of technology would lead to
1. less pollution.
2. wastage of precious natural resources.
3. low value addition.
4. hurting the poorest most.

Select the most appropriate answer from the following codes.
(a) 1, 2 and 4 (b) 2, 1 and 4
(c) 1, 2 and 3 (d) 2, 3 and 4

3. According to the given passage, which of the following are indicative of the fourth dimension?
1. Aspirations of people.
2. Modern day dynamism.
3. Economy in the global context.
4. Strategic interests.

Select the most appropriate answer from the following codes.
(a) 1, 3 and 4 (b) 1, 2 and 4
(c) 1, 2 and 3 (d) 2, 3 and 4

4. More productive employment demands
(a) geo-political considerations
(b) large industries
(c) pervasive use of technology
(d) limiting competitive market place

5. The advantage of technological inputs would result in
(a) sidelining environmental issues
(b) lifting our people to a life of dignity
(c) unbridled technological growth
(d) importing plant and machinery

Passage 41

Climate change is considered to be one of the most serious threats to sustainable development, with adverse impacts on the environment, human health, food security, economic activity, natural resources and physical infrastructure. Global climate varies naturally. According to the Intergovernmental Panel on Climate Change (IPCC), the effects of climate change have already been observed, and scientific findings indicate that precautionary and prompt action is necessary. Vulnerability to climate change is not just a function of geography or dependence on natural resources; it also has social, economic and political dimensions which influence how climate change affects different groups. Poor people rarely have insurance to cover loss of property due to natural calamities i.e., drought, floods, super cyclones, etc.

The poor communities are already struggling to cope with the existing challenges of poverty and climate variability and climate change could push many beyond their ability to cope or even survive. It is vital that these communities are helped to adapt to the changing dynamics of nature. Adaptation is a process through which societies make themselves better able to cope with an uncertain future. Adapting to climate change entails taking the right measures to reduce the negative effects of climate (or exploit the positive ones) by making the appropriate adjustments and changes.

These range from technological options such as increased sea defences or flood-proof houses on stilts to behavioural change at the individual level, such as reducing water use in times of drought. Other strategies include early warning systems for extreme events, better water management, improved risk management, various insurance options and biodiversity conservation.

Because of the speed at which climate change is happening due to global temperature rise, it is urgent that the vulnerability of developing countries to climate change is reduced and their capacity to adapt is increased and national adaptation plans are implemented.

Adapting to climate change will entail adjustments and changes at every level from community to national and international. Communities must build their resilience, including adopting appropriate technologies while making the most of traditional knowledge and diversifying their livelihoods to cope with current and future climate stress. Local coping strategies and knowledge need to be used in synergy with government and local interventions. The need of adaptation interventions depends on national circumstances.

There is a large body of knowledge and experience within local communities on coping with climatic variability and extreme weather events. Local communities have always aimed to adapt to variations in their climate.

To do so, they have made preparations based on their resources and their knowledge accumulated through experience of past weather patterns. This includes times when they have also been forced to react to and recover from extreme events, such as floods, drought and hurricanes.

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Local coping strategies are an important element of planning for adaptation. Climate change is leading communities to experience climatic extremes more frequently, as well as new climate extremes. Traditional knowledge can help to provide efficient appropriate and time-tested ways of advising and enabling, adaptation to climate change in communities who are feeling the effects of climate changes due to global warming.

1. To address the challenge of climate change, developing countries urgently require
(a) implementation of national adaptation policy at their level
(b) adoption of short-term plans
(c) adoption of technological solutions
(d) imposition of climate change tax

2. Given below are the factors of vulnerability of poor people to climate change.
1. Their dependence on natural resources.
2. Geographical attributes.
3. Lack of financial resources.
4. Lack of traditional knowledge.

Select the most appropriate answer from the following codes.
(a) 2, 3 and 4 (b) 1, 2, 3 and 4
(c) Only 3 (d) 1, 2 and 3

3. Adaptation as a process enables societies to cope with
1. an uncertain future.
2. adjustments and changes.
3. negative impact of climate change.
4. positive impact of climate change.

Select the most appropriate answer from the following codes.
(a) Both 1 and 3 (b) 2, 3 and 4
(c) Only 3 (d) 1, 2, 3 and 4

4. The main focus of the passage is on
(a) co-ordination between regional and national efforts
(b) adaptation to climate change
(c) social dimensions of climate change
(d) combining traditional knowledge with appropriate technology

5. The traditional knowledge should be used through
(a) improvement in national circumstances
(b) synergy between government and local interventions
(c) modern technology
(d) its dissemination

Passage 42

The last great war, which nearly shook the foundations of the modern world, had little impact on Indian literature beyond aggravating the popular revulsion against violence and adding to the growing disillusionment with the 'humane pretensions' of the Western World. This was eloquently voiced in Tagore's later poems and his last testament, 'Crisis in Civilisation'. The Indian intelligentsia was in a state of moral dilemma.

On the one hand, it could not help sympathising with England's dogged courage in the hour of peril, with the Russian fighting with their backs to the wall against the ruthless Nazi hordes, and with China groaning under the heel of Japanese militarism; on the other hand, their own country was practically under military occupation of their own soil and an Indian army under Subhas Bose was trying from the opposite camp to liberate their country.

No creative impulse could issue from such confusion of loyalties. One would imagine that the achievement of Indian Independence in 1947, which came in the wake of the Allies' victory and was followed by the collapse of colonialism in the neighbouring countries of South-East Asia, would have released an upsurge of creative energy.

No doubt it did, but unfortunately it was soon submerged in the great agony of partition, with its inhuman slaughter of the innocents and the uprooting of millions of people from their homeland, followed by the martyrdom of Mahatma Gandhi.

These tragedies, along with Pakistan's invasion of Kashmir and its later atrocities in Bangladesh, did indeed provoke a poignant writing, particularly in the languages of the regions most affected, Bengali, Hindi, Kashmiri, Punjabi, Sindhi and Urdu. But poignant or passionate writing does not by itself make great literature.

What reserves of enthusiasm and confidence survived these disasters have been mainly absorbed in the task of national reconstruction and economic development. Great literature has always emerged out of chains of convulsions. Indian literature is richer today in volume, range and variety than it ever was in the past.

1. What was the impact of the last great war on Indian literature?
(a) It had no impact
(b) It aggravated popular revulsion against violence
(c) It shook the foundations of literature
(d) It offered eloquent support to the Western World

2. What did Tagore articulate in his last testament?
(a) Offered support to Subhas Bose
(b) Exposed the humane pretensions of the Western World
(c) Expressed loyalty to England
(d) Encouraged the liberation of countries

3. What was the stance of Indian intelligentsia during the period of great war?
(a) Indifference to Russia's plight
(b) They favoured Japanese militarism
(c) They prompted creativity out of confused loyalties
(d) They expressed sympathy for England's dogged courage

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4. Identify the factor responsible for the submergence of creative energy in Indian literature.
   (a) Military occupation of one's own soil
   (b) Resistance to colonial occupation
   (c) Great agony of partition
   (d) Victory of Allies

5. What was the aftermath that survived tragedies in Kashmir and Bangladesh?
   (a) Suspicion of other countries
   (b) Continuance of rivalry
   (c) Menace of war
   (d) National reconstruction

6. The passage has the message that
   (a) disasters are inevitable
   (b) great literature emerges out of chains of convulsions
   (c) Indian literature does not have a marked landscape
   (d) literature has no relation with war and independence

Passage 43

In terms of labour, for decades the relatively low cost and high quality of Japanese workers conferred considerable competitive advantages across numerous durable goods and consumer electronics industries (e.g. machinery, automobile, TV, radio).

Then labour-based advantages shifted to South Korea, then to Malaysia, Mexico and other nations. Today, China appears to be capitalising best on the basis of labour. Japanese firms still remain competitive in markets for such durable goods, electronics and other products, but the labour force is no longer sufficient for competitive advantage over manufacturers in other industrialising nations.

Such shifting of labour-based advantage is clearly not limited to manufacturing industries. Today, a huge number of IT and service jobs are moving from Europe and North America to India, Singapore and like countries with relatively well-educated, low-cost workforces possessing technical skills.

However, as educational levels and technical skills continue to rise in other countries, India, Singapore and like nations enjoying labour-based competitive advantage today are likely to find such advantage cannot be sustained through emergence of new competitors.

In terms of capital, for centuries the days of gold coins and later even paper money restricted financial flows. Subsequently regional concentrations were formed where large banks, industries and markets coalesced. But today capital flows internationally at rapid speed. Global commerce no longer requires regional interactions among business players.

Regional capital concentrations in places such as New York, London and Tokyo still persist, of course, but the capital concentrated there is no longer sufficient for competitive advantage over other capitalists distributed worldwide.

Only if an organisation is able to combine, integrate and apply its resources (e.g. land, labour capital, IT) in an effective manner i.e. not readily imitable by competitors can such an organisation enjoy competitive advantage sustainable overtime.

In a knowledge-based theory of the firm, this idea is extended to view organisational knowledge as a resource with atleast the same level of power and importance as the traditional economic inputs. An organisation with superior knowledge can achieve competitive advantage in markets that appreciate the application of such knowledge.

1 Which country enjoyed competitive advantages in automobile industry for decades?
   (a) South Korea (b) Japan
   (c) Mexico (d) Malaysia

2 Why labour-based competitive advantages of India and Singapore cannot be sustained in IT and service sectors?
   (a) Due to diminishing levels of skill
   (b) Due to capital-intensive technology making in roads
   (c) Because of new competitors
   (d) Because of shifting of labour-based advantage in manufacturing industries

3 How can an organisation enjoy competitive advantage sustainable overtime?
   (a) Through regional capital flows
   (b) Through regional interactions among business players
   (c) By making large banks, industries and markets coalesced
   (d) By effective use of various instrumentalities

4 What is required to ensure competitive advantages in specific markets?
   1. Access to capital.
   2. Common office buildings.
   3. Superior knowledge.

   Select the most appropriate answer from the following codes.
   (a) Only 1 (b) Both 1 and 2
   (c) Only 3 (d) All of these

5 The passage also mentions about the trend of
   (a) global financial flow
   (b) absence of competition in manufacturing industry
   (c) regionalisation of capitalists
   (d) organisational incompatibility

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Passage 44

I did that thing recently where you have to sign a big card-which is a horror unto its especially as the keeper of the big card was leaning over me at the time. Suddenly I was on the spot, a rabbit in the headlights, torn between doing a fun message or some sort of in-joke or a drawing. Instead overwhelmed by the myriad options available to me, I decided to just write 'Good luck, best, Joel'. It was then that I realised, to my horror, that I had forgotten how to write.

My entire existence is 'tap letters into computer'. My shopping lists are hidden in the notes function of my phone. If I need to remember something I send an e-mail to myself. A pen is something I chew when I am struggling to think. Paper is something I pile beneath my laptop to make it a more comfortable height for me to type on.

A poll of 1000 teens by the stationers, Bic found that one in 10 don't own a pen, a third have never written a letter, and half of 13 to 19 years-old have never been forced to sit down and write a thank you letter. More than 80% have never written a love letter, 56% don't have letter paper at home and a quarter have never known the unique torture of writing a birthday card. The most a teen ever has to use a pen is on an exam paper.

Bic, have you heard of mobile phones? Have you heard of e-mail, facebook and snap chatting? This is the future. Pens are dead. Paper is dead. Handwriting is a relic. "Handwriting is one of the most creative outlets we have and should be given the same importance as other art forms such as sketching, painting or photography."

1. According to the author, which one is not the most creative outlet of pursuit?
(a) Reading (b) Handwriting
(c)Photography (d) Sketching

2. When confronted with signing a big card, the author felt like 'a rabbit in the headlight'. What does this phrase mean?
(a) A state of pain (b) A state of confusion
(c) A state of pleasure (d) A state of anxiety

3. How many teens, as per the Bic survey do not own a pen?
(a) 100 (b) 800
(c) 560 (d) 500

4. The entire existence of the author revolves round
1. computer. 2. mobile phone.
3. typewriter.

Select the correct answer using the codes given below.
(a) Both 2 and 3 (b) Only 2
(c) Both 1 and 2 (d) All of these

5. What is the main concern of the author?
(a) That the teens have forgotten the art of handwriting
(b) That the teens use social networks for communication
(c) That the teens use mobile phones
(d) That the teens use computer

Passage 45

Storytelling is not in our genes. Neither it is an evolutionary history. It is the essence of what makes us human. Human beings progress by telling stories. One event can result in a great variety of stories being told about it. Sometimes, those stories differ greatly. Which stories are picked up and repeated and which ones are dropped and forgotten often determines, how we progress. Our history, knowledge and understanding are all the collections of the few stories that survive.

This includes the stories that we tell each other about the future. And how the future will turn out depends partly, possibly largely, on which stories we collectively choose to believe. Some stories are designed to spread fear and concern. This is because some storytellers feel that there is a need to raise some tensions. Some stories are frightening, they are like totemic warnings. 'Fail to act now and we are all doomed. Then, there are stories that indicate that all will be fine so long as we leave everything upto a few especially able adults. Currently, this trend is being led by those who call themselves 'rational optimists'.

They tend to claim that it is human nature to compete and to succeed and also to profit at the expense of others. The rational optimists however, do not realise, how humanity has progressed overtime through amiable social networks and how large groups work in less selfishness and in the process accommodate rich and poor, high and low alike. This aspect in storytelling is considered by the 'Practical Possibles', who sit between those who say all is fine and cheerful and be individualistic in your approach to a successful future and those who ordain pessimism and fear that we are doomed.

What the future holds for us is, which stories we hold on to and how we act on them?

1. Our knowledge is a collection of
(a) all stories that we have heard during our life-time
(b) some stories that we remember
(c) a few stories that survive
(d) some important stories

2. Storytelling is
(a) an art
(b) a science
(c) in our genes
(d) the essence of what makes us human

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3. How the future will turn out to be, depends upon the stories?
   (a) We collectively choose to believe in
   (b) Which are repeatedly narrated
   (c) Designed to spread fear and tension
   (d) Designed to make prophecy

4. Rational optimists
   1. look for opportunities.
   2. are sensible and cheerful.
   3. are selfishly driven.

   Select the most appropriate answer from the following codes.
   (a) Both 1, 2 and 3 (b) Only 1
   (c) Both 1 and 2 (d) Both 2 and 3

5. Humans become less selfish when
   (a) they work in large groups
   (b) they listen to frightening stories
   (c) they listen to cheerful stories
   (d) they work in solitude

6. 'Practical Possibles' are the ones who
   1. follow midway path.
   2. are doom-mongers.
   3. are self-centred.

   Select the most appropriate answer from the following codes.
   (a) Both 2 and 3 (b) Only 1
   (c) Only 2 (d) All of these

Passage 46

The battle that immediately took place was frightful to be hold. Most of the men used sticks of huge size and strange shapes, with which they beat each other's heads. As they wore almost no clothes and had to bound, leap and run in their terrible hand to hand fights, they looked more like devils than human beings.

I felt my heart grew sick at the sight to their bloody battle and would have liked to have turned away, but something seemed to hold me down and keep my eyes upon the fighting men. I observed that the attacking party was led by a most strange being, who, from his size and strangeness I thought, was a chief. His hair stood out, so that it looked like a large hat. It was of a light yellow colour, which surprised me much, for the man's body was as black as coal and I felt certain that the hair must have been coloured. He was painted from head to toe. With his yellow coloured hair, his huge black frame, his shining eyes and white teeth, he seemed the most terrible monster I ever saw. He was very terrible in the fight and had already killed four men.

1. The narrator found that the battle was
   (a) a rare and pleasing event
   (b) being fought with different kinds of sticks
   (c) being fought atop a hill
   (d) confined to members of the same group

2. The nude fighters
   (a) looked vulgar and spineless
   (b) leapt around a fire
   (c) fought like ferocious devils
   (d) slowly bled to death

3. The battle was nauseating, but the narrator was
   (a) forced to watch it by the fighters
   (b) inexplicably glued to the scene
   (c) afraid to move away
   (d) could not take the risk of being seen

4. The chief could be recognised because
   (a) he was wearing a large hat
   (b) the colour of his hair was yellow
   (c) he uttered terrible war cries
   (d) he was big and unfamiliar

5. The chief
   (a) offered to make peace
   (b) led his men to victory
   (c) fought like a huge animal
   (d) remained fixed like a pole

Passage 47

Today the game reserves of East Africa are facing a number of threats. Although they earn considerable revenue by attracting tourists, they take up land which is increasingly sought by the local people. While these reserves feed and protect animals they are in danger of turning into barren areas or deserts. Trees, shrubs and grass are gradually being eaten by grazing herds.

Another problem is to be found in the changing attitudes of the animals themselves. Many of them are losing their hereditary fear of man. In this way they may become a danger to visitors and thus to themselves. Attacks on vehicles are beginning to increase and it is possible that the problem will become serious in a few years time.

The problem of shortage of land is not a simple one. As the population increases, more and more people look hungrily at the land set aside for game reserves. They claim that Government's first duty is to its inhabitants and not to tourists or to wild animals. Despite the income obtained from tourism, this is an argument which is difficult to answer satisfactorily.

1. Why many local people look hungrily at the game reserves?
   (a) They may seek land for their own cultivation
   (b) The animals may be a danger to them and their villages
   (c) They may dislike living in a deserted place
   (d) They may be hungry and want to eat the animals

2. What is causing soil erosion in the game reserves?
   (a) The tropical heat
   (b) The disappearance of vegetation, which is eaten by the animals

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(c) The violent storms, which are caused by grazing herds
(d) The animals are losing their hereditary fear of man

3. **As far as you can tell from the passage, why does the Government bother to maintain game reserves?**
(a) To stop the people from using the land
(b) To keep the vegetation under control
(c) To obtain income from tourism
(d) To make the country beautiful

4. **What may be the attitude of the animals (in these reserves) in general in a few years' time?**
(a) They may become a nuisance in various ways
(b) They may become too shy to be seen
(c) They may chase away every visitor who enters a game reserve
(d) They may become friendly with the local people

5. **To what does 'this' refer in the last sentence of the passage?**
(a) The income obtained from tourists who park their cars in town
(b) The revenue from tourists who visit the game reserves
(c) The clap concerning the duty of the government
(d) The problems concerning game reserve in East Africa

Passage 48

But perfect organisation, faultless team-work, indomitable courage, super human endurance, even the latest equipment-all these are unavailing unless the weather is kind. In the mountains it is the weather that rules every thing. It may be fair in the early morning when the climb begins, but unexpectedly blizzards may halt the climbers with inadequate protection on an exposed slope. The villains of the piece are cold wind and snow and in the Himalayas these conspire together for the whole year, except for two short periods.

In early May and in October there may be short intervals between the tremendous gales of winter and the treacherous snows of the monsoon.

Only in these intervals is there any chance of finding the right weather conditions for an assault upon a peak. Cold can atleast be kept at bay by warm clothing and scientifically planned food and a certain amount of exercise; but against the wind and the snow of the worst Himalayan weather there is no defence.

1. **The two greatest enemies of the Himalayan climber are**
(a) altitude and scarcity of oxygen
(b) wind and snow
(c) ice fields and rocks
(d) slopes and valleys

2. **It is best to attempt scaling a peak**
(a) in the summer months
(b) between storms and gales
(c) early in May or in October
(d) when the monsoons are over

3. **The perils of intense cold may be counteracted by**
(a) a special kind of food and clothing
(b) the use of alcohol
(c) climbing only during the morning hours
(d) the use of drugs and medicines

4. **When climbing in the Himalayas one must always remember that the weather is**
(a) severe (b) conquerable
(c) the supreme arbiter (d) fickle

5. **According to the author, what the mountaineer today needs most is**
(a) regular exercise (b) adequate medical aid
(c) financial support (d) modern equipment

Passage 49

The heart of Naval officer Sub Lieutenant Atul Kumar Pawar, 24, who died at a private hospital in Kochi has started beating in 50-year-old Subramanya Bhatt, a patient in Kottayam Medical/College. The officer belongs to Panchkula. The organ was transferred by road in an hour through the green corridor set up by the district administration, Kochi and Kottayam city police.

The Centre and the State government machinery moved to fulfill the wish of naval officer's family who wanted their son's organs to be given to defence personnel awaiting donors. Following his request, naval officials contacted the members of National Organ and Tissue Transplant Organisation (NOTTO), who in turn got in touch with the state government.

The officials of Kerala Network for Organ Sharing (KNOS) said that since the heart, liver and kidney were in good condition, NOTTO began efforts to transfer organs to the Army Hospital in Delhi. However, due to technical difficulties, the plan was dropped. But continued efforts ensured that at least one organ, a kidney, was given to a patient at Air Force Command hospital in Bengaluru.

The kidney was transported by a special Indian Air Force (IAF) plane on Thursday and transferred to the Naval base, Kochi, from Aster Medicity hospital through a green corridor.

1. **Naval officer's family refers to**
(a) family of Subramanya Bhatt
(b) family of a martyr
(c) family of Sub Lt Atul Kumar Pawar
(d) None of the above

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2. Who all set up the green corridor for the transfer of the organs?
   (a) Kochi City Police
   (b) Kottayam City Police
   (c) District administration, Kochi
   (d) Both 'a' and 'c'

3. Which plan was dropped due to technical difficulties?
   (a) Transforming of organs to Army Hospital, Delhi
   (b) Transferring of organs to Kottayam Medical College
   (c) Transferring of organs to KNOS
   (d) Transferring of organs to IAF

4. What does 'government machinery' refer to?
   (a) The machines used to transplant the organs.
   (b) The government machines used to transport the organs.
   (c) Various governments working in tandem.
   (d) The government surgeons used to conduct the organ transplant.

5. The following organs of Sub Lt A K Pawar that were finally transplanted successfully
   (a) Heart and Liver (b) Heart and Lungs
   (c) Heart and Kidney (d) Lungs and Intestines

Passage 50

In today's world, where corruption, violence, unrest have become so prevalent in our society, schools have an added responsibility to ensure that value education as a subject is taken seriously as a part of the curriculum to produce not just educated but also responsible citizens with insightful minds who believe in giving back to the society.

Values should be integrated in various aspects of life. It goes without saying that values go a long way in building a person's character. Education without strong character is like a ship without a captain. Good education is inconceivable if it fails to inculcate values which are indispensable for a holistic life.

Qualifications and skills are essential in the success of an individual but without values he is incomplete as a person.

Values are virtues that are imbibed by the children from their surroundings, the environment in which they are brought up, the environment in which they live. The people around them play a vital role in leaving an impression on the tender minds of these young individuals. With the increasing trend of nuclear families, parents working round the clock, absence of grand parents and elderly in the family, children and up spending a lot of time with housemaids and caretakers.

Here, role of the school and particularly the teacher becomes imperative to ensure that values are interwoven in all her lessons she takes up with her students. Values should be a part of each lesson, each topic taken up irrespective of the subject being taught.

1. Education without strong character is like
   (a) Ship with a captain
   (b) Ship without sailors
   (c) Ship without a captain
   (d) Ship without harness

2. What goes a long way in building a person's character?
   (a) Education (b) Values
   (c) Unrest (d) Sports

3. Which word in para 3 is the opposite of 'Joint'?
   (a) Absence (b) Jointly
   (c) Nuclear (d) Virtues

4. Values should be a part of
   (a) each lesson (b) each student
   (c) each teacher (d) each school

5. Who play a vital role in leaving an impression on the minds of children?
   (a) The people around them.
   (b) The serials they watch on TV.
   (c) The mobile phones they use.
   (d) The music they listen to.

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Answer Key

Examples

Passage 1 (Factual)

1. (b)	2. (c)	3. (c)	4. (a)	5. (c)
6. (c)	7. (d)	8. (a)	9. (d)	10. (b)
11. (d)				

Passage 2 (Discursive)

1. (d)	2. (c)	3. (c)	4. (b)	5. (c)
6. (c)	7. (c)	8. (b)	9. (d)	10. (b)
11. (c)				

Passage 3 (Literary)

1. (a)	2. (c)	3. (b)	4. (b)	5. (a)
6. (c)	7. (b)	8. (a)	9. (c)	10. (d)
11. (c)				

Passage 4 (Narrative)

1. (a)	2. (b)	3. (a)	4. (c)	5. (d)

Factual Passage

Passage 1

1. (c)	2. (c)	3. (d)	4. (a)	5. (a)
6. (d)	7. (b)	8. (c)	9. (b)	10. (a)

Passage 2

1. (d)	2. (a)	3. (d)	4. (b)	5. (c)
6. (c)	7. (d)	8. (c)	9. (b)	10. (c)
11. (b)				

Passage 3

1. (b)	2. (c)	3. (d)	4. (a)	5. (b)
6. (a)	7. (b)	8. (d)	9. (d)	10. (c)
11. (a)				

Passage 4

1. (a)	2. (c)	3. (a)	4. (d)	5. (c)
6. (b)	7. (a)	8. (d)	9. (b)	10. (d)
11. (d)				

Passage 5

1. (a)	2. (d)	3. (a)	4. (c)	5. (d)
6. (a)	7. (c)	8. (c)	9. (b)	10. (b)
11. (c)				

Discursive Passage

Passage 6

1. (d)	2. (a)	3. (b)	4. (b)	5. (c)
6. (c)	7. (b)	8. (c)	9. (c)	10. (a)
11. (b)				

Passage 7

1. (a)	2. (c)	3. (b)	4. (c)	5. (d)
6. (a)	7. (a)	8. (b)	9. (d)	10. (b)
11. (b)				

Passage 8

1. (b)	2. (a)	3. (d)	4. (b)	5. (d)
6. (c)	7. (a)	8. (c)	9. (d)	10. (d)
11. (c)				

Passage 9

1. (b)	2. (b)	3. (c)	4. (b)	5. (d)
6. (c)	7. (b)	8. (d)	9. (a)	10. (c)
11. (c)				

Passage 10

1. (a)	2. (d)	3. (d)	4. (a)	5. (b)
6. (c)	7. (b)	8. (d)	9. (a)	10. (c)
11. (b)				

Literary Passage

Passage 11

1. (d)	2. (b)	3. (c)	4. (a)	5. (b)
6. (b)	7. (d)	8. (a)	9. (a)	10. (a)
11. (a)				

Passage 12

1. (b)	2. (d)	3. (c)	4. (a)	5. (b)
6. (c)	7. (a)	8. (c)	9. (d)	10. (b)
11. (d)				

Passage 13

1. (d)	2. (d)	3. (d)	4. (a)	5. (b)
6. (d)	7. (b)	8. (c)	9. (d)	10. (a)
11. (b)				

Passage 14

1. (c)	2. (b)	3. (a)	4. (d)	5. (a)
6. (c)	7. (b)	8. (a)	9. (d)	10. (c)
11. (c)				

Passage 15

1. (c)	2. (a)	3. (d)	4. (b)	5. (c)
6. (a)	7. (b)	8. (b)	9. (d)	10. (c)
11. (a)				

Narrative Passage

Passage 16

1. (a)	2. (b)	3. (c)	4. (d)	5. (c)

Passage 17

1. (b)	2. (b)	3. (a)	4. (a)	5. (a)

Passage 18

1. (b)	2. (b)	3. (a)	4. (b)	5. (c)

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Passage 19

1. (b) 2. (b) 3. (a) 4. (d) 5. (a)

Passage 20

1. (a) 2. (a) 3. (a) 4. (c) 5. (b)

Practice Exercise

Passage 1

1. (c) 2. (c) 3. (c) 4. (b) 5. (d)
6. (c) 7. (c) 8. (c) 9. (a) 10. (d)

Passage 2

1. (c) 2. (d) 3. (b) 4. (a) 5. (a)
6. (a) 7. (d) 8. (a) 9. (c) 10. (b)

Passage 3

1. (b) 2. (b) 3. (c) 4. (d) 5. (c)
6. (c) 7. (a) 8. (d) 9. (c) 10. (c)

Passage 4

1. (c) 2. (a) 3. (b) 4. (d) 5. (d)
6. (d) 7. (b) 8. (a) 9. (b) 10. (b)
11. (c)

Passage 5

1. (a) 2. (d) 3. (b) 4. (b) 5. (c)
6. (b) 7. (c) 8. (b) 9. (c) 10. (a)

Passage 6

1. (d) 2. (d) 3. (b) 4. (b) 5. (b)
6. (c) 7. (d) 8. (a) 9. (c) 10. (c)

Passage 7

1. (a) 2. (c) 3. (b) 4. (d) 5. (c)
6. (c) 7. (d) 8. (c) 9. (a) 10. (c)

Passage 8

1. (d) 2. (b) 3. (a) 4. (a) 5. (b)
6. (d) 7. (b) 8. (d) 9. (a) 10. (a)

Passage 9

1. (d) 2. (c) 3. (a) 4. (d) 5. (b)
6. (c) 7. (d) 8. (a) 9. (c) 10. (d)

Passage 10

1. (c) 2. (b) 3. (d) 4. (d) 5. (b)
6. (b) 7. (d) 8. (c) 9. (a) 10. (b)

Passage 11

1. (a) 2. (b) 3. (d) 4. (c) 5. (a)

Passage 12

1. (a) 2. (b) 3. (c) 4. (b) 5. (b)

Passage 13

1. (b) 2. (b) 3. (c) 4. (b) 5. (b)

Passage 14

1. (a) 2. (b) 3. (c) 4. (d) 5. (a)

Passage 15

1. (b) 2. (c) 3. (d) 4. (d) 5. (d)

Passage 16

1. (a) 2. (a) 3. (a) 4. (d) 5. (a)

Passage 17

1. (b) 2. (b) 3. (a) 4. (a) 5. (d)

Passage 18

1. (c) 2. (a) 3. (b) 4. (a) 5. (d)

Passage 19

1. (a) 2. (b) 3. (a) 4. (d) 5. (c)

Passage 20

1. (d) 2. (a) 3. (b) 4. (c) 5. (d)

Passage 21

1. (d) 2. (a) 3. (c) 4. (c) 5. (b)

Passage 22

1. (c) 2. (b) 3. (c) 4. (b) 5. (b)

Passage 23

1. (c) 2. (d) 3. (c) 4. (c) 5. (d)

Passage 24

1. (a) 2. (a) 3. (d) 4. (d) 5. (b)

Passage 25

1. (b) 2. (d) 3. (a) 4. (b) 5. (a)

Passage 26

1. (c) 2. (c) 3. (d) 4. (d) 5. (c)

Passage 27

1. (d) 2. (b) 3. (c) 4. (a) 5. (a)

Passage 28

1. (b) 2. (d) 3. (d) 4. (d) 5. (b)

Passage 29

1. (c) 2. (b) 3. (d) 4. (d) 5. (b)

Passage 30

1. (b) 2. (d) 3. (d) 4. (d) 5. (d)

Passage 31

1. (d) 2. (d) 3. (a) 4. (a) 5. (b)

Passage 32

1. (b) 2. (a) 3. (b) 4. (c) 5. (d)

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Passage 33

1. (b) 2. (a) 3. (c) 4. (c) 5. (d)

Passage 34

1. (c) 2. (d) 3. (c) 4. (d) 5. (b)

Passage 35

1. (d) 2. (c) 3. (b) 4. (a) 5. (b)

Passage 36

1. (c) 2. (a) 3. (d) 4. (b) 5. (b)

Passage 37

1. (d) 2. (d) 3. (b) 4. (a) 5. (c)

Passage 38

1. (b) 2. (c) 3. (c) 4. (a) 5. (b)

Passage 39

1. (a) 2. (a) 3. (a) 4. (b) 5. (c)

Passage 40

1. (b) 2. (d) 3. (a) 4. (c) 5. (b)

Passage 41

1. (a) 2. (d) 3. (a) 4. (b) 5. (b)

Passage 42

1. (b) 2. (b) 3. (d) 4. (c) 5. (d)
6. (b)

Passage 43

1. (b) 2. (c) 3. (c) 4. (c) 5. (c)

Passage 44

1. (a) 2. (b) 3. (a) 4. (c) 5. (a)

Passage 45

1. (c) 2. (d) 3. (a) 4. (a) 5. (a)
6. (b)

Passage 46

1. (b) 2. (c) 3. (b) 4. (d) 5. (c)

Passage 47

1. (a) 2. (b) 3. (c) 4. (c) 5. (c)

Passage 48

1. (b) 2. (c) 3. (a) 4. (c) 5. (d)

Passage 49

1. (c) 2. (d) 3. (a) 4. (c) 5. (c)

Passage 50

1. (c) 2. (b) 3. (c) 4. (a) 5. (a)

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VERBAL ABILITY

In order to understand what Verbal Ability means, it is important to define the term verbal. Verbal in general means making use of words while communicating. The term ability in this context refers to a candidate's potential to use words effectively to generate meaning. In verbal ability, effective use of grammar, vocabulary and comprehension is stressed. Thus, verbal ability can be defined as making use of the essential components of the English language in order to effectively communicate in both spoken and written forms.

Given below is the list of topics which are a part of the verbal ability section

1. **Choose the correct word (Sentence Completion)**
2. **Antonyms and Synonyms**
3. **Idioms and Phrases**
4. **One Word Substitution**
5. **Spellings**
6. **Rearrangement of Sentences.**

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Choose the Correct Word (Sentence Completion)

Sentence completion test is a test which checks the comprehension ability and knowledge of words, of a candidate which are required to be filled in the sentences. A sound vocabulary and knowledge of grammatical rules give an edge while solving questions.

The candidates are asked to choose the best alternative given under a sentence to make the sentence complete and meaningful.

Ex. 1 To err is …… to forgive divine.
(a) human (b) inhuman
(c) natural (d) blunder

Ans. (*a*) 'human' is the correct alternative to be filled in the sentence as it is a proverb.

Ex. 2 He was accused …… stealing money from the wallet.
(a) for (b) of (c) with (d) to

Ans. (*b*) Preposition 'of ' should be filled in the blank as phrasal verb 'accuse of ' mean charge with an offence or crime.

Practice Questions

Directions (Q. Nos. 1-39) *Fill in the blanks with the most suitable word from the alternatives given under each sentence.*

1. No sooner had she entered the cabin …… the light went out and everyone started talking loudly.
(a) than (b) when
(c) if (d) and

2. My mother prefers drinking tea …… coffee.
(a) than (b) to
(c) over (d) on

3. My teacher congratulated me …… my victory in the match.
(a) for (b) on
(c) to (d) in

4. I have read one novel of Chetan Bhagat. I want to read …… novel of him.
(a) other (b) second
(c) another (d) few

5. The Ganga overflowed its …… and flooded the area.
(a) limits (b) fronts
(c) edges (d) banks

6. Mr Chahar is too old …… climb the hill.
(a) for (b) at (c) to (d) of

7. The apples are now …… enough to be picked.
(a) ready (b) mature
(c) advanced (d) ripe

8. If he …… a doctor, he would treat you free.
(a) was (b) is
(c) were (d) will be

9. The meeting was presided …… by the President.
(a) very (b) upon
(c) over (d) on

10. The lawyer was threatened …… dire consequences.
(a) with (b) for (c) of (d) by

11. Madhur felt ……, the manager rejected his proposal.
(a) pleased (b) miserable
(c) overjoyed (d) happy

12. We cannot eat these fruits; they are …… .
(a) rancid (b) bad
(c) old (d) rotten

13. Don't …… her, she has done no harm to any of us.
(a) accuse (b) admire
(c) discuss (d) scold

14. His answer was such …… I expected him to give.
(a) that (b) as
(c) about (d) like

15. Fate smiled …… him in all his ventures.
(a) at (b) with (c) on (d) over

16. A son who is unable to look his father in the face is …… .
(a) timid (b) guilty
(c) arrogant (d) ashamed

17. All of us should abide …… the laws of our country.
(a) on (b) by (c) to (d) with

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18. Today the standard of education has …… so much.
(a) deteriorates
(b) deteriorated
(c) deteriorate
(d) will deteriorate

19. I couldn't buy the book because it was …… .
(a) out of print (b) out of order
(c) out of sight (d) out of hand

20. He came with a …… of flowers.
(a) herd (b) gang
(c) panel (d) bunch

21. One cannot lose what one …… had.
(a) once (b) never
(c) always (d) have

22. Never waste all your money on purchase of some …… items.
(a) Trivial (b) important
(c) excellent (d) significant

23. What are you …… in the kitchen cupboard?
(a) looking in (b) looking to
(c) looking for (d) looking to

24. We have not yet fully realised the …… consequences of the war.
(a) grim (b) happy
(c) pleasing (d) exciting

25. Rihana could not muster …… courage to stand against the harassment.
(a) to (b) up
(c) in (d) on

26. One requires great …… to teach and handle little children.
(a) attitude (b) anger
(c) knowledge (d) patience

27. I would rather stay at home …… the rain stops.
(a) unless (b) usually
(c) until (d) for

28. I have got your point, …… ?
(a) aren't I (b) hadn't I
(c) haven't I (d) have I

29. People who …… on horses usually lose in the end.
(a) gamble (b) play
(c) ride (d) save

30. I shall call …… you tomorrow.
(a) up (b) on
(c) with (d) down

31. Indeed, all over the world, more and more people are …… coffee.
(a) wanting (b) drinking
(c) liking (d) partaking

32. My sister fell …… the bicycle as she does not know riding.
(a) off (b) from (c) of (d) under

33. Health is too important to be …… .
(a) discarded (b) detested
(c) neglected (d) despised

34. The brand of your jeans is quite inferior …… that of mine.
(a) than (b) to
(c) over (d) with

35. The writer is very efficient. He is …… to his publication house.
(a) a boon (b) a credit
(c) a blessing (d) an asset

36. Man must …… now to stop pollution.
(a) operate (b) act
(c) behave (d) perform

37. Children enjoy …… the TV programmes.
(a) to watch (b) to see
(c) watching (d) seeing

38. According to the weather …… it is going to be cloudy today.
(a) prediction
(b) forecast
(c) announcement
(d) indication

39. When my father got home last evening, he found that we …… .
(a) have slept
(b) had slept
(c) were sleeping
(d) will have slept

Directions (Q. Nos. 40-70) *In the following questions, the sentence given with blanks to be filled in with an appropriate word. Select the correct alternative out of the four and indicate it by selecting the appropriate option.*

40. I have …… respect for his achievement.
(a) abundant (b) profound
(c) strong (d) unique

41. Everyone was pleased to learn the actor would …… his role as the captivating pirate.
(a) reprise (b) rescue
(c) save (d) free

42. The diamond necklace was …… too extravagant for a simple dinner party.
(a) distance (b) long
(c) very much (d) far

43. Keith has …… with a failure in English examination thrice.
(a) caught (b) gone
(c) got (d) met

44. The manager was …… an explanation of his conduct.
(a) called for (b) called off
(c) called to (d) called up

45. There are …… books of computer science in your school library, so you need to purchase them from the market.
(a) a few (b) a little
(c) few (d) the few

46. The publisher is bringing … a revised edition of this book.
(a) up (b) about
(c) out (d) round

47. She had to …… illness in order to avoid going to the party meeting.
(a) fain (b) feint
(c) feign (d) faint

48. This is our house and that is …… .
(a) their (b) theirs
(c) them (d) their's

49. Your …… nature will aid you in attaining success in every venture you undertake.
(a) lackadaisical (b) persevering
(c) catalytic (d) rotund

50. Rita ..... her cooking last night.
(a) does not do (b) did not do
(c) will not do (d) would not do

51. I have known her ..... the end of the World War II.
(a) form (b) since
(c) during (d) towards

52. His appointment may ..... some new life into the committee.
(a) increase (b) inject
(c) infect (d) insure

53. The pages of the book ..... by Ravi were lying on the floor.
(a) torn off (b) torn away
(c) torn of (d) torn in

54. The computer ..... nonsense because there was a mistake in the programming.
(a) produces (b) produced
(c) will produce (d) produce

55. That farmer may be old but he is ...
(a) less energetic
(b) more energetic
(c) most energetic
(d) energetic

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56. The monitor takes care ..... the class ..... the absence of the teacher.
(a) in, at
(b) of, in
(c) during, in
(d) of, for

57. When he saw the fish swimming ..... the river, he was extremely happy.
(a) on
(b) besides
(c) in
(d) at

58. The railway coaches .... by the integral coach factory, Chennai.
(a) is manufactured
(b) are manufactured
(c) are manufacture
(d) is being manufactured

59. The truck was .... when the bus rammed into it.
(a) stationery
(b) machinary
(c) machinery
(d) stationary

60. I haven't ..... butter but I have a lot of bread.
(a) a lot of (b) little
(c) much (d) some

61. People from ..... and near came to see the final match of the tournament yesterday.
(a) distance
(b) long
(c) above
(d) far

62. The student ..... book I still have can take it from me.
(a) that
(b) whose
(c) which
(d) his

63. Corruption should be ..... out with the utmost vigour.
(a) talked (b) left
(c) rooted (d) brought

64. Books are a great source ..... happiness.
(a) of (b) for
(c) into (d) with

65. He spoke ..... his travels.
(a) of (b) on
(c) about (d) along

66. The telephone kept ..... ringing but no one attended.
(a) off
(b) on
(c) up
(d) up with

67. She is sad because her father turned ..... her request.
(a) up (b) off
(c) out (d) down

68. You should not confide ..... a stranger.
(a) in (b) to
(c) with (d) by

69. Poets have compared this world ... a stage.
(a) with (b) to
(c) by (d) on

70. I prevailed ..... him to contest the election.
(a) on (b) off
(c) over (d) of

ANSWERS

1	(a)	2	(b)	3	(b)	4	(c)	5	(d)
6	(c)	7	(d)	8	(c)	9	(c)	10	(a)
11	(b)	12	(d)	13	(a)	14	(b)	15	(c)
16	(a)	17	(b)	18	(b)	19	(a)	20	(d)
21	(b)	22	(a)	23	(c)	24	(a)	25	(b)
26	(d)	27	(c)	28	(c)	29	(a)	30	(b)
31	(b)	32	(a)	33	(c)	34	(b)	35	(d)
36	(b)	37	(c)	38	(b)	39	(b)	40	(b)
41	(a)	42	(d)	43	(d)	44	(a)	45	(c)
46	(c)	47	(c)	48	(b)	49	(b)	50	(b)
51	(b)	52	(a)	53	(b)	54	(b)	55	(d)
56	(b)	57	(c)	58	(b)	59	(d)	60	(c)
61	(d)	62	(b)	63	(c)	64	(a)	65	(c)
66	(b)	67	(d)	68	(b)	69	(a)	70	(c)

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CHAPTER **02**

Synonyms and Antonyms

Synonyms

Synonyms are the words that mean exactly or nearly the same to each other.
e.g. (i) Abridge – Shorten, Curtail; (ii) Brave – Courageous, Daring

List of Words with Their Synonyms

Words	Synonyms
Awkward	Clumsy, Rough
Allure	Entice, Fascinate
Abortive	Vain, Unproductive
Allay	Pacify, Soothe
Axiom	Maxim, Truth
Abjure	Forsake, Renounce
Abject	Despicable, Servile
Authentic	Genuine, Reliable
Audacity	Boldness, Arrogance
Abate	Moderate, Decrease
Arraign	Charge, Blame
Apathy	Unconcern, Indifference
Alien	Foreigner, Outsider
Affront	Provoke, Irreverence
Adversity	Misfortune, Calamity
Antipathy	Hostility, Aversion
Amplify	Enlarge, Extend
Alleviate	Abate, Relieve
Admonish	Counsel, Reprove
Adherent	Follower, Disciple
Absolve	Pardon, Forgive
Acrimony	Harshness, Bitterness
Accord	Agreement, Harmony

Words	Synonyms
Adamant	Stubborn, Inflexible
Adjunct	Complement, Addition
Abandon	Leave
Attain	Gain, Acquire
Ascent	Rise, Lift
Anguish	Distress, Sorrow
Arrogant	Disdainful, Imperious
Avoid	Ignore, Shun
Ability	Capacity, Skill
Acknowledge	Admit, Confess
Aid	Help, Relief
Apology	Pardon, Excuse
Anger	Fury, Rage
Adept	Proficient, Expert
Answer	Reply, Response
Bustle	Haste, Flurry
Brittle	Delicate, Fragile
Bleak	Dismal, Gloomy
Benevolence	Humanity, Generosity
Barbarous	Uncivilised, Savage
Baffle	Frustrate, Perplex
Bewitching	Magical, Fascinating

Words	Synonyms
Brilliant	Clever, Intelligent
Bliss	Happiness, Joy
Brave	Valiant, Bold
Build	Construct, Make
Barbarous	Uncivilised, Wild
Bane	Curse, Harm
Benefit	Advantage, Gain
Banish	Exile, Expel
Beautiful	Lovely, Pretty
Bold	Fearless, Daring
Bear	Tolerate, Endure
Busy	Engaged, Engrossed
Careful	Cautious, Alert
Cease	Desist, Stop
Competent	Able, Capable
Chaste	Pure, Simple
Confess	Admit, Disclose
Consolation	Solace, Comfort
Convict	Criminal, Prisoner
Candid	Frank, Outspoken
Contrary	Dissimilar, Conflicting
Contradict	Deny, Oppose
Contempt	Scorn, Disregard
Conspicuous	Prominent, Obvious
Consolidate	Compact, Strong
Consequence	Effect, Outcome

Words	Synonyms
Consent	Agree, Permit
Concede	Yield, Assent
Comprise	Include, Contain
Compassion	Kindness, Sympathy
Concur	Approve, Agree
Chastise	Punish, Admonish
Caricature	Exaggeration, Imitation
Captivity	Imprisonment, Confinement
Captivate	Charm, Fascinate
Calumny	Defamation, Aspersion
Callous	Obdurate, Unfeeling
Calamity	Adversity, Misfortune
Cavity	Depth, Hole
Despicable	Worthless, Shameless
Disdain	Detest, Despise
Deride	Mock, Taunt
Deprive	Despoil, Divest
Demolish	Ruin, Devastate
Delicious	Palatable, Tasteful
Deliberate	Ponder, Intentional
Defray	Spend, Pay
Defile	Contaminate, Pollute

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Words	Synonyms
Defer	Prolong, Suspend
Dedicate	Devote, Consecrate
Decipher	Interpret, Reveal
Deceit	Deception, Artifice
Decay	Collapse, Decomposition
Dainty	Elegant, Exquisite
Evident	Obvious, Apparent
Eternal	Perpetual, Endless
Esteem	Respect, Reverence
Eradicate	Destroy, Exterminate
Equivocal	Uncertain, Ambiguous
Epitome	Precise, Exemplar
Endowment	Grant, Benefit
Endeavour	Undertake, Aspire
Encumbrance	Hindrance, Obstacle
Eloquence	Expression, Fluency
Eliminate	Expel, Oust
Elevate	Dignify, Heighten
Efface	Destroy, Obliterate
Ecstasy	Delight, Exultation
Eccentric	Strange, Abnormal
Fabricate	Construct, Produce
Frugality	Economy, Providence
Frivolous	Petty, Worthless
Frantic	Violent, Agitated
Fragile	Weak, Infirm
Forsake	Desert, Renounce
Fluctuate	Deflect, Vacillate
Flimsy	Trifling, Transparent
Fleeting	Transient, Temporary
Feud	Strife, Quarrel
Ferocious	Untamed, Barbarous
Feeble	Weak, Frail
Fantastic	Fanciful, Uncommon
Fanatical	Narrow-minded, Biased
Falter	Fluctuate, Demur
Fallacy	Delusion, Mistake
Guile	Cunning, Deceit
Grudge	Hatred, Aversion
Grisly	Disgusting, Atrocious

Words	Synonyms
Gracious	Courteous, Beneficent
Gorgeous	Magnificent, Dazzling
Glut	Stuff, Satiate
Gloom	Obscurity, Darkness
Hypocrisy	Insincerity, Falsity
Hideous	Frightful, Shocking
Heretic	Non-conformist, Secularist
Hazard	Presumption, Danger
Haughty	Arrogant, Pompous
Harass	Irritable, Molest
Hardship	Misfortune, Difficulty
Holy	Godly, Pious
Homage	Tribute, Respect
Humane	Kind, Sympathetic
Humble	Modest, Meek
Haven	Refuge, Shelter
Hygiene	Cleanliness, Sanitation
Invincible	Unconquerable, Impregnable
Intricate	Tangled, Complicated
Intrigue	Scheme, Conspiracy
Intrinsic	Genuine, Fundamental
Invective	Accusation, Censure
Instil	Inculcate, Inject
Insolvent	Indigent, Destitute
Insipid	Tasteless, Vapid
Insinuate	Communicate, Allude
Ingenuous	Undisguised, Naive
Infringe	Violate, Encroach
Inevitable	Unavoidable, Ascertained
Incongruous	Inappropriate, Absurd
Incompetent	Inefficient, Unskilled
Inclination	Disposition, Affection
Impute	Attribute, Ascribe
Impious	Irreligious, Unholy
Impediment	Hurdle, Obstruction
Impartial	Just, Unbiased
Impair	Diminish, Deteriorate

Words	Synonyms
Immunity	Prerogative, Privilege
Imminent	Impending, Brewing
Immerse	Submerge, Involve
Immense	Huge, Enormous
Immaculate	Unsullied, Spotless
Juvenile	Young, Tender
Justify	Defend, Exculpate
Just	Honest, Impartial
Judicious	Thoughtful, Prudent
Jubilant	Rejoicing, Triumphant
Jovial	Frolicsome, Cheerful
Jaded	Tired, Exhausted
Jejune	Dull, Boring
Kindred	Relation, Species
Keen	Sharp, Poignant
Knave	Dishonest, Scoundrel
Knell	Death Bell, Last Blow
Knotty	Complicated, Difficult
Luxuriant	Profuse, Abundant
Luscious	Palatable, Delicious
Lure	Attract, Entice
Lunacy	Delusion, Insanity
Lucid	Sound, Rational
Listless	Lazy, Inattentive
Linger	Loiter, Prolong
Liberal	Flexible, Generous
Liable	Accountable, Bound
Lenient	Compassionate, Merciful
Lax	Slack, Careless
Lavish	Abundant, Excessive
Mutual	Joint, Identical
Mutinous	Recalcitrant, Insurgent
Murky	Dusky, Dreary
Munificent	Liberal, Hospitable
Monotonous	Irksome, Tedious
Momentous	Notable, Eventful
Mollify	Appease, Assuage
Molest	Paster, Harass
Modest	Humble, Courteous
Mitigate	Alleviate, Relieve

Words	Synonyms
Miraculous	Marvellous, Extraordinary
Minute	Diminutive, Miniature
Numerous	Profuse, Various
Nullify	Cancel, Annul
Noxious	Baneful, Injurious
Novice	Tyro, Beginner
Nonchalant	Indifferent, Negligent
Nimble	Prompt, Brisk
Niggardly	Miserly, Covetous
Negligent	Inattentive, Careless
Overwhelm	Triumph, Subjugate
Outrage	Offence, Maltreatment
Outbreak	Eruption, Insurrection
Ornamental	Decorative, Adorned
Ordain	Order, Impose
Oracular	Cryptic, Vague
Opaque	Obscure, Shady
Offspring	Descendants, Siblings
Offensive	Abhorrent, Arrogant
Odious	Malevolent, Obnoxious
Occult	Latent, Ambiguous
Obvious	Evident, Apparent
Obstruct	Impede, Prevent
Prudent	Cautious, Discreet
Queer	Strange, Odd
Quit	Leave, Abandon
Regard	Respect, Esteem
Rival	Competitor, Opponent
Raise	Increase, Lift
Recover	Regain, Obtain
Release	Free, Liberate
Reliable	Trustworthy, Dependable
Ruin	Destruction, Downfall
Realize	Accomplish, Fulfil
Significant	Distinctive, Important
Settle	Adjust, Compromise
Separate	Part, Divide
Simple	Plain, Natural
Summary	Synopsis, Substance
Sacred	Holy, Consecrated

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Words	Synonyms
Savage	Wild, Uncivilised
Scorn	Contempt, Disdain
Splendid	Glorious, Magnificient
Strife	Dispute, Discord
Struggle	Fight, Battle
Summit	Top, Peak
Seize	Capture, Arrest
Temper	Mood, Nature
Tough	Aggressive, Unyielding
Tremendous	Huge, Colossal
Thin	Slim, Slender
Thick	Dense, Compact

Words	Synonyms
Teach	Instruct, Educate
Target	Goal, Object
Tedious	Boring, Dull
Timid	Cowardly, Shy
Trust	Faith, Confidence
Uproar	Tumult
Unique	Unequalled, Matchless
Urge	Solicit, Plead
Understanding	Insight, Perception
Variety	Assortment, Diversify
Valid	Authorised, Legitimate

Words	Synonyms
Various	Several, Many
Vague	Nuclear, Indefinite
Vanish	Disappear
Vice	Wickedness
Vigour	Energy, Force
Victory	Conguest, Success
Vigilant	Cautious, Alert
Venture	Dare, Risk
Wicked	Immoral, Sinful
Withhold	Retrain, Detain
Wisdom	Intelligence, Foresight
Wreck	Destruction, Ruin

Words	Synonyms
Waive	Relinquish, Remove
Wary	Cautious, Circumspect
Wane	Decline, Dwindle
Wilt	Wither, Perish
Yoke	Connect, Harness
Yield	Surrender, Abdicate
Yearn	Languish, Crave
Zest	Delight, Enthusiasm
Zenith	Summit, Apex
Zeal	Eagerness, Fervour

Antonyms

Antonyms are the words which are opposite in meaning to each other.

e.g. (i) Accord – Discord, Disagreement; (ii) Deference – Disrespect, Irreverence

List of Words with Their Antonyms

Words	Antonyms
Above	Below
Attack	Defend
Ability	Inability
Advance	Retreat
Adversity	Prosperity
Arrival	Departure
Arrest	Release
Ascent	Descent
Acceptance	Rejection
Armament	Disarmament
Absurd	Reasonable
Agree	Disagree
Angel	Devil
Ancient	Modern
Alive	Dead
Bottom	Top
Broad	Narrow
Buy	Sell
Blunt	Sharp
Busy	Idle
Beautiful	Ugly
Blessing	Curse
Bravery	Cowardice
Belief	Disbelief
Beneficial	Harmful
Barren	Fertile

Words	Antonyms
Boon	Bane, Curse
Better	Worse
Bold	Meek
Bitter	Sweet
Cheerful	Gloomy
Complicated	Simple
Confess	Deny
Compare	Contrast
Courageous	Timid
Care	Neglect
Creation	Destruction
Civilised	Uncivilised, Wild
Cause	Effect
Certain	Uncertain
Contrary	Similar, Alike
Contradict	Approve, Confirm
Contempt	Regard, Praise
Conspicuous	Concealed, Hidden
Consolidate	Separate, Weak
Consequence	Origin, Start
Consent	Object, Disagree
Concede	Deny, Reject
Comprise	Reject, Lack
Compassion	Cruelty, Barbarity

Words	Antonyms
Concur	Differ, Disagree
Chastise	Cheer, Encourage
Chaste	Sullied
Caricature	Exactness, Precision
Captivity	Freedom, Liberty
Captivate	Disillusion, Offend
Calumny	Commendation, Praise
Callous	Compassionate, Tender
Calamity	Happiness, Fortune
Cavity	Elevation, Projection
Cease	Continue, Originate
Despicable	Worthy, Decent
Disdain	Approve, Praise
Deride	Inspire, Encourage
Deprive	Restore, Renew
Demolish	Repair, Construct
Delicious	Distasteful, Unsavoury
Deliberate	Rash, Sudden
Defray	Disclaim, Repudiate
Defile	Purify, Sanctity

Words	Antonyms
Defer	Accelerate, Expedite
Dedicate	Refuse, Negate
Decipher	Misinterpret, Distort
Deceit	Veracity, Sincerity
Decay	Flourish, Progress
Dainty	Clumsy, Insipid
Evident	Obscure, Concealed
Esteem	Ridicule, Spurn
Eradicate	Secure, Plant
Equivocal	Obvious, Lucid
Epitome	Increment, Expansion
Endowment	Drawback, Damage
Endeavour	Cease, Quit
Encumbrance	Incentive, Stimulant
Eloquence	Halting, Stammering
Eliminate	Restore, Accept
Elevate	Deprecate, Denounce
Efface	Retain, Maintain
Ecstasy	Despair, Calamity

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Words	Antonyms
Eccentric	Natural, Conventional
Fabricate	Destroy, Dismantle
Frugality	Lavishness, Extravagance
Frivolous	Solemn, Significant
Frantic	Subdued, Gentle
Fragile	Enduring, Tough
Forsake	Hold, Maintain
Fluctuate	Stable, Resolute
Flimsy	Firm, Tenacious
Fleeting	Enduring, Eternal
Feud	Fraternity, Harmony
Ferocious	Gentle, Innocent
Feeble	Strong, Robust
Fantastic	Ordinary, Normal
Fanatical	Liberal, Tolerant
Falter	Persist, Endure
Fallacy	Veracity, Truth
Guile	Honesty, Frankness
Grudge	Benevolence, Affection
Grisly	Pleasing, Attractive
Gracious	Rude, Unforgiving
Gorgeous	Dull, Unpretentious
Glut	Reduce, Abstain
Gloom	Delight, Mirth
Hypocrisy	Sincerity, Honesty
Hideous	Attractive, Alluring
Heretic	Conformable, Religious
Hazard	Conviction, Security
Haughty	Humble, Submissive
Harass	Assist, Comfort
Import	Export
Include	Exclude

Words	Antonyms
Increase	Decrease
Innocent	Guilty
Initial	Final
Inhale	Exhale
Junior	Senior
Justice	Injustice
Joy	Sorrow
Known	Unknown
King	Subject
Knowledge	Ignorance
Kind	Cruel
Like	Dislike
Literate	Illiterate
Logical	Illogical
Lack	Abundance
Legitimate	Illegitimate
Laugh	Cry
Lend	Borrow
Material	Spiritual
Maximum	Minimum
Mortal	Immortal
Miser	Spendthrift
Merit	Demerit
Mourn	Rejoice
Mature	Immature
Mad	Sane
Noble	Ignoble
Natural	Unnatural, Artificial
Night	Day
Noise	Quiet
Oral	Written
Odd	Even
Offer	Refuse
Order	Disorder
Optimistic	Pessimistic
Provoke	Pacify, Comfort
Protract	Abbreviate, Curtail
Proscribe	Solicit, Include
Profuse	Scarce, Meagre

Words	Antonyms
Profligate	Virtuous, Upright
Prodigy	Normal, Average
Prodigious	Unimpressive, Diminutive
Premature	Belated, Opportune
Predicament	Resolution, Confidence
Precarious	Assured, Undeniable
Pompous	Unpretentious, Humble
Perverse	Complacent, Docile
Pertness	Modesty, Diffidence
Peevish	Suave, Amiable
Quaint	Familiar, Usual
Quack	Upright, Unfeigned
Quibble	Unfeign, Plain
Ruthless	Compassionate, Lenient
Rustic	Cultured, Refined
Rout	Succumb, Withdraw
Retract	Confirm, Assert
Remote	Adjoining, Adjacent
Remorse	Ruthless, Obduracy
Resentment	Content, Cheer
Rescind	Delegate, Permit
Remonstrate	Agree, Laud
Remnant	Entire, Whole
Sycophant	Devoted, Loyal
Superficial	Profound, Discerning
Subvert	Generate, Organise
Substantial	Tenuous, Abstract
Subsequent	Preceding, Previous

Words	Antonyms
Stain	Honour, Purify
Sporadic	Incessant, Frequent
Solicit	Protest, Oppose
Sneer	Flatter, Praise
Trenchant	Feeble, Vacillating
Transient	Lasting, Enduring
Tranquil	Violent, Furious
Timid	Bold, Intrepid
Temperate	Boisterous, Violent
Tedious	Exhilarating, Lively
Taciturn	Talkative, Extrovert
Utterly	Deficient, Incomplete
Usurp	Restore, Compensate
Uncouth	Elegant, Graceful
Umbrage	Sympathy, Goodwill
Vulgar	Elegant, Civil
Vouch	Repudiate, Prohibit
Volatile	Heavy, Ponderous
Vicious	Noble, Virtuous
Venerable	Unworthy, Immature
Vanity	Modesty, Humility
Valour	Fear, Cowardice
Waive	Impose, Clamp
Wary	Heedless, Negligent
Wane	Ameliorate, Rise
Welt	Revive, Bloom
Yoke	Liberate, Release
Yield	Resist, Protest
Yearn	Content, Satisfied
Zest	Disgust, Passive
Zenith	Nadir, Base
Zeal	Apathy, Lethargy

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Practice Questions

Exercise-1

Synonyms

Directions (Q. Nos. 1-25) *In the following questions, out of the given four alternatives, select the one which best expresses the meaning of the given word.*

1. Ostentatious
(a) Distinct (b) Complete
(c) Flashy (d) Trusted

2. Proximal
(a) Frontier (b) Obscure
(c) Remote (d) Adjacent

3. Parlance
(a) Definitive (b) Lingo
(c) Canonical (d) Classic

4. Expose
(a) Hide (b) Bury
(c) Reveal (d) Protect

5. To alight
(a) To escalate (b) To clamber
(c) To disembark (d) To astride

6. Mordant
(a) Kind (b) Complimentary
(c) Bitter (d) Peaceable

7. Turbulence
(a) Agitation (b) Calmness
(c) Repose (d) Stillness

8. Nifty
(a) Dandy (b) Obnoxious
(c) Grody (d) Gross

9. Austerity
(a) Strict (b) Moist
(c) Tolerant (d) Kindness

10. Splayed
(a) Nimble (b) Jade
(c) Frayed (d) Spread

11. Reassert
(a) Renounce (b) Acknowledge
(c) Disbelief (d) Conceal

12. Troll
(a) Spruce (b) Suave
(c) Gnome (d) Dapper

13. Curtail
(a) Prolong (b) Downsize
(c) Lengthen (d) Extend

14. Hind
(a) Near (b) Rear (c) First (d) Front

15. Inference
(a) Beginning (b) Conclusion
(c) Preparation (d) Discovery

16. Pathetic
(a) Powerful (b) Purposeful
(c) Plentiful (d) Pitiful

17. Maestro
(a) Neophyte (b) Catechumen
(c) Sophomore (d) Conductor

18. Splinter
(a) Stub (b) Share
(c) Chip (d) Friction

19. To visualise
(a) To repudiate (b) To anticipate
(c) To eschew (d) To scorn

20. Hybrid
(a) Homogeneous (b) Composite
(c) Pure (d) Love

21. Discreet
(a) Described (b) Careful
(c) Rash (d) Mundane

22. Opportune
(a) Rarely (b) Likely
(c) Timely (d) Barely

23. Dedication
(a) Contentment (b) Trepidation
(c) Determination (d) Commitment

24. Invective
(a) Invent (b) Expressive
(c) Abusive (d) Invitation

25. Scrap
(a) Hoard (b) Save
(c) Store (d) Reject

Antonyms

Directions (Q. Nos. 26-50) *In the following questions, out of the given four alternatives, select the one which is opposite in meaning of the given word.*

26. Coalesce
(a) Separate (b) Adhere
(c) Cleave (d) Amalgamate

27. Proceed
(a) Ahead (b) Recede
(c) Forward (d) Continue

28. Advance
(a) Shift (b) Move
(c) Progress (d) Retreat

29. Sacred
(a) Pious (b) Hallowed
(c) Divine (d) Profane

30. Grumpy
(a) Cross (b) Bad tempered
(c) Irritable (d) Pleasant

31. Loiter
(a) Lag (b) Hasten
(c) Amble (d) Loll

32. Consensus
(a) Accord (b) Discord
(c) Consent (d) Unity

33. Salient
(a) Negligible (b) Prominent
(c) Striking (d) Clear

34. To amputate
(a) To server (b) To fasten
(c) To truncate (d) To lop

35. Reserved
(a) Placid (b) Communicative
(c) Quiet (d) Modest

36. Eternity
(a) Perpetuity (b) Yonder
(c) Aeon (d) Ephemeral

37. Frazzle
(a) Prostration (b) Vigour
(c) Enervation (d) Lassitude

38. Complacent
(a) Humble (b) Satisfied
(c) Confident (d) Trusted

39. Prosperity
(a) Adversity (b) Simplicity
(c) Nobility (d) Affinity

40. Heed
(a) Care (b) Caution
(c) Attention (d) Neglect

41. To flay
(a) To scalp (b) To peel
(c) To excoriate (d) To sheath

42. Guile
(a) Cleverness (b) Suspicious
(c) Dishonesty (d) Honesty

43. Articulate
(a) Unclear (b) Enunciate
(c) Eloquent (d) Coherent

44. Vile
(a) Virtuous (b) Coarse
(c) Vicious (d) Abject

45. Hope
(a) Daring (b) Courage
(c) Despair (d) Confidence

46. Inferior
(a) Ulterior (b) Exterior
(c) Interior (d) Superior

47. Abstract
(a) Elusive (b) Concrete
(c) Intangible (d) Vague

48. Ominous
(a) Threatening (b) Foreboding
(c) Auspicious (d) Baleful

49. To actuate
(a) To retard (b) To spur
(c) To impel (d) To propel

50. Horrify
(a) Affright (b) Petrify
(c) Appall (d) Soothe

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Exercise-2

Directions (Q. Nos. 1-20) *In each of the following sentences, a word or phrase is written in italicised letter. For each italicised part four words/phrases are listed below each sentence. Choose the word nearest in meaning to the italicised part.*

1. A million cinemas a year bring the same stale *balderdash*.
(a) adventure (b) nonsense
(c) thriller (d) romance

2. There must be lively discussion of Indian authors if we are to *foster* our knowledge.
(a) promote (b) cherish
(c) nourish (d) nurture

3. Buoyed by these visions of the future of his son, the artist *soldiered on*.
(a) continued bravely
(b) stopped further
(c) struggled hard (d) fought on

4. Last fortnight, the rain came to the parched soils of India after the merciless drought had already *sapped* the vitality and livelihood of millions of peasants.
(a) decreased (b) demolished
(c) destroyed (d) drained away

5. The boy gave a *vivid* description of all that happened.
(a) brilliant (b) fresh
(c) explanatory (d) picturesque

6. It is *compulsory* for all the students to join this tour.
(a) regular (b) necessary
(c) dutiful (d) obligatory

7. Some of the discoveries of modern science are simply *marvellous*.
(a) praiseworthy (b) commendable
(c) amazing (d) admirable

8. The teacher felt that the student lacked *discrimination* in the study of his data.
(a) imagination (b) good taste
(c) objectivity (d) good judgement

9. We don't know how we are to *recompense* you for the trouble you have taken.
(a) reward (b) help
(c) praise (d) thank

10. John Milton wrote 'Paradise Lost' to *vindicate* the ways of God to man.
(a) explain (b) support
(c) justify (d) criticise

11. When youngsters do not have good role-models to *emulate* they start searching for them among sportsmen or filmstars.
(a) inhabit (b) imitate
(c) mollify (d) modify

12. The eyewitness testimony was *incontrovertible*.
(a) debatable (b) unquestionable
(c) unacceptable (d) disputable

13. The invasion forces had no artillery and were completely *annihilated*.
(a) reduced (b) destroyed
(c) dismembered (d) split

14. The novel was so interesting that I was *oblivious* of my surroundings.
(a) indifferent (b) watchful
(c) unmindful (d) precarious

15. Elsie is seventy years old and a *fanatical* gardener.
(a) crazy
(b) fantastic
(c) excessively enthusiastic
(d) obsessed

16. The courage shown by the soldiers at this moment of crisis is *exemplary*.
(a) admirable (b) clear
(c) elementary (d) suitable

17. Grandfather has been getting *feeble* of late.
(a) tall (b) weak
(c) diseased (d) small

18. Even though Akshay does not study hard, he always *comes* first in his class.
(a) scores (b) stands
(c) arrives (d) completes

19. The arguments of the lawyer of the accused were so *persuasive* that the judge acquitted him.
(a) convincing (b) clever
(c) eloquent (d) logical

20. Your master will like you if you are *diligent*.
(a) conscientious
(b) obedient
(c) meticulous
(d) hard working

Directions (Q. Nos. 21-40) *The following sentences consist of a word or a phrase which is written in italicised letters. Each of them is followed by four words or phrases. Select the word or the phrase which is closest to the opposite in meaning of the italicised word or phrase.*

21. Self reliance has been *adopted* as an important objective of economic planning in modern India.
(a) refused (b) forsaken
(c) denied (d) discarded

22. His *appointment* was confirmed last month.
(a) disappointment
(b) suspension
(c) dismissal
(d) discharge

23. She has a passion for *indigenous* goods.
(a) native (b) foreign (c) silly (d) cheap

24. He made an *exhaustive* list of the items his secretary should attend to.
(a) short (b) incomplete
(c) interesting (d) meticulous

25. I like his *friendly* attitude.
(a) jealous (b) envious
(c) hostile (d) vicious

26. He appears to be a *phony* person.
(a) beautiful (b) unread
(c) genuine (d) ugly

27. He was in a *dejected* mood.
(a) jubilant (b) rejected
(c) irritable (d) romantic

28. Philosophers say that the world is an *illusion*.
(a) a fact (b) a reality
(c) an actuality (d) a truth

29. He was a marked *deterioration* in his condition.
(a) improvement
(b) revision
(c) reformation
(d) amendment

30. This offer has come as a great *boon* to me.
(a) curse (b) blemish
(c) trouble (d) misfortune

31. I liked the poem for its *literal* meaning.
(a) deep (b) complex
(c) fictitious (d) figurative

32. His book has a short but useful *introduction*.
(a) end (b) conclusion
(c) termination (d) deduction

33. The Principal hardly managed to give the papers a *cursory* glance.
(a) curious
(b) thorough
(c) through
(d) superficial

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34. The attack on the freedom of the press is a *retrograde* step.
(a) progressive (b) stubborn
(c) punitive (d) aggressive

35. We received a *cordial* welcome from our host.
(a) indifferent (b) distrustful
(c) cold (d) official

36. We should not *belittle* the value of small things.
(a) extol (b) praise
(c) inflate (d) expand

37. It used to be said that travel *broadens* one's outlook.
(a) narrows (b) shrinks
(c) contracts (d) restricts

38. The criminal was *detained* by the police.
(a) deterred (b) released
(c) dismissed (d) protected

39. It is *obligatory* for a common citizen to follow the rules.
(a) advisable (b) unnecessary
(c) superfluous (d) optional

40. The government empowered itself to *attach* the assets of all the scam suspects.
(a) release (b) return
(c) donate (d) detach

ANSWERS

Exercise 1

1. (c)	2. (d)	3. (b)	4. (c)	5. (c)	6. (c)	7. (a)	8. (a)	9. (a)	10. (d)
11. (b)	12. (c)	13. (b)	14. (b)	15. (b)	16. (d)	17. (d)	18. (c)	19. (b)	20. (b)
21. (b)	22. (c)	23. (d)	24. (c)	25. (d)	26. (a)	27. (b)	28. (d)	29. (d)	30. (d)
31. (b)	32. (b)	33. (a)	34. (b)	35. (b)	36. (d)	37. (b)	38. (a)	39. (a)	40. (d)
41. (d)	42. (d)	43. (a)	44. (a)	45. (c)	46. (d)	47. (b)	48. (c)	49. (a)	50. (d)

Exercise 2

1. (b)	2. (d)	3. (a)	4. (d)	5. (d)	6. (d)	7. (c)	8. (d)	9. (a)	10. (c)
11. (b)	12. (b)	13. (b)	14. (c)	15. (c)	16. (a)	17. (b)	18. (b)	19. (a)	20. (d)
21. (d)	22. (c)	23. (b)	24. (b)	25. (c)	26. (c)	27. (a)	28. (b)	29. (a)	30. (a)
31. (d)	32. (b)	33. (b)	34. (a)	35. (a)	36. (a)	37. (a)	38. (b)	39. (d)	40. (a)

Solutions

Exercise-1

1. (c) The word 'ostentatious' means showy or flashy. Hence, option (c) 'flashy' is correct.

2. (d) The word 'proximity' means 'at the centre or point of attachment'. Out of the given options, 'adjacent' is its correct answer.

3. (b) 'Parlance' means 'a particular lingo'. Hence, option (b) is correct.

4. (c) 'Expose' means 'to make something visible'. Hence, 'reveal' is the correct answer.

5. (c) 'To alight' means 'to get off or to disembark'. Thus, from the given options, 'to disembark' is the correct answer.

6. (c) The word 'mordant' means 'bitter'. Hence, option (c) is correct.

7. (a) 'Turbulence' means 'an irregular motion'. From the given options, 'agitation' is closely similar to the word 'turbulence'.

8. (a) 'Nifty' means 'particularly good, skillful or effectively stylish'. From the given options, 'dandy' which means 'fashionable' is the correct answer.

9. (a) 'Austerity' means 'sterness, strictness'. Hence, option (a) is correct.

10. (d) 'Splayed' means 'spread out'. Hence, option (d) is its correct answer.

11. (b) 'Reassert' means 'to assert or acknowledge again'. Hence, option (b) is the correct answer.

12. (c) Troll or gnome are ugly creatures depicted as either a giant or dwarf. So, option (c) is the correct choice.

13. (b) 'Curtail' means to reduce or downsize. Hence, option (b) is the correct answer.

14. (b) 'Hind means' 'back or rear'. Hence, option (b) is its correct answer.

15. (b) 'Inference' means 'to draw conclusion'. Hence, option (b) is the correct answer.

16. (d) 'Pathetic' means 'a very bad or pitiable condition'. Hence, option (d) is correct.

17. (d) 'Maestro' means 'a distinguished conductor or performer of a classical music. Hence, option (d) is correct.

18. (c) 'Spinter' means 'a small, thin' sharp piece of wood, glass or similar material'. From the given options, option (c) would be its correct synonym.

19. (b) 'To visualise' means 'to speculate, imagine or anticipate'. Hence, option (b) is its correct answer.

20. (b) 'Hybrid' means 'a composition of two or more species or elements'. Hence, option (b) is its correct answer.

21. (b) 'Discreet' means 'careful'. Hence, option (b) is the correct answer.

22. (c) 'Opportune' means 'at a convenient time'. Hence, option (c) is the correct answer.

23. (d) 'Dedication' means 'commitment towards a task'. Therefore, 'commitment' is its correct synonym.

24. (c) 'Invective' means 'insulting or abusive'. Hence, option (c) is the correct answer.

25. (d) 'Scrap' means 'to remove or reject'. Hence option (d) is its correct answer.

26. (a) The word 'coalesce' means to combine or merge. From the given options, its opposite is option (a).

27. (b) 'Proceed' means 'to move forward'. Its antonym from the given options is 'recede'.

28. (d) 'Advance' means 'to move forward'. From the given options, 'retreat' to move back is its antonym.

29. (d) 'Sacred' means 'holy, pious or divine'. Thus, from the given options, profane meaning 'not sacred' is the correct answer.

30. (d) 'Grumpy' means 'Bad–tempered or irritable'. From the given options, 'pleasant' is its antonym.

31. (b) 'Loiter' means 'to stand and wait without any purpose'. From the given options, 'hasten' meaning 'to hurry' can be the antonym of loiter.

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32. (b) 'Consensus' means 'a unity or accord'. From the given options, 'discord' meaning disagreement, is its correct antonym.

33. (a) 'Salient' means 'most important or noticeable'. From the given options, negligible is the correct answer.

34. (b) 'To amputate' means to cut off. From the given options, 'to fasten' meaning 'to join', is its correct antonym.

35. (b) 'Reserved' means 'shy, quiet'. From the given options, 'communicative' is its correct antonym.

36. (d) 'Eternity' means 'forever or permanent'. Out of the given options, 'ephemeral' meaning 'something that is temporary' is its correct answer.

37. (b) 'Frazzled' means exhausted. From the given options, 'vigour' means 'good health' is its correct answer.

38. (a) 'Complacent' means 'smug or prideful'. From the given options, 'humble' meaning 'respectable and kind' is its correct opposite.

39. (a) 'Prosperity' means 'living in wealth and luxury'. From the given options, 'adversity' meaning 'living in poor condition' is its antonym.

40. (d) 'Heed' means 'to care or to give attention'. From the given options, neglect is its antonym.

41. (d) 'To flay' means 'to strip the skin off a dead body'. Out of the given options, 'to sheath' meaning 'to cover' is its correct antonym.

42. (d) 'Guile' means 'cunning, sly or dishonest'. From the given options, 'honest' is its correct antonym.

43. (a) 'Articulate' means 'to present your thoughts or ideas in a clear and concise manner'. From the given options, 'unclear' is its correct antonym.

44. (a) 'Vile' means 'extremely unpleasant'. From the given options, virtuous meaning 'pleasant and kind' is its correct antonym.

45. (c) 'Hope' means 'a feeling of expectation or desire'. Out of the given options, 'despair' meaning hopelessness is its correct answer.

46. (d) 'Inferior' means 'low in rank or quality'. Its antonym will be superior. Hence, option (d) is its correct answer.

47. (b) 'Abstract' means 'something that exists only in thoughts or ideas but has no physical and concrete form'.

Out of the given options, 'concrete' seems to be its antonym.

48. (c) 'Ominous' means 'something that is threatening or inauspicious.

From the given options, auspicious is its correct antonym.

49. (a) 'To actuate' means 'to operate'. From the given options, 'to retard' meaning 'to delay' is its closest opposite word.

50. (d) 'Horrify' means 'to shock greatly or to scare'. Out of the given options, option (d) is its correct answer.

Exercise-2

1. (b) 'Balderdash' and 'nonsense' both have same meaning.

2. (d) 'Foster' and 'nurture' have the same meaning —to help to grow.

3. (a) 'Soldiered on' means 'to continue very bravely'.

4. (d) 'sapped' means 'to be drained away' i.e. taken the moisture away.

5. (d) 'Vivid' means 'picturesque' i.e. very lively.

6. (d) 'Compulsory' and "obligatory'both mean 'necessary'.

7. (c) 'Marvellous' gives the sense of 'amazing'.

8. (d) 'Discrimination' has the context of 'good judgement'.

9. (a) 'Recompense' and 'reward' both have same meaning—a prize or a present for a good deed.

10. (c) 'Vindicate' has the sense of 'justifying'.

11. (b) 'Emulate' and 'imitate' both mean 'to copy'.

12. (b) 'Incontrovertible' means 'unquestionable'.

13. (b) 'Annihilite' means 'to destroy'.

14. (c) 'Oblivious' means 'unmindful' i.e. forgetful.

15. (c) 'Fanatical' gives the sense of being excessively enthusiastic.

16. (a) 'Exemplary' means 'admirable' i.e. worthy to be praised.

17. (b) 'Feeble' means 'weak'.

18. (b) 'Comes' has the context 'stands'.

19. (a) 'Persuasive' means 'convincing' i.e. appealing to logic and rationale.

20. (d) 'Diligent' means 'hard working'.

21. (d) 'Adopted' means 'to accept' hence 'discarded' is its antonym that gives the sense 'to reject'.

22. (c) 'Appointment' means 'to offer employment'. Hence 'dismissal' is antonym.

23. (b) 'Indigenous' means 'related to the native place' but 'foreign' gives the opposite sense.'

24. (b) 'Exhaustive' means 'complete' hence 'incomplete' is its antonym.

25. (c) Antonym of 'friendly' is 'hostile' i.e. filled with enmity.

26. (c) 'Phony' means 'fake'. Hence, 'genuine' is its antonym.

27. (a) 'Dejected' means 'being in a sad mood' so 'jubilant' is antonym which gives the sense of 'being happy'.

28. (b) 'Illusion' is 'not being real'. So, the antonym will be 'reality'.

29. (a) 'Deterioration' means 'worsening of a condition'. So, 'improvement' is its antonym.

30. (a) 'Boon' and 'curse' are antonyms to each other.

31. (d) 'Literal' means 'exact' while 'figurative' means 'contextual'. Hence these are antonyms.

32. (b) 'Introduction' and 'Conclusion' are the antonyms to each other.

33. (b) 'Cursory' means 'casual' while 'thorough' means 'careful'. Hence, these are antonyms.

34. (a) 'Retrograde' means 'declining'. Hence, 'progressive' is its antonym.

35. (a) 'Cordial' means 'affectionate'. Hence, 'indifferent' is its antonym.

36. (a) 'Belittle' means 'to consider small' hence 'extol' is its antonym that means 'to amplify the value'.

37. (a) 'Broadens' means 'to expand'. So, 'narrows' will be antonym that means 'to shrink.'

38. (b) 'Detained' means 'to keep in the legal custody'. Hence, 'released' will be the antonym.

39. (d) 'Obligatory' means 'compulsory'. So, 'optional' will be its antonym.

40. (a) 'Attach' means 'to confiscate' or 'to seize'. Hence, 'release' is its antonym.

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Idioms and Phrases

- An idiom is a commenly used expression, whose meaning does not relate to the literal meaning of its words.

  e.g.
  (i) **An early bird** means someone who wake up early in the morning.
  (ii) **Snake in the grass** means a hidden energy.

  A phrase/phrasal verb is a small group of words standing together as an idiomatic expression and it is mostly derived from the verb, preposition etc.

  e.g.
  (i) **Fall out** means quarrel.
  (ii) **Take off** means remove.

Important Idioms and Phrases

- **Heart and soul** (*the central core of something*) Now, we are getting to the heart and soul of the matter.
- **Helter skelter** (*disorderly*) On arrival of the police the strikers ran helter skelter.
- **First and foremost** (*first of all*) to be sincere and devoted is the first and formost requirement for this job.
- **Might and main** (*with as much effort or strength as one can muster*) She attacked the punching bag with might and main.
- **Milk and water** (*weak*) The foreign policy of India is nothing more than a milk and water policy.
- **Live-wire** (*a very lively or energetic person*) Gurvind is such a live-wire that its tough to keep up with his stories.
- **Ins and outs** (*the intricate details of situation*) Before starting any new business you must know all ins and outs of it.
- **Intents and purposes** (*almost completely*) My wife is the incharge of the house for all intents and purposes.
- **To be weak or vacant in the upper storey** (*lack in willpower*) I can't assign such work to him, as he is vacant in the upper storey.
- **To be under one's thumb** (*under the control of someone*) She is no more under the thumb of her mother-in-law.
- **To be at daggers drawn** (*to be angry with each other*) Both the brothers are at daggers drawn.
- **To pull a long face** (*look sad*) My son pulled a long face when he was scolded by his mother.
- **To play truant** (*absent from school without leave*) It is a very bad habit of the students to play truant from class.
- **To flog a dead horse** (*to waste time to do something*) He keeps trying to get his essay published, but I think he is flogging a dead horse.
- **To fall flat** (*to fail miserably*) The Principal's speech fell flat on the students.
- **To get into hot water** (*in trouble*) The manager got into hot water while participating in the union meeting.
- **Fair field and no favour** (*with honesty and sincerity*) The staff wants a fair field and no favour in the matter of transfer.
- **Far and wide** (*having great extent*) Many tourists come to see the Taj from far and wide.
- **To move heaven and earth** (*to do everything possible*) He can move heaven and earth to get it done on time.
- **To make light of** (*to treat something as not very serious*) I wish you wouldn't make light of his problems.
- **To make both ends meet** (*to earn the minimum amount of money necessary for living*) Sudden increase in prices has made it difficult for the employees to make both ends meet.
- **Right and left** (*on all sides or everywhere*) The robbers looted the village right and left and fled away.
- **Safe and sound** (*unharmed*) She reached there safe & sound.
- **To go on a fool's errand** (*a fruitless mission*) The key was in his pocket and he sent me on a fool's errand to search the same at the shopping complex.
- **To gain ground** (*become more popular or accepted*) The belief in the abolition of Sati rites has gained ground.

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- **The last nail in the coffin** (*to shorten life*) The reservation policy of VP Singh was the last nail in the coffin of the Janta Party.
- **Thick and thin** (*good and bad times*) I shall support you through thick and thin.
- **To make sure** (*to ensure*) I went to the college to make sure if our exams would commence from the next week.
- **To make neither head nor tail** (*to fail to understand*) The leader spoke so rapidly that the audience could make neither head nor tail of his lecture.
- **To nip in the bud** (*to stop something from developing further*) Many serious illnesses can be nipped in the bud if they are detected early enough.
- **Tooth and nail** (*with every available resources*) Students of general caste opposed the reservation policy tooth and nail but to no avail.
- **To knit the brow** (*to frown*) My father always knits his brow at everything I do.
- **To kick the bucket** (*to die*) She had kicked the bucket after suffering from cancer for several years.
- **To keep someone at arm's length** (*to avoid*) She is not a good girl and must be kept at arm's length.
- **Confusion worse confounded** (*a still worse state of disorder or confusion*) Recess was already going on when the fire alarm rang, leading to confusion worse confounded.
- **To gild the pill** (*To make something unpleasant seem appealing*) I knew that my daughter won't go to the doctor, so I gilded the pill by reminding her about the toys that are at the clinic.
- **To stem the tide of** (*to resist*) As a true social worker, first of all you stem the tide of poverty and unemployment.
- **To speak volumes for** (*to express something clearly and completely*) The sacrifice made by freedom fighters speak volumes for their true love for the country.
- **Rhyme or reason** (*without meaning*) He resigned from the service without any rhyme or reason.
- **Cut and dried** (*fixed*) There is no cut and dried method of English speaking.
- **To keep abreast of** (*to have recent information*) It is very important for the youth to keep abreast of all current events.
- **To keep one's fingers crossed** (*to wish or hope for good luck*) We should keep our fingers crossed till the last ball is bowled.
- **Nook and corner** (*at every corner*) I searched her in every nook and corner.
- **Now and then** (*sometimes*) I visit church now and then.
- **Stuff and nonsense** (*foolishness*) The judge found all his arguments stuff and nonsense.
- **Sum and substance** (*a summary*) The sum and substance of the paragraph must be reflected in a good precis.
- **To put all eggs in one basket** (*To invest all of one's energy or resources into a single goal*) Mrs Tan's financial advisor urged her to be careful and not put all her eggs in one basket.
- **To pour oil on troubled water** (*to calm someone down*) Both of them were fighting for the property but the justified decision of their mother poured oil on troubled water.
- **With tail between the legs** (*to feel ashamed or defeated*) The Minister was talking a lot about the values of honesty etc. but when Ramesh reminded him about the money paid to him for the work, he went away with his tail between the legs.
- **To get off scot free** (*free from harm or penalty*) He got off scot free for lack of evidence.
- **To be worth its weight in gold** (*very useful*) For a hungry man a piece of bread is often worth its weight in gold.
- **To be lost in clouds** (*lost in thoughts*) Philosophers are often lost in clouds.
- **Pins and needless** (*in a state of tense anticipation nervousness*) He was on pins and needles while waiting for the test results.
- **Pin money** (*A small amount of money to buy things that you want but don't need*) She teaches a little french now and then, just for pin money.
- **Out of gear** (*in worse condition*) The strike of employees always put the Government machinery out of gear.
- **Out and out** (*abosolute or definitely*) Mahatma Gandhi was a great leader out and out.
- **Hornet's nest** (*unusal difficulty*) The speaker of Lok Sabha stirred up hornet's nest by referring to impending changes in several rules.
- **Hole and corner policy** (*secretive*) The officer adopted a hole and corner policy to get his personal assistant transferred.
- **To live in a fool's paradise** (*foolish ideas*) It is wrong to live in a fool's paradise and not put hard efforts to achieve success.
- **To lie in the bed one has made** (*suffer for one's misdeed*) He has made his fortune so he must lie in the bed he has made.
- **To give one a long rope** (*to allow a person full scope to commit mistakes*) He never gives his employees a long rope.
- **To give currency** (*to make something credible by providing additional details*) You are famous in this field if you comment on this guy's stupid ideas, you will just give currency to them.
- **To grease the palm** (*to give money as bribe*) You cannot get this contract unless you grease the palm of the officials.
- **To have gift of the gab** (*the ability to talk readily*) Ram may seem different but he has the gift of the gab.
- **To have an iron will** (*strong will*) A person with iron will can achieve anything.
- **Once and again** (*a few times*) I have told you once and again that I have no money to purchase the car at the moment.
- **Achilles heel** (*the most weak point*) Her involvement in corruption scandal has been her Achilles heel.
- **To turn the corner** (*to advance beyond a difficult stage*) He turned the corner by passing the examinations with good marks.

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- **To take to one's heels** (*to flee away*) On seeing the police, the thief took to his heels.
- **Over and above** (*in addition to*) I paid him rupees ten thousand over and above what he demanded.
- **Over head and ears** (*completely/hopelessly*) He is over head and ears in debt.
- **To make much ado about nothing** (*make a fuss*) He is a quarrelsome man, he makes much ado about nothing.
- **To make hay while the sun shines** (*make the best of a good situation*) As the Congress party came into power, he became chairman of UTI. He rightly says to make hay while the sun shines.
- **To make the most of** (*to use or enjoy something as much as possible*) Students should make the most of their time if they want to secure good marks.
- **To be at a loss** (*to not know what do or say*) In the interview he found himself at a loss and could not answer even very simple questions.
- **To be at one's wit's end** (*not knowing what to do next*) Seeing the income tax officer at his shop, he was at his wit's end.
- **To come to a standstill** (*to stop completely*) As the car came to standstill for want of petrol, the thief ran away on foot.
- **Open and aboveboard** (*completely and openly honest*) He believes in open and aboveboard discussion on every point before arriving at a conclusion.
- **Seamy side of life** (*the most unpleasant*) The present day cinema depicts the seamy side of life.
- **Spick and span** (*neat and clean*) Mr. Jawaharlal Nehru was always spick and span in his dressing style.
- **Null and void** (*having no legal effect*) The law passed by legislature was declared null and void by the Supreme Court.
- **To steal a march** (*to gain advantage secretly*) Shalini stole a march on her friend in marketing her products slowly and steadily.
- **To steer clear of** (*to stay away*) You should try to steer clear of such nasty people.
- **To give the devil his dues** (*to give your enemy a proper credit*) No doubt he is a naughty man, but to give the devil his dues he is dedicated and hard working.
- **To give chapter and verse for a thing** (*to give a detailed account of something without missing anything*) He can give chapter and verse for all the allegations, he made against the minister.
- **To add a new feather in one's cap** (*great achievement*) His success in his ICFAI exams has added a new feather in his cap.
- **To be at sea** (*confused*) My wife is quite at sea in maths.
- **To be in fix** (*to be in dilemma*) The police department was in a fix about the threatning calls sent by the militants.
- **To lead up the garden path** (*to deceive someone*) The tricky traders try to lead the customers up the garden path by assuring them of warranty and good discount.
- **To hang fire** (*to hold back as if in suspense*) The problem of poverty has been hanging fire for the last fifty five years.
- **To have feet of clay** (*a weakness or failure*) The inquiry has revealed that most of the politicians have feet of clay.
- **To have thing at one's finger tips** (*complete knowledge*) He has all the statistics of employment at his finger tips.
- **To have an axe to grind** (*self interest*) I am sure, he has an axe to grind in this proposal.
- **Watch and ward** (*a continuous watch*) At least three guards are required to have perfect watch and ward of the building.
- **Whip and spur** (*in utmost haste*) He completed the project in a whip and spur.
- **Willy nilly** (*whether one agrees or not*) After her boss fell sick, she willy nilly found herself directing the project.
- **Take bull by horns** (*handle difficult situation directly*) One should have courage to take bull by horns if one wants to succeed in life.
- **The die is cast** (*a decision has been made*) There is no point of discussing the matter now as the die is cast.
- **Flesh and blood** (*physical existence*) I am only flesh and blood as anybody else.
- **Gall and wormwood** (*bitter resentment*) Ever since I lost the election for school president, I only feel gall and wormwood when I think of my unworthy opponent.
- **To rub one the wrong way** (*to irritate*) If you rub him the wrong way, he will oppose the proposal.
- **To rule the roost** (*to be the boss or manager*) Today the scheduled caste minister rules the roost in the Government.
- **Yellow press** (*sensational journalism*) These days newspapers with yellow press are earning like anything.
- **To add fuel to the flame or fire** (*make a problem worse*) With the arrest of the leader of agitators, the Government only added fuel to the flame.
- **To assume airs** (*to be proud of*) He is in the habit of assuming airs in the presence of his inlaws.
- **Pick and choose** (*to select with a great care*) The management adopted pick and choose policy in the promotions from clerical to assistant cadre.
- **Through fire and water** (*endure danger*) He can go through fire and water to achieve his goal.
- **Time and tide** (*time and opportunity*) Time and tide waits for none.
- **To and fro** (*back and forth*) What are the to and fro taxi charges for travelling from Alwar to Delhi?
- **To be not worth one's salt** (*not deserving*) You should not help Ramesh, he is not worth his salt.
- **To be in tune** (*agreeing*) The Principal asked the students if they were in tune for organising the annual function.
- **To be out of sorts** (*to feel slightly ill*) She had been out of sorts for several days and so could not do her office work.
- **Herculean task** (*a difficult task*) Getting selected in IAS is a herculean task for everybody.

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- **Hit below the belt** (*to give someone an unfair blow*) By making his private secrets public he hit him below the belt.
- **Hither and thither** (*here and there*) He is in the habit of putting his goods hither and thither.
- **To take people by storm** (*impress greatly*) The refusal by Soniya to accept the Prime Ministership took the nation by storm.
- **To the backbone** (*thoroughly*) We need leaders who are honest to the backbone.
- **Toil and moil** (*hard work*) It requires too much of toil and moil to secure first position.
- **Tom, Dick and Harry** (*everyone*) Every Tom, Dick and Harry knows that MS Dhoni is a wonderful cricketer.
- **Ups and downs** (*the mixture of good and bad*) There are ups and downs in every business.
- **Uphill task** (*a difficult and challenging task*) Passing CAT examination is an uphill task.
- **Warp and woof** (*a base or a foundation*) Blood and bones are warp and woof of human body.
- **To put a spoke in one's wheel** (*hinder someone*) Every competitor in the market is trying to put a spoke in the wheel of others.
- **To rip up old sores** (*reopen the quarrel*) Ramesh and his wife can't live in peace, they are always ripping up old soros.
- **Fire and brimstone** (*to punish*) The USA has threatened Iraq with fire and brimstone if it refuses follow the resolutions of UNO.
- **Fire and fury** (*full of haughty temper*) The speech of the leader was full of fire and fury.
- **To be in the good books** (*to have approval*) A good student is always in the good books of his teachers.
- **To be under a cloud** (*under suspicious*) His connections with the militants have brought him under a cloud.
- **To be at large** (*to be free*) The man who tried to kill her is still at large.
- **To get oneself into a mess** (*get into muddle*) He seems to have got himself into a mess because of the involvement of his wife in a criminal case.
- **To go to the dogs** (*to go to ruin*) He went to the dogs because of his son's involvement in the murder of a girl.
- **To keep body and soul together** (*to manage to keep existing*) Because of the inflation it has become difficult for many to keep body and soul together.
- **To keep the wolf from the door** (*to prevent starvation*) In our country the poor have to struggle hard to keep the wolf from the door.
- **To break the news** (*to tell someone some important news*) He broke the news of her husband's death very cautiously in order to lessen the shock.
- **To burn the midnight oil** (*to work very hard*) I have to burn the midnight oil for several days in order to complete the work in time.
- **To be born with a silver spoon in one's mouth** (*to be born in wealthy family*) Indira Gandhi was born with a silver spoon in her mouth.
- **To lose ground** (*fail to hold one's position*) He has lost ground and so his opponent has won the election.
- **To leave no stone unturned** (*to make every possible effort*) The Prime Minister has assured the country that he shall leave no stone unturned to uplift the condition of the countrymen.
- **To get down to brass tacks** (*to begin to discuss the important details*) Instead of wasting time in discussion please get down to brass tacks.
- **To give a wide berth** (*to keep far away*) I try my best to give a wide berth to such a selfish person.
- **To see a thing through coloured glasses** (*to see only one aspect of things*) A prejudiced man will see the thing through coloured glasses. He can't judge the things properly.
- **To show the white feather** (*to betray or cowardise*) He will show the white feather when the real time or action comes.
- **Ivory tower** (*a place away from practical affairs*) Those who talk of non-violence as a useful tool in tackling the militants live in ivory tower.
- **Kith and kin** (*one's relatives*) All kith and kin were invited in the marriage of his son.
- **To hold a candle to** (*compare to*) She is the daughter of a famous dancer, but she does not hold a candle to her mother.
- **To have brush with** (*to have a brief contact with something*) Our neighbours had a brush with one another over the matter of throwing the garbage.
- **To pay one back in the same coin** (*to seek revenge on someone by treating them in the same negative manner as they had done*) I believe in the policy of paying back in the same coin.
- **To put the cart before the horse** (*to do things in improper order*) He made a contract with the publisher, without getting the book ready. He put the cart before the horse as such.
- **By and by** (*soon*) She is recovering by and by after long illness.
- **Hue and cry** (*commotion*) A lot of hue and cry was raised in Parliament against this bill.
- **Hush money** (*a bribe paid to keep something secret*) He managed to escape punishment by paying hush money.
- **Goods and chattels** (*all kinds of personal possessions*) They have been turned out of their house on short notice and don't know where to store their goods and chattels.
- **To play fast and loose** (*to ignore social conventions to suit one's purpose*) There is a willingness to play fast and loose with the facts.
- **To pay off old scores** (*to get revenge*) By suspending the clerk on frivolous grounds the officer paid off old scores.
- **Egg on** (*urge on*) The captain egged the players on to continue the struggle.

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- **Fair and square** (*just and honest*) He is fair and square in his dealings.
- **Fabian policy** (*a policy of delays and cautions*) Mr. Narsimha Rao always followed a Fabian policy in all political issues.
- **Few and far between** His visits to his parents are few and far between because of his busy schedule.
- **Pros and cons** (*considering all the fact*) Before signing this agreement you must understand all pros and cons well.
- **Queer fish** (*odd person*) He is such a queer fish that we can't expect anything positive from him.
- **Rank and ruin** (*complete destruction*) The present drought has put the farmers at the verge of rank and ruin.
- **Oily tongue** (*too smooth of speech*) One should be aware of the persons with oily tongue.
- **Part and parcel** (*an essential element*) Each employee should feel himself part and parcel of the business enterprises.
- **Foot the bill** (*to pay the bill*) Although she hosted the feast, her father had to foot the bill.
- **Free and easy** (*casual, calm and relaxed*) If you're free and easy with your savings, you'll be broke again in no time.
- **To take heart** (*to be confident or courageous*) You must take heart and face the failures boldly.
- **To take up arms** (*commence hostilities*) We must not shy for taking up arms against the misdeeds of the public departments.
- **To have no backbone** (*lacking strength*) The movement against the reservation based on caste, had no backbone and collapsed too soon.
- **To harp on the same string** (*to dwell upon one subject*) The speakers had nothing new to say, everyone harped on the same string of his predecessor.
- **Loaves and fish** (*benefits or rewards*) Now-a-days Government servants are concerned with the loaves and fish of the office than to solve the problems of common public.
- **Lock and key** (*full security*) He keeps jewellery under lock and key.
- **Length and breadth** (*throughout the place*) Anti English agitation spread through the length and breadth of country.
- **Life and Soul** (*very lively and entertaining, good with mixing with people*) Soniya Gandhi is the life and soul of Congress (I).
- **Like a fish out of water** (*in a very awakward manner*) Ram was given an unremunerative post. He is feeling like a fish out of water.
- **To sail under false colours** (*disguise your true nature*) We should not believe the politicians because they sail under false colours.
- **To set Thames on fire** (*do something remarkable work*) Qualifying civil services examination for you is like setting Thames on fire.
- **To say ditto to** (*a copy*) You are bound to say ditto to what your boss says.
- **Neck and crop** (*altogether*) The Pak army ruined the border village neck and crop.
- **Need of the hour** (*most essential need or requirement*) Providing full security for the residents of border area is the need of the hour.
- **To cry for the moon** (*ask for impossible thing*) Your hope for marrying with Aishwarya is like a cry for the moon.
- **To curry favour** (*gain favour by flattery*) By giving present and visiting again and again, you are trying to curry his favour.
- **To draw the long bow** (*to exaggerate or overstate*) In calling her the best racer of the world, her admirers draw the long bow.
- **Fishy** (*suspicious*) There seems to be something fishy going on.
- **Call a spade a spade** (*to speak clearly*) He believes in calling a spade a spade.
- **Cats and dogs** (*contrary to belief unusually*) It has been raining cats and dogs for the last three hours.
- **Cock and bull story** (*concocted story*) All his excuses seem a cock and bull story.
- **To play ducks and drakes** (*to waste foolishly*) He is playing ducks and drakes with parental money.
- **Hard and fast** (*fixed*) There are no hard and fast rules to sanction the loan in the banks.
- **Haughty and naughty** (*rude and old*) The haughty and naughty attitude of the President is not liked by any member of the society.
- **dig the grave** (*do something foolish*) By taking a side of the thief, he dug the grave of his honest image.
- **To end in smoke/fiasco** (*to not get a positive result*) He spoke a lot about his new book but it all ended in fiasco, when the book was in the market.
- **To feather one's own nest** (*to grow wealthy by taking advantage of one position*) Our leaders are busy feathering their own nests and have no concern for the general mass.
- **To pass the buck** (*pass the blame*) Political parties pass the buck on to one another on all small or big matters.
- **To play the gallery** (*try to win approval*) Every action of the political leaders is aimed to play the gallery.
- **To send about one's business** (*to dismiss or fire*) His employer sent him about his business when he was caught involved in forgery.
- **To stand ones ground** (*to maintain one's position*) He did not yield to pressure and stood his ground till he won the game.
- **Gird up the loin** (*to get ready*) We should gird up the loin to fight the poverty and menace of dowery.
- **Give in** (*give up*) He is a brave man, he will not give in easily.

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Practice Questions

Directions (Q. Nos. 1-50) *In the following questions, out of the four alternatives, select the alternative which best expresses the meaning of the idiom/phrase.*

1. Never-never land
(a) An imaginary utopian place or situation.
(b) A place that is worse than hell.
(c) A place that you know that you will never be able to visit.
(d) A popular place about which you have heard such stories that you would not like to go there.

2. Through thick and thin
(a) To be scared of small dangers
(b) Passing through a thick forest
(c) Support under all circumstances
(d) To be hard hearted in times of loss

3. New kid on the block
(a) New rules which are bound to fail
(b) A junior
(c) A new social trend
(d) A newcomer

4. Kitty-corner
(a) Favourite place of cats
(b) A place where ladies meet to party
(c) A very small place
(d) Things located diagonally opposite each other

5. In a nutshell
(a) Add nuts into something
(b) Put everything in a shell
(c) Packed very tightly
(d) Express very briefly

6. To go for broke
(a) To risk everything in an all-out effort
(b) Failure in relationship or partnership
(c) Losing all money in an effort to revive a failing business
(d) To start again after failing in a business

7. Put your best foot forward
(a) Take care to dress well
(b) Walk very cautiously
(c) Try as hard as one can
(d) check every step

8. Fixed in one's ways
(a) Not wanting to change how one does things
(b) One will succeed if one does not change their path
(c) Trapped in a particular unpleasant situation
(d) A dilemma of two different paths

9. Be in two minds
(a) Behave smart at sometime and stupid at other.
(b) Unable to decide
(c) Having a split personality disorder.
(d) Trying to do two things at the same time.

10. Dance to someone's tune
(a) Argue with others on petty matters
(b) Delay in making a decision
(c) Do what others want you to do
(d) Be engaged in an energetic activity

11. At large
(a) A very big opportunity
(b) A criminal escaped or not yet captured.
(c) To have a big heart
(d) A big appetite

12. Leave no stone unturned
(a) Leave the path halfway
(b) Not make enough efforts
(c) Turn everything upside down
(d) Try everything possible

13. Variety is the spice of life
(a) New experiences make life more interesting
(b) Experimentation may be risky
(c) Life is very beautiful
(d) There is no life without excitement

14. Rule the roost
(a) To make all the decisions
(b) To be prosperous but generous
(c) To frequently pick a quarrel
(d) To blindly follow others

15. At somebody's expense
(a) Paid for by someone
(b) To blame a crime on someone else
(c) The unlucky persons who lose a race
(d) If one person benefits it is always at the loss of another

16. Actions speak louder than words
(a) Achievers are better than those who talk big
(b) No action can compensate for saying bad words
(c) A pen is mightier than a sword
(d) What someone does mean more than what they say they will do

17. Acid test
(a) A malicious way of taking revenge
(b) A test that shows how to harm someone
(c) Proof that an attack has been made
(d) Definitive proof of truth or falsehood

18. Bolt from the blue
(a) Winning after losing a game many times
(b) Something sudden that happens unexpectedly
(c) Someone who runs fast and wins a race
(d) Locking the doors to keep the rain out

19. Be on the air
(a) Broadcast over the radio or on TV
(b) Float like a bird
(c) To pass bodily gases
(d) Be very arrogant

20. At snail's pace
(a) Do something very carefully
(b) Be very persistent
(c) Do something very slowly
(d) Keep your moves secret

21. Hanging by a thread
(a) In a sorry or humble estate
(b) Be extremely weak
(c) Unable to act as desired
(d) Be in a dangerous situation

22. Zero tolerance
(a) Accuracy is paramount
(b) Non-acceptance of antisocial behaviour
(c) No return without risk
(d) No problem at all

23. Turn a deaf ear
(a) To pay attention
(b) To listen carefully
(c) To make someone deaf
(d) To pay no need

24. Green thumb
(a) To have talent in gardening
(b) To be envious
(c) To be angry
(d) To have talent in painting

25. A blessing in disguise
(a) A misfortune that eventually has good results
(b) A person who has changed so much that he is now unrecognisable
(c) A prayer asking for God's favour
(d) A bad person hiding his face behind a mask

26. Silver bullet
(a) A very expensive solution used only as the last measure
(b) A simple and seemingly magical solution to a complicated problem
(c) A solution which is worse than the problem
(d) A thing of beauty but which is actually deadly

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27. Take to task
(a) To assign work (b) To rebuke
(c) To praise (d) To give an award

28. At arm's length
(a) Checking the length of fabric
(b) As close as one can touch
(c) Avoiding too much closeness
(d) Using one's arm to measure length

29. Against the clock
(a) To do a job fast to finish it before a deadline
(b) Time is money
(c) Man is a victim of time
(d) It is useless to fight destiny

30. Four corners of the earth
(a) From the very beginning
(b) From morning till night
(c) From all parts of the world
(d) From beginning to end

31. Gift of the gab
(a) Receive a precious gift
(b) Achieve sudden greatness
(c) Have the ability to adapt
(d) Have the talent to speak well

32. Red letter day
(a) A very special day
(b) A very hot day
(c) A frightful day
(d) A very cold day

33. As the crow flies
(a) To be uncertain
(b) A long winding path
(c) The shortest route
(d) To be directionless

34. A hot potato
(a) A war like situation which could have been easily avoided
(b) A common eatery but favoured by celebrities
(c) A controversial situation which is awkward to deal with
(d) A celebrity who keeps getting into some or the other controversy

35. Pull the plug
(a) Make a firm refusal
(b) Save a situation by acting in the nick of time
(c) To waste away somebody's effort
(d) Prevent something from continuing

36. Ethnic cleansing
(a) A social revolution where negative aspects of a culture are removed
(b) To perform mass religious conversions
(c) The mass killing of members of one ethnic group
(d) Removal of all signs of culture from a society

37. Pull the wool over someone's eyes
(a) To protect someone
(b) To keep oneself warm
(c) Deceive someone by telling lies
(d) To pretend to be blind to the other person's bad behaviour

38. Head in the clouds
(a) To daydream (b) To be very tal
(c) To be very lazy (d) To feel giddy

39. to shake off
(a) To denounce (b) To get rid of
(c) To recollect (d) To pass off

40. Mind your language
(a) To speak first and think later
(b) To put a lot of efforts to understand what the other person is trying to say
(c) Tell someone to speak politely
(d) To speak grammatically incorrect language

41. Face the music
(a) Face the enemy
(b) Enjoy the harmony
(c) Get appreciation
(d) Face the criticism

42. Hand in glove
(a) Working together in the same office
(b) Wearing gloves while working
(c) In partnership for something dishonest
(d) Doing work in the garden

43. To grease the palm
(a) To give support
(b) To bribe someone
(c) To cheat someone
(d) To give a massage

44. Add fuel to the fire
(a) Go from one bad situation to another
(b) A cause becomes stronger when more people join
(c) The flame will extinguish if it runs out of oil
(d) Cause a situation to become worse

45. Pass the hat
(a) To sell something
(b) To collect money
(c) To play a game
(d) To avoid work

46. Make no headway
(a) Check if the head can pass through
(b) Unable to progress ahead
(c) Unable to overtake anyone
(d) Forced to fix a new goal

47. Flesh and blood
(a) A very gory murder scene
(b) A lot of hard work
(c) Loss of lives in battle
(d) A person's physical body and their needs and frailties

48. Flea market
(a) A market for semi-precious stones and jewellery
(b) A market where stolen goods are sold
(c) A street market selling second hand goods
(d) A small but crowded and noisy place

49. In a pickle
(a) In great pain
(b) In jubiliation
(c) In trouble
(d) In deep sorrow

50. A walk of life
(a) An easy comfortable life not necessarily prosperous
(b) The most important day of your life
(c) A person's occupation or position within society
(d) Walking is the best form of exercise

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ANSWERS

1. (a)	2. (c)	3. (d)	4. (d)	5. (d)	6. (a)	7. (c)	8. (a)	9. (b)	10. (c)
11. (b)	12. (d)	13. (a)	14. (a)	15. (a)	16. (d)	17. (d)	18. (b)	19. (a)	20. (c)
21. (d)	22. (b)	23. (d)	24. (a)	25. (a)	26. (b)	27. (b)	28. (c)	29. (a)	30. (c)
31. (d)	32. (a)	33. (c)	34. (c)	35. (d)	36. (c)	37. (c)	38. (a)	39. (b)	40. (c)
41. (d)	42. (c)	43. (b)	44. (d)	45. (b)	46. (b)	47. (d)	48. (c)	49. (c)	50. (c)

One Word Substitution

One Word Substitution is substituting a group of words with a unique word according to its meaning. Most of these words are noun and these words are commonly used in our daily life, newspaper etc.

In examination, this kind of test is provided, especially to test the candidate's skill of memorising important words in English language. Questions of one word substitution is formed by writing the definition of these important words, similarly as they are written in any English to English dictionary. The only way to prepare this segment is to make yourself complete familiar with every important word as you can.

Generally, one word substitution covers specific words from the different aspects of Professions, Political, Religious, Medical Terms etc.

Here are some questions from 'One Word Substitution'. Go through these questions and try to understand the pattern and nature of such question.

A few one word substitution are given below

1. One who does not believe in the existence of God — *Atheist*
2. The life-history of someone written by himself — *Autobiography*
3. One who plays not to earn money but for pleasure — *Amateur*
4. Without name or identification—*Anonymous*
5. A place where birds are kept—*Aviary*
6. One who believes in destruction of all forms of government— *Anarchist*
7. One who is appointed to settle disputes between two parties— *Arbitrator*
8. A medicine which makes the effect of poison zero — *Antidote*
9. One who is unable to pay one's debt —*Bankrupt, Insolvent*
10. One whose religious view is very narrow—*Bigot*
11. An object which breaks easily—*Brittle*
12. One who eats human beings' flesh—*Cannibal*
13. Composed of things from all parts of the world — *Cosmopolitan*
14. Someone or something existing at the same period as another —*Contemporary*
15. One who believes very easily —*Credulous*
16. A place for burying the dead —*Cemetery*
17. Eating flesh or meat —*Carnivorous*
18. Someone leaving one's country to settle in another — *Emigrant*
19. A disease spreading over a large area —*Epidemic*
20. Speech without prior preparation —*Extempore*
21. Producing the desired result —*Efficacious*
22. Suitable for selection —*Eligible*
23. One who spends without care and excessively — *Extravagant, Prodigal*
24. One who believes in fate —*Fatalist*
25. Very choosy and hard to please —*Fastidious*
26. Killing of one's own brother —*Fratricide*
27. An office or post without pay —*Honorary*
28. Killing of man —*Homicide*
29. Done or given without charge or fee —*Gratis*
30. Something that cannot be read —*Illegible*
31. Someone that cannot be defeated —*Invincible*
32. A place that cannot be reached —*Inaccessible*
33. That which cannot be explained —*Inexplicable*
34. That which cannot be corrected —*Incorrigible*
35. That which cannot be done without, absolutely necessary —*Indispensable*
36. That which cannot be erased —*Indelible*
37. That which cannot be avoided —*Inevitable*
38. That which cannot be understood or realised easily — *Inscrutable*
39. That which cannot be changed or ended — *Irrevocable*
40. Not to the point —*Irrelevant*
41. That which never fails or faults —*Infallible*
42. One who wastes his time without any job —*Idler*
43. Killing of one's own mother —*Matricide*
44. One who dies for one's country or for others— *Martyr*

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45. Marrying with one person —*Monogamy*
46. Hater of mankind —*Misanthrope*
47. An attitude measuring everything in terms of money or profit —*Materialistic*
48. One who can be hired to do any illegal act— *Mercenary*
49. A drug causing sleep or intoxication —*Narcotic*
50. No longer in use —*Obsolete*
51. One who speaks skilfully —*Orator*
52. All powerful —*Omnipotent*
53. Present everywhere —*Omnipresent*
54. Knowing everything —*Omniscient*
55. Marrying with more than one —*Polygamy*
56. One who knows many languages —*Polyglot*
57. A single cure for all diseases —*Panacea*
58. Happening after one's death —*Posthumous*
59. One who uses others to survive —*Parasite*
60. Killing of one's own father —*Patricide*
61. A person doing good acts for mankind—*Philanthropist*
62. One who lives alone and avoids people — *Recluse*
63. Habitually reserved and silent —*Reticent*
64. Murder of king —*Regicide*
65. One who walks in sleep — *Somnambulist*
66. One who talks in sleep —*Somniloquist*
67. A post or office high in reputation and pay but no work —*Sinecure*
68. Talking to oneself —*Soliloquy*
69. One who is made to suffer for another —*Scapegoat*
70. With the opinion or agreement of all —*Unanimous*
71. Very clear in meaning —*Unambiguous*
72. That which cannot be predicted before — *Unforeseen*
73. Using too many words in writing or speaking — *Verbose*
74. Someone with a long experience —*Veteran*
75. Examination of one's thoughts or experience — *Introspection*
76. Killing (out of mercy) someone suffering from incurable disease —*Euthanasia*
77. Written in a document after it has been signed — *Postscript*
78. Religious song —*Hymn*
79. The policy of extending a country's empire — *Imperialism*
80. Blood relationship —*Consanguinity*
81. Opposed to great or sudden change —*Conservative*
82. Using someone else's ideas as own —*Plagiarism*
83. Someone not sure about God's existence — *Agnostic*
84. One who leaves a religion or faith —*Apostate*
85. One who has no taste for literature, art or music — *Philistine*
86. Deriving pleasure by inflicting pain on others — *Sadism*
87. One having excessive enthusiasm for a cause — *fanatic*
88. An insult to God —*Blasphemy*
89. One who loves books —*Bibliophile*
90. One who is indifferent to pleasure or pain — *Stoic*
91. One who poses himself as someone he is not— *Imposter*
92. Code of diplomatic etiquette —*Protocol*
93. A word for word copy —*Verbatim*
94. That which cannot be understood —*Unintelligible*
95. A story intended to reveal a moral or spiritual truth —*Parable*
96. One who travels from place to place — *Itinerant*
97. One who uses both his hands with equal skill — *Ambidextrous*
98. A short journey for fun— *Excursion*
99. One who doubts every good thing — *Cynic*
100. Giving undue favours to one's relatives — *Nepotism*
101. Not allowing the light to pass through —*Opaque*
102. An official sent on a diplomatic mission — *Emissary*
103. One who abstains completely from alcoholic drinks —*Teetotaller*
104. One who loves to entertain one's guests — *Hospitable*
105. A general pardon for political convicts — *Amnesty*

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Practice Questions

Directions (Q. Nos. 1-45) *In each of the following questions, choose the alternative which can be substituted for the given words/sentence.*

1. A tank where fish or water plants are kept
(a) Apiary (b) Aviary
(c) Nursery (d) Aquarium

2. Yearly celebration of a date or an event
(a) Birthday (b) Anniversary
(c) Jubilee (d) Centenary

3. Custom of having many wives
(a) Bigamy (b) Monogamy
(c) Polygamy (d) Matrimony

4. Customs of having several husbands at the same time
(a) Polyandry (b) Polyglot
(c) Polysexual (d) Polygamy

5. One who knows many languages
(a) Polygamy (b) Popular
(c) Panacea (d) Polyglot

6. A remedy for all diseases
(a) Recoil (b) Panacea
(c) Marvel (d) Treatment

7. An examination of dead body
(a) Ante-mortem (b) Autopsy
(c) Morgue (d) Cremation

8. A supporter of the cause of women
(a) Feminist (b) Colleague
(c) Extempore (d) Womanish

9. A man having no hair on the scalp
(a) Hoary (b) Naked
(c) Gaudy (d) Bald

10. A building where dead bodies are kept
(a) Aviary (b) Hospital
(c) Zoo (d) Mortuary

11. The violation of profaning of sacred things
(a) Solemn (b) Sinecure
(c) Posthumous (d) Sacrilege

12. A place where birds are kept
(a) Apiary (b) Aviary
(c) Nursery (d) Extempore

13. Killings one's brother
(a) Suicide (b) Fratricide
(c) Patricide (d) Matricide

14. One who is not easily pleased by anything
(a) Maiden (b) Pessimist
(c) Vulnerable (d) Fastidious

15. A group of three persons sharing power
(a) Triology (b) Tetralogy
(c) Triumvirate (d) Tripode

16. A person who regards the whole world as his country
(a) Cosmopolitan (b) Nationalist
(c) Patriot (d) Metropolitan

17. Of unknown authorship
(a) Anonymous (b) Unanimous
(c) Amiguous (d) Extempore

18. A person who rules without consulting the opinion of others
(a) Democrat (b) Autocrat
(c) Bureaucrat (d) Fanatic

19. One who is well versed in the science of female ailments
(a) Cardiologist (b) Surgeon
(c) Gynecologist (d) Sergeant

20. One who eats everything
(a) Omnipotent (b) Insolvent
(c) Irresistible (d) Omnivorous

21. An elderly unmarried woman
(a) Spinster (b) Vandal
(c) Bachelor (d) Adult

22. A man who wastes his money on luxury
(a) Extempore (b) Extravagant
(c) Nymph (d) Surge

23. To induce to have sexual intercourse
(a) Incite (b) Seduce
(c) Lax (d) Entice

24. Incapable of being seen through
(a) Invisible (b) Obsolete
(c) Opaque (d) Transparent

25. One who sacrifices his life for a cause
(a) Patriot (b) Martyr
(c) Soldier (d) Revolutionary

26. A person coming to a foreign land to settle
(a) Immigrant (b) Visitor
(c) Tourist (d) Emigrant

27. Murder of a king
(a) Homicide (b) Matricide
(c) Patricide (d) Regicide

28. An associate in a office or institution
(a) Companion
(b) Ally
(c) Colleague
(d) Accomplice

29. An official numbering of the population
(a) Censor (b) Counting
(c) Census (d) Demography

30. A name assumed by a writer or a false name
(a) Lie (b) Portable
(c) Anonymous (d) Pseudonym

31. One who believes in fate
(a) Atheist (b) Philanthropist
(c) Fatalist (d) Amateur

32. List of headings of the business to be transacted at a meeting
(a) Schedule (b) Agenda
(c) Proceedings (d) Excerpts

33. A government run by a dictator
(a) Democracy (b) Autocracy
(c) Oligarchy (d) Theocracy

34. An office or post with no work but high pay
(a) Honorary (b) Sinecure
(c) Gratis (d) Ex-officio

35. Person who believes that God is everything and everything is God
(a) Agnostic (b) Theist
(c) Pantheist (d) Pantechnicon

36. Relationship by blood or birth
(a) Parentage (b) Affiliation
(c) Consanguinity (d) Nepotism

37. Walking in sleep
(a) Somniloquism
(b) Somnambulism
(c) Obsession
(d) Hallucination

38. A person who kills somebody especially for political reason
(a) Criminal
(b) Murderer
(c) Assassin
(d) Hangman

39. Study of mankind
(a) Pathology (b) Physiology
(c) Philology (d) Anthropology

40. Through which light cannot pass
(a) Dull (b) Dark
(c) Obscure (d) Opaque

41. A person not sure of the existence of God
(a) Theist (b) Atheist
(c) Agnostic (d) Cynic

42. One who deserts his religion
(a) Deserter (b) Turn-coat
(c) Fanatic (d) Apostate

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43. One who uses fear as a weapon of power
(a) Terrorist (b) Militant
(c) Extremist (d) Anarchist

44. Place where birds are kept
(a) Zoo (b) Apiary
(c) Armoury (d) Aviary

45. A man of odd habits
(a) Eccentric
(b) Cynical
(c) Introvert
(d) Moody

Directions (Q.Nos. 46-55) *Out of the four alternatives choose the one which can be substituted for the given words / sentence.*

46. One who can not be corrected
(a) Incorrigible
(b) Ineligible
(c) Indolent
(d) Indefatigable

47. Put side by side
(a) Impose (b) Juxtapose
(c) Depose (d) Propose

48. Chief or Commander of army
(a) Major (b) Lieutenant
(c) Colonel (d) General

49. One who pays rent to the landlord.
(a) Termagant (b) Trojan
(c) Tenant (d) Payee

50. Two pieces of bread spread with butter or any other food.
(a) Sand dune (b) Loaves
(c) Bun (d) Sandwich

51. Without change of tone or pitch.
(a) Monotone (b) One tone
(c) Single tone (d) First tone

52. A place where treasures of art, curios are preserved or exhibited.
(a) Museum (b) Stable
(c) Library (d) Studio

53. Associated with God or religion
(a) Humbly (b) Holy
(c) Virtuous (d) Godly

54. Work for which one does not take salary or payment.
(a) Remunerated (b) Charge-sheet
(c) Complementary (d) Honorary

55. No longer in use
(a) Absolute (b) Obsolete
(c) Contemporary (d) Remote

ANSWERS

1	(d)	2	(b)	3	(c)	4	(a)	5	(d)
6	(b)	7	(b)	8	(a)	9	(d)	10	(d)
11	(d)	12	(b)	13	(b)	14	(d)	15	(c)
16	(a)	17	(a)	18	(b)	19	(c)	20	(d)
21	(a)	22	(b)	23	(b)	24	(c)	25	(b)
26	(a)	27	(d)	28	(c)	29	(c)	30	(d)
31	(c)	32	(b)	33	(b)	34	(b)	35	(c)
36	(c)	37	(b)	38	(c)	39	(d)	40	(d)
41	(c)	42	(d)	43	(a)	44	(d)	45	(a)
46	(a)	47	(b)	48	(d)	49	(c)	50	(d)
51	(a)	52	(a)	53	(b)	54	(d)	55	(b)

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Spellings

A Spelling test is an assessment of a candidate's ability to spell words correctly. Spelling is the combination of alphabetic letters to form written word. Spelling test are also used to check the familiarity of the newly added words with the candidate.

To provide help to the candidates a list of 'Frequently misspelt words' is given here.

COMMONLY MISSPELT WORDS

A

absence	accommodate	achieve	acquire
across	address	advertise	advice
apparent	argument	athlete	awful

B

balance	basically	beginning	believe
benefit	breathe	brilliant	business

C

calendar	category	certain	chief
citizen	coming	competition	convenience
criticise			

D

decide	definite	deposit	describe
desperate	develop	difference	dilemma
disappear	disappoint	discipline	

E

embarrass	environment	equipped	exaggerate
excellent	except	exercise	existence
expect	experience	experiment	explanation

F

familiar	fascinating	finally	foreign
forward	fundamental		

G

generally	government	grammar	guarantee
guidance			

H

happiness	habitat	humorous	hammer
harbour	harvest		

I

identity	imaginary	imitation	immediately
incidentally	independent	intelligent	interesting
interfere	interpretation	interruption	invitation
irrelevant	irritable	island	

J

jealous	jewel	judgement	journal
jailor	jiggle	joyous	

K

knowledge	kindness	knock	knot
kneel	kingdom	keen	knee
know			

L

laboratory	length	lesson	library
license	loneliness	lose	lying

M

marriage	medicine	miniature	minute	mysterious

N

naturally	necessary	neighbour	neither	noticeable

O

occasion	occurred	official	often
omission	operate	optimism	original

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P

parallel	particularly	peculiar	perceive
perform	permanent	persevere	personally
persuade	picture	piece	planning
pleasant	political	possess	possible
practical	prefer	prejudice	presence
privilege	probably	professional	promise
psychology			

Q

quantity	quarter	quiet	quit	quite

R

realise	receive	recognise	recommend	reference
religious	repetition	restaurant	rhythm	ridiculous

S

sacrifice	safety	scissors	secretary
separate	shining	similar	sincerely
soldier	speech	stopping	strength
studying	succeed	successful	surely
surprise			

T

temperature	temporary	through	towards
tries	truly	twelfth	

U

until	ugly	unusual	usually
undergraduate	undertake	unemployed	understand

V

village	vacation	valley	various
version	vessel	victim	variety

W

weird	welcome	whether

Practice Questions

Directions (Q. Nos. 1-10) *In each of the following questions, a word has been written in four different ways, out of which only one is correctly spelt. Find the correctly spelt word.*

1. (a) Cancelation (b) Cancelletion
(c) Cancellation (d) Cancellasion

2. (a) Mischeivous (b) Mischevous
(c) Mischievous (d) Mischivous

3. (a) Foreigner (b) Forienor
(c) Foriegnor (d) Foriegnar

4. (a) Exhilirate (b) Exhilarate
(c) Exhiliret (d) Exhilerate

5. (a) Inimitable (b) Imimatible
(c) Inimitible (d) Inimmitable

6. (a) Skeletan (b) Sekeleton
(c) Skelaton (d) Skeleton

7. (a) Colaborate (b) Collaboratte
(c) Collaborate (d) Collabarate

8. (a) Scriptur (b) Scriptare
(c) Scripture (d) Scripcher

9. (a) Commettee
(b) Committee
(c) Committe
(d) Commitee

10. (a) Obssesion
(b) Obsession
(c) Obssession
(d) Obsessien

Directions (Q. Nos. 11-20) *In the following questions, there are four words in each question, find the word which is wrongly spelt.*

11. (a) Eficient (b) Horrible
(c) Insignificant (d) Barren

12. (a) Adulation (b) Recieve
(c) Prejudice (d) Rythm

13. (a) Prolong (b) Conditional
(c) Obscure (d) Cautios

14. (a) Worshipped (b) Deterred
(c) Murmurred (d) Lapped

15. (a) Inept (b) Amature
(c) Vacuum (d) Glorify

16. (a) Appraise (b) Behaviour
(c) Commend (d) Mentanence

17. (a) Fortunately (b) Internaly
(c) Uniquely (d) Coldly

18. (a) Benefecial (b) Regular
(c) Despise (d) Deprave

19. (a) Narrator (b) Oversear
(c) Pretence (d) Licence

20. (a) Seperation (b) Desertion
(c) Serenity (d) Rejoice

Directions (Q. Nos. 21-40) *Find the correctly spelt words.*

21. (a) Reminiscent (b) Reminicent
(c) Riminisent (d) Reminisent

22. (a) Emphetic (b) Emphatic
(c) Emphatick (d) Emphattic

23. (a) Epilogue (b) Epiloug
(c) Eppilogue (d) Epiloge

24. (a) Massacar (b) Masacre
(c) Messacre (d) Massacre

25. (a) Opressed (b) Oppresed
(c) Oppressed (d) Operessed

26. (a) Mountainer (b) Mounteener
(c) Mountaineer (d) Mountiner

27. (a) Ineffectual (b) Iniffectual
(c) Inefecttual (d) Inefictual

28. (a) Privilege (b) Previlege
(c) Prevelege (d) Privelage

29. (a) Contemptable
(b) Contamptible
(c) Contemptible
(d) Contemptibble

30. (a) Efflorescence (b) Eflorescence
(c) Efllorescence (d) Efflorascence

31. (a) Exterminatte (b) Inexpliccable
(c) Reffere (d) Offspring

32. (a) Friming (b) Burning
(c) Runing (d) Fryng

33. (a) Sychological (b) Psychological
(c) Psykological (d) Sykological

34. (a) Velnerable (b) Vulnerable
(c) Vulnarable (d) Valnerable

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35. (a) Palete (b) Palet
(c) Palate (d) Pelate

36. (a) Faithfuly (b) Sincerely
(c) Truely (d) Affectionatly

37. (a) Perverted (b) Pervirted
(c) Parverted (d) Parvirted

38. (a) Ditheering (b) Dethering
(c) Dithering (d) Detheering

39. (a) Composure (b) Cumposure
(c) Composore (d) Cumposore

40. (a) Conssensus
(b) Consenssus
(c) Consensus
(d) Conssenssus

Directions (Q. Nos. 41-50) *Four words are given in each question, out of which only one word is correctly spelt. Find the correctly spelt word.*

41. (a) Juvinile (b) Juvenile
(c) Juvinnile (d) Juvenille

42. (a) Deteriorate (b) Deteriorrate
(c) Detariorate (d) Deterriorate

43. (a) Knoledgeable (b) Knowledgeable
(c) Knowledgable (d) Knowledgeble

44. (a) Renaissance
(b) Renaisance
(c) Renassance
(d) Renaissancee

45. (a) Fictiteous
(b) Fictisious
(c) Fictitieous
(d) Fictitious

46. (a) Annoyence
(b) Annayonce
(c) Annoyance
(d) Anoyance

47. (a) Posibility
(b) Possibility
(c) Posibbility
(d) Possebility

48. (a) Cuffe (b) Cough
(c) Cuf (d) Kough

49. (a) Misterious
(b) Mistereous
(c) Mysterious
(d) Mystereousf

50. (a) Dictionery
(b) Dectionary
(c) Dictionary
(d) Dictienary

ANSWERS

1	(c)	2	(c)	3	(a)	4	(b)	5	(a)
6	(d)	7	(c)	8	(c)	9	(b)	10	(b)
11	(a)	12	(b)	13	(d)	14	(c)	15	(b)
16	(d)	17	(b)	18	(a)	19	(b)	20	(a)
21	(a)	22	(b)	23	(a)	24	(d)	25	(c)
26	(c)	27	(a)	28	(a)	29	(c)	30	(a)
31	(d)	32	(b)	33	(b)	34	(b)	35	(c)
36	(b)	37	(a)	38	(c)	39	(a)	40	(c)
41	(b)	42	(a)	43	(b)	44	(a)	45	(d)
46	(c)	47	(b)	48	(b)	49	(c)	50	(c)

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CHAPTER **06**

Rearrangement of Sentences

Sentence/word rearrangement is concerned with putting the sentences or words in the correct order. These sentences are the part of a logical or thoughtful paragraph.

Questions based on rearrangement are usually of two types.

Type 1

- In first type, a paragraph is split into four sentences and labelled as A, B, C, D or P, Q, R, S. You are required to arrange these sentences in a proper order to form a coherent and meaningful paragraph and choose the option that gives the correct sequence as your answer.

Example (Type 1) *Given below are four jumbled sentences. Out of the given options, pick the one that gives their correct order.*

A. He often asked questions which were strange and witty.
B. Emperor Akbar was in the habit of putting riddles and puzzles to his courtiers.
C. Once he asked a strange question that a confused everyone.
D. It took much wisdom to answer these questions.

(a) BADC (b) CABD
(c) ABCD (d) BACD

Ans. (a)

Type 2

- In second type, the initial part of the sentence is given as a hint and rest of the sentence is split into some parts which are not given in their proper order. You are required to rearrange these parts so as to produce a meaningful sentence.

Example (Type 2) *Out of the four options given, select the most logical order of the sentences to form a coherent paragraph.*

Cars were owned by

A. only a privileged few and
B. my class of society was
C. as yet untouched by it

(a) ABC (b) CBA
(c) CAB (d) BCA

Ans. (a)

Practice Questions

Directions (Q. Nos. 1-15) *In the following questions, some parts have been jumbled up. You are required to rearrange these parts, which are labelled P, Q, R and S, to produce the correct sentence.*

1. When
P : it becomes an honour of a lifetime
Q : in recognition of their great performance
R : illustrious personalities
S : win an award
(a) R P Q S (b) P Q R S
(c) Q R S P (d) R S Q P

2. The inspector argued that no force was used
P : beyond that was necessary to put an end to the disturbances
Q : by the police
R : produced
S : by the anti-social elements
(a) Q P R S (b) S P R Q
(c) P S R Q
(d) Q R P S

3. Though my father
P : he is deeply concerned
Q : about their needs
R : makes his children
S : carry out their duties promptly
(a) R S P Q
(b) P R Q S
(c) R S Q P
(d) P Q R S

4. The concept of death
P : that it has been reduced
Q : as an inevitability
R : is so ancient
S : to a cliche
(a) S P R Q
(b) Q R P S
(c) S R P Q
(d) Q P R S

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5. The specific
P : ability requirements of the job
Q : depend on the
R : required for adequate job performance
S : intellectual or physical abilities
(a) P Q R S (b) S R Q P
(c) P R Q S (d) S Q R P

6. In life
P : some rules are
Q : as in business
R : they seem almost instinctive
S : learnt so early that
(a) R S P Q
(b) Q P S R
(c) R P S Q
(d) Q S P R

7. For thousands of years
P : one of the most important fruits
Q : the strange fruit of this bush
R : of the mediterranean region
S : has been regarded as
(a) P Q R S (b) Q S P R
(c) P S Q R (d) Q R P S

8. If
P : no amount of experience could alter them
Q : they could be fixed at birth and
R : completely dictated by heredity
S : personality characteristics were
(a) Q R S P (b) S P Q R
(c) Q P S R (d) S R Q P

9. The Great Powers are engaged
P : in spite of common knowledge
Q : in arming themselves to the teeth,
R : total destruction of the human race
S : that another war will mean
(a) Q R S P (b) S P Q R
(c) Q P S R (d) S R Q P

10. Everyone knows that
P : it's difficult
Q : to speak more politely
R : to go to the manager
S : and tell him that he ought
(a) Q S R P (b) P R S Q
(c) Q R S P (d) P S R Q

11. The Government has assured the people that
P : in the Kargil operation
Q : who have sacrificed their lives
R : will be properly looked after
S : the families of all those soldiers
(a) P S R Q (b) S Q P R
(c) S R Q P (d) S P R Q

12. The Portuguese,
P : had a great talent
Q : as also for choosing the right place to.build
R : for building houses
S : who arrived in Goa 400 years ago
(a) R P S Q (b) S Q R P
(c) R Q S P (d) S P R Q

13. The unfortunate reality
P : as a result of this decline England is
Q : peripheral sport in England and
R : is cricket is today a
S : peripheral to world cricket
(a) S Q P R (b) R P Q S
(c) S P Q R (d) R Q P S

14. All precautionary measures were taken
P : to prevent the capture of booths
Q : during the election
R : by the Government
S : by the terrorists
(a) S P R Q (b) Q S P R
(c) R P S Q (d) R Q P S

15. Making
P : had formed from the receding tide
Q : I noticed a man fishing in
R : my way to a favourite fishing spot
S : a very small pool of water that
(a) S P Q R (b) R Q S P
(c) S Q R P (d) R P S Q

Directions (Q. Nos. 16-30) *Given below are four jumbled sentences. Out of the given options, pick the one that gives their correct order.*

16. A. Gone are the days when you stayed with one firm for your entire career and made lifelong friends in the office.
B. This phenomenon was noted in a recent research report which found that the median tenure for employees below the age of 30 is just two years.
C. The research report stated that young people today are tempted to switch jobs quickly.
D. As job longevity becomes a phenomenon of the past, there is a change in attitude in the modern generation towards employment.
(a) D B C A (b) B A D C
(c) C D A B (d) D C B A

17. A. On the morning of April 12, Gopal rose at 5.30 am.
B. Then he drove to the Joggers Park which was four km away.
C. There he met his group of walking enthusiasts.
D. He put on his track suit and walking shoes.
(a) C B A D (b) A D B C
(c) D C A B (d) A C B D

18. A. Her father had been stuck in an elevator for six hours.
B. Esha had heard from her parents about a blackout caused by a sudden storm.
C. She had to grope in the dark and cook by the candlelight.
D. Her mother's story had been quite different from his.
(a) C A D B (b) B A D C
(c) B D C A (d) A D C B

19. A. But when their short racing careers are over, greyhounds are adopted as household pets.
B. Greyhound racing is a popular spectator sport in the United States.
C. They worry that the greyhounds would need a large space to run to get sufficient exercise.
D. Unfortunately, many people hesitate to adopt a retired racing greyhound as a pet.
(a) D A C B (b) D B C A
(c) B A D C (d) B D A C

20. A. The subjects taught in the Gurukul varied from Sanskrit to Mathematics.
B. Indian education has its roots in the ancient ages.
C. However this system changed when the British came to India.
D. In those days the Gurukul system was followed.
(a) D C A B (b) B C A D
(c) C B A D (d) B D A C

21. A. But after a while they all began to blur in our memories.
B. When we arrived in Bangkok, we took a tour of the city's famous Buddhist temples.
C. However there was one temple, the Temple of Golden Buddha, which left an indelible impression in our hearts and minds.
D. We visited numerous temples that day.
(a) B A C D (b) D C B A
(c) A D B C (d) B D A C

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22. A. We even fail to recognise that their call of duty keeps them away from their families.
B. Yet, we often fail to appreciate these sacrifices that they make.
C. They make countless sacrifices for the nation and keep us safe from our enemies.
D. The uniformed men and women are our unsung heroes.
(a) D A B C (b) D C B A
(c) A B C D (d) C B A D

23. A. They used thin twigs called chew sticks as tooth cleaners.
B. The fuzzy end was rubbed against the teeth to keep them clean.
C. These sticks were fuzzy at one end.
D. How did people clean their teeth before the toothbrush was invented?
(a) D B C A (b) A C B D
(c) D A C B (d) B C A D

24. A. One population lives in the Bwindi National Park in Uganda.
B. Mountain gorillas are some of the most threatened animals on the planet.
C. Only two groups of mountain gorillas remain.
D. The other group lives in the Virunga Mountains.
(a) B D C A (b) C D B A
(c) A B C D (d) B C A D

25. A. Yet, whatever was printed was profound and even inspirational.
B. In pre-independence India there were two kinds of newspapers.
C. The other spoke of the aspirations of the people and pointed out injustice.
D. One set was supportive of the colonial power.
(a) D C A B (b) B D C A
(c) A B D C (d) B A C D

26. A. Little did she know that I was out of job once again.
B. But all the money soon vanished into the bottomless pit of household needs.
C. I returned home with my pockets full of my earnings.
D. However, my grandmother was happy that I had become responsible.
(a) D B A C (b) C B D A
(c) B C D A (d) C D A B

27. A. Today, man is master of the world and he makes the animals do what he likes.
B. Others he eats; and those like the lion and the tiger, he shoots for pleasure.
C. Early man, when he first came, must have been surrounded by many huge animals and he must have lived in fear of them.
D. Some he tames like the horse, the cow, the elephant, the dog, the cat and so many others.
(a) C A D B
(b) C B D A
(c) A C B D
(d) B C D A

28. A. This code contains information about its nature.
B. Each living organism has a DNA code.
C. If this genetic material is altered, it would alter the organism.
D. The nature of an individual is determined by the unique genetic material in the code.
(a) D C A B (b) D B C A
(c) B A D C (d) B C D A

29. A. Yet, it is India that is the home of the malnourished child.
B. Some major ones are lack of food, sanitation and proper healthcare.
C. The reasons for malnutrition among Indian children are many.
D. Millions of rupees have been spent on child care in the country.
(a) C B A D (b) D C A B
(c) D A C B (d) A C B D

30. A. For them, it's like a magic carpet, their version of a car.
B. All kids want to be older, so from an early age they imitate their parents or siblings.
C. While cycling they imagine they are doing adult things or being adults.
D. Bikes offer them a chance to be independent.
(a) A D C B (b) D C B A
(c) B D A C (d) B A C D

Directions (Q. Nos. 31-49) *Rearrange the parts of the sentence in correct order.*

31. In developing countries today
P : urban health conditions
Q : than rural health conditions
R : seem to be better
(a) P R Q (b) P Q R
(c) Q R P (d) R P Q

32. All the sound reasons
P : ever given for conserving
Q : to the conservation of wildlife
R : other natural resources apply
(a) P R Q (b) R Q P
(c) P Q R (d) Q R P

33. The art of
P : efforts and practice
Q : fruit of persistent
R : effective presentation is the
(a) Q P R (b) R P Q
(c) R Q P (d) P R Q

34. The Greek plays
P : maintain an extremely
Q : particularly the tragedies,
R : high intellectual level
(a) P Q R (b) R P Q
(c) Q R P (d) Q P R

35. The whole biosphere, like
P : a chemically dynamic state
Q : the individual organisms that
R : live inside it, exists in
(a) R Q P (b) Q R P (c) Q P R (d) P Q R

36. For ages,
P : the Indian psyche has been
Q : geared towards devoting one's life
R : to the welfare of all
(a) P Q R (b) R Q P
(c) P R Q (d) Q P R

37. Many a bird found
A- secure in the branches
B- safety in the trees and
C- built their nests, feeling
(a) B A C (b) B C A
(c) A C B (d) A B C

38. I learnt he had
A. spoke about yoga, slums and Indian
B. never been to India, yet he
C. cinema with conviction
(a) A C B (b) B A C
(c) A B C (d) C B A

39. If your ward talks
A. well to convince you, be
B. social and interpersonal creativity
C. proud that he or she has
(a) B A C (b) A C B
(c) B C A (d) A B C

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40. Today, less privileged white
P : Americans are considered to be
Q : and pathologists predominates
R : in crisis, and the language of sociologists
(a) P R Q (b) Q P R (c) R P Q (d) Q R P

41. It may not be a simple
P : someone does stand to gain
Q : by keeping farmers divided
R : case of "divide and rule", but
(a) Q P R (b) P Q R
(c) R P Q (d) Q R P

42. This alone
P : should alert us to what
Q : is actually about
R : the demand for a Uniform Civil Code
(a) P R Q (b) P Q R
(c) Q P R (d) R P Q

43. Ensuring security
P : harder than hacking into a system
Q : of data, information, and
R : communication is considerably
(a) R Q P (b) R P Q (c) P R Q (d) Q R P

44. Williamson shoveled scorn on
P : the low-income white Republican voters who,
Q : were most responsible for the rise of Trump
R : as he saw it,
(a) P R Q (b) R Q P
(c) Q P R (d) Q R P

45. This may be essential at
P : where the market fails to deliver
Q : swath of an economy
R : times, but there is a wide
(a) Q R P (b) Q P R (c) P R Q (d) R Q P

46. It is a crisis which
P : unless policymakers
Q : exercise some intelligence
R : will get even worse
(a) R P Q (b) R Q P (c) P Q R (d) Q P R

47. Elections globally
P : dominated by numbers, percentages
Q : and tallies
R : can be dry affairs
(a) R Q P (b) P Q R
(c) R P Q (d) Q R P

48. It is the right to
P : who see us at our most vulnerable
Q : the indiscretions of doctors
R : privacy that protects us from
(a) Q R P (b) Q P R
(c) P R Q (d) R Q P

49. We should learn our lesson
P : from this history and stay away
Q : of our neighbours
R : from interfering in the messy domestic politics
(a) P R Q (b) P Q R
(c) Q P R (d) R P Q

ANSWERS

1. (d)	2. (a)	3. (a)	4. (b)	5. (b)	6. (b)	7. (b)	8. (d)	9. (c)	10. (b)
11. (b)	12. (d)	13. (d)	14. (c)	15. (b)	16. (a)	17. (b)	18. (b)	19. (c)	20. (d)
21. (d)	22. (b)	23. (c)	24. (d)	25. (b)	26. (b)	27. (a)	28. (c)	29. (c)	30. (c)
31. (a)	32. (a)	33. (c)	34. (d)	35. (b)	36. (a)	37. (b)	38. (b)	39. (b)	40. (a)
41. (c)	42. (a)	43. (d)	44. (a)	45. (d)	46. (a)	47. (c)	48. (d)	49. (a)	

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Practice Set 01

Instructions 40 questions to be attempted out of 50. **Time :** 60 Min

Directions (Passage 1-10) *Read the following passges carefully and answer the questions that follow*

Passage 1

I. Food is an important part of our identity and culture. We are known by what we eat. It reflects the geography to which we belong and the locally available resources used in our cuisine. Adivasi food systems are deeply embedded in local culture and traditions, given that the way of life of these indigenous peoples is so closely linked to nature and its resources.

II. Jharkhand is a natural abode and home to numerous Adivasi communities constituting a little over 25% of the total population. These communities, in addition to their rich social and cultural traditions, practice immensely diverse food practices which are based on locally available resources and techniques. Such Adivasi food systems have been instrumental in maintaining the sovereignty and self-reliance of these communities. They have taken many varieties of vegetables and tubers, wild or grown, to enrich their diet and also to meet their requirements of calcium, iron, minerals and vitamins.

III. The realm of medicinal plants and herbal products is even vaster. According to the All India Coordinated Research Project on Ethnobiology, tribal communities are acquainted with the use of over 9,000 species of plants including food plants, while specifically for the purpose of healing they know the use of around 7,500 species of plants.

IV. The Adivasi food of Jharkhand may be defined in terms of a few characteristic features: food is influenced by physiological needs and geographical conditions and the habit is closely associated with habitat. This means food habits are guided by locally available resources. Adivasis consume boiled food like rice, pulses, herbs or 'saag' and on some occasions, animal or bird meat is roasted on a fire. Because of these consistent food habits that are based on locally available resources, instances of serious diseases are considerably lower among Adivasis.

V. Nutrition Value: Ingredients used in Adivasi food are a great source of nutrition in addition to taste. Studies have revealed that Adivasi food provides high immunity to diseases and protection from deformities. Food like tubers, shoots, berries, nuts, etc. are a good source of protein and fat. The consumption of meat, fish, egg, shellfish, etc., provides good quality protein apart from important vitamins and minerals. Widely consumed wild or grown tubers enrich their dietary requirement of calcium, iron, mineral elements and vitamins.

1. The mention of medicinal plants and herbal products makes the writer seem.
(a) Commend (b) Thankless
(c) Appreciative (d) Critical

2. Alliteration refers to the occurrence of the same letter or sound at the beginning of adjacent or closely connected words.
Select the option that contains a word from the passage that will form an alliteration with 'Adivasi food of Jharkhand'.
(a) Sovereignty (b) Ingredients
(c) Features (d) Medicinal

3. Select the option that suitably completes the given dialogue as per the context on the passage.
Jaya That seminar about the Adivasis was very informative but I don't think I can ever eat what they eat.
Rishi Why are you saying that? Their food …… .
(a) is so different from ours
(b) is so rich in nutrition
(c) is made up raw materials
(d) is obtained from medicinal plants

4. What is the relationship between (1) and (2)?
(1) Such Adivasi food systems have been instrumental in maintaining the sovereignty and self-reliance of these communities.
(2) This means food habits are guided by locally available resources.
(a) (1) is the reason for (2).
(b) (2) elaborates the problem described in (1).
(c) (1) gives the motive behind (2)
(d) (2) explains the problem discussed in (1)

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5. The sentence "We are known by what we eat" means that

(a) It's important to eat good food in order to be healthy and fit.
(b) We become famous by the kind of food we eat.
(c) Healthful and nutritious food is the reason behind our fame.
(d) People remember us because of our eating habits.

6. Select the option that states the reason behind the statement- "Adivasi food provides high immunity to diseases and protection from deformities".

(a) The food of Adivasis have more protein and fibre.
(b) The food of Adivasis have a rich balance of protein, vitamins and minerals.
(c) Adivasis grow their own food themselves.
(d) Adivasis know the use of around 7,500 species of plants.

7. Which of the following statements is/are true in the context of the passage?

1. Studies have revealed that as the Adivasi food is rich in nutrients, it provides high immunity to disease and protection from deformities.
2. Most of the Adivasis have frequent cases of serious diseases due to their consistent eating habits.
3. Adivasi food provides ample amount of proteins, vitamins and minerals to boost the immune system of the eater.
4. Adivasi communities cover more than 34% of Jharkhand- which is their natural house.

(a) Only 1 (b) Both 1 and 2
(c) Both 1 and 3 (d) Only 4

8. Which quote summarises the writer's feelings about the Adivasi's food and culture as described in the passage?

(a) If you keep good food in your fridge, you will eat good food. –Errick Mc Adams
(b) It's health that is real wealth and not pieces of Gold and Silver. –Mahatma Gandhi
(c) Eating healthy food fills your body with energy and nutrients. Imagine your cells smiling back at you and saying: 'Thank You!. –Karen Salmansohn
(d) A Journey of thousand miles begins with a single step. –Lao Tzu

9. Select the option that lists what we can conclude from the passage.

(1) Adivasis are self-reliant and have a good immune system as they eat nutritious food that is available as per their natural resources.
(2) Adivasis are self-reliant and have good immune system as they eat every kind of food that is given to them by their governing agencies.
(3) Adivasis are self-reliant, modern and have good knowledge of healing properties.
(4) Adivasis are not self-reliant but have good immune system as they eat nutritious food that is available as per their natural resources.

(a) Only (1) is true (b) Both (1) and (3) are true
(c) Both (2) and (3) are true (d) Only (4) is true

10. The writer mentions that 'food is an important part of our identity and culture'.

Pick the option that closely gives the meaning of the statement.

(a) Culture is what makes everyone different from who they are and where they originate.
(b) Food is family treasure in a way that the recipes are passed on from one generation to another.
(c) As the world becomes more globalised, it is easier to access cuisines from different cultures.
(d) How we eat and talk about food is a different key part of our identities.

Passage 2

Democratic societies from the earliest times have expected their governments to protect the weak against the strong. No ''era of good feeling'' can justify discharging the police force or giving up the idea of public control over concentrated private wealth.

On the other hand, it is obvious that a spirit of self-denial and moderation on the part of those who hold economic power will greatly soften the demand for absolute equality. Men are more interested in freedom and security than in an equal distribution of wealth. The extent to which Government must interfere with business, therefore, is not exactly measured by the extent to which economic power is concentrated into a few hands.

The required degree of government interference depends mainly on whether economic powers are oppressively used and on the necessity of keeping economic factors in a 'tolerable state of balance.'

But with the necessity of meeting all these dangers and threats to liberty, the powers of government are unavoidably increased, whichever political party may be in office. The growth of government is a necessary result of the growth of technology and of the problems that go with the use of machines and science. Since the government in our nation, as well as in all civilised nations, must take on more powers to meet its problems, there is no way to preserve freedom except by making democracy more powerful.

11. 'Era of good feeling' in second sentence can mean

(a) time of prosperity (b) time of adversity
(c) time without government (d) time of police atrocities

12. 'Tolerable state of balance' in the last sentence of the first paragraph may mean

(a) a reasonable amount of government interference
(b) an adequate level of police force
(c) a reasonable check on economic power
(d) a reasonable level of economic equality

13. A spirit of moderation on the part of the economically sound people would make the less-privileged

(a) unhappy with their lot
(b) clamour less for absolute equality
(c) unhappy the rich people
(d) more interested in freedom and security

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14. The advent of science and technology has
(a) increased the chances of economic inequality
(b) increased the freedom of people
(c) increased the powers of the government
(d) increased the tyranny of the political parties

15. The growth of government is necessitated
(a) to curb the accumulation of wealth in a few hands
(b) to deploy the police force wisely
(c) to monitor science and technology
(d) to make the rich and the poor happy

Passage 3

I. As we speed our way from Guwahati towards Sualkuchi, vivid images of colourful silk mekhela chadars flood my mind. This is my second visit to Sualkuchi. Sualkuchi is endearingly referred to as the Manchester of the East. Situated on the northern banks of the Brahmaputra, it is famous for its centuries-old heritage of weaving. When I reach Sualkuchi, I can hear the rhythmic click-clack of the traditional throw-shuttle loom.

II. Here, weaving is not just a tradition handed down by generations, but a way of life and a labour of love. The majority of the families have hand operated looms, which they call 'taatxaal'. "I've been weaving for more than 25 years now; I still love the craft," says Binita Roy, a weaver working here. As I ask Binita about the different designs used in the silk garments, I'm amazed at the sheer beauty of the motifs. A popular design used in mekhela chadars is the 'kinkhaap'. It is believed that this design has been used since the days of the Ahom kings and consists of two front-facing lions. Other popular designs include those inspired by Assamese jewellery like the 'gaamkharu' (a wrist band) or 'joonbiri' (a half moon-shaped pendant) and the kaziranga design inspired by the wildlife at Kaziranga National Park. These days, colored silk threads are bought from South India as it is not commercially viable to dye the silks before weaving here.

III. Assam's flora and fauna often sneak into its mekhela chadars. Creepers are woven into borders, peacocks prance about the chadars, and delicate, geometric flowers dot the bodies of the mekhelas. Occasionally, pots and lions too make an appearance. The more I learn about the tedious procedure of weaving, the more my respect for the craft grows.

IV. There are mekhela chadars in different colours: red, blue, green, purple and blue as well as white, beige, black and grey. The 'paat' silk mekhela chadars have intricate designs made out of golden silk threads or guna all over. In some of them, different coloured threads are also used.

V. The white 'paat' silk, warm 'eri' and the golden 'muga' silk threads are made into exquisite chadars, saris, shawls, dress materials, rihas and 'gamochas'. The 'paat' fabric is often described as one that dries in the shade and hides in a fist. The crisp, bright, gold 'muga' silk, exclusive to Assam, is of superior quality and very costly. Mekhela chadars made from 'muga' are gracefully draped by dancers during Rongali Bihu, the traditional festival of Assam. 'Muga', the golden silk of Assam, was given the Geographical Indication status in 2007 and the GI logo in 2014.

16. Which of the following statements is not substantiated in paragraph IV?
(a) The paat silk mekhela chadars have intricate designs made from different colors of silk threads.
(b) The silk chadars are made only of limited colors like golden, red, green and blue because of their maximum liking by the customers.
(c) The mekhela chadars are made in all different types of colors.
(d) The paat silk mekhela chadars have complex designs made out of golden silk threads.

17. Onomatopoeia refers to the formation of a word from a sound associated with what is named.
From the options given below, choose a word that is an example of onamotopoeia.
(a) Click - clack (b) Creepers
(c) Throw shuttle (d) White paat

18. Select the option that lists central idea of paragraph V.
(a) Muga, the golden silk of Assam.
(b) Assam's floura and fauna depicted in the mekehla chadars.
(c) The famous golden tea of Assam.
(d) Mekhela chadars- the identity of Sualkuchi in Assam.

19. The writer's question to Binita, about knowing about the different designs, was intended to
(a) Criticize her creativity and lack of abilities.
(b) Make the process of creating designs sound simple.
(c) Encourage Binita to join a textile design course.
(d) Showcase her expertise in creating designs.

20. The 'gaamkharu' and the 'joonbiri' designs have been inspired by
(a) The Kaziranga National Park
(b) The Assamese jewellery
(c) The traditional Rangali Bihu festival
(d) The Ahom kings

Passage 4

I. Family is one of the few universal and permanent institutions of mankind. In every society and at every stage of development we found some sort of family. As a result, we found different types of family all over the world. But in India we found a peculiar family system which deserves special attention. The family in India does not consist only of husband, wife and their children but also of uncles, aunts, cousins and grandsons.

II. This system is called joint family or extended family system. This joint family system is a peculiar characteristic of the Indian social life. Usually, a son

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after marriage does not separate himself from the parents but continues to live under the same roof, eating food cooked at one hearth, participating in common worship and holding property in common with every person's share in it.

III. All the members of joint family keep their earnings in a common fund out of which family expenses are met. Accordingly, Indian Joint family system is like a socialistic community in which every member earns according to their capacity and receives according to their needs. This family is formed on the basis of close blood relationships. It normally consists of members of three to four generations.

IV. In other words, joint family is a collection of more than one primary family on the basis of close blood ties and common residences. All the members are bound by mutual obligations and have a common ancestor. It consists of an individual, his wife and married sons, their children and unmarried daughter, his brother and his parents. But to have a clear understanding of the meaning of joint family, we must have to analyse its definitions given by different sociologists.

V. Some of these definitions are as follows:

(1) According to Smt. Iravati Karve, "A joint family is a group of people who generally live under one roof, who eat food cooked at one hearth, who hold property in common and who participate in common worship and are related to each other as some particular type of Kindred."

(2) According to K.M. Kapadia, "Joint family is a group formed not only of a couple and their children but also of other relations either from father's side or from mother's side depending on whether the joint family is patrilineal or matrilineal."

Thus, we conclude that the joint family comprises of a large number of members which has greater generation depth and who are related to one another by property, income, household and mutual rights and obligations.

21. Which of the following statement/statements is not true in the context of the passage?

A. Indian Joint family system is like a connected system in which every member earns according to their capacity and receives according to their needs.

B. The joint family is an extension of the nuclear family (parents and dependent children).

C. Non-earning members have as much share as the earning members in the joint family system due to the common funds.

D. The entire members in the joint family system are not bound by mutual obligations and are free to take their independent decisions.

(a) Only (A) (b) Both (A) and (B)
(c) Both (A) and (C) (d) Only (D)

22. Select the option that lists what we can conclude from the passage.

(1) The family in India does not consist only of husband, wife and their children but also of uncles, aunts and cousins and grandsons.

(2) The joint family is based on close blood relationships and kinship.

(3) One of the main advantages of a joint family system is the strong bonding it creates among siblings and other members of the family.

(4) The food is cooked in different firesides but eaten at a common place with all the heads in the leading roles.

(a) (1) and (2) are true (b) (1), (2) and (3) are true
(c) (2) and (4) are true (d) (1), (3) and (4) are true

23. Which quote summarises the writer's feelings in the best manner about the joint family system?

(a) When everything goes to hell, the people who stand by you without flinching, they are your family. –Jim Butcher
(b) Joint Family : Divided by property but united by heart. –Harshita Ashwani
(c) Nobody has ever before asked the nuclear family to live all by itself in a box the way we do. –Margaret Mead
(d) Happiness is having a large, loving, caring, close-knit family in another city. –George Burns

24. Which board can be chosen as displaying the title of the above passage?

(a) Global Joint Family System
(b) Members of Joint Family
(c) Indian Joint Family
(d) Types of Families in India

25. The writer mentions 'This family is formed on the basis of close blood relationships.'
Pick the option that closely gives the meaning of the statement.

(a) The joint family members are a coherent group who follow the same culture and ties of blood.
(b) The child who cares for the parents usually receives the house in addition to his or her own share of land and moveable property in joint families.
(c) An extended family can also be called a complex family, joint family, or multi-generational family.
(d) With globalisation and increasing urbanisation, people have become more individualistic and consider family secondary.

Passage 5

I. Many of us believe that 'small' means 'insignificant'. We believe that small actions and choices do not have much impact on our lives. We think that it is only the big things, the big actions and the big decisions that really count. But when you look at the lives of all great people, you will see that they built their character through small decisions, small choices and small actions that they performed every day. They transformed their lives through a step-by-step or day-by-day approach. They nurtured and nourished their good habits and chipped away at their bad habits,

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one step at a time. It was their small day-to-day decisions that added up to make a tremendous difference in the long run. Indeed, in matters of personal growth and character building, there is no such thing as an overnight success.

II. Growth always occurs through a sequential series of stages. There is an organic process to growth. When we look at children growing up, we can see this process at work: the child first learns to crawl, then to stand and walk, and finally to run. The same is true in the natural world. The soil must first be tilled, and then the seed must be sowed. Next, it must be nurtured with enough water and sunlight, and only then will it grow, bear fruit and finally ripen and be ready to eat.

III. Gandhi understood this organic process and used this universal law of nature to his benefit. Gandhi grew in small ways, in his day-to-day affairs. He did not wake up one day and find himself to be the 'Mahatma'. In fact, there was nothing much in his early life that showed signs of greatness. But from his mid-twenties onwards, he deliberately and consistently attempted to change himself, reform himself and grow in some small way every day. Day-by-day, hour-by-hour, he risked failure, experimented and learnt from mistakes. In small and large situations alike, he took up rather than avoiding responsibility.

IV. People have always marvelled at the effortless way in which Gandhi could accomplish the most difficult tasks. He displayed a great deal of self-mastery and discipline that was amazing. These things did not come easily to him. Years of practice and disciplined training went into making his successes possible. Very few saw his struggles, fears, doubts and anxieties, or his inner efforts to overcome them. They saw the victory, but not the struggle.

V. This is a common factor in the lives of all great people: they exercised their freedoms and choices in small ways that made great impact on their lives and their environment. Each of their small decisions and actions, added up to have a profound impact in the long run. By understanding this principle, we can move forward with confidence in the direction of our dreams. Often when our 'ideal goal' looks too far from us, we become easily discouraged, disheartened and pessimistic. However, when we choose to grow in small ways, taking small steps one at a time, performing it becomes easy.

26. The main idea in the first paragraph is that
(a) big things, big actions and big decisions make a person great.
(b) small actions and decisions are important in one's life.
(c) overnight success is possible for all of us.
(d) personal changes are not important.

27. The line "Chipped away at their bad habits" given in the passage means
(a) steadily gave up bad habits.
(b) slowly produced bad habits.
(c) gradually criticised bad habits.
(d) did not like bad habits.

28. How great people transform their lives?
(a) They approach life on a day-by-day basis.
(b) They build character in small ways.
(c) They believe in performing every day.
(d) All of these

29. The word …… in para 3 means 'purposely '.
(a) Consistently (b) Deliberately
(c) Universal (d) Risked

30. The word …… in para 1 is an antonym of 'slight'.
(a) Insignificant (b) Nurtured
(c) Nourished (d) Tremendous

31. Select the most appropriate antonym of the given word.
TURBULENT
(a) Raging (b) Peaceful
(c) Forceful (d) Swirling

32. Select the most appropriate sequence from the given options to make a meaningful paragraph from jumbled sentences.
A. Security cameras captured the whole incident.
B. Commuters in Virginia, USA got a shock when a deer entered a metro station.
C. However, it eventually backed out and ran away unharmed.
D. Nobody knows how it made into the station.
(a) DCBA (b) BADC
(c) BDCA (d) ADCB

33. Select the most appropriate option to fill in the blank.
I have visited several places in India, but I …… the Andaman and Nicobar Islands yet.
(a) haven't been visiting (b) didn't visit
(c) haven't visited (d) don't visit

34. Select the most appropriate word for the given group of words.
A dome- shaped shelter built from blocks of solid snow used by Eskimos
(a) Wigwam (b) Yurt
(c) Tepee (d) Igloo

35. Select the most appropriate meaning of the given idiom.
The trouble makers <u>took to their heels</u> when they saw the police coming.
(a) hid themselves (b) ran away
(c) faced them boldly (d) prepared to fight

36. Select the wrongly spelt word.
(a) Medieval (b) Measure
(c) Magazine (d) Machenic

37. Select the most appropriate option to fill in the blank.
The rescue team dug out a soldier from the snow …… how he could have survived for seven days buried under it.
(a) wondering (b) wondered
(c) to wonder (d) wonder

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38. Select the most appropriate sequence from the given options to make a meaningful paragraph from jumbled sentences.

A. It is because nowadays people have no time for recreation.

B. But this pastime is getting out of favour now.

C. It is really a thrilling exercise.

D. Flying kites is my favourite pastime.

(a) DCBA (b) CDAB
(c) DBAC (d) BCDA

39. Select the most appropriate word for the given group of words.

The Science which studies the crust of the Earth

(a) Zoology (b) Etymology
(c) Biology (d) Geology

40. Select the most appropriate option to fill in the blank.

Bhanu made a working model of an airplane …… when he was sixteen.

(a) itself (b) himself
(c) oneself (d) herself

41. Select the most appropriate antonym of the given word.

Empathy

(a) Appreciation (b) Warmth
(c) Sympathy (d) Apathy

42. Select the most appropriate sequence from the given options to make a meaningful paragraph from jumbled sentences.

A. They appeared to be posing for 'selfies'.

B. An expeditioner had left it sitting on the ice while he visited a rookery.

C. In Antarctica, two penguins found a video camera.

D. The penguins curiously stared down at the camera.

(a) CBDA (b) CADB
(c) DACB (d) BCDA

43. Fill in the blank with the most appropriate idiom.

This is strictly …… but some changes are going to happen in the company in the near future.

(a) off the rails (b) off the key
(c) off the mark (d) off the record

44. Select the most appropriate word for the given group of words.

The cultivation of grapevines

(a) Agriculture (b) Horticulture
(c) Viticulture (d) Sericulture

45. Select the most appropriate synonym of the given word.

Evidence

(a) Indication (b) Refutation
(c) Denial (d) Concealment

46. Select the wrongly spelt word.

(a) Lathargy (b) Latter
(c) Lateral (d) Latitude

47. Select the most appropriate synonym of the given word.

Cogent

(a) Convincing (b) Weak
(c) Ineffective (d) Pathetic

48. Select the most appropriate option to fill in the blank.

In view of the excessive heat, schools in Delhi remained closed …… a week in July.

(a) for (b) about
(c) in (d) to

49. Select the wrongly spelt word.

(a) Naucea (b) Naughty
(c) Naturalistic (d) Nautical

50. Select the most appropriate option to fill in the blank.

Right from the beginning …… government's focus has been on …… development of the country.

(a) the, the (b) a, the
(c) the, a (d) a, no word required

ANSWERS

1.	(c)	2.	(c)	3.	(b)	4.	(a)	5.	(a)	6.	(b)	7.	(c)	8.	(c)	9.	(a)	10.	(b)
11.	(a)	12.	(a)	13.	(b)	14.	(c)	15.	(d)	16.	(b)	17.	(a)	18.	(a)	19.	(d)	20.	(b)
21.	(d)	22.	(b)	23.	(b)	24.	(c)	25.	(a)	26.	(b)	27.	(a)	28.	(d)	29.	(b)	30.	(d)
31.	(b)	32.	(c)	33.	(c)	34.	(d)	35.	(b)	36.	(d)	37.	(a)	38.	(a)	39.	(d)	40.	(b)
41.	(d)	42.	(a)	43.	(d)	44.	(c)	45.	(a)	46.	(a)	47.	(a)	48.	(a)	49.	(a)	50.	(a)

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Practice Set 02

Instructions 40 questions to be attempted out of 50. **Time :** 60 Min

Directions (Passage No. 1-5) *Read the following passges carefully and answer the questions that follow.*

Passage 1

The world is big but in a sense, it starts from me. Knowledge and awareness about my own self has to precede my knowledge of things other than me. If I want the external environment to appreciate a value, I need to do it by myself, first. In order to make the atmosphere around me green, I have to be green myself, in belief and action.

From dusk to dawn and dawn to dusk, our every activity leaves its footprint on the environment and ecology. It is a 24×7, eternal phenomenon. A laboured consciousness of having to go green in all possible areas is required in each one of us. It is after all, our own self interest and that of our descendants. The conscious application of change a few times is going to become a habit and one's culture in due course. Though we read and hear a lot on green initiatives, we hardly tweak our routines to suit the larger picture.

Greenery in the surroundings prevent dust and noise pollution. The way we water and manure plants also matters. Water is also a fast depleting resource. Sprinklers are one example to use and conserve it. Compost from bio —waste can be used as manure for the plants which is cost — effective and eco-friendly. We can also contribute to preservation of water bodies by not dumping our garbage in them. The use of public transport systems in the place of individual modes can reduce carbon footprint.

'Reuse', 'Recyle', 'Re - engineer' and 'Renew' are the mantras. Let us appreciate, support and contribute our might to the promotional efforts of the community in this direction. Remember, my ecology is also the community, society and the nation that I care for which in turn cares for me. In other words, all these seemingly outward initiatives done for other are going to make my life more comfortable ultimately. I have to be, therefore, concerned about what sort of environment I am responsible for, for my own sustenance, livelihood and progress.

As long as my impact is positive, my presence will be welcome. If it is otherwise, I am going to be shunned. It is either 'Embrace' or 'Embarrass'.

Green initiatives are anti — scorch earth. Air, water and soil need to be conserved for the thriving of mankind in future. The increasing onslaughts on the quality of air and soil need to be reversed. The indiscriminate exploitation of water — consumable water is only 0.3% of fresh water — needs to be stopped. The earth ought not to shrink further, continue to breathe easy. Mother earth looks for only love and care from her children and nothing more in return for all the wealth she has so generously showered on us.

1. The writer emphasises on knowing the
(a) external environment (b) atmosphere
(c) world (d) self

4. The societal behaviour can help in maintaining the environment if we
(a) plant trees
(b) use bio-manure
(c) realise social obligation
(d) All of the above

3. Our life can become more productive if we
(a) focus on our environment
(b) reuse, recycle and renew
(c) do more promotional efforts
(d) Both (a) and (b)

4. Which of the following will be the most appropriate title for the passage?
(a) Knowledge and Awareness
(b) Green Initiatives
(c) Making the Green Initiative a part of our Lives
(d) Environment Conservation

5. The phrase "contribute our might" refers to the contribution towards
(a) saving the flora and fauna
(b) reducing pollution
(c) development of the nation
(d) maintenance of the environment

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Passage 2

A youngster quit Facebook in December after spending over three years on social networking site. With that one act, he bid a silent adieu to more than 300 contacts that he had added to his account during the period. Last week a new feature on Facebook called timeline forced him to reconsider the pros and cons of being on the networking site.

"Everyone has some skeletons in their closet and I am just not comfortable with Facebook digging out and displaying all the facts of my life on a bulletin board'', says this youngster who joined the network in July 2013.

Facebook, you see, had compressed the time, he spent on the site and arranged it in chronological order. And while he initially liked the new neatly organised scrapbook like feature, he wasn't happy to reveal posts from the past, those that, until recently, were hidden under layers and layers of recent updates. Just clicking on a date on the timeline could transport his friends back in time and enable them to view every embarrassing comment, link or photo he had posted on his profile.

"I think it's a recipe for disaster," he says. "In 2013, I had some wallposts, which seemed appropriate at a time, but now after a lapse of four years, I have moved on and don't want them to be openly displayed for all to see."

And he is not alone. Many users, worried about how Facebook activity could possibly effect their offline lives, are choosing to commit 'Facebook Suicide'. While some have privacy concerns,others feel that, the site that was meant to bring them closer to their friends actually does the opposite - it reduces their friendship to something superficial.

"Poking and liking are not enough to keep a friendship going'', says a business analyst. Having quit Facebook three years ago, he prefers meeting is 'real' friends face to face, instead of reading their trite posts online. "On Facebook, people hype everyday issues including what they ate and where they went on daily basis'', says this analyst who continues to use twitter.

"Facebook has become a time sink and it could not justify the time I spent on it, "he says, "I spend more time calling up friends or relatives over the phone now.....I also go out and meet people whenever possible and have a good offline life. I do not regret the change.

"Today, Facebook has 800 million users of which 37 million are Indians. The site has become an online identity for most, and many of those who decided to quit cannot overcome the withdrawal symptoms and return.

Facebook, fully aware of its addictive powers, facilitates this return by allowing users to 'deactivate' their accounts but continues to store information on its servers so that they can return from their 'break', whenever they wish.

6. Which feature of Facebook was responsible for the action of the youngster?
(a) Poking (b) Liking
(c) Gif's (d) Timeline

7. Why are people generally not comfortable with the new feature?
(a) Facebook digging out and displaying their past
(b) Facebook providing their data to other sites
(c) Facebook making their data available to all
(d) All of the above

8. How did the timeline feature work?
(a) It categorised all the data into their types
(b) It put all data in chronological order
(c) It put together all activity into a video
(d) It set reminders for posts

9. Why is Facebook called 'A recipe for disaster'?
(a) It displays the deleted matter
(b) It makes every post public
(c) It displays the past that was relevant then but not now
(d) They use the data for further advertisement

10. What are the concerns regarding Facebook?
(a) Privacy
(b) Disrupts communication
(c) Creates superficial friendships
(d) All of the above

11. What did the youngster do with his Facebook account?
(a) He updated it (b) He deleted it
(c) He deactivated it (d) He made it private

12. Which of the following characteristics can be apt for the lives of the people who had quit Facebook?
(i) Embarrassing (ii) Peaceful
(iii) Real (iv) Nostalgic
(v) Social (vi) Addictive
(a) (ii) and (iv) (b) (iii) and (v)
(c) (iii) and (vi) (d) (i) and (v)

13. For what reason did the business analyst quit Facebook?
(a) It bought forward false data regarding her friends
(b) Fear of leakage of private information
(c) She prefers meeting friends face to face
(d) She is not as tech-savvy

14. Which of the following will be the most appropriate title for the passage?
(a) Quitting Facebook
(b) Facebook: Stay or Quit
(c) Can you Quit Facebook?
(d) Facebook- A Digital Drug

15. What shows that Facebook is aware of its addictive powers?
(a) It deactivate feature
(b) It act of storing information in its servers
(c) Allowing users to rejoin the app
(d) All of the above

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Passage 3

Management is a set of processes that can keep a complicated system of people and technology running smoothly. The most important aspects of management include planning, budgeting, organising, staffing, controlling and problem solving. Leadership is a set of processes that creates organisations in the first place or adapts them to significantly changing circumstances.

Leadership defines what the future should look like, aligns people with that vision and inspires them to make it happen despite the obstactles. This distinction is absolutely crucial for our purposes here. Successful transformation is 70 to 90 percent leadership and only 10 to 30 percent management. Yet for historical reasons, many organisations today don't have much leadership. And almost everyone thinks about the problem here as one of meaning change.

For most of this century, as we created thousands and thousands of large organisations for the first time in human history, we did not have enough good managers to keep all those bureaucracies functioning. So many companies and universities developed management programs and hundreds and thousands of people were encouraged to learn management on the job. And they did. But people were taught little about leadership. To some degree, management was emphasised because it's easier to teach than leadership. But even more so, management was the main item on the twentieth centuary agenda because that's what was needed. For every enterpreneur or business builder who was a leader, we needed hundreds of managers to run their ever-growing enterprises.

Unfortunately for us today, this emphasis on management has often been institutionalised in corporate cultures that discourage employees from learning how to lead. Ironically, past success is usually the key ingredient in producing this outcome. The syndrome, as I have observed it on many occasions, goes like this. Success creates some degree of market dominance, which in turn produces much growth. After a while keeping the ever-larger organisation under control becomes the primary challenge. So, attention turns inward and managerial competencies are **nurtured**. With a strong emphasis on management but not leadership, bureaucracy and an inward focus take over. But with continued success, the result mostly of market dominance, the problem often goes unaddressed and an unhealthy arrogance beings to evolve. All of these characteristics then make any transformation effort much more difficult.

Arrogant managers can over-evaluate their current performance and competitive position, listen poorly and learn slowly. Inwardly focused employees can have difficulty seeing the very forces that present threats and opportunities. Bureaucratic cultures can **smother** those who want to respond to shifting conditions. And the lack of leadership leaves no force inside these organisations to break out of the morass.

16. Which of the following is **not** the characteristic of bureaucratic culture?
(a) Manager's listen poorly and learn slowly
(b) Managerial competencies are nurtured
(c) Employee clearly see the forces that present threats and opportunities
(d) Prevalence of unhealthy arrogance.

17. Which of the following statements is NOT TRUE in the context of the passage?
(a) Bureaucratic culture smother those who want to respond to changing conditions.
(b) Leadership produces change and has the potential to establish direction.
(c) Pressure on managers come mostly from within.
(d) Leadership centres on carrying out important functions such as planning and problem solving.

18. Why did companies and universities develop programmes to prepare managers in such a large number?
(a) Companies and Universities wanted to generate funds through these programmes.
(b) The large number of organisations were created and they needed managers in good number.
(c) Organisations did not want to spend their scarce resources in training managers.
(d) Organisations wanted to create communication network through trained managers.

19. Which of the following is similar in meaning of the word **smother** as used in the passage?
(a) Suppress (b) Encourage
(c) Instigate (d) Criticise

20. What, according to the author, is leadership?
(a) Process which keeps system of people and technology running smoothly.
(b) Planning the future and budgeting resources of the organisation
(c) Inspiring people to realise the vision.
(d) Carrying out the crucial functions of management

Passage 4

Human analytical abilities remain vastly superior to anything demonstrated elsewhere in the animal kingdom. Virtually in all studies of animal intelligence and language skills, performance plummets as more elements are added to a task and as an animal has to remember these elements for long periods. By contracts, humans can call on vast working memory.

Many evolutionary scholars suspect that as ancient human groups became larger, the need to keep track of every more complex social interactions was what really pushed the human brain toward superiority. Both dolphins and chimps have very complex interactions, but the intricacy of their social world pales beside the lattice of entanglements that characterised human society as early. Homosapiens bonded together to gather food and defend themselves. In Somalia today, warring clans identify friend or foe by demanding that those accosted recite their ancestry going back many

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generations. It is easy to see how similar challenges in antiquity might have driven the development of brainpower.

It does not lessen the grandeur of the human intellect to argue that it evolved partly in response to social pressures or that these pressures also produced similar abilities in lesser creatures. Instead, the fact that nature may have broadly sown the seeds of consciousness, suggests a world enlivened by many different minds. There may even be practical applications. Studies of animal cognition and language have yielded new approaches to communicating with handicapped and autistic children. Some scientists are pondering ways to turn intelligent animals like sea lions and dolphins into research assistants in marine studies or into lifeguards who can save the drowing upon commond.

If the notion that animals might actually think poses a problem, it is an ethical one. The great philosopher, such as Descartes, used their belief that animals cannot think as a justification for arguing that they do not have moral rights. It is one thing to treat animals as mere resources if they are presumed to be little more than living robots, but it is entirely different if they are recognised as fellow sentient beings. Working out the moral implication makes a perfect puzzle for a large-brained, highly social species like our own.

21. **What could be some of the practical applications of animal intelligence?**
(a) To use dolphins for solving difficult mathematical problems.
(b) To use some animals for guarding and superivising other animals.
(c) To develop new approaches to communicate with handicapped and mentally ill children.
(d) All of the above

22. **In many studies of animal intelligence and language skills, the performance significantly drops**
(a) as we move from humans to animals
(b) membered for long periods
(c) as we move from animals with large brains to those with small brains
(d) as the time allowed to develop these skills is reduced

23. **What makes a perfect puzzle for a large brained highly social species like humans, according to the author?**
(a) Determining the moral implications of the fact that animals might actually think.
(b) discovering the real reason why nature developed the ability to think in animals.
(c) Deciding what should be the ideal relationship between humans and animals.
(d) To answer the question if animals are different from humans.

24. **What really pushed the human brain towards superiority?**
(a) The need to keep track of ever more complex social interactions.
(b) The need to develop efficient methods of gathering food.
(c) The need to find better methods of defending themselves.
(d) The need to evolve faster than other species.

25. **What is the ethical problem posed by the notion that animals might actually think?**
(a) It is difficult to accept that humans are also animals.
(b) Animals should perhaps not be used in laboratory experiments.
(c) Animals cannot perhaps be treated as mere resources.
(d) It has to correctly assessed as to how much can an animal actually think.

Passage 5

The Indian scenario can be described very briefly. The apparatus of the state has become an integral part of what Americans term the iron triangle : a collusion of (*a*) those who benefit from the subsides the industry, urban populations, rich farmers (*b*) those who decide on who is to be subsidised at whose cost the politicians and (*c*) those who administer the subsidies the bureacuracy.

Let me explain what I mean. Take the example of bamboo. Bamboo has been made available to paper mills at rates as low as one to two rupees per tonne, when the basket weavers were buying it in the market at a *high* price several thousand rupees per tonne. Cament factories receive power and raw materials at subsidised rates and pass on the costs of pollution to the society at large; the cement thus subsidised flow to metropolises. These metropolises also attract *large* quantities of bricks made from the previous topsoil of farms and baked with old banyan trees now being liquidated for kilns.

When a *giant* hydel project on a river in one state was concluded, the *bulk* of its power was given over to a single aluminium industry at a few paise per unit, well below the cost of production. Later, the State Government decided to charge only a nominal flat rate per irrigation pump, ensuring that the farmers kept the pumps running whether they needed the water or not.

Villagers who lose their lands and *small* homes under irrigation projects have always been inadequately compensated, thereby keeping the cost of projects low. But the beneficiaries in the command areas never have to pay for water to take care of even those artificially depressed costs.

26. **Which of the following industries have been referred to in the passage?**
(a) Aluminium (b) Brick
(c) Paper (d) Iron

27. **According to the author, who decides the beneficiaries of various subsidies?**
(a) The bureaucrats (b) The industrialists
(c) Rich farmers (d) None of these

28. **Which of the following describes correctly the approach of the author?**
(a) Positive criticism followed by suggestions for improvement
(b) Prove how government has handle the situation effectively
(c) One sided, negative and highly critical
(d) Indifference to both government and welfare of people

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29. Four of the five words used in the passage form one group, the fifth one does not belong to that group. Find out the word that does to belong to the group.
(a) Giant (b) Bulk
(c) High (d) Small
(e) Large

30. Which of the following statements is true in the context of the passage?
(a) Paper mills and basket weavers both get bomboo at very low rates.
(b) Wood from banyan trees is used by the cement industries.
(c) The government machinery is taking a balanced view about development.
(d) The cement industry is responsible for puolluting the atmosphere E. The government is influenced by American terms.

31. Sentences of a paragraph are given below in jumbled order. Arrange the sentences in the correct order to form a meaningful and coherent paragraph.
A. His role also includes the smooth flow of goods from farms and factories to the consumer.
B. As the final link between the producer and the consumer, he plays a key role in the economy.
C. It is he who promotes or impedes the sale of products.
D. The retailer determines the final cost of a product.
(a) BACD (b) CABD
(c) DCBA (d) ABCD

32. Select the most appropriate meaning of the given idiom.
A square deal
(a) A fair and honest deal (b) An advantageous deal
(c) An unfruitful plan (d) A false claim

33. Sentences of a paragraph are given below in jumbled order. Arrange the sentences in the correct order to form a meaningful and coherent paragraph.
A. He stamped them mechanically and returned them to us.
B. They had information that large sums of money were being smuggled out of the country.
C. No sooner had he left than the custom officers entered.
D. An official entered our train compartment and asked for passports.
(a) CBDA (b) DCBA
(c) ACBD (d) DACB

34. Select the most appropriate meaning of the given idiom.
To have an axe to grind
(a) To have a selfish motive in doing something
(b) To have an indomitable task to accomplish
(c) To have adequate means of subsistence
(d) To have access to top levels of authority

35. Select the option that can be used as a one-word substitute for the given group of words.
An entertainer who performs difficult physical feats
(a) Archer (b) Acrobat
(c) Artist (d) Artisan

36. Select the most appropriate meaning of the given idiom.
To hit below the belt
(a) To attack after warning
(b) To hit someone boldly
(c) To hit off the mark
(d) To attack in an unfair manner

37. Select the most appropriate antonym of the given word.
Thwart
(a) Allow (b) Obstruct
(c) Oppose (d) Appoint

38. Select the incorrectly spelt word.
(a) Accumulate (b) Neccessary
(c) Occasion (d) Remittance

39. Select the option that can be used as a one-word substitute for the given group of words.
Study of diseases
(a) Pathology (b) Anthology
(c) Etymology (d) Neurology

40. Select the most appropriate option to fill in the blank.
In the absence of the Principal, the Vice-Principal …… for him.
(a) deputes (b) exchanges
(c) officiates (d) replaces

41. Sentences of a paragraph are given below in jumbled order. Arrange the sentences in the correct order to form a meaningful and coherent paragraph.
A. In fact he began his career as a peon in a small firm.
B. Before he joined us as the accounts officer, he was a junior clerk.
C. He learnt typing, accounting and even graduated.
D. But he gradually improved his qualifications.
(a) CDAB (b) BADC
(c) CBAD (d) BCDA

42. Select the most appropriate antonym of the given word.
Indigenous
(a) Alien (b) Innate
(c) Natural (d) Primitive

43. Select the most appropriate option to fill in the blank.
The workers …… against the new labour laws.
(a) remonstrated (b) dissented
(c) implicated (d) opposed

44. Select the most appropriate meaning of the given idiom.
To read between the lines
(a) To criticise the writer's style
(b) To interrupt someone while reading
(c) To read each line carefully
(d) To understand the implied meaning

45. Select the most appropriate antonym of the given word.
Remorse
(a) Empathy (b) Regret
(c) Sorrow (d) Satisfaction

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46. Select the option that can be used as a one-word substitute for the given groups of words.
One who possesses several talents
(a) Versatile (b) Verbose
(c) Virtuous (d) Virtual

47. Arrange the sentences in the correct order to form a meaningful and coherent paragraph.
A. The sand is so hot that you cannot walk over it in the day time.
B. Here, there is nothing but sand and rock.
C. A great part of Arabia is a desert.
D. However, there are springs of water but these are few and far apart.
(a) CBAD (b) BDCA
(c) CABD (d) ACDB

48. Select the option that can be used as a one-word substitute for the given group of words.
No longer in use
(a) Obscure (b) Oriental
(c) Original (d) Obsolete

49. Select the most appropriate option to fill in the blank.
The more he tried to solve the mystery, the more …… he felt.
(a) perplexed (b) humbled
(c) callous (d) confusing

50. Select the most appropriate option to fill in the blank.
He was …… at his brother's refusal to help him financially.
(a) indignant (b) indicted
(c) enchanted (d) enamoured

ANSWERS

1.	(d)	2.	(d)	3.	(b)	4.	(c)	5.	(d)	6.	(d)	7.	(a)	8.	(b)	9.	(c)	10.	(d)
11.	(b)	12.	(b)	13.	(c)	14.	(c)	15.	(d)	16.	(c)	17.	(d)	18.	(b)	19.	(a)	20.	(c)
21.	(c)	22.	(b)	23.	(a)	24.	(a)	25.	(c)	26.	(d)	27.	(d)	28.	(c)	29.	(d)	30.	(d)
31.	(c)	32.	(a)	33.	(d)	34.	(a)	35.	(b)	36.	(d)	37.	(a)	38.	(b)	39.	(a)	40.	(c)
41.	(b)	42.	(a)	43.	(a)	44.	(d)	45.	(d)	46.	(a)	47.	(a)	48.	(d)	49.	(a)	50.	(a)

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GENERAL MENTAL ABILITY/ QUANTITATIVE REASONING

VERBAL

CHAPTER 1

Analogies

NUMBER ANALOGY

In number analogy also, the relationship between the given numbers is detected and then applied to the second part to find the missing numbers. This relationship between the numbers can be based on any of the following patterns : *(i)* numbers can be odd/even/prime numbers; *(ii)* numbers can be multiples of one number; *(iii)* numbers can be squares/cubes of different numbers; *(iv)* some numbers can be added to/subtracted from/multiplied to/divided into the first number to get the second number; *(v)* the second number can be the sum/product/difference of the digits of first number; and *(vi)* combinations of any mathematical calculations given above can apply to the relationship between the two given numbers.

SOLVED EXAMPLES

Directions : *Which number will come in the place of question mark?*

1. 25 : 81 : : 36 : ?

(*a*) 121 (*b*) 93 (*c*) 65 (*d*) 103

Ans. (*a*) : All the numbers are squares of different numbers.

$$\begin{array}{ccccccc} 25 & : & 81 & : : & 36 & : & 121 \\ \downarrow & & \downarrow & & \downarrow & & \downarrow \\ 5^2 & & 9^2 & & 6^2 & & 11^2 \end{array}$$

2. 36 : 18 : : 72 : ?

(*a*) 164 (*b*) 134 (*c*) 94 (*d*) 14

Ans. (*d*) : The second number is the product of digits of the first number.

$$\underbrace{36 \quad : \quad 18}_{3\times 6} \quad : : \quad \underbrace{72 \quad : \quad 14}_{7\times 2}$$

MULTIPLE CHOICE QUESTIONS

Directions : *In the following questions, select the number from the given options which follows the same relationship as shared between the first two numbers.*

1. 1 : 11 : : 2 : ?

(*a*) 20 (*b*) 22
(*c*) 24 (*d*) 44

2. 18 : 27 : : 22 : ?

(*a*) 42 (*b*) 39
(*c*) 33 (*d*) 54

3. 14 : 20 : : 16 : ?

(*a*) 23 (*b*) 10
(*c*) 48 (*d*) 32

4. 8 : 27 : : 64 : ?

(*a*) 277 (*b*) 125
(*c*) 250 (*d*) 99

5. 0.16 : 0.0016 : : 1.02 : ?

(*a*) 10.20 (*b*) 0.102
(*c*) 0.0102 (*d*) 1.020

6. $\frac{1}{7} : \frac{1}{14} :: \frac{1}{9} : ?$

(*a*) $\frac{1}{88}$ (*b*) $\frac{1}{80}$

(*c*) $\frac{1}{81}$ (*d*) $\frac{1}{18}$

7. 5 : 24 : : 8 : ?

(*a*) 65 (*b*) 63

(*c*) 62 (*d*) 64

8. 23 : 53 : : 8 : ?

(*a*) 66 (*b*) 57

(*c*) 27 (*d*) 19

9. 6 : 9 : : 7 : ?

(*a*) 4 (*b*) 14

(*c*) 10 (*d*) 28

10. 7 : 28 : : 2 : ?

(*a*) 8 (*b*) 16

(*c*) 24 (*d*) 12

EXPLANATORY ANSWERS

1. *(b)* : The first number is repeated to obtain the second number.

2. *(c)* : In the given set, the numbers are multiples of 9 and in the second set, multiples of 11.

18	:	27	: :	22	:	33
↓		↓		↓		↓
9×2		9×3		11×2		11×3

3. *(a)* : The relationship between the numbers is :

14	:	20	: :	16	:	23
↓		↓		↓		↓
7×2		$(7 \times 3) - 1$		8×2		$(8 \times 3) - 1$

4. *(b)* : The numbers are cubes of different numbers.

8	:	27	: :	64	:	125
↓		↓		↓		↓
2^3		3^3		4^3		5^3

5. *(c)* : The decimals are divided by 100.

6. *(d)* : The first fraction is multiplied by half to obtain the second fraction.

$$\underbrace{\frac{1}{7} : \frac{1}{14}}_{\times\frac{1}{2}} :: \underbrace{\frac{1}{9} : \frac{1}{18}}_{\times\frac{1}{2}}$$

7. *(b)* : The second number is square of first number minus 1.

$$\underbrace{5 : 24}_{(5^2)-1} :: \underbrace{8 : 63}_{(8^2)-1}$$

8. *(d)* : All the numbers are prime numbers.

9. *(c)* : The second number is three more than the first number.

$$\underbrace{6 : 9}_{+3} :: \underbrace{7 : 10}_{+3}$$

10. *(a)* : The second number is four times the first.

$$\underbrace{7 : 28}_{\times 4} :: \underbrace{2 : 8}_{\times 4}$$

LETTER ANALOGY

In this type of analogy the relationship between two given set of letters is established and then applied to the other set to obtain the required set of letters as the answer. These letters can be moved some steps backward or forward; reversed in whole or in sections or have some common identity between each other.

SOLVED EXAMPLES

Directions : *Which set of letters will come in the place of question mark?*

1. JILK : KLIJ : : MNPQ : ?

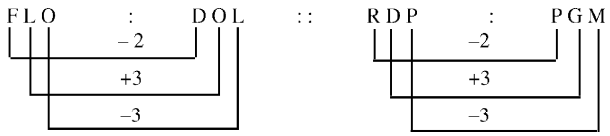
(*a*) QNPM (*b*) MPQN (*c*) QPNM (*d*) PNMQ

Ans. (*c*) : The letters are written in reverse order to get the related set of letters.

J I L K : K L I J : : M N P Q : Q P N M

2. FLO : DOL : : RDP : ?
(*a*) PGM (*b*) MGP (*c*) GMP (*d*) MPG

Ans. (*a*) : The first and third letters are moved two and three steps backwards respectively and the second letter three steps forward.



MULTIPLE CHOICE QUESTIONS

Directions : *In the questions given below one term is missing. Based on the relationship of the two given terms find the missing term from the given options.*

1. GFC : CFG : : RPJ : ?
(*a*) JRP (*b*) JPR
(*c*) PJR (*d*) RJP

2. BCF : DEG : : MNQ : ?
(*a*) OPR (*b*) PQS
(*c*) OPP (*d*) QRT

3. NATION : ANITNO : : HUNGRY : ?
(*a*) HNUGRY (*b*) UNHGYR
(*c*) YRNGUH (*d*) UHGNYR

4. SSTU : MMNO : : AABC : ?
(*a*) GGHH (*b*) IJKK
(*c*) XXYZ (*d*) NOOP

5. ACE : FGH : : LNP : ?
(*a*) QRS (*b*) PQR
(*c*) QST (*d*) MOQ

6. UVW : SXU : : LMN : ?
(*a*) JOL (*b*) KNM
(*c*) JKL (*d*) MLO

7. EIGHTY : GIEYTH : : OUTPUT : ?
(*a*) UTOPTU (*b*) UOTUPT
(*c*) TUOUTP (*d*) TUOTUP

8. TSR : FED : : WVU : ?
(*a*) CAB (*b*) MLK
(*c*) PQS (*d*) GFH

9. CJDL : FMGR : : IKJR : ?
(*a*) OQPT (*b*) RSTU
(*c*) OQRT (*d*) KRMO

10. BOQD : ERTG : : ANPC : ?
(*a*) DQSF (*b*) FSHU
(*c*) SHFU (*d*) DSQF

11. BaBy : TaTa : : LiLy : ?
(*a*) PooL (*b*) ROse
(*c*) HaNd (*d*) DoWN

12. BCDA : STUR : : KLMJ : ?
(*a*) VWXU (*b*) EFHG
(*c*) SRTU (*d*) QSRP

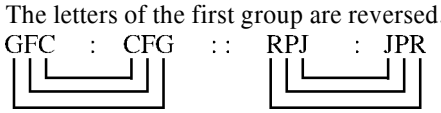
13. AEI : LPT : : CGK : ?
(*a*) OSV (*b*) RUY
(*c*) TXC (*d*) FJN

14. RUX : TRP : : BEH : ?
(*a*) SQN (*b*) QON
(*c*) QOM (*d*) QNL

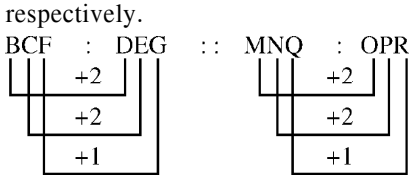
15. CART : ART : : FOUR : ?
(*a*) RUN (*b*) TWO
(*c*) QUE (*d*) OUR

EXPLANATORY ANSWERS

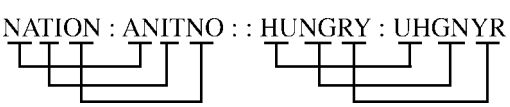
1. *(b)* : The letters of the first group are reversed.



2. *(a)* : The three letters are moved 2, 2 and 1 steps forward respectively.

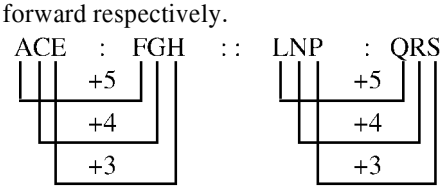


3. *(d)* : The word is divided in sections of two letters and the letters are reversed.



4. *(c)* : The first letter in each group is repeated and followed by two consecutive letters.

5. *(a)* : The three letters are moved 5, 4, and 3 steps forward respectively.



6. ***(a)*** **:** The three letters are moved –2, +2 and –2 steps respectively.

UVW : SXU : : LMN : JOL

–2 +2 –2 | –2 +2 –2

7. ***(d)*** **:** The word is divided into two sections and the letters are written backwards.

EIGHTY : GIEYTH : : OUTPUT : TUOTUP

8. ***(b)*** **:** The letters are consecutive and written in reverse order.

9. ***(a)*** **:** In each set of letters, the 1st and 3rd letters are consecutive.

CJDL : FMGR : : IKJR : OQPT

10. ***(a)*** **:** In each group, the first and fourth letters are jumping one letter and the second and third letters are also jumping one letter.

BOQD : ERTG : : ANPC : DQSF

P S O R

C F B E

11. ***(c)*** **:** In each group the alternate letters are capitals.

12. ***(a)*** **:** In each group the first three letters are consecutive and they follow the fourth letter.

ABCD : RSTU : : JKLM : UVWX

13. ***(d)*** **:** In each group the letters jump three letters between them, *i.e.,* they are moving to the fourth letter.

A E I : L P T : : C G K : F J N

+4 +4 | +4 +4 | +4 +4 | +4 +4

14. ***(c)*** **:** The letters in first set are jumping two letters, *i.e.,* moving three steps forward and in the second they are jumping one letter, *i.e.* moving two steps backward.

R U X : T R P : : B E H : Q O M

+3 +3 | –2 –2 | +3+3 | –2 –2

15. ***(d)*** **:** The first set of letters drop the first letter to get the second set.

CART : ART : : FOUR : OUR

SEMANTIC ANALOGY

In Analogy Tests the relationship between two given words is established and then applied to the other words. The type of relationship may vary, so while attempting such questions the first step is to identify the type of relationship, which can be any one of the following.

SOLVED EXAMPLES

1. Action Object Relationship

Example : Shoot is to Gun as Eat is to.....

(*a*) Hunger (*b*) Thirst (*c*) Dinner (*d*) Fruit

Ans. (*d*) : The relationship between the given words is that 'shoot' is the action and 'Gun' is the specified object of action. Similarly 'eat' is the action and 'fruit' is the specified object.

2. Association Relationship

Example : Glamour is to Stardom as Colour is to.....

(*a*) Rainbow (*b*) Shades (*c*) Art (*d*) Painting

Ans. (*d*) : As glamour is associated with stardom so is colour with painting.

3. Antonym Relationship

Example : INTROVERT : EXTROVERT

(*a*) ANGLE : TANGENT (*b*) EXTREME : INTERIM

(*c*) AGAINST : FAVOUR (*d*) ACTION : LAW

Ans. (*c*) : The related words are opposite in meaning.

4. Cause and Effect Relationship

Example : INJURY : PAIN

(*a*) GRADES : MERIT (*b*) THUNDER : LIGHTNING

(*c*) ROTATE : CHURNING (*d*) MATTER : LABOUR

Ans. (*b*) : Injury is the cause of pain and so is thunder the cause of lightning.

5. Degree Relationship

Example : Tepid is to Hot as... is to Wail.

(*a*) Sob (*b*) Shout (*c*) Smile (*d*) Calm

Ans. (*a*) : Tepid is less hot and so also the lower degree of wail is sob.

6. Grammatical Relationship

Example: Clever is to Beautiful as Sour is to ...

(*a*) Lemon (*b*) Cunning (*c*) Loathing (*d*) Taste

Ans. (*b*) : The related words are Adjectives.

7. Obvious Relationship

Example : Mt. EVEREST : NEPAL

(*a*) MEXICO : SOUTH AMERICA (*b*) K2 : CHINA

(*c*) BIG BEN : RUSSIA (*d*) AHMEDABAD : GUJARAT

Ans. (*d*) : Mt. Everest is in Nepal and so is Ahmedabad in Gujarat.

8. Part Whole Relationship

Example : MAN : MAMMAL

(*a*) HAIL : SNOW (*b*) NATIVE : INHABITANT

(*c*) OFFSPRING : FAMILY (*d*) LIBERTY : LITERATE

Ans. (*c*) : Man is a part of the whole species of mammal so is an offspring of the whole family.

9. Purpose Relationship

Example : INSTITUTION : EDUCATION

(*a*) WAR : PEACE (*b*) HEALTH : OBESITY

(*c*) MEDICATION : RECUPERATION (*d*) BUILDING : URBANISM

Ans. (*c*) : The purpose of institution is to impart education and the purpose of medication is quick recuperation (recovery).

10. Sequence Relationship

Example : ..... is to Dusk as Summer is to Monsoon.

(*a*) Evening (*b*) Dawn (*c*) Night (*d*) Noon

Ans. (*a*) : Summer season is immediately followed by monsoon (rainy season) and evening is immediately followed by dusk.

11. Synonym Relationship

Example : INDENT : REQUEST

(*a*) REPLICA : CHEAT (*b*) DOLE : ALMS

(*c*) DISMAL : DUNCE (*d*) EXACT : CHECK

Ans. (*b*) : The related words have the same meaning.

12. Volume Relationship

Example : GALLONS : SWIMMING POOL

(*a*) SPECTATORS : AUDITORIUM (*b*) CURRENCY : SHARES

(*c*) DUST : MOUNTAIN (*d*) BOOKS : CATALOGUE

Ans. (*a*) : Gallons of water is needed to fill a swimming pool and large number of spectators can be admitted into an auditorium.

MULTIPLE CHOICE QUESTIONS

Directions : *In the questions given below establish the relationship between the two words. Then from the given options select one which has the same relationship as of the given two words.*

1. HUNGER : FOOD : : THIRST : ?

(*a*) Water (*b*) Drink

(*c*) Tea (*d*) Coffee

2. HUNTER : GUN : : WRITER : ?

(*a*) Book (*b*) Pen

(*c*) Poem (*d*) Page

3. WOOL : SHEEP : : SILK : ?

(*a*) Saree

(*b*) String

(*c*) Silkworm

(*d*) Moth

4. FOOD : STOMACH : : FUEL : ?
(*a*) Engine (*b*) Automobile
(*c*) Rail (*d*) Aeroplane

5. WATER : SAND : : OCEAN : ?
(*a*) Island (*b*) River
(*c*) Desert (*d*) Waves

6. ADULT : BABY : : FLOWER : ?
(*a*) Seed (*b*) Bud
(*c*) Fruit (*d*) Butterfly

7. WRITER : READER : : PRODUCER : ?
(*a*) Creator (*b*) Contractor
(*c*) Creature (*d*) Consumer

8. ENTRANCE : EXIT : : LOYALTY : ?
(*a*) Treachery (*b*) Patriotism
(*c*) Fidelity (*d*) Reward

9. MOTHER : MATERNAL : : FATHER : ?
(*a*) Eternal (*b*) Detrimental
(*c*) Paternal (*d*) Formidable

10. PEARL : NECKLACE : : FLOWER : ?
(*a*) Plant (*b*) Garden
(*c*) Petal (*d*) Bouquet

11. ALPHABET : WORD : : WORD : ?
(*a*) Sound (*b*) Music
(*c*) Sentence (*d*) Dictionary

12. LIFE : DEATH : : HOPE : ?
(*a*) Cry (*b*) Pain
(*c*) Despair (*d*) Sad

13. GOOD : BAD : : VIRTUE : ?
(*a*) Blame (*b*) Sin
(*c*) Despair (*d*) Vice

14. BIRD : FLY : : SNAKE : ?
(*a*) Timid (*b*) Clatter
(*c*) Crawl (*d*) Hole

15. CAT : MOUSE : : BIRD : ?
(*a*) Cage (*b*) Trap
(*c*) Eagle (*d*) Worm

16. STATE : EXILE
(*a*) Police : Arrest
(*b*) Judge : Convict
(*c*) Constitution : Amendment
(*d*) Church : Excommunicate

17. CAPRICIOUSNESS : RELIABILITY
(*a*) Extemporaneous : Predictability
(*b*) Unreliable : Inhuman
(*c*) Tenacious : Practicality
(*d*) Arbitrary : Whimsical

18. LOATH : COERCION
(*a*) Detest : Caressing (*b*) Irritate : Caressing
(*c*) Irate : Antagonism (*d*) Reluctant : Persuasion

19. SCALES : FISH
(*a*) Lady : Dress (*b*) Tree : Leaves
(*c*) Bird : Feather (*d*) Skin : Man

20. TREE : SAPLING
(*a*) Hut : Mansion (*b*) Giant : Dwarf
(*c*) Horse : Foal (*d*) Ant : Elephant

EXPLANATORY ANSWERS

1. *(a)* : Hunger is satiated by food, thirst by water.

2. *(b)* : Weapon of a hunter is a gun, weapon of a writer is a pen.

3. *(c)* : Wool is obtained from sheep, silk is obtained from silkworm.

4. *(a)* : Food is consumed in stomach, fuel is consumed in engine.

5. *(c)* : The related words are near opposites.

6. *(b)* : The youngone of an adult is a baby and that of a flower is a bud.

7. *(d)* : A writer aims to please the readers by his writings, a producer aims to please the consumers by his products.

8. *(a)* : The related words are opposites.

9. *(c)* : Relations on the mother's side are maternal and on the father's side paternal.

10. *(d)* : Many pearls make a necklace, many flowers make a bouquet.

11. *(c)* : More than one alphabet make a word, more than one word make a sentence.

12. *(c)* : The related words are opposites.

13. *(d)* : The related words are opposites.

14. *(c)* : Birds fly, snakes crawl.

15. *(d)* : Cat chases the mouse, bird chases the worm.

16. *(d)* : Punishment of leaving the State is exile, punishment of leaving the Church is excommunication.

17. *(c)* : The related words are antonyms

18. *(d)* : Loathing is the result of constant coersion, reluctance is the result of constant persuasion.

19. *(d)* : Covering of the fish is scales, covering of man is skin.

20. *(c)* : Young tree is a sapling, young horse is a foal.

CHAPTER 2

Number Classification

ODD ONE OUT—NUMBERS

In this type of classification, different numbers are given as options. These numbers have some commonness; except one which is the odd one. One has to identify the similarity and then strike the odd one out as answer option. The number can be odd/even/consecutive, prime numbers, multiple of some number, single, square or cubes of different numbers, plus/minus of some other number or combinations of any mathematical calculation.

SOLVED EXAMPLES

Directions : *Find the odd number from the given options.*

1. (*a*) 62 (*b*) 121 (*c*) 36 (*d*) 256

Ans. ***(a)*** **:** The other numbers are squares of :

11, (= 121), 6 (= 36) and 16 (= 256)

2. (a) 27 (b) 132 (c) 93 (d) 154

Ans. ***(d)*** **:** All other numbers are divisible by 3.

MULTIPLE CHOICE QUESTIONS

Directions : *In each of the following questions, there are four options. Three numbers, in these options, are alike in certain manner. Only one number does not fit in. Choose the one which is different from the rest.*

1. (*a*) 1948 (*b*) 2401 (*c*) 966 (*d*) 1449

2. (*a*) 182 (*b*) 169 (*c*) 130 (*d*) 158

3. (*a*) 129 (*b*) 130 (*c*) 131 (*d*) 132

4. (*a*) 3215 (*b*) 9309 (*c*) 4721 (*d*) 2850

5. (*a*) 1776 (*b*) 2364 (*c*) 1976 (*d*) 3776

6. (*a*) 64 (*b*) 84 (*c*) 16 (*d*) 36

7. (*a*) 24 (*b*) 90 (*c*) 54 (*d*) 36

8. (*a*) 7658 (*b*) 1234 (*c*) 9876 (*d*) 6543

9. (*a*) 3 (*b*) 9 (*c*) 5 (*d*) 7

10. (*a*) 6450 (*b*) 1776 (*c*) 2392 (*d*) 3815

11. (*a*) 24 (*b*) 48 (*c*) 42 (*d*) 12

12. (*a*) 616 (*b*) 252 (*c*) 311 (*d*) 707

13. (*a*) 18 (*b*) 12 (*c*) 30 (*d*) 20

14. (*a*) 3730 (*b*) 6820 (*c*) 5568 (*d*) 4604

EXPLANATORY ANSWERS

1. (*a*) : Other numbers are divisible by 7.
2. (*d*) : Other numbers are multiples of 13.
3. (*c*) : 131 is a prime number.
4. (*b*) : In other numbers, no digit is repeated.
5. (*b*) : In other numbers the last two digits are same.
6. (*b*) : All other numbers are perfect squares.
7. (*a*) : In other numbers, the sum of both the digits is 9.
8. (*a*) : In others, the digits are consecutive in natural or reverse series.
9. (*b*) : All others are prime numbers.
10. (*d*) : All other numbers are divisible by 2.
11. (*c*) : All other numbers are multiples of 12.
12. (*c*) : In other numbers, the first and last digits are same.
13. (*a*) : The other numbers are $3^2 + 3 = 12$, $5^2 + 5 = 30$, $4^2 + 4 = 20$, $6^2 + 6 = 42$
14. (*b*) : In all other numbers, two digits are same.

ODD ONE OUT—LETTERS

In this classification of letters, four groups of letters or a series of letters is given as options. One has to select the option as answer which does not share the commonness of the others.

SOLVED EXAMPLES

Directions : *Find the odd one out in the following letters :*

1. (*a*) NOP (*b*) RTU (*c*) JKL (*d*) EFG
Ans. *(b)* : In each group the letters are consecutive. In this option the first two letters jump one letter (S) inbetween.

2. (*a*) RUX (*b*) CFI (*c*) BDG (*d*) FIL
Ans. *(c)* : In each group, the difference between the letters is same. In this option B and D jump one letter and D and G jump two letters.

MULTIPLE CHOICE QUESTIONS

Directions : *In each of the following questions, four out of five alternatives contain alphabet placed in a particular form. Find the one that does not belong to the group.*

1. (*a*) BXCW (*b*) OTPS (*c*) GQHR (*d*) JNKM

2. (*a*) BVPS (*b*) OLMZ (*c*) RPSR (*d*) XTCD

3. (*a*) RNJH (*b*) SOKG (*c*) QMIE (*d*) MIEA

4. (*a*) QLJS (*b*) GVTI (*c*) KRPM (*d*) ONMP

5. (*a*) PEAR (*b*) TORE (*c*) REAP (*d*) TEAR

6. (*a*) ECA (*b*) JHF (*c*) OMK (*d*) UWY

7. (*a*) ACE (*b*) PRT (*c*) UWY (*d*) MNO

8. (*a*) WVU (*b*) NML (*c*) HGF (*d*) DBA

9. (*a*) ABD (*b*) FGI (*c*) LMO (*d*) STU

10. (*a*) CDE (*b*) JKL (*c*) PQS (*d*) TUV

EXPLANATORY ANSWERS

1. (*c*) : In all other groups, first and third letters are consecutive and second and fourth letters are in reverse alphabetical order.
2. (*c*) : No letter is repeated in any other group.
3. (*a*) : In all other groups, there is a gap of three letters between two consecutive letters.
4. (*d*) : In all other groups, first and third letters are moved two steps forward to obtain fourth and second letters respectively.
5. (*b*) : All other groups contain E, A and R.
6. (*d*) : All other groups contain alternate letters from right to left.

7. (*d*) : All other groups contain alternate letters from left to right.

8. (*d*) : In all others, the three letters are consecutive but in reverse order.

9. (*d*) : In all others, the first two letters are consecutive and third letter is obtained by skipping one letter from the second.

10. (*c*) : In all other, the three letters are consecutive.

ODD ONE OUT—WORDS

In this type of classification, five words are given out of which four are almost same in matter or meaning and only one word is different from the common four. One has to find out the word which is different from the rest.

SOLVED EXAMPLES

Directions : *In the following questions spot the odd one out.*

1. (a) Father (b) Mother (c) Friend (d) Brother

   Ans. *(c)* : All other are blood relations.

2. (a) Water (b) Jelly (c) Lemonade (d) Coffee

   Ans. *(b)* : All other are liquids.

MULTIPLE CHOICE QUESTIONS

Directions : *In each of the following questions, four words are alike in some manner. Spot the odd one out.*

1. (*a*) Green (*b*) Red (*c*) Colour (*d*) Orange

2. (*a*) Stable (*b*) Hole (*c*) Canoe (*d*) Sty

3. (*a*) Nose (*b*) Eyes (*c*) Skin (*d*) Teeth

4. (*a*) Venus (*b*) Moon (*c*) Pluto (*d*) Mars

5. (*a*) Happy (*b*) Gloomy (*c*) Lively (*d*) Cheerful

6. (*a*) Cone (*b*) Circle (*c*) Triangle (*d*) Rectangle

7. (*a*) Lead (*b*) Mercury (*c*) Copper (*d*) Iron

8. (*a*) Kite (*b*) Bird (*c*) Radar (*d*) Jet

9. (*a*) Knee (*b*) Shoulder (*c*) Ankle (*d*) Palm

10. (*a*) Deluge (*b*) Calamity (*c*) Catastrophe (*d*) War

11. (*a*) Cub (*b*) Chicken (*c*) Pig (*d*) Pup

12. (*a*) Rabbit (*b*) Crocodile (*c*) Earthworm (*d*) Snail

13. (*a*) Tree (*b*) Leaf (*c*) Bush (*d*) Herb

14. (*a*) Doctor (*b*) Teacher (*c*) Engineer (*d*) Diver

15. (*a*) Trot (*b*) Equestrian (*c*) Derby (*d*) Grunt

EXPLANATORY ANSWERS

1. *(c)* : All others are types of colour.

2. *(c)* : Canoe is a boat. Others are resting places of birds/ animals.

3. *(d)* : All others are sense organs.

4. *(b)* : All others are planets.

5. *(b)* : All others are expressions of joy

6. *(a)* : All others are geometrical figures.

7. *(b)* : All others are solid metals.

8. *(c)* : All others are flying objects. Radar traces the objects in sky.

9. *(d)* : All others are joints in human body.

10. *(d)* : All others are nature-bound. Only war is man-made.

11. *(c)* : All others are young ones of animals.

12. *(a)* : All others are crawling animals.

13. *(b)* : All others are types of vegetation.

14. *(d)* : All others are professions, but only Diver's profession comprises of diving under water.

15. *(d)* : All other terms are related with activities of a horse.

CHAPTER 3

Small & Capital Letters/ Numbers Coding-Decoding and Classification

TYPE - I

Coding is a secretive language which is used to change the representation of the actual term/word/value. This coded language can be framed by *(i)* moving the letters one or more steps forward or backward; *(ii)* substituting numbers for letters and vice–versa; *(iii)* writing the letters of the given word in reverse order in part or in whole; and *(iv)* replacing the letters in their natural series by the same positioned letters in their reverse series.

Alphabet in natural series are :

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
↓				↓					↓					↓					↓					↓	
1st				5th					10th					15th					20th					25th	

Alphabet in reverse series are :

Z	Y	X	W	V	U	T	S	R	Q	P	O	N	M	L	K	J	I	H	G	F	E	D	C	B	A
↓				↓					↓					↓					↓					↓	
1st				5th					10th					15th					20th					25th	

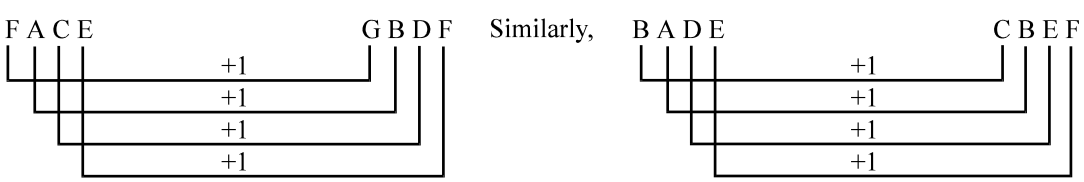
Note : On reaching Z, the series restarts from A and on reaching A, it restarts from Z.

SOLVED EXAMPLES

1. If FACE is coded as GBDF, then BADE will be coded as :

(*a*) CBEF (*b*) CEBF (*c*) CFBE (*d*) CBFE

Ans. *(a)* : The word is coded by moving the letters one step forward.



2. If RESULT is coded as 798206, LET will be coded as :

(*a*) 680 (*b*) 092 (*c*) 096 (*d*) 086

Ans. *(c)* : The letters are coded by numbers, and to code the given word, select the respective coded numbers.

R	E	S	U	L	T	→	letters
7	9	8	2	0	6	→	code

So, code for LET will be

L	E	T	→	letters
0	9	6	→	code

MULTIPLE CHOICE QUESTIONS

Directions : *In the following questions select the right option which indicates the correct code for the word or letter given in the question.*

1. If CHAIR is coded as FKDLU then RAID is coded as :
(*a*) ULGD (*b*) ULKG
(*c*) ULDG (*d*) UDLG

2. If CONDEMN is coded as CNODMEN, then TEACHER is coded as :
(*a*) TEACHER (*b*) TAEECHR
(*c*) TCAEEHR (*d*) TAECEHR

3. In a code language COME is written as XLNV and ABLE as ZYOV. How will MOLLY be written in that code?
(*a*) NLOBO (*b*) NLBOO
(*c*) LNOOB (*d*) NLOOB

4. In a certain code PROFESSION is written as EFORPNOISS. In the same code DICTIONARY will be written as :
(*a*) YRANOITCID (*b*) ITCIDYRANO
(*c*) ITCIDYRNAO (*d*) ITCDIYARNO

5. JUNE is coded as NXPF, how will STAY be coded in the same manner?
(*a*) WWCZ (*b*) WVCZ
(*c*) WWDB (*d*) VWZC

6. If in a certain code GENIUS is coded as IGPKWU, then IDIOT will be written in the same code as :
(*a*) JEJPU (*b*) KFKQV
(*c*) LGLRW (*d*) HCHNS

7. If ACTION is coded as ZXGRLM, then HEALTH will be coded in the same way as :
(*a*) SVZOGS (*b*) TVZOGT
(*c*) RUZPGR (*d*) QVGOZQ

8. If THOUSAND is coded as SGNTRZMC, then FUMING will be coded as :
(*a*) GVNJOH (*b*) ETHLMF
(*c*) EVLJMH (*d*) ETLHMF

9. If EARTHQUAKE is coded as MOGPENJOSM, then EQUATE will be coded as :
(*a*) MENOPM (*b*) MENOMP
(*c*) MJOGPM (*d*) MNJOPM

10. In a certain code language HJIZT code is deciphered as MONEY, in the same way NOVGZ will be deciphered as :
(*a*) STUMP (*b*) STALE
(*c*) STICK (*d*) SPIRE

11. If in a certain code JOSEPH is coded as FKOALD, then GEORGE will be coded in the same way as :
(*a*) CBJNCA (*b*) CANKCA
(*c*) CAKNCA (*d*) CAKCNA

12. If COUNTRY is coded in a certain way as EMWLVPA, ELECTORATE will be coded in the same manner as :
(*a*) CJCEVQPYWC (*b*) GJGERQTYVG
(*c*) CNCERQPCRG (*d*) GJGAVMTYVC

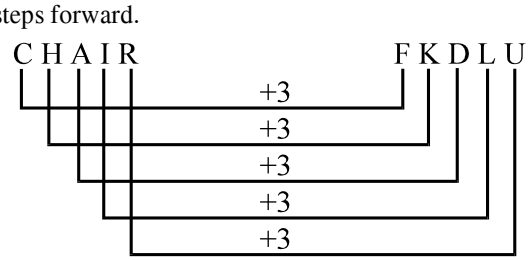
13. In a certain code PORTUGESE is written as ESEGUTROP, MALAYALAM will be written in the same code as :
(*a*) MALAYALAM (*b*) MALYALAM
(*c*) MALAYALM (*d*) MALAYLAM

14. If PHILOSOPHY is coded as HPLISOPOYH, ORNAMENTAL will be coded as :
(*a*) ROANEMNTLA (*b*) ONRAMNEALT
(*c*) ROANEMTNLA (*d*) ROANEMNATL

15. If SABOTAGE is coded as UADOVAIE, how will EMERGENCY be coded in the same manner?
(*a*) GMGRIEPCA (*b*) GMGRGEPCA
(*c*) BNBQFDOBZ (*d*) EOETGGNEY

EXPLANATORY ANSWERS

1. ***(d)*** **:** The word is coded by moving the letters three steps forward.



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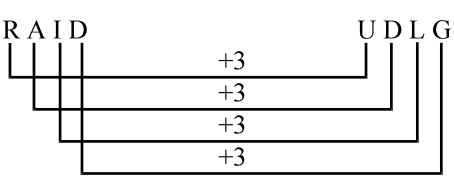
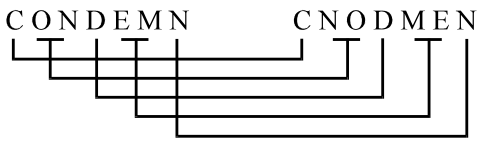


2. ***(d)*** **:** In this word, the second and third letters interchange their places and the fifth and sixth letters do the same. Other letters retain their position.



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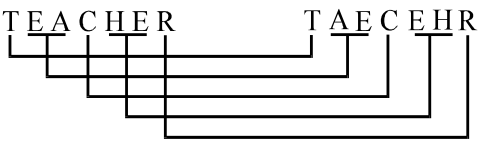


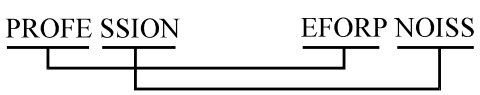
3. ***(d)*** **:** The letters of the word are coded by their represented letters in the reverse series.

C O M E → letters in natural series
X L N V → letters in reverse series
↓ ↓ ↓ ↓
3rd 15th 13th 5th → position of letters
A B L E → letters in natural series
Z Y O V → letters in reverse series
↓ ↓ ↓ ↓
1st 2nd 12th 5th → position of letters

Similarly,

M O L L Y → letters in natural series
N L O O B → letters in reverse series
↓ ↓ ↓ ↓ ↓
13th 15th 12th 12th 25th → position of letters

4. ***(b)*** **:** The word is divided into two equal parts and the letters of each part are written backwards.



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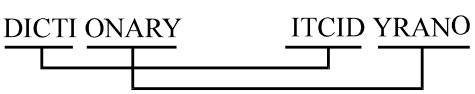
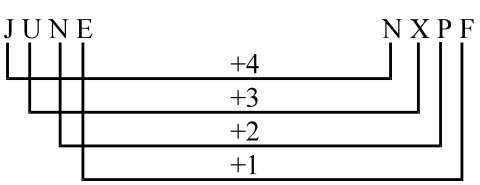


5. ***(a)*** **:** The word is coded by moving the letters +4, +3, +2, and +1 steps respectively.



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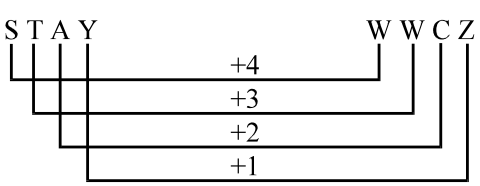
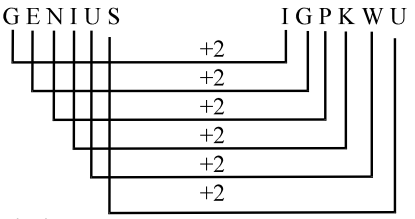


6. ***(b)*** **:** The word is coded by moving the letters two steps forward, *i.e.,*



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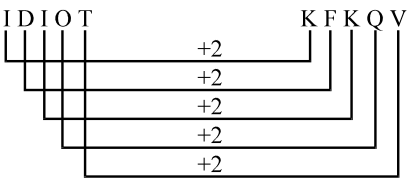


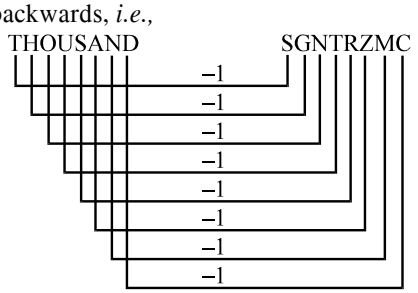
7. ***(a)*** **:** The letters of the word are coded by their represented letters in the reverse series.

A C T I O N → letters in natural series
Z X G R L M → letters in reverse series
↓ ↓ ↓ ↓ ↓ ↓
1st 3rd 20th 9th 15th 14th position of letters

Similarly,

H E A L T H → letters in natural series
S V Z O G S → letters in reverse series
↓ ↓ ↓ ↓ ↓ ↓
8th 5th 1st 12th 20th 8th → position of letters

8. ***(d)*** **:** The word is coded by moving the alphabet one step backwards, *i.e.,*



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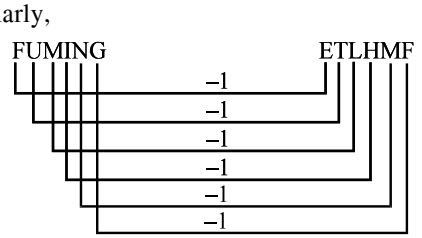
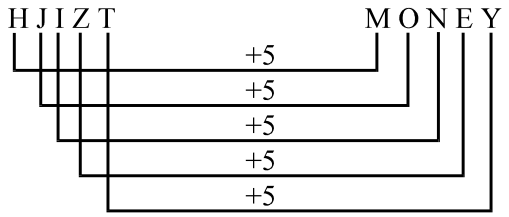


9. ***(d)*** **:** The alphabet in word EQUATE are taken from the given word EARTHQUAKE. Tally the letters from the coded word to get the answer code.

E A R T H Q U A K E → letters
M O G P E N J O S M → codes
E Q U A T E → letters to be coded
M N J O P M → answer codes

10. ***(b)*** **:** The coded alphabet are deciphered by moving five steps forward, *i.e.,*



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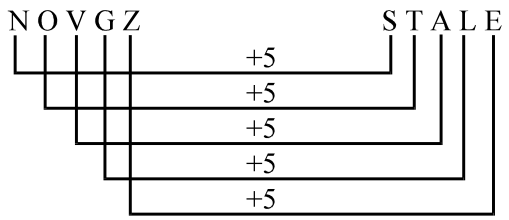
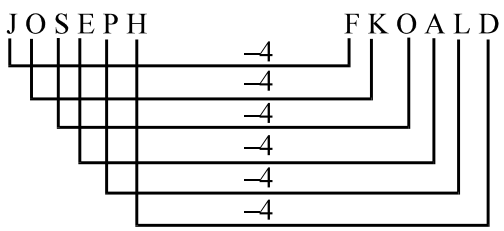


11. ***(c)*** **:** The word is coded by moving the alphabet four steps backward, *i.e.,*



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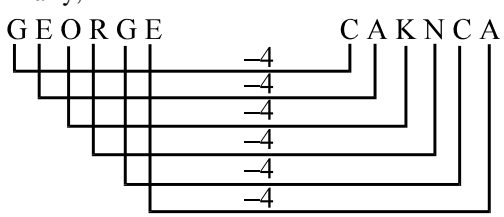
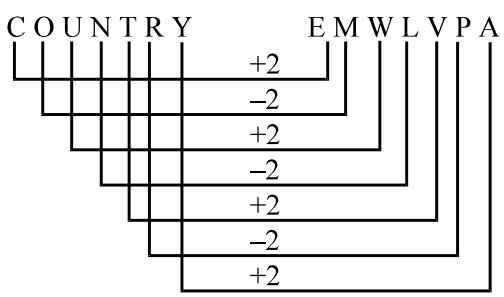


12. ***(d)*** **:** The word is coded by moving the alphabet two steps forward and two steps backward alternately, *i.e.,*



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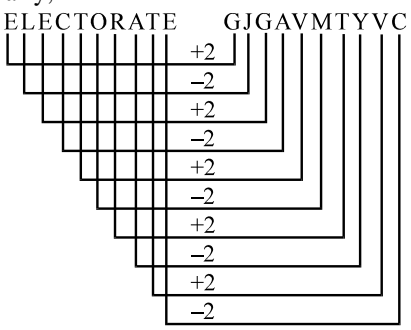
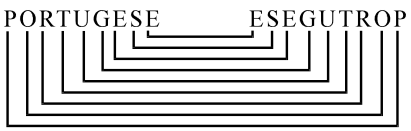


13. ***(a)*** **:** The coded word is the alphabet of the word written backwards.



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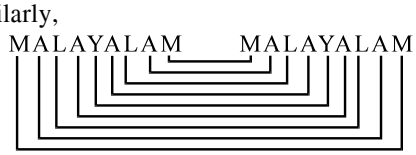
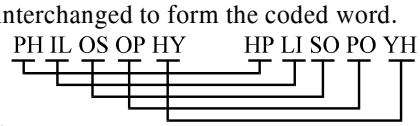


14. ***(c)*** **:** The places of two consecutive letters in the word are interchanged to form the coded word.



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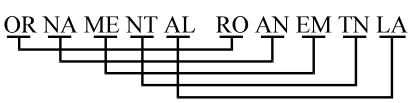
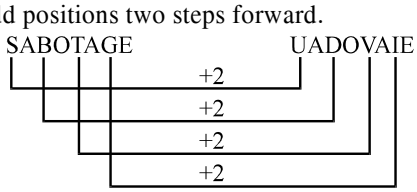


15. ***(a)*** **:** The word is coded by moving only the alphabet at odd positions two steps forward.



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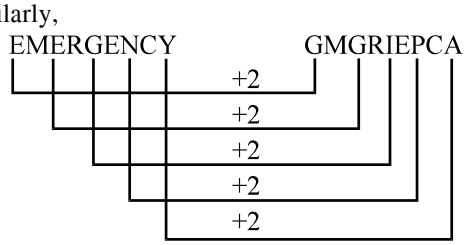


TYPE - II

Column coding is a very complex form of coding. It needs a lot of attention and swift eye movement to decode the code for each letter of the given words. Proper words in capital letters are given in one column and the codes in small letters are given in another column. Based on the information given in both columns the candidate has to arrive at the correct answer option.

MULTIPLE CHOICE QUESTIONS

Directions: *The following questions are based on the column pattern. Understand the coding pattern and answer the questions.*

Column I	Column II
(1) FAMOUS	(a) jcqhxp
(2) SATIRE	(b) hqdbyn
(3) FRIGHT	(c) ybcnke
(4) TANGLE	(d) zewhnd
(5) ROVING	(e) epbmyw
(6) HUNTER	(f) wdnbxk

1. What is the code used for the letter U?
(*a*) d (*b*) n
(*c*) b (*d*) x

2. What is the code used for the letter N?
(*a*) e (*b*) p
(*c*) m (*d*) w

3. What is the code used for the letter A?
(*a*) h (*b*) q
(*c*) b (*d*) n

4. What is the code used for the letter F?
(*a*) w (*b*) p
(*c*) d (*d*) c

5. What is the code used for the letter E?
(*a*) d (*b*) n
(*c*) b (*d*) k

Column I	Column II
(1) WRONG	(a) cklxd
(2) GRANT	(b) pdqkc
(3) STEAM	(c) qpuns
(4) CROWS	(d) lxnvk
(5) CEMET	(e) usqvs
(6) TERMS	(f) nukqs

6. What is the code used for the letter N?
(*a*) c (*b*) x
(*c*) l (*d*) n

7. What is the code used for the letter M?
(*a*) v (*b*) q
(*c*) u (*d*) s

8. What is the code used for the letter W?
(*a*) d (*b*) x
(*c*) c (*d*) p

9. What is the code used for the letter G?
(*a*) k (*b*) c
(*c*) s (*d*) d

10. What is the code used for the letter S?
(*a*) n (*b*) s
(*c*) d (*d*) k

Column I	Column II
(1) HOUSE	(a) lfyqx
(2) PAGES	(b) pyfgm
(3) LUNGS	(c) nhmzf
(4) PHONE	(d) xqygh
(5) LANDS	(e) hofzp
(6) HOUND	(f) qnoxh

11. What is the code used for the letter O?
(*a*) h (*b*) g
(*c*) q (*d*) x

12. What is the code used for the letter E?
(*a*) n (*b*) y
(*c*) p (*d*) m

13. What is the code used for the letter G?
(*a*) p (*b*) o
(*c*) f (*d*) m

14. What is the code used for the letter N?
(*a*) l (*b*) y
(*c*) x (*d*) h

15. What is the code used for the letter D?
(*a*) o (*b*) z
(*c*) g (*d*) p

EXPLANATORY ANSWERS

1. (*d*) : From statements (1) and (6), U = X.

2. (*d*) : From statements (5) and (6), RN = bw. From statement (4), N = w.

3. (*a*) : From statements (2) and (4), ATE = hdn. From statement (6), TE = dn. Therefore, A = h.

4. (*d*) : From statements (1) and (3), F = c.

5. (*a*) : From statements (2) and (4), ATE = hdn. From statement (6), TE = dn. From statement (3), T = n. Hence E = d.

6. (*a*) : From statements (1) and (2), N = C.

7. (*c*) : From statements (3), (5) and (6), M = u.

8. (*b*) : From statements (1) and (4), W = x.

9. (*d*) : From statements (1) and (2), G = d.

10. (*a*) : From statements (3), (4) and (6), S = n.

11. (*d*) : From statements (1), (4) and (6), O = x.

12. (*b*) : From statements (1), (2) and (4), E = y.

13. (*d*) : From statements (2) and (3), G = m.

14. (*d*) : From statements (3), (4), (5) and (6), N = h.

15. (*a*) : From statements (5) and (6), D = o.

TYPE - III

There is variety in ways of coding. Coding language is not only for words and numbers but also for hiding a group of words, statements or even sentences. This form of coding pattern may appear to be confusing but after solving only a few questions it is very easy to understand. Questions based on this coding pattern require no moving of steps or straining efforts of calculations, but only quick tallying or comparing ability. The codes can be letters or numbers.

SOLVED EXAMPLE

In a certain code 'ra mei ket' means 'he is rich'; 'rui pha jeu' means 'run for money'; and 'pha rui ket' means 'money for rich'. Which of the following is the code for 'rich'?

(*a*) ra (*b*) pha
(*c*) ket (*d*) jeu

Ans. *(c)* : The given information is :

	Code	*Sentence*
1.	ra mei *ket*	he is *rich*
2.	rui pha jeu	run for money
3.	pha rui *ket*	money for *rich*

After comparing codes and sentences 1 and 3, it is clear that word 'rich' is common and so is the code 'ket'.

MULTIPLE CHOICE QUESTIONS

Directions : *In the following questions study the coded patterns and then select the right option from the given alternatives.*

1. In a certain language, (a) 'go ju mi' stands for 'plenty of money'; (b) pao ju go nei vu' for 'money creates lots of problems'; (c) 'kol vu nei' for 'problems create tension'; and (d) 'sol tun ju haw' for 'still money is needed'. Which of the following words stand for 'money'?
(*a*) nei (*b*) ju
(*c*) haw (*d*) go

2. In a certain language, (a) 'FOR' stands for 'old is gold'; (b) 'ROT' stands for 'gold is pure'; (c) 'ROM' stands for 'gold is costly'. How will 'pure old gold is costly' be written?
(*a*) TFROM (*b*) FOTRM
(*c*) FTORM (*d*) TOMRF

3. In a certain code '415' means 'milk is hot'; '18' means 'hot soup'; and '895' means 'soup is tasty'. What number will indicate the word 'tasty'?
(*a*) 9 (*b*) 8
(*c*) 5 (*d*) 4

4. In a certain code '643' means 'she is beautiful', '593' means 'he is handsome', and '567' means 'handsome meets beautiful'. What number will indicate the word 'meets'?
(*a*) 5 (*b*) 3
(*c*) 7 (*d*) 6

5. In a certain code language, (a) 'dugo hui mul zo' stands for 'work is very hard'; (b) 'hui dugo ba ki' for 'Bingo is very smart'; (c) 'nano mul dugo' for 'cake is hard', and (d) 'mul ki qu' for 'smart and hard'. Which of the following words stand for 'Bingo'?
(*a*) jalu (*b*) dugo
(*c*) ki (*d*) ba

6. In a certain code language, (a) 'pic vic nic' stands for 'winter is cold'; (b) 'to nic re' for 'summer is hot'; (c) 're pic boo' for 'winter and summer' and (d) 'vic tho pa' for 'nights are cold'. Which of the following word is the code for 'summer'?
(*a*) nic (*b*) boo
(*c*) to (*d*) re

7. In a certain language, (a) 'mx das sci' means 'good little frock'; (b) 'jm coz sci' means 'girl behaves good'; (c) 'ngv drs coz' means 'girl makes mischief'; and (d) 'das gp coz' means 'little girl fell'. What is the code for 'frock' in this language?
(*a*) mx (*b*) das
(*c*) sci (*d*) gp

8. In a certain language 'mu mit es' means 'who is she' and 'elb mu es' means 'where is she'. What is the code for 'where' in this language?
(*a*) es (*b*) elb
(*c*) mu (*d*) mit

9. In a certain code language '069' means 'grapes are sweet', '476' means 'very sweet fruit' and '509' means 'grapes are ripe'. Which of the following digits means 'ripe' in that language?
(*a*) 0 (*b*) 5
(*c*) 9 (*d*) 7

10. In a certain code language 'roi ja kyo twa' means 'Moody is writing letters', 'pok ju ja twa' means 'Woody is writing cards', 'trn kyo pos un' means 'they are writing letters', and 'koi rus pok' means 'gifts and cards'. What is the code word for 'Moody'?
(*a*) ja (*b*) twa
(*c*) roi (*d*) kyo

EXPLANATORY ANSWERS

1. (*b*) :

	Code	*Sentence*
1.	go *ju* mi	plenty of *money*
2.	pao *ju* go nei vu	*money* creates lots of problems
3.	kol vu nei	problems create tension
4.	sol tun *ju* haw	still *money* is needed

In 1st, 2nd and 4th codes and their sentences the word 'ju' is repeated and so is 'money'.

2. (*a*) :

	Code	*Sentence*
1.	FOR	old is gold
2.	ROT	gold is pure
3.	ROM	gold is costly

Therefore,

F stands	for	old
O stands	for	is
R stands	for	gold
T stands	for	pure
M stands	for	costly

So, 'pure old gold is costly' will be written as 'TFROM'.

3. (*a*) :

	Code	*Sentence*
1.	415	milk is hot
2.	18	hot soup
3.	895	soup is *tasty*

From 3rd code and its sentence neither number '9' is repeated nor the word 'tasty'.

4. (*c*) :

	Code	*Sentence*
1.	643	she is beautiful
2.	593	he is handsome
3.	567	handsome *meets* beautiful

From 3rd code and its sentence, neither number '7' nor the word 'meets' is repeated.

5. (*d*) :

	Code	*Sentence*
1.	*dugo hui* mul zo	work *is very* hard
2.	*hui dugo* **ba** *ki*	**Bingo** *is very smart*
3.	nano mul *dugo*	cake is *hard*
4.	mul *ki* qu	*smart* and hard

From 2nd code and its sentence, neither 'ba' nor 'Bingo' is repeated.

(Words repeated are in italics)

6. (*d*) :

	Code	*Sentence*
1.	pic vic nic	winter is cold
2.	to nic *re*	*summer* is hot
3.	*re* pic boo	winter and *summer*
4.	vic tho pa	nights are cold

The word 'summer' is common in 2nd and 3rd sentences and so is the code 're'.

7. (*a*) :

	Code	*Sentence*
1.	**mx** *das sci*	*good little* **frock**
2.	jm coz *sci*	girl behaves *good*
3.	ngv drs coz	girl makes mischief
4.	*das* gp coz	*little* girl fell

Word 'frock' is only in the 1st sentence. The code word 'das' is repeated in 4th sentence and 'sci' in 2nd sentence. So, 'mx' is the code for 'frock'.

8. (*b*) :

	Code	*Sentence*
1.	*mu* mit *es*	who *is she*
2.	**elb** *mu* es	**where** *is she*

The code words 'mu' and 'es' are repeated in Ist sentence. The only code left is 'elb' which means 'where'.

9. (*b*) :

	Code	*Sentence*
1.	*069*	*grapes are* sweet
2.	476	very sweet fruit
3.	**5**0*9*	*grapes are* **ripe**

The code numbers '0' and '9' are repeated in 1st and 3rd sentences. The only code remaining is '5' which stands for 'ripe'.

10. (*c*) :

	Code	*Sentence*
1.	**roi** *ja kyo twa*	**Moody** *is writing letters*
2.	pok ju *ja twa*	Woody *is writing* cards
3.	trn *kyo* pos un	they are writing *letters*
4.	koi rus pok	gifts and cards

'Moody' is in 1st sentence only. The code words 'ja' and 'twa' are repeated in 2nd sentence and 'kyo' in 3rd sentence. Only code word 'roi' remains which stands for 'Moody'.

CHAPTER 4

Semantic Series

MULTIPLE CHOICE QUESTIONS

1. ADG, XVT, BEH, WUS, ?
(*a*) VTR (*b*) CFI
(*c*) DFJ (*d*) STU

2. GMSY, IOUA, KQWC, ?
(*a*) MSYE (*b*) NSYE
(*c*) MTYE (*d*) MSYF

3. ADG, GJM, ?, SVY
(*a*) MPS (*b*) MQR
(*c*) MQS (*d*) SPM

4. KNQ, TWZ, CFI, ?
(*a*) KOR (*b*) LOR
(*c*) MNQ (*d*) JLM

5. AEI, BFJ, CGK, ?
(*a*) DLH (*b*) EGF
(*c*) EFL (*d*) DHL

6. CFI, IKM, OPQ, ?
(*a*) UUU (*b*) UST
(*c*) VUS (*d*) TUV

7. LAZ, NEX, PIV, ?
(*a*) SLS (*b*) QNS
(*c*) RMT (*d*) RMS

8. DED, EFE, FGF, ?
(*a*) HGH (*b*) GHG
(*c*) EFE (*d*) FHF

9. XYZ, UVW, ?, OPQ
(*a*) RST (*b*) STU
(*c*) QRS (*d*) TUV

10. VCL, UEI, TGF, ?
(*a*) SJC (*b*) THI
(*c*) SIC (*d*) RHD

11. ABC, EFG, HIJ, ?
(*a*) IJK (*b*) KLM
(*c*) LMN (*d*) JKL

12. PQR, HIJ, DEF, ?
(*a*) DEF (*b*) CDE
(*c*) ABC (*d*) BCD

13. KNQ, TWZ, CFI, ?
(*a*) MNQ (*b*) LOR
(*c*) LPR (*d*) KOR

14. JOBS, KMEO, LKHK, ?, NGNC
(*a*) MJLH (*b*) LIKG
(*c*) MIKG (*d*) MNGM

15. ABC, ACE, ADG, ?
(*a*) AEG (*b*) AFH
(*c*) AFG (*d*) AEI

16. IOU, JKL, PQR, ?
(*a*) UVW (*b*) XYZ
(*c*) TUV (*d*) VWX

17. AZ, GT, MN, ?, YB
(*a*) KF (*b*) TS
(*c*) RX (*d*) SH

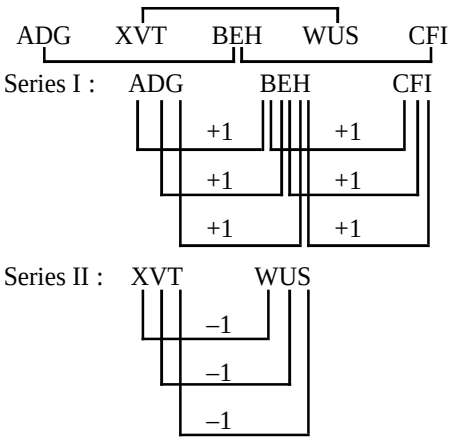
18. BMY, DNW, FOU, ?
(*a*) HPT (*b*) HPS
(*c*) HQS (*d*) GPS

19. ADG, GJM, MPS, ?
(*a*) SVW (*b*) SVY
(*c*) SUW (*d*) SWY

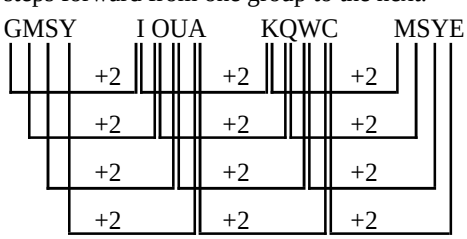
20. AZ, CX, EV, ?
(*a*) HU (*b*) GS
(*c*) GT (*d*) HT

EXPLANATORY ANSWERS

1. (b) : There are two alternate series.

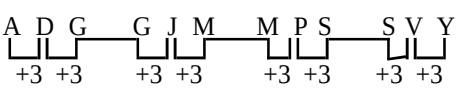


2. (a) : The series is formed by moving each letter two steps forward from one group to the next.

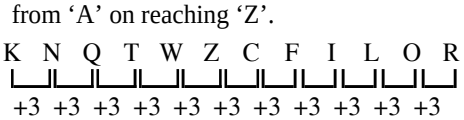


(The series restarts from A on reaching Z)

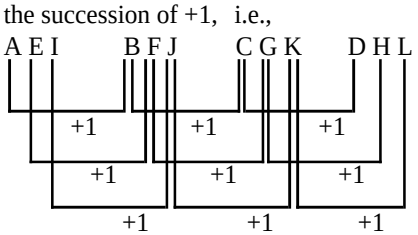
3. (a) : In each group of three letters the alphabet is in the succession of +3. The next group begins with the last alphabet of the previous group.



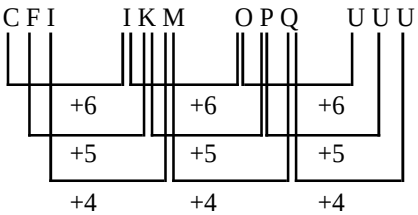
4. (b) : All the alphabet in this group series is in succession of +3. The alphabetical series repeat from 'A' on reaching 'Z'.



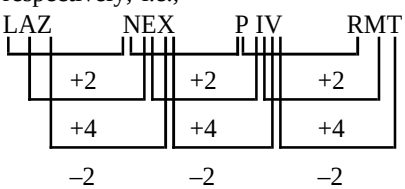
5. (d) : Each of the three alphabet in one group corresponds to the alphabet in the next group in the succession of +1, i.e.,



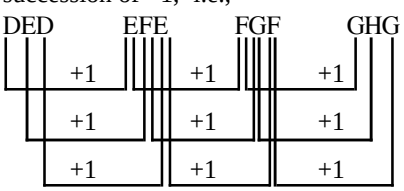
6. (a) : The three alphabet in one group correspond to the alphabet in the next group in the manner +6, +5, +4 respectively, i.e.,



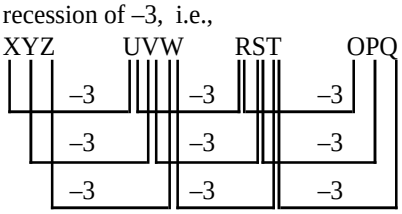
7. (c) : The three alphabet in one group correspond to the alphabet in the next group in the manner +2, +4, –2 respectively, i.e.,



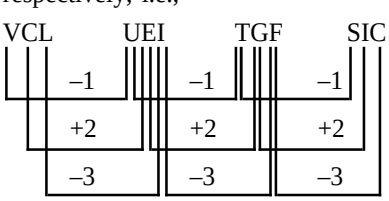
8. (b) : The alphabet from one group to the next are in succession of +1, i.e.,



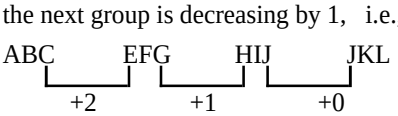
9. (a) : The alphabet from one group to the next are in recession of –3, i.e.,



10. (c) : The alphabet in one group correspond to the alphabet in the next group in the manner –1, +2, –3 respectively, i.e.,

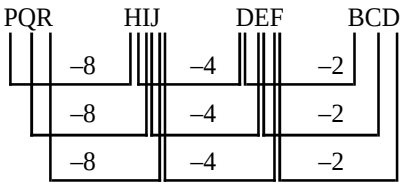


11. (d) : The difference between the last letter of the preceding group of alphabet and the first letter of the next group is decreasing by 1, i.e.,

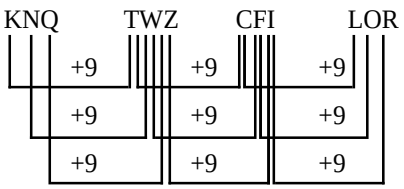


Otherwise the three letters in each group are in their natural order.

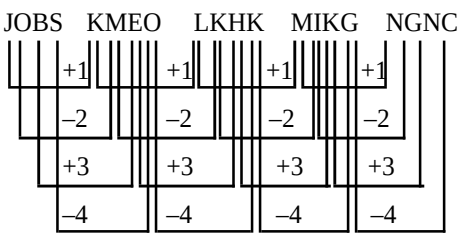
12. (d) : The letters in each group of alphabet are in the recession of –8, –4, –2 respectively.



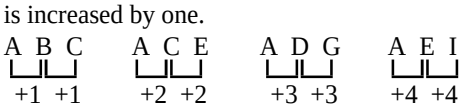
13. (b) : The letters in each group correspond to the letter in next group in the succession of +9.



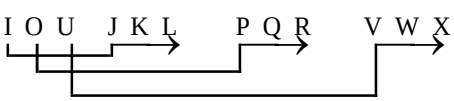
14. (c) : The alphabets in each group follow the pattern +1, –2, +3 and –4 respectively from one group to the next group.



15. (d) : The difference between the letters in each group is increased by one.

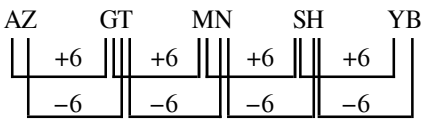


16. (d) : The series is formed in this manner :

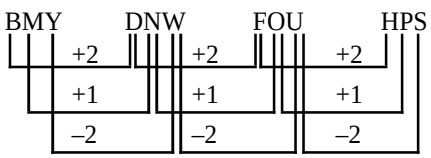


Three consecutive letters to each letter in the first group forms the other groups in the series.

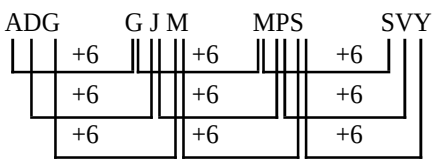
17. (d) : The letters in one group correspond to the letters in the next group in the manner +6, –6 respectively, i.e.,



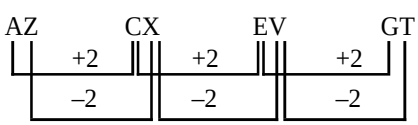
18. (b) : The letters in one group correspond to the letters in the next group in the manner +2, +1, -2 respectively, i.e.,



19. (b) : The letters in each group are moved six steps forward, i.e.,



20. (c) : The letters in each group correspond to the letters in the next group in the manner +2, –2 respectively, i.e.,



CHAPTER 5

Number Series

In this type of series, the set of given numbers in a series are related to one another in a particular pattern or manner. The relationship between the numbers may be (i) consecutive odd/even numbers; (ii) consecutive prime numbers; (iii) squares/cubes of some numbers with/without variation of addition or subtraction of some number; (iv) sum/product/difference of preceding numbers; (v) addition/subtraction/multiplication/division by some number; and (vi) many more combinations of the relationships given above.

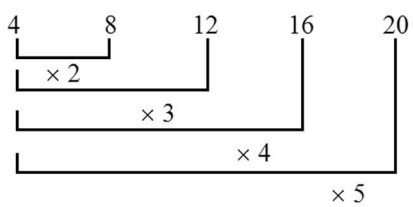
SOLVED EXAMPLES

1. Which number will complete the given series?

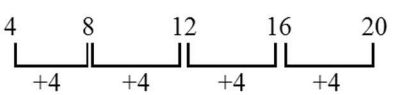
4, 8, 12, 16, ?

(*a*) 18 (*b*) 20 (*c*) 22 (*d*) 24

Ans. (*b*): The series is made of numbers which are multiples of 4. Other explanation can be that the difference between the two consecutive numbers is 4.



Or

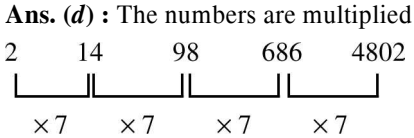


2. Complete the given series.

2, 14, 98, 686, ?

(*a*) 1976 (*b*) 2548 (*c*) 980 (*d*) 4802

Ans. (*d*) : The numbers are multiplied by 7 to obtain the next numbers.



The given series may also comprise of two alternate series merged as one.

MULTIPLE CHOICE QUESTIONS

Directions: *In the following questions, select the number(s) from the given options for completing the given series.*

1. 3, 9, 27, 81, 243, ?

(*a*) 486 (*b*) 729
(*c*) 972 (*d*) 359

2. 1, 6, 12, 19, 27, ?

(*a*) 38 (*b*) 35
(*c*) 36 (*d*) 54

3. 2, 6, 14, 30, 62, ?

(*a*) 126 (*b*) 128
(*c*) 120 (*d*) 130

4. 8, 48, 16, 96, 32, ?
(*a*) 192 (*b*) 150
(*c*) 64 (*d*) 288

5. 2, 8, 14, 24, 34, 48, ?
(*a*) 66 (*b*) 62
(*c*) 58 (*d*) 64

6. 4, 9, 19, 34, 54, ?, 109
(*a*) 89 (*b*) 84
(*c*) 74 (*d*) 79

7. 3, 15, 35, 63, 99, ?
(*a*) 144 (*b*) 143
(*c*) 121 (*d*) 169

8. 2, 3, 6, 18, 108, ?
(*a*) 1944 (*b*) 1658
(*c*) 648 (*d*) 1008

9. 1, 2, 3, 2, 3, 5, 4, 5, ?
(*a*) 9 (*b*) 6
(*c*) 10 (*d*) 7

10. 7776, 1296, 216, 36, 6, ?
(*a*) 6 (*b*) 0
(*c*) 3 (*d*) 1

11. 1, 8, 27, 64, 125, ?
(*a*) 172 (*b*) 176
(*c*) 216 (*d*) 189

12. 2, 3, 5, 7, 11, 13, ?
(*a*) 19 (*b*) 57
(*c*) 31 (*d*) 17

13. 80, 64, 48, 32, 16, ?
(*a*) 4 (*b*) 0
(*c*) 8 (*d*) 1

14. 3, 8, 13, 24, 41, ?
(*a*) 65 (*b*) 75
(*c*) 70 (*d*) 80

15. 9, 81, 90, 810, 819, ?
(*a*) 7371 (*b*) 900
(*c*) 8100 (*d*) 1638

16. 0, 8, 24, 48, 80, ?
(*a*) 110 (*b*) 96
(*c*) 120 (*d*) 140

17. 2, 4, 8, 3, 9, 27, 4, 16, ?
(*a*) 64 (*b*) 32
(*c*) 48 (*d*) 24

18. 27, 28, 25, 25, 23, 22, 21, ?
(*a*) 20 (*b*) 21
(*c*) 19 (*d*) 18

19. 80, 63, 72, 72, 64, 81, 56, ?
(*a*) 96 (*b*) 98
(*c*) 89 (*d*) 90

20. 0, 5, 22, 57, ?, 205
(*a*) 198 (*b*) 116
(*c*) 172 (*d*) 92

EXPLANATORY ANSWERS

1. (*b*) : The numbers in the series are multiplied by 3 to get the next numbers.

2. (*c*) : The difference between the numbers in the series increases by 1, after beginning from 5, *i.e.,*

1 6 12 19 27 36
+5 +6 +7 +8 +9

3. (*a*) : The difference between the numbers in the series doubles each time, after beginning from 4, *i.e.,*

2 6 14 30 62 126
+4 +8 +16 +32 +64

4. (*a*) : *Explanation I* : The sequence in the series is × 6, ÷ 3 which is repeated.

8 48 16 96 32 192
×6 ÷3 ×6 ÷3 ×6

Explanation II : There are two alternate series and the numbers are multiplied by 2.

× 2 × 2
8 48 16 96 32 192
× 2 × 2

Series I : 8, 16, 32
Series II : 48, 96, 192

5. (*b*) : The sequence in the series is :

2 8 14 24 34 48 62
+6 +6 +10 +10 +14 +14

The difference increases by 4 at alternate step.

6. (*d*) : The difference between the numbers increases by 5, after beginning from 5, *i.e.,*

4 9 19 34 54 79 109
+5 +10 +15 +20 +25 +30

7. (*b*) : The series follows the sequence of the squares of even numbers beginning from 2, minus 1.

8. (*a*) : Every third number in the series is the product of previous two numbers.

2 3 6 18 108 1944
2 × 3
3 × 6
6 × 18
18 × 108

9. *(a)* : In this series three numbers form a set. The first two numbers of each set are in natural order and the third number is the sum of first and second numbers. The first number of the next set begins with double the first number of the previous set.

× 2 × 2

1 2 3 2 3 5 4 5 9

1 + 2 2 + 3 4 + 5

10. *(d)* : The numbers in this sequence are divided by 6 each time.

11. *(c)* : The sequence in the series is cube of numbers in their natural order.

12. *(d)* : The series consists of prime numbers in increasing order.

13. *(b)* : The numbers in the series are decreasing with the difference of 16 at each step.

14. *(c)* : The sequence in the series is (number + next number) + addition of natural number increasing by 1 at each step, after beginning from 2.

3 8 13 24 41 70

(3+8) + 2

(8 + 13) + 3

(13 + 24) + 4

(24 + 41) + 5

15. *(a)* : The sequence in the series is × 9, + 9 which is repeated.

16. *(c)* : The sequence of the series consists of the product of 2 even numbers in natural order, *i.e.,*

0	8	24	48	80	120
↓	↓	↓	↓	↓	↓
(0 × 2)	(2 × 4)	(4 × 6)	(6 × 8)	(8 × 10)	(10 × 12)

17. *(a)* : In this series 3 numbers form a set. The first number is in natural order. The second number is the square of above number. The third number is the cube of first number.

18. *(c)* : There are two alternate series :

–2 –2 –2

27 28 25 25 23 22 21 19

–3 –3 –3

Series I : 27, 25, 23, 21 (following –2 pattern)

Series II : 28, 25, 22, 19 (following –3 pattern)

19. *(d)* : There are two alternate series :

–8 –8 –8

80 63 72 72 64 81 56 90

+9 +9 +9

Series I : 80, 72, 64, 56 (following –8 pattern)

Series II : 63, 72, 81, 90 (following +9 pattern)

20. *(b)* : The series follows this sequence : cube of natural numbers starting from 1 minus odd numbers starting from 1.

0	5	22	57	116	205
↓	↓	↓	↓	↓	↓
1^3-1	2^3-3	3^3-5	4^3-7	5^3-9	6^3-11

CHAPTER 6

Arithmatical Reasoning

MULTIPLE CHOICE QUESTIONS

Directions (1–5) : *The following questions are based on the information given below :*

Data of 450 candidates, who took part in an examination in Social Science, Mathematics and Science is given below:

Passed in all the subject	167
Failed in all the subject	60
Failed in Mathematics	199
Failed in Social Science	175
Failed in Science	191
Passed in Science only	52
Passed in Mathematics only	48
Passed in Social Science only	62

1. How many passed in at least one subject?
(*a*) 450 (*b*) 390
(*c*) 304 (*d*) 167
(*e*) None of these.

2. How many failed in two subjects only?
(*a*) 56 (*b*) 61
(*c*) 152 (*d*) 162
(*e*) None of these.

3. How many passed in Mathematics and at least in one more subject?
(*a*) 210 (*b*) 203
(*c*) 170 (*d*) 94
(*e*) None of these.

4. How many failed in Social Science only?
(*a*) 15 (*b*) 21
(*c*) 30 (*d*) 42
(*e*) None of these.

5. How many failed in one subject only?
(*a*) 152 (*b*) 144
(*c*) 61 (*d*) 56
(*e*) None of these

6. A, B, C, D and E play a game of cards. A says to B, ''If you give me three cards, you will have as many as E has and if I give you three cards, you will have as many as D has.'' A and B together have 10 cards more than what D and E together have. If B has two cards more than what C has and the total number of cards be 133, how many cards does B have?
(*a*) 22 (*b*) 35
(*c*) 25 (*d*) 23
(*e*) None of these

7. A bus starts from city X. The number of women in the bus is half of the number of men. In the city Y, 10 men left the bus and five women entered. Now, number of men and women is equal. In the beginning, how many passenger entered the bus?
(*a*) 15 (*b*) 30
(*c*) 36 (*d*) 45
(*e*) None of these

8. I have a few sweets to be distributed. If I keep 2, 3 or 4 in a pack, I am left with one sweet. If I keep 5 in a pack, I am left with none. What is the minimum number of sweets I can have to pack and distributed?
(*a*) 25 (*b*) 37
(*c*) 54 (*d*) 65
(*e*) None of these

9. A, B, C, D and E play a game of cards. A says to B, ''If you give me 3 cards, you will have as many as I have at this moment while if D takes 5 cards from you, he will have as many as E has'', A and C together have twice as many cards as E has B and D together also have the same number of cards as A and C taken together. I all together they have 150 cards, how many cards has C got.
(*a*) 28 (*b*) 29
(*c*) 31 (*d*) 35
(*e*) None of these

10. At the end of a business conference, ten people present shake hands with each other once. How many handshakes will be there all together?
(*a*) 20 (*b*) 45
(*c*) 90 (*d*) 55
(*e*) None of these.

11. Jayesh is as much younger to Anil as he is older to Prashant. If the sum of the ages of Anil and Prashant is 48 years. What is the age of Jayesh?
(*a*) 30 years
(*b*) 24 years
(*c*) 20 years
(*d*) Can't be determined
(*e*) None of these.

12. Five years ago Vinay's age was one-third of the age of Vikash and now Vinay's age is 17 years. What is the present age of Vikash?
(*a*) 9 years (*b*) 36 years
(*c*) 41 years (*d*) 51 years

13. The sum of ages of a father and son is 45 years. Five years ago the product of their ages was 4 times the father's age at that time. The present age of the father and son respectively are.
(*a*) 25 years, 10 years (*b*) 36 years, 9 years
(*c*) 39 years, 6 years (*d*) None of these.

14. Out of a total 120 musicians in a club, 5% can play all the three instruments – guitar, violin and flute. It so happens that the number of musicians who can play any two and only two of the above instruments is 30. The number of musicians who can play the guitar alone is 40. What is the total number of those who can play violin alone or flute alone?
(*a*) 30 (*b*) 38
(*c*) 44 (*d*) 45
(*e*) None of these.

15. In a group of persons travelling in a bus, 6 persons can speak Tamil, 15 can speak Hindi and 6 can speak Gujarati. In that group, none can speak any other language. If 2 persons in the group can speak two languages and one person can speak all the three languages, then how many persons are there in the group?
(*a*) 21 (*b*) 22
(*c*) 23 (*d*) 24
(*e*) None of these.

16. There are 50 students admitted to a nursery class. Some students can speak only English and some can speak only Hindi. Ten students can speak both English and Hindi. If the number of students who can speak English is 21, then how many students can speak Hindi, how many can speak only Hindi and how many can speak only English?
(*a*) 39, 29 and 11 respectively.
(*b*) 37, 27 and 13 respectively.
(*c*) 28, 18 and 22 respectively.
(*d*) 21, 11 and 29 respectively.

17. A shephard had 17 sheep. All but nine died. How many was he left with?
(*a*) Nil (*b*) 17
(*c*) 9 (*d*) 8
(*e*) None of these.

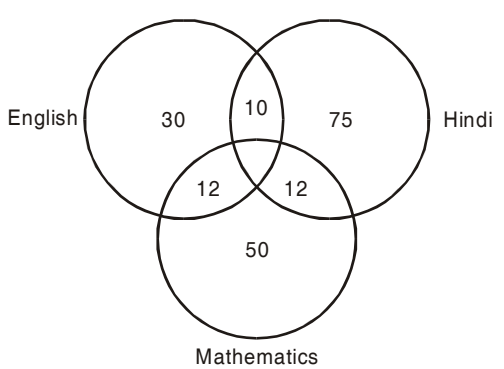
18. 10 years ago, Chandravati's mother was 4 times older than her daughter. After 10 years, the mother will be twice older than the daughter. The present age of Chandravati is:
(*a*) 5 years (*b*) 10 years
(*c*) 20 years (*d*) 30 years
(*e*) None of these.

19. Pushpa is twice as old as Rita was two years ago. If difference between their ages be 2 years, how old is Pushpa today?
(*a*) 6 years (*b*) 8 years
(*c*) 10 years (*d*) 12 years

20. Mr. Sohan Lal is four times as old as his son. Four years later sum of their age will be 43 years. The present age of the son is:
(*a*) 5 years (*b*) 7 years
(*c*) 8 years (*d*) 10 years
(*e*) None of these.

21. 15 years ago the difference between the age of two persons is 10 years. The elder one was twice as old as the younger one. The present age of the elder person is:
(*a*) 15 years (*b*) 35 years
(*c*) 65 years (*d*) 45 years
(*e*) None of these.

22. Consider the diagram given below:



Five hundred candidates appeared in the examination conducted for the tests in English, Hindi and Mathematics. The diagram gives the number of candidates who failed in different tests. What is the percentage of candidates who failed in at least two subjects?

(*a*) 0.078 (*b*) 1.0
(*c*) 6.8 (*d*) 7.8
(*e*) None of these.

23. The sum of the ages of a son and father is 56 years. After four years, the age of the father will be three times that of the son. Their ages respectively are:
(*a*) 12 years, 44 years (*b*) 18 years, 36 years
(*c*) 16 years, 42 years (*d*) 16 years, 48 years
(*e*) None of these.

24. The number of boys in a class are three times the number of girls. Which one of the following numbers cannot represent the total number of children in the class?
(*a*) 48 (*b*) 44
(*c*) 42 (*d*) 46
(*e*) None of these.

25. In 10 years, A will be twice as old as B was 10 years ago. If at present A is 9 years older than B, the present age of B is:
(*a*) 19 years (*b*) 29 years
(*c*) 39 years (*d*) 49 years
(*e*) None of these.

EXPLANATORY ANSWERS

1. (*b*) : Candidates passed at least in one subject = (Candidates passed in only one subjects) + (Candidates passed in only two subjects) + (Candidates passed in only all subjects).
(Candidates failed in only two subjects) + (Candidates failed in only one subject) + (Candidates passed in all the subject) = 162 + 61 + 167 = 390.

2. (*d*) : Candidates failed in two subjects only = Candidates passed in one subjects only = 62 + 48 + 52 = 162.

3. (*b*) : Candidates failed in science only =191 – (62 + 60 + 48) = 21
Candidates failed in one social science only = 15
Therefore, candidates passed in maths and at least one more subject
= (21 + 15 + 167) =203

4. (*a*) : Candidates failed in social science only = (candidates failed in social science) – (candidates failed in all subjects + candidates passed in science only + candidates passed in maths only)
= 175 – (60 + 52 + 48) = 175 – 160 = 15.

5. (*c*) : Candidates failed in one subject only
= (total number of candidates) – (candidates passed in all subjects + candidates failed in all the subjects + candidates passed in one subject only)
= 450 – (167 + 60 + 62 + 48 + 52)
= 450 – 389 = 61.

6. (*c*) : From the questions, we have
B – 3 = E ..... (i)
B + 3 = D ..... (ii)
A + B = D + E + 10 ..... (iii)
B = C + 2 ..... (iv)
A + B + C + D + E = 133 ..... (v)
From (i) and (ii)
B – E = D – B ⇒ E + D = 2 B ..... (vi)
From (iii) and (vi)
A + B = 2B + 10 ⇒ B = A – 10
or, A = B + 10 ..... (vii)
From (v), (vi), (iv) and (vii) we have
(B + 10) + (B) + (B – 2) + 2B = 133
5B = 133 – 8 = 125
= 25.

7. (*d*) : In the city X let the number of men be x
Then the number of women be $\frac{x}{2}$.
In the city y, $x-10=\frac{x}{2}+5$
or, $\frac{x}{2}=15$ or, $x=30$ and $y=15$.
Therefore, total number of passenger at the beginning were 30 + 15 = 45.

8. (*a*) : The required number will be obtained by taking LCM of 2, 3 and 4 and adding 1 into it. The number so obtained is 25.

9. (*a*) : From the questions it is clear that
B – 3 = A ..... (1)
D + 5 = E ..... (2)
A + C = 2 E ..... (3)
A + C = B + D ..... (4)
A + B + C + D + E = 150 ..... (5)
From (3), (4) and (5) we get
5E = 150 ∴ E = 30
Now from (2) D = 30 – 5 = 25
and from (4) A = 32
Now from (3) 32 + C = 2 × 30
C = 60 – 32 = 28.

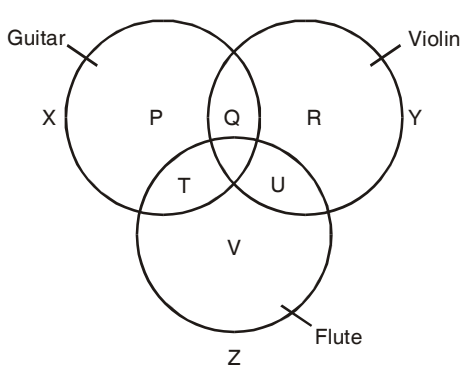
10. (*b*) : Total number of handshakes = (9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1) = 45

11. (*b*) : Let the age of Anil and Prashant be x and (48 – x) years.
Let the age of Jayesh be y years then
$(x - y) = y - (48 - x)$
$x - y = y - 48 + x$
$2y = 48$, $y = 24$ years
So, Age of Jayesh is 24 years.

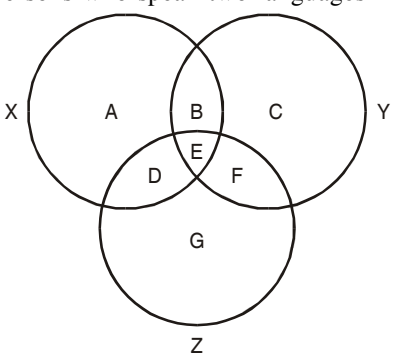
12. (*c*) : Vinay's present age is 17 years.
Five years ago Vinay's age was 12 years. and that of Vikash = 36 years
Present age of Vikash = 36 + 5 = 41 years.

13. (*b*) : Let the present age of father be x years and that of son be $(45 - x)$ years.
Five years ago the age of son was $(45 - x - 5) = (40 - x)$.
and that of father $(x - 5)$ years
$(x - 5)(40 - x) = 4(x - 5)$
$40x - x^2 - 200 + 5x = 4x - 20$
or, $41x - x^2 - 180 = 0$
$x = 36$.
$x^2 - 41x - 180 = 0$
$x^2 - (36 + 5)x + 180 = 0$
or, $x^2 - 36x - 5x + 180 = 0$
$x(x - 36) - 5(x - 36) = 0$
$(x - 36)(x - 5) = 0$
$x = 36 \mid x = 5$ unacceptable
Therefore, the present age of father and son are 36 years and 9 years respectively.

14. (*c*) : Let the circles x, y, z represent the musicians who can play guitar, violin and flute respectively.
P + Q + R + S + T + U + V = 120 ..... (1)
Number of musicians who can play all the three instruments = S = 5% of 120 = 6
S = 6 ..... (2)
Number of musicians who can play guitar only = P = 40 ..... (3)
Number of musicians who can play any two and only two of the instruments
= Q + T + U = 30 ..... (4)
Now, from equations (1), (2), (3) and (4) we get
P + Q + R + S + T + U + V = 120
P + (Q + T + U) + S + R + V = 120
40 + 30 + 6 + R + V = 120
R + V = 120 – 76
= 44
Total number of musicians who can play violin alone or flute alone
= (R + V)
= 44

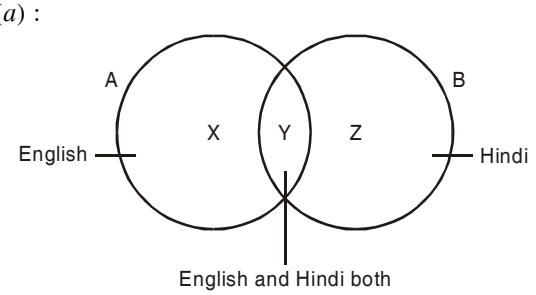


15. (*c*) : Let circles x, y and z represent persons who can speak Tamil, Hindi and Gujarati respectively.
Persons who speak Tamil
= A + B + D + E = 6 ... (1)
Persons who speak Hindi
= B + C + E + F = 15 ... (2)
Persons who speak Gujarati
= D + E + F + G = 6 ... (3)
Persons who speak two languages



= B + D + F = 2 ... (4)
Persons who speak all the three language
= E = 1 ... (5)
Substituting the value of E in equations (1), (2) and (3) we get
A + B + D = 5 ... (6)
B + C + F = 14 ... (7)
D + F + G = 5 ... (8)
Subtracting (4) from (6), we get
A – F = 3 ... (9)
Adding (7) and (8) we get
B + C + 2F + D + G = 19 ... (10)
Adding (9) and (10) we get
A + B + C + D + F + G = 22 ... (11)
Adding (5) and (11) we get
A + B + C + D + E + F + G = 23 ... (12)
Therefore, total number of person = 23.

16. (*a*) :



Circle A and B represent the students who speak English and Hindi respectively. Now as per information given in the question total number of students
$= x + y + z = 50$ ... (1)
$y = 10$ ... (2)
$x + y = 21$ ... (3)
From (2) and (3) $x = 11$
Number of students who can speak Hindi is $(y + z)$

From (1) we get

$y + z = 50 - 11 = 39$ ... (4)

Now, number of students who can speak Hindi only is z.

From (4), $y + z = 39$, $z = 39 - y = 39 - 10 = 29$

Therefore, number of the students speaking Hindi = 39, number of students speaking Hindi only = 29 and number of students speaking English only = 11.

17. (*c*) : 'All but nine died' means 'All except nine died'. It means that nine sheep remained alive and other died.

18. (*c*) : Let Chandravati's age 10 years ago be x year mother's age 10 yeags ago was $4x$ year.

After ten year, or after 20 years when Chandravati's age was 10 years.

$(4x + 20) = 2(x + 20)$

$4x + 20 = 2x + 40$

$2x = 20$

or, $x = 10$ years

Present age of Chandravati = 20 years.

19. (*b*) : Let the present age of Pushpa be x year. The present age of Rita would be $(x - 2)$ year.

Now as per question, $x = 2(x - 2 - 2)$

or, $x = 2x - 8$

or, $x = 8$

Therefore, present age of Pushpa is 8 years.

20. (*b*) : Let the present age of the son be x years then, the age of Sohanlal would be $4x$ years. Four years later their age would be $(x + 4)$ and $(4x + 4)$ years.

Now, as per questions,

$(x + 4) + (4x + 4) = 43$ years

$5x + 8 = 43$ years

$5x = 35$ years

or, $x = 7$ years.

Therefore, the present age of son is 7 years.

21. (*b*) : Let the present age of the elder persons be x years.

then, the present age of the younger person

$= (x - 10)$ years.

$(x - 15) = 2(x - 10 - 15)$

or, $x = 35$ years.

$\therefore$ The present age of the elder person is 35 years.

22. (*d*) : From the diagram it is clear that number of candidates who failed in at least two subjects = number of candidates who failed in two or more subjects.

$= (10 + 12 + 12 + 5) = 39$

Therefore, required percentage

$$\left(\frac{39}{500} \times 100\right)\% = 7.8\%$$

Therefore, option (*d*) is our answer.

23. (*a*) : Let the age of the father be x, then the age of the son would be $(56 - x)$.

After four years, the age of father would be $(x + 4)$ and that of son would be $(56 - x + 4)$

Now from the information given in the questions.

We have

$(x + 4) = 3(56 - x + 4)$

$x + 4 = 168 - 3x + 12$

$4x = 168 + 12 - 4 = 176$

$x = 44$ years

Therefore, the age of father and son is 44 years and 12 years respectively.

24. (*c*) : Let the number of girls be x, then from the question it is clear that number of boys are $3x$.

Therefore, total number of students

= Number of Boys + Numbers of girls $= x + 3x = 4x$.

Now, the total number of children in the class must be a multiple of 4.

Out of the four options (c) does not qualify this condition. Hence 42 does not represent the total number of children in the class.

25. (*c*) : Let the present age of B be x years

The present age of A would be $(x + 9)$ years.

After ten years the age of A would be $(x + 9 + 10) = (x + 19)$ years. and before ten years the age of B was $(x - 10)$ years.

Now from the information given in the question,

$(x + 19) = 2(x - 10)$

$x + 19 = 2x - 20$

$x = 19 + 20 = 39$ years.

CHAPTER 7

Problem Solving

Number problems consists of number sequences, problems with algebraic expressions, mathematical calculations and other compatiable problems.

SOLVED EXAMPLES

1. How many such 7s are there in the following number sequence which are immediately followed by 4 but not immediately preceded by 8?

5 4 7 8 9 7 4 3 8 7 5 7 4 8 7 4 1 2 7 4 5 7 9 4

(a) Two (b) Three (c) Four (d) Five (e) None of these

Ans. (b) : Number of 7s which are immediately followed by 4 but not immediately preceded by 8 are :

5 4 7 8 9 7 4 3 8 7 5 7 4 8 7 4 1 2 7 4 5 7 9 4

1 2 3

2. A number is 9 times twice the other number. The sum of two numbers is 133. The two numbers are :

(a) 9, 124 (b) 11, 122 (c) 17, 166 (d) 7, 126 (e) 27, 136

Ans. (d) : If the smaller number is x, then

$$x + (2x \times 9) = 133$$
$$x + 18x = 133$$
$$19x = 133$$
$$x = 133 \div 19 = 7$$

If one number is 7, the other number is :

$$133 - 7 = 126$$

3. If all the numbers from 1 to 28 which are exactly divisible by 3 are arranged in descending order, which would come at the sixth place from the top?

(a) 12 (b) 21 (c) 15 (d) 18 (e) 24

Ans. (a) : The numbers divisible by 3 in descending order are : 27, 24, 21, 18, 15, 12, 9, 6, 3 and the number at the sixth place is 12.

MULTIPLE CHOICE QUESTIONS

1. How many 6's are there in the following series of numbers which are preceded by 7 but not immediately followed by 9?

6 7 9 5 6 9 7 6 8 7 6 7 8 6 9 4 6 7 7 6 9 5 7 6 3

(a) One (b) Two

(c) Three (d) Four

2. In a chess tournament each of six players will play every other player exactly once. How many matches will be played during the tournament?

(a) 12 (b) 15

(c) 30 (d) 36

3. How many 4's are there in the following series which are preceded by 7, but are not preceded by 8?

3 4 5 7 4 3 7 4 8 5 4 3 7 4 9 8 4 7 2 7 4 1 3 6
(a) 1 (b) 2
(c) 3 (d) 4

4. How many even numbers are there in the following series of numbers, each of which is immediately preceded by an odd number, but not immediately followed by an even number?

5 3 4 8 9 7 1 6 5 3 2 9 8 4 3 5
(a) Nil (b) 1
(c) 2 (d) 3

5. If all the numbers from 1 to 51 which are exactly divisible by 3 are arranged in descending order, which of the following numbers will come at the seventh and tenth places from the top?
(a) 33 & 27 (b) 33 & 21
(c) 21 & 30 (d) 33 & 24

6. Nitin was counting down from 32. Shasank was counting upwards, the numbers starting from 1 and he was calling out only the odd numbers. Which common number will they call out at the same time if they were calling out at the same speed?
(a) 21
(b) 22
(c) 19
(d) They will not call out the same number

7. In the following list of numerals, how many 3s are followed by 3, but NOT preceded by 3?

2 4 6 3 3 1 5 7 8 3 3 3 4 6 2 3 3 3 3 9 7 2 3
(a) 1 (b) 2
(c) 3 (d) 4

8. If in a given number 5 8 9 4 3 2 7 6 1 4, we interchange the first and the second digits, the third and the fourth, the fifth and the sixth and so on, then counting from the right end, which digit will be sixth?
(a) 3 (b) 2
(c) 4 (d) 5

9. Aparna cuts a cake into two halves and cuts one-half into smaller pieces of equal size. Each of the small pieces is twenty grams in weight. If she has seven pieces of the cake in all with her, how heavy was the original cake?
(a) 140 grams (b) 280 grams
(c) 240 grams (d) 120 grams

10. In the following number sequence how many such even numbers are there which are exactly divisible by its immediate preceding number but not exactly divisible by its immediate following number?

3 8 4 1 5 7 2 8 3 4 8 9 3 9 4 2 1 5 8 2
(a) Two (b) Three
(c) Four (d) More than four

11. How many 7s are there in the following series which are not immediately followed by 3 but immediately preceded by 8?

8 9 8 7 6 2 2 6 3 2 6 9 7 3 2 8 7 2 7 7 8
7 3 7 7 9 4
(a) Nil (b) One
(c) Two (d) Three

12. How many 9's are there in the following sequence which are neither preceded by 6 nor immediately followed by 3?

9 3 8 6 9 9 5 9 3 7 8 9 9 9 3 9 6 3 9
(a) One (b) Two
(c) Three (d) Four

13. If a number is five times as great as another number which is four less than forty, then the number is :
(a) 220 (b) 180
(c) 144 (d) 200

14. If 2/3rd of a number is 96, what will be the 3/4th of that number?
(a) 108 (b) 198
(c) 128 (d) 48

15. If such numbers which are divisible by 5, and also those which have 5 as one of the digits are eliminated from the numbers 1 to 60, how many numbers would remain?
(a) 53 (b) 47
(c) 40 (d) 45

16. How many 8's are there in the following number series which are exactly divisible by its immediately preceding and also exactly divisible by immediately succeeding numbers?

8 2 4 5 1 7 2 8 4 8 4 2 2 8 2 6 9 8 4 5 4 8
3 2 8 4 3 1 8 3
(a) 1 (b) 2
(c) 3 (d) 4

17. Jagan was to either get one-seventh of a milk chocolate or one-fourteenth of a bigger fruit chocolate. Which chocolate would give him the larger piece if the fruit chocolate is three times as large as the milk chocolate?
(a) Milk chocolate
(b) Fruit chocolate
(c) The pieces will be of the same size
(d) Information inadequate

18. How many such 3's are there in the following number sequence which are immediately preceded by an odd number and immediately followed by an even number?

5 3 8 9 4 3 7 2 3 8 1 3 8 4 2 3 5 7 3 4 2 3 6
(a) One (b) Two
(c) Three (d) Four

19. Count each 7 which is not immediately preceded by 5 but is immediately followed by either 2 or 3. How many such 7's are there?

5 7 2 6 5 7 3 8 3 7 3 2 5 7 2 7 3 4 8 2 6 7 8

(a) 2 (b) 3
(c) 4 (d) 5

20. A number is four less than two times the other number. If their difference is 21, what is the greater number?

(a) 50 (b) 46
(c) 31 (d) 21

EXPLANATORY ANSWERS

1. (c) : 6 7 9 5 6 9 7 6 8 7 6 7 8 6 9 4 6 7 7 6 9 5 7 6 3
(1) (2) (3)

2. (b) : When all the players have to play with each other then the method of calculating the number of matches to be played is $\frac{n(n-1)}{2}$ where 'n' is the number of players playing the match. So, the number of matches played will be :
$(6 \times 5) \div 2 = 30 \div 2 = 15$

3. (*d*) : 3 4 5 7 4 3 7 4 8 5 4 3 7 4 9 8 4 7 2 7 4 1 3 6
(1) (2) (3) (4)

4. (c) : 5 3 4 8 9 7 1 6 5 3 2 9 8 4 3 5
(1) (2)

5. (*d*) : The numbers divisible by 3 in descending order are:
51, 48, 45, 42, 39, 36, 33, 30, 27, 24, 21,
(7th) (10th)
18, 15, 12, 9, 6, 3.

6. (d) : When Nitin is on count 22, Shasank is on 21 and when Nitin is on count 21, Shasank is on 23.

7. (c) : 2 4 6 3 3 1 5 7 8 3 3 3 4 6 2 3 3 3 3 9 7 2 3
(1) (2) (3)

8. (b) : The new number after interchanging the digits is :
8 5 4 9 2 3 6 7 4 1
(6th)

9. (c) : There is one bigger piece and six smaller pieces. One small piece weighs 20 gm. Total weight of six smaller speices is 120 gm.
∴ Weight of the bigger piece = 120 gm
∴ Weight of the original cake = 240 gm

10. (a) : 3 8 4 1 5 7 2 8 3 4 8 9 3 9 4 2 1 5 8 2
(1) (2)

11. (*c*) : 8987622632697328727787377 94
(1) (2)

12. (d) : 9 3 8 6 9 9 5 9 3 7 8 9 9 9 3 9 6 3 9
(1) (2) (3) (4)

13. (b) : Number four less than forty is 40 – 4 = 36
Five times the number is = 36 × 5 =180

14. (a) : If the number is x, then

$$\frac{2}{3}x = 96$$

$$x = \frac{96 \times 3}{2} = 144$$

$\frac{3}{4}$th of the number is $144 \times \frac{3}{4} = 108$

15. (c) : The eliminated twenty numbers are : 5, 10, 15, 20, 25, 30, 35, 40, 45 and 50 to 60. The remaining numbers are 60 – 20 = 40.

16. (d) : 8 2 4 5 1 7 2 8 4 8 4 2 2 8 2 6 9 8 4 5 4 8
(1) (2) (3)
3 2 8 4 3 1 8 3
(4)

17. (b) : If fruit chocolate (F) is equal to three times as milk chocolate (M) then —

$$F = 3M$$

or $$\frac{F}{M} = 3$$

$$\therefore \frac{1/14\ F}{1/7\ M} = \frac{3/14}{1/7}$$

When 3/14 > 1/7, then F (Fruit chocolate) will give him the larger piece.

18. (c) : 5 3 8 9 4 3 7 2 3 8 1 3 8 4 2 3 5 7 3 4 2 3 6
(1) (2) (3)

19. (a) : 5 7 2 6 5 7 3 8 3 7 3 2 5 7 2 7 3 4 8 2 6 7 8
(1) (2)

20. (b) : If smaller number is x, then

$$(2x - 4) - x = 21$$
$$2x - x = 21 + 4$$
$$x = 25$$

The greater number is

$$(25 \times 2) - 4 = 46$$

CHAPTER 8

Numerical Operations/ Symbol Substitution

Questions in this category are easy to attempt. Candidates must be quick in substituting symbols and calculations. The common pattern of questions asked are given below.

SOLVED EXAMPLES

1. If '+' stands for '×'; '×' stands for '÷'; '÷' stands for '–' and '–' stands for '+' then
$2 - 8 \times 2 + 6 \div 7 = ?$
(*a*) 32 (*b*) 19 (*c*) 23 (*d*) 9

Ans. (*b*) : After substituting the symbols in the given expression the new expression will be :
$2 + 8 \div 2 \times 6 - 7$
The solving steps will be :
$2 + 4 \times 6 - 7$
$2 + 24 - 7$
$26 - 7 = 19$

2. If ▲ stands for '+'
■ stands for '–'
● stands for '÷'
⁕ stands for '×' then
13 ▲ 5 ⁕ 20 ● 10 ■ 9 = ?
(*a*) 26 (*b*) 37 (*c*) 14 (*d*) 55

Ans. (*c*) : After substituting the symbols the new expression will be :
$13 + 5 \times 20 \div 10 - 9$
The solving steps will be :
$13 + 5 \times 2 - 9$
$13 + 10 - 9$
$23 - 9 = 14$

MULTIPLE CHOICE QUESTIONS

Directions : *Each of the following questions is followed by four alternatives. Select the most appropriate answer.*

1. If "+" means "–"; "–" means "×"; "×"means "÷" and "÷" means "+", then
$15 \times 5 \div 10 + 5 - 3 = ?$
(*a*) 9.5 (*b*) 0
(*c*) – 2 (*d*) 24

2. If "+" means "–"; "–" means "×"; "×"means "÷" and "÷" means "+", then
$15 \times 3 \div 15 + 5 - 2 = ?$
(*a*) 0 (*b*) 10
(*c*) 20 (*d*) 6

3. If "+" means "÷"; "×" means "–"; "÷"means "+" and "–" means "×", then
$16 \div 8 \times 6 - 2 + 12 = ?$
(*a*) 22 (*b*) 24
(*c*) 23 (*d*) 20

4. If "+" means "×"; "–" means "÷"; "÷"means "+" and "×" means "–", then what will be the value of $20 \div 40 - 4 \times 5 + 6 = ?$
(*a*) 60 (*b*) 1.67
(*c*) 150 (*d*) 0

5. If "+" means "×"; "–" means "÷"; "×"means "–" and "÷" means "+", then
$5 + 8 - 4 \times 2 \div 9 = ?$
(*a*) 15 (*b*) 13
(*c*) 17 (*d*) 11

6. If × stand for addition, ÷ stands for subtraction, + stands for multiplication and – stands for division, then $(20 \times 6 \div 6 \times 4)$ is equal to
(*a*) 5 (*b*) 24
(*c*) 25 (*d*) 80

7. If "+" means "×"; "÷" means "–"; "×"means "÷" and "–" means "+", what will be the value of the following expression?
$4 + 11 \div 5 - 50 = ?$
(*a*) 79 (*b*) –11
(*c*) 91 (*d*) 89

8. If "+" means "÷"; "÷" means "–"; "–"means "×" and "×" means "+", then
$10 \div 2 - 15 + 3 \times 5 = ?$
(*a*) 10 (*b*) 15
(*c*) 25 (*d*) 5

9. If A stands for add, B for subtract, C for multiply and D for divide, then for what does 4A 3B 3A 2 stand?
(*a*) 2 (*b*) 4
(*c*) 6 (*d*) 8

10. If × stands for add, *y* stands for subract, *z* stands for divide and *p* stands for multiply, then what is the the value of (7 p 3) y 6 × 5?
(*a*) 5 (*b*) 10
(*c*) 15 (*d*) 20

11. If "+" means "÷"; "÷" means "–"; "–"means "×" and "×" means "+", what will be the value of $8 + 2 \div 3 - 4 \times 6 = ?$
(*a*) –2 (*b*) $-15\frac{1}{3}$
(*c*) 12 (*d*) 15

12. If "+" means "÷"; "×" means "–"; "÷"means "×" and "–" means "+", what will be the value of the following expression?
$9 + 3 \div 4 - 8 \times 2 = ?$
(*a*) $6\frac{3}{4}$ (*b*) $-1\frac{3}{4}$
(*c*) $-6\frac{1}{4}$ (*d*) 18

13. If "–" means "÷"; "+" means "×"; "÷"means "–" and "×" means "+", then which of the following must be true?
(*a*) $1 \div 2 + 3 \times 6 - 8 = 12$
(*b*) $2 + 3 - 5 \times 8 \div 4 = 7$
(*c*) $5 + 6 \times 8 - 2 \div 3 = 31$
(*d*) $6 \div 1 + 2 - 8 \times 4 = 31$

14. If "÷" means "+"; "+" means "×"; "–"means "÷" and "×" means "–", then
$5 + 8 - 4 \times 2 \div 9 = ?$
(*a*) 13 (*b*) 15
(*c*) 11 (*d*) 17

EXPLANATORY ANSWERS

1. (*c*) : $15 \div 5 + 10 - 5 \times 3$
$3 + 10 - 15 = -2$

2. (*b*) : $15 \div 3 + 15 - 5 \times 2$
$5 + 15 - 10 = 10$

3. (*c*) : $16 + 8 - 6 \times 2 \div 12$
$16 + 8 - 1 = 23$

4. (*d*) : $20 + 40 \div 4 - 5 \times 6$
$20 + 10 - 30 = 0$

5. (*c*) : $5 \times 8 \div 4 - 2 + 9$
$10 - 2 + 9 = 17$

6. (*b*) : $20 + 6 - 6 + 4 = 24$

7. (*d*) : $4 \times 11 - 5 + 50$
$44 - 5 + 50 = 89$

8. (*d*) : $10 - 2 \times 15 \div 3 + 5$
$10 - 10 + 5 = 5$

9. (*c*) : $4 + 3 - 3 + 2 = 6$

10. (*d*) : $(7 \times 3) - 6 + 5$
$21 - 6 + 5 = 20$

11. (*a*) : $8 \div 2 - 3 \times 4 + 6$
$4 - 12 + 6 = -2$

12. (*d*) : $9 \div 3 \times 4 + 8 - 2$
$12 + 8 - 2 = 18$

13. (*c*) : (*a*) $1 - 2 \times 3 + 6 \div 8 = 12 \Rightarrow \frac{-17}{4} = 12$
(*b*) $2 \times 3 \div 5 + 8 - 4 = 7 \Rightarrow \frac{26}{5} = 7$
(*c*) $5 \times 6 + 8 \div 2 - 3 = 31 \Rightarrow 31 = 31$
(*d*) $6 - 1 \times 2 \div 8 + 4 = 31 \Rightarrow \frac{-39}{4} = 31$

14. (*d*) : $5 \times 8 \div 4 - 2 + 9$
$10 - 2 + 9 = 17$

CHAPTER 9

Word Building

These are spellings, word order and dictionary related questions. The candidate is given a word and asked to select the word that can/cannot be formed from its spellings. He/she may be asked to decide the meaningful order of the given words. He/she may also be asked to arrange the given words in the sequence in which they occur in the dictionary.

MULTIPLE CHOICE QUESTIONS

Directions (Qs. No. 1 to 12): *From the given alternatives select the word which* ***cannot*** *be formed using the letters of the given word.*

1. REPUBLICAN
(*a*) CLIP (*b*) PURE
(*c*) ANKLE (*d*) BANE

2. ESTRANGE
(*a*) GENERATE (*b*) SERGEANT
(*c*) REAGENTS (*d*) GREAT

3. DETERMINATION
(*a*) DETENTION (*b*) DESTINATION
(*c*) TERMINATE (*d*) DOMINATE

4. CHRISTMAS
(*a*) CHRIST (*b*) SMART
(*c*) CRUST (*d*) HARM

5. LEGALIZATION
(*a*) ALERT (*b*) ALEGATION
(*c*) GALLANT (*d*) NATAL

6. CHARACTER
(*a*) CRATE (*b*) CHARTER
(*c*) HEARTY (*d*) TRACER

7. ADMINISTRATION
(*a*) Station (*b*) Minister
(*c*) Ration (*d*) Mind

8. ORGANISATION
(*a*) ORGAN (*b*) ORGANISE
(*c*) NATION (*d*) ORATION

9. PERAMBULATOR
(*a*) RAMPANT
(*b*) LABOUR
(*c*) MARBLE
(*d*) RAMBLE

10. POSSESSION
(*a*) SESSION
(*b*) POSE
(*c*) POISE
(*d*) OBSESS

11. PRINTINGS
(*a*) SAINT (*b*) PRINT
(*c*) STING (*d*) RINGS

12. QUALIFICATION
(*a*) LIAR (*b*) FIAT
(*c*) LION (*d*) FICTION

13. From the given alternatives select the word which can be formed using the letters given in the word.
ULTRANATIONALISM
(*a*) ULTRAMONTANE
(*b*) ULTRAMODERN
(*c*) ULTRAIST
(*d*) ULULATE

14. A meaningful word starting with R is made from the first, second, fourth, fifth and eighth letters of the word CREATIVE. Which of the following is the middle letter of the word?
(*a*) E (*b*) T
(*c*) C (*d*) A

Directions (Qs. No. 15 to 18): *Which one of the given responses would be a meaningful order of the following words?*

15. 1. Amoeba 2. Oyster
3. Worm 4. Cow
(*a*) 1, 3, 2, 4 (*b*) 1, 2, 3, 4
(*c*) 4, 3, 2, 1 (*d*) 3, 2, 4, 1

16. 1. Birth 2. Death
3. Childhood 4. Infancy
5. Adolescence 6. Adulthood
7. Old age
(*a*) 2, 6, 7, 5, 4, 3, 1 (*b*) 1, 4, 3, 5, 6, 7, 2
(*c*) 1, 4, 3, 6, 5, 7, 2 (*d*) 2, 7, 6, 4, 5, 3, 1

17. 1. Police 2. Punishment
3. Crime 4. Judge
4. Judgement
(*a*) 3, 1, 2, 4, 5
(*b*) 1, 2, 4, 3, 5
(*c*) 5, 4, 3, 2, 1
(*d*) 3, 1, 4, 5, 2

18. 1. Orange 2. Indigo
3. Red 4. Blue
5. Green 6. Yellow
7. Violet
(*a*) 7, 2, 4, 5, 6, 1, 3 (*b*) 7, 2, 4, 6, 5, 1, 3
(*c*) 7, 2, 6, 4, 5, 1, 3 (*d*) 7, 2, 6, 4, 1, 5, 3

Directions (Qs. Nos. 19 and 24): *Arrange the given words in the sequence in which they occur in the dictionary.*

19. 1. Clone 2. Climate
3. Clutter 4. Create
5. Clapped
(*a*) 52143 (*b*) 51234
(*c*) 52134 (*d*) 53124

20. 1. Lasted 2. Loop
3. Lake 4. Litter
5. Listed
(*a*) 31542 B. 31254
(*c*) 31245 (*d*) 31452

21. 1. Intricate 2. Interview
3. Intransigent 4. Interrogation
5. Intravenous
(*a*) 2, 4, 5, 3, 1 (*b*) 5, 3, 1, 2, 4
(*c*) 4, 2, 3, 5, 1 (*d*) 3, 5, 2, 1, 4

22. 1. Forge 2. Forget
3. Forgo 4. Forgive
5. Format
(*a*) 1, 2, 4, 3, 5
(*b*) 5, 2, 4, 3, 1
(*c*) 1, 4, 3, 2, 5
(*d*) 3, 4, 5, 2, 1

23. 1. Forecast 2. Forget
3. Foreign 4. Forsook
5. Force
(*a*) 3, 5, 1, 2, 4 (*b*) 5, 1, 3, 2, 4
(*c*) 5, 1, 3, 4, 2 (*d*) 5, 1, 2, 3, 4

24. 1. Fenestration 2. Feather
3. Feed head 4. Feature
5. Feminine
(*a*) 2, 4, 3, 5, 1 (*b*) 4, 2, 3, 1, 5
(*c*) 2, 4, 1, 5, 3 (*d*) 4, 2, 3, 5, 1

25. Arrange the given words in the sequence in which they occur in the Dictionary and locate the last word.
(*a*) Frankenstein (*b*) Frankincense
(*c*) Frankalmoign (*d*) Frauendienst

26. Grouping of words are given. Choose the next word in the series from the given options.

AFGHAN, INDEFINITELY, SYNOPSIS, STUPENDOUS, BURST
(*a*) GLACIAL (*b*) COMPANION
(*c*) RESCRIPT (*d*) HIJACKER

ANSWERS

1	2	3	4	5	6	7	8	9	10
(*c*)	(*a*)	(*b*)	(*c*)	(*a*)	(*c*)	(*b*)	(*b*)	(*a*)	(*d*)
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
(*a*)	(*a*)	(*c*)	(*d*)	(*a*)	(*b*)	(*d*)	(*a*)	(*c*)	(*d*)
21	**22**	**23**	**24**	**25**	**26**				
(*c*)	(*a*)	(*b*)	(*a*)	(*d*)	(*d*)				

CHAPTER 10

Relationship Concept

While attempting questions on blood relations, one should be clear of all the relation patterns that can exist between any two individuals. These type of questions are given mainly to test one's relationship ability.

Very well known relations are :

Mother	Grandmother
Father	Grandfather
Son	Grandson
Daughter	Granddaughter
Brother	Brother-in-law
Sister	Sister-in-law
Niece	Father-in-law
Nephew	Mother-in-law
Uncle	Son-in-law
Aunt	Daughter-in-law
Husband	Cousin
Wife	

The patterns of some relationships which help in solving questions in these tests are :

Father's *or* Mother's Father	—	Grandfather (Paternal *or* Maternal)
Father's *or* Mother's Mother	—	Grandmother (Paternal *or* Maternal
Father's *or* Mother's Son	—	Brother
Father's *or* Mother's Daughter	—	Sister
Father's Brother	—	Paternal Uncle
Father's Sister	—	Paternal Aunt
Mother's Brother	—	Maternal Uncle
Mother's Sister	—	Maternal Aunt
Uncle *or* Aunt's Son *or* Daughter	—	Cousin
Son's Wife	—	Daughter-in-law
Daughter's Husband	—	Son-in-law
Husband's *or* Wife's Brother	—	Brother-in-law
Husband's *or* Wife's Sister	—	Sister-in-law
Brother's Wife	—	Sister-in-law
Sister's Husband	—	Brother-in-law
Brother's Son	—	Nephew
Brother's Daughter	—	Niece

MULTIPLE CHOICE QUESTIONS

Directions : *In each of the following questions keenly study the relationship mentioned between the persons, and then from the given options select the right relationship as the answer.*

1. 'A' is the father of 'B' and 'C'. 'B' is the son of 'A' but 'C' is not the son of 'A'. What is 'C's' relation with 'A'?
(a) Daughter (b) Son
(c) Niece (d) Nephew

2. A lady said, "The person standing there is my grandfather's only son's daughter". How is the lady related to the standing person?
(a) Sister (b) Mother
(c) Aunt (d) Cousin

3. Ravi is the brother of Amit's son's son. What is Amit's relation to Ravi?
(a) Cousin (b) Father
(c) Grandfather (d) Son

4. Mayank said, "My mother is the sister of Rajat's brother." What is Rajat's relation with Mayank?
(a) Cousin (b) Maternal uncle
(c) Uncle (d) Brother-in-law

5. Introducing Lily, Raghav said, "Her father is my mother's only son". How is Lily related to Raghav?
(a) Aunt (b) Daughter
(c) Mother (d) Sister

6. Ajay is the brother of Vijay. Mili is the Sister of Ajay. Sanjay is the brother of Rahul and Mehul is the daughter of Vijay. Who is Sanjay's Uncle?
(a) Rahul (b) Ajay
(c) Mehul (d) Data inadequate

7. Adity is Bhavi's brother, Bharat is Jayant's father. Ella is Bhavi's mother. Aditya and Jayant are brothers. What is Ella's relationship with Bharat?
(a) Sister (b) Mother
(c) Daughter (d) Wife

8. A man introduced the boy coming with him as "He is son of the father of my wife's daughter". What relation did the boy bear to the man?
(a) Son-in-law (b) Son
(c) Brother (d) Father

9. A and B are two brothers. C is sister of B. D is sister of E. E is son of A. Who is D's uncle?
(a) D (b) E
(c) B (d) C

10. Varun said pointing towards Arun, "He is my sister's only brother's son". How is Arun related to Varun?
(a) Son (b) Brother
(c) Nephew (d) Data insufficient

11. Pointing to a man, a lady said, "His brother's father is my grandfather's only son." How is the lady related to the man?
(a) Mother (b) Sister
(c) Daughter (d) Aunt

12. Vidya is the wife of Gopi and Gopi is the brother of Akhil. Akhil is the uncle of Vijay. What is Vijay's relation with Vidya?
(a) Son (b) Nephew
(c) Brother-in-law (d) Brother

13. If Amit's father is Billoo's father's only son and Billoo has neither a brother nor a daughter, what is the relationship between Amit and Billoo?
(a) Uncle - Nephew
(b) Father- Daughter
(c) Father - Son
(d) Cousins

14. A is the sister of B. B is the son of C, and E is the daughter of D, and sister of A. What is D to C?
(a) Brother (b) Husband
(c) Wife (d) Data is inadequate

15. A Man said to a lady, "Fagu's mother is the only daughter of your father". How is the lady related to Fagu?
(a) Daughter (b) Sister
(c) Wife (d) Mother

16. Pointing to a man, a woman said, "He is the only son of my mother's mother". How is the woman related to the man?
(a) Aunt (b) Daughter
(c) Niece (d) Sister

17. If B's mother was A's mother's daughter, how was A related to B?
(a) Uncle (b) Aunt
(c) Sister (d) Data is insufficient

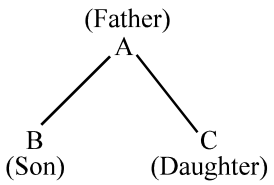
18. Pointing to a woman in the photograph a man said, "She is the daughter of my grandmother's only son. How is the woman related to the man?
(a) Mother (b) Daughter
(c) Sister-in-law (d) Sister

19. A man and a woman are sitting in a room. Man's mother-in-law and woman's mother-in-law are mother and daughter respectively. Man is the ..... of the woman.
(a) Father (b) Father-in-law
(c) Uncle (d) Grandfather-in-law

20. Pointing to Suman, Amit said, "He is my sister's only brother's son". How is Suman related to Amit?
(a) Grandson
(b) Son
(c) Nephew
(d) Cannot be determined

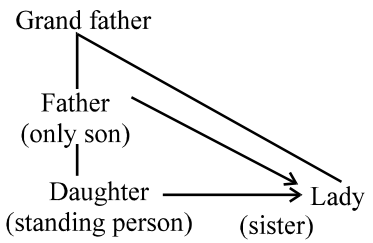
EXPLANATORY ANSWERS

1. (a) :



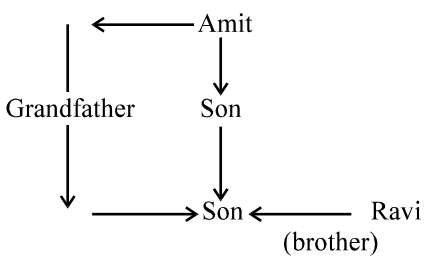
'C' is not the son of 'A', but 'A' is the father of 'C'. So, 'C' is the daughter of 'A'.

2. (a) :



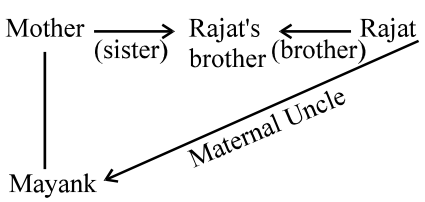
Lady's grandfather's son is lady's father and father's daughter will only be lady's sister.

3. (c) :



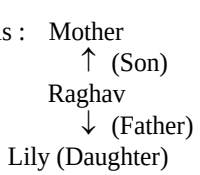
Amit's son's son is Amit's grandson. Ravi is the brother of Amit's son's son. So, Amit is also the grandfather of Ravi.

4. (b) :



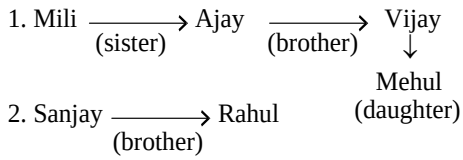
Mayank's mother is the sister of Rajat's brother. So Rajat is also the brother of Mayank's mother. Relation of the brother with his sister's child is maternal. So Rajat is Mayank's maternal uncle.

5. (b) : The relation is :



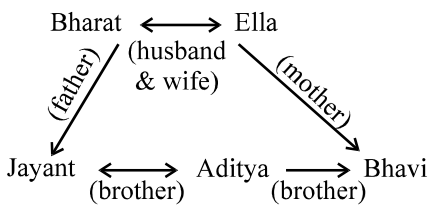
'My mother's only son' means Raghav himself. 'Her father' means Lily's father; i.e. Raghav and so, Lily is Raghav's daughter.

6. (d) :



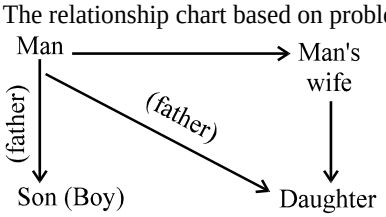
There are two sets of relationship. Information given is incomplete and no relation can be established between the two sets.

7. (d) : The relationship chart based on problem is :



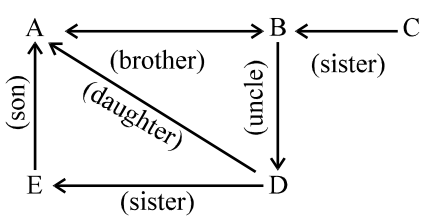
Jayant and Aditya are brothers. If Aditya is Bhavi's brother, then Jayant is also Bhavi's brother. If Bharat is Jayant's father, then he is also the father of Aditya and Bhavi. If Ella is Bhavi's mother, then she is also the mother of Aditya and Jayant. This means Bharat and Ella are husband and wife and the parents of three.

8. (b) : The relationship chart based on problem is :



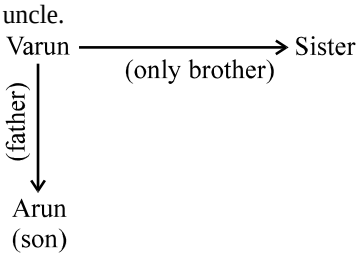
'Father of the man's wife's daughter' is the man himself and the boy in question is the man's son.

9. (c) : The relationship chart based on the problem is :



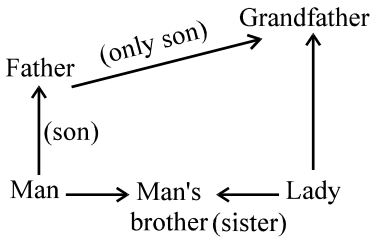
When D is sister of E, who is son of A then D is daughter of A. Brother of A is B and so, B is D's uncle.

10. (a) :



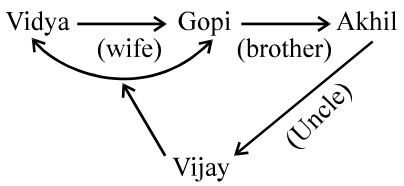
Varun's sister's only brother is Varun himself and Arun is his son.

11. (b) :



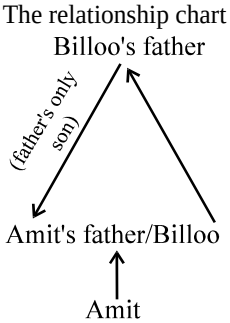
Man's brother's father is also the lady's father as he is the only son of lady's grandfather. So, the lady is man's sister.

12. (b) : The relationship chart based on problem is :



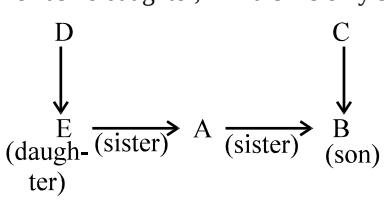
Vidya is wife of Gopi who is brother of Akhil. So, Vidya is sister-in-law of Akhil. If Akhil is uncle of Vijay then Gopi will naturally be the uncle of Vijay as it is not specified that any of the mentioned persons are Vijay's parents. Now, when Vijay is Gopi's nephew then he will also be Vidya's nephew.

13. (c) : The relationship chart based on problem is :



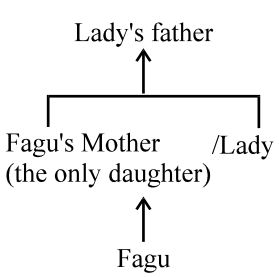
Amit's father is Billoo's father's only son means Billoo is the only son in question also, he is the father of Amit. It must be noted that Billoo has no brother which means he is single and also, when he has no daughter, Amit is his only son.

14. (d) :



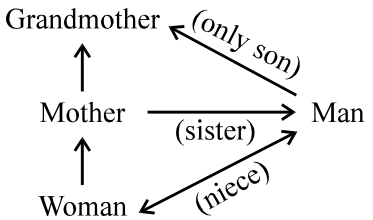
Information about 'D' and 'C' is not given as such no relation can be specified.

15. (d) :



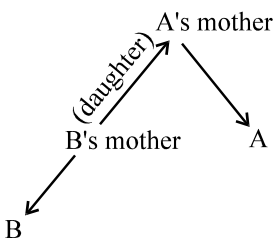
The only daughter of Lady's father is Fagu's mother.

16. (c) :



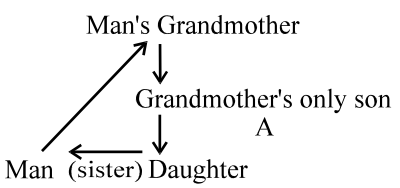
The man is the brother of the woman's mother. So, the woman is man's niece.

17. (d) :



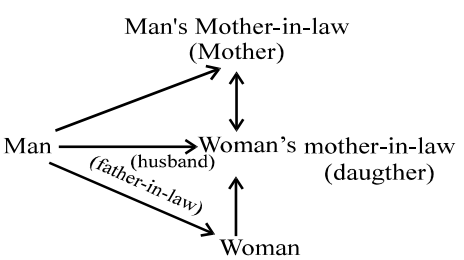
Sex of 'A' is not known. Either option A or B is correct.

18. (d) :



'My grandmother's only son' is the father of the man, and 'daughter of my grand-mother's only son' is the sister of the man.

19. (b) :



Woman's mother-in-law is the daughter of Man's mother-in-law. So, the man is the husband of woman's mother-in-law and the father-in-law of the woman.

20. (b) : Amit (only brother) ⟷ Amit's Sister

↓

Son (Suman)

'My sister's only brother's is Amit himself and 'Sister's only brother's son' is the son of Amit i.e., Suman is the son of Amit.

CHAPTER 11

Analysis

In these type of questions, a few statements are given. Certain facts are broken up and mentioned in these statements. What is required is to analyse the statements, arrange and sort out the given facts and then answer the questions related to the given statements.

SOLVED EXAMPLES

1. Icecream is as cold as snow. Ice is not as cold as hail. Flakes are not as cold as ice but colder than icecream. What is the coldest?

(a) Hail (b) Icecream (c) Flakes (d) Ice (e) Snow

Ans. (a) : The order showing an increase in coldness, is Icecream/Snow, Flakes, Ice, Hail.

2. *Read the following statements and answer the questions a and b.*

Five men Heavy, Fat, Thin, Short and Tall are running one behind the other. Of the Heavy and the Tall man one is an Artist and the other is Talkative. Thin man who is a Genius is in the centre. Short man is not Dark and the one who is Fair is ahead of Thin man. The Heavy man, who is not an Artist, is in front of the Fat man.

a. Who is Fair?

(a) Tall man (b) Fat man (c) Short man (d) Heavy man (e) Thin man

Ans. ***(b)***

b. What is the Tall Man?

(a) Genius (b) Talkative (c) Artist (d) Dark (e) Fair

Ans. (c)

The chart of the characteristics of five men is :

Heavy man is Talkative.

Fat man is Fair.

Thin man is Genious.

Short man is not Dark.

Tall man is the artist.

MULTIPLE CHOICE QUESTIONS

1. Among five friends, A is heavier than B; C is lighter than D; B is lighter than D but heavier than E. Who among them is the heaviest?

(a) B (b) C

(c) A (d) Can't say

2. Pune is bigger than Jhansi, Sitapur is bigger than Chittor. Raigarh is not as big as Jhansi, but is bigger than Sitapur. Chittor is not as big as Sitapur. Which is the smallest?

(a) Jhansi (b) Pune

(c) Chittor (d) Sitapur

3. Ajay works more than Ram. Alok works as much as Raju. Pankaj works less than Alok. Ram works more than Alok. Who works the most of all?

(a) Ajay (b) Ram
(c) Alok (d) Raju

4. Vipul is taller than Hans. Hans is taller than Anand. Alok is taller than Ashok. Ashok is taller than Hans. Who among them is the tallest?
(a) Vipul (b) Alok
(c) Ashok (d) Cannot be determined

5. Pramod is taller than Gopal. Gopal is shorter than Madhu. To find out who among them is the tallest, which of the following further informations is necessary?
(a) Madhu is taller than Gopal.
(b) Madhu is shorter than Pramod's brother
(c) Pramod is taller than Madhu.
(d) Pramod is taller than Madhu's brother.

6. Among five friends P, Q, R, S and T, who is the youngest? To arrive at the answer which of the following information given in the statements (A) and (B) is sufficient?
(A) R is younger than P and T.
(B) S is younger than Q.
(a) Only A alone is sufficient
(b) Either A or B is sufficient
(c) Both A and B together are needed
(d) Both A and B together are not sufficient

7. Sushma is richer than Rashmi whereas Anand is richer than Priya. Arun is as rich as Rashmi. Shoba is richer than Sushma.

Which of the following statements is correct according to the above propositions?
(a) Rashmi is poorer than Priya.
(b) Priya is richer than Arun
(c) Arun is poorer than Sushma.
(d) Anand is richer than Rashmi

8. A is elder to B while C and D are elder to E who lies between A and B. If C be elder to B, which one of the following statements is necessarily true?
(a) E is elder to B (b) A is elder to C
(c) C is elder to D (d) D is elder to C

9. Vikram is taller than Rajan but shorter than Annie. Jamal is taller than Annie. Sita is taller than Vikram. Rajan is shorter than Sita. Who is the shortest of all in the group?
(a) Sita (b) Rajan
(c) Vikram (d) Cannot be determined

10. Suresh is as much older than Kamal as he is younger than Prabodh. Navin is as old as Kamal. Which of the following statements is wrong?
(a) Suresh is older than Navin
(b) Kamal is younger than Suresh
(c) Prabodh is not the oldest
(d) Navin is younger than Prabodh

11. Ashok is heavier than Gopal. Mahesh is lighter than Jayesh. Prashant is heavier than Jayesh but lighter than Gopal. Who among them is the heaviest?
(a) Gopal
(b) Jayesh
(c) Prashant
(d) Ashok

12. Subodh's marks in English are as much more than Gopal's marks in History as less than Pramod's marks in English. To find out Subodh's marks in English, which of the following informations given in the statements (A) and (B) is/ are sufficient?
(A) Gopal's marks in History.
(B) Pramod's marks in History.
(a) Both A and B together are needed
(b) Only B is sufficient
(c) Either A or B is sufficient
(d) Both A and B together are not sufficient

13. Pramod is older than Jayesh and Sudhir. Vikas is younger than Anil. To find out who among them is the oldest, which of the following further information will be required, if any?
(a) Sudhir is older than Jayesh
(b) Anil is older than Jayesh
(c) Vikas is older than Pramod
(d) Vikas is younger than Pramod

14. Ashok is younger than Prabir and Gopal. Sohan is younger than Prabir but older than Gopal. Which of the following statements is definitely true?
(a) Ashok is older than Sohan
(b) Sohan is the oldest among them
(c) Gopal is younger than Ashok
(d) Gopal is next to the youngest among them

15. Among five boys, Vasant is taller than Manohar, but not as tall as Raju. Jayant is taller than Datta, but shorter than Manohar. Who is the tallest in their group?
(a) Raju
(b) Manohar
(c) Vasant
(d) Cannot be determined

16. A and D study in the same class. K and L study in the same class. In which class does D study? To answer the above question, which of the following informations given in the statements A and B is/are necessary?
(A) D studies one standard below L.
(B) A's elder brother studies with K.
(a) Both A and B together are not sufficient
(b) Both A and B together are needed
(c) Only A is sufficient
(d) Only B is sufficient

Directions (Qs. 17-18) : *(A) Gopal is shorter than Ashok but taller than Kuhav; (B) Navin is shorter than Kuhav; (C) Jayesh is taller than Navin; (D) Ashok is taller than Jayesh.*

17. Who among them is the tallest?
(a) Gopal (b) Ashok
(c) Jayesh (d) Navin

18. Which of the following informations is not necessary to answer the above question?
(a) A (b) B
(c) C (d) D

Directions (Qs. 19-20) : *Five men A, B, C, D and E read a newspaper. The one who reads first gives it to C. The one who reads last had taken from A. E was not the first or last to read. There were two readers between B and A.*

19. B passed the newspaper to whom?
(a) E (b) B
(c) A (d) None of these

20. Who read the newspaper last?
(a) E (b) B
(c) D (d) Cannot be determined

EXPLANATORY ANSWERS

1. (d) : The five friends in descending order of weight are : A/D, B/C, E or A/D, B, C/E. Either A or D is the heaviest.
2. (c) : The order of cities in descending order of size is : Pune, Jhansi, Raigarh, Sitapur, Chittor.
3. (a) : On the basis of doing work, the descending order will be : Ajay, Ram, Alok/Raju, Pankaj.
4. (d) : On the basis of height, the descending order will be Vipul/Alok, Ashok, Hans, Anand. Either Vipul or Alok is the tallest.
5. (c) : According to the information both Pramod and Madhu are taller than Gopal. Option (c) decides who is the tallest.
6. (d) : Statements are not inter-related.
7. (c) : On the basis of wealth, the descending order will be :
   1. Shobha, Sushma, Rashmi/Arun
   2. Anand, and Priya
   (The two statements are not inter-related.)
8. (a) : The order in descending seniority will be : A/C/D, E, B.
9. (b) : On the basis of height the descending order will be :
   Jamal/Sita, Annie, Vikram, Rajan.
   or
   Jamal, Sita/Annie, Vikram, Rajan.
10. (c) : On the basis of age the descending order will be : Prabodh, Suresh, Kamal/Navin.
11. (d) : On the basis of weight, the descending order will be : Ashok, Gopal, Prashant, Jayesh, Mahesh.
12. (d) : Comparison in marks do no clarify Subodh's marks in a subject.
13. (c) : On the basis of age the descending order will be :
   1. Pramod, Jayesh/ Sudhir
   and
   2. Anil, Vikas
   Option (c) connects these two statements.
14. (d) : On the basis of age the descending order will be : Prabir, Sohan, Gopal, Ashok.
15. (a) : The boys in descending order of height will be: Raju, Vasant, Manohar, Jayant, Datta.
16. (a) : There is no useful information in either of the two statements.
17. (b) : On the basis of height the descending order will be :
   Ashok, Gopal/Jayesh, Kuhav, Navin
   or
   Ashok, Gopal, Kuhav/Jayesh, Navin.
18. (c)
19. (d) : The men read the newspaper in this order : B, C, E, A, D, and B passed the newspaper to C.
20. (c) : See answer 19 explanation.

CHAPTER 12

Judgement

MULTIPLE CHOICE QUESTIONS

1. Eileen is planning a special birthday dinner for her husband's 35th birthday. She wants the evening to be memorable, but her husband is a simple man who would rather be in jeans at a baseball game than in a suit at a fancy restaurant. Which restaurant below should Eileen choose?

(*a*) Alfredo's offers fine Italian cuisine and an elegant Tuscan decor. Patrons will feel as though they've spent the evening in a luxurious Italian villa.

(*b*) Pancho's Mexican Buffet is an all-you-can-eat family style smorgasbord with the best tacos in town.

(*c*) The Parisian Bistro is a four-star French restaurant where guests are treated like royalty. Chef Dilbert Olay is famous for his beef bourguignon.

(*d*) Marty's serves delicious, hearty meals in a charming setting reminiscent of a baseball clubhouse in honor of the owner,Marty Lester, a former major league baseball all-star. Answer & Explanation

2. The film director wants an actress for the lead role of Lucy who perfectly fits the description that appears in the original screenplay. He is not willing to consider actresses who do not resemble the character as she is described in the screenplay, no matter how talented they are. The screenplay describes Lucy as an average-sized, forty something redhead, with deep brown eyes, very fair skin, and a brilliant smile. The casting agent has four actresses in mind.

1. Actress #1 is a stunning red-haired beauty who is 5'9" and in her mid-twenties. Her eyes are brown and she has an olive complexion.
2. has red hair, big brown eyes, and a fair complexion. She is in her mid-forties and is 5'5".
3. is 5'4" and of medium build. She has red hair, brown eyes, and is in her early forties.
4. is a blue-eyed redhead in her early thirties. She's of very slight build and stands at 5'.

(*a*) 1, 2 (*b*) 2, 3
(*c*) 1, 4 (*d*) 2, 4

3. The school principal has received complaints from parents about bullying in the school yard during recess. He wants to investigate and end this situation as soon as possible, so he has asked the recess aides to watch closely. Which situation should the recess aides report to the principal?

(*a*) A girl is sitting glumly on a bench reading a book and not interacting with her peers.

(*b*) Four girls are surrounding another girl and seem to have possession of her backpack.

(*c*) Two boys are playing a one-on-one game of basketball and are arguing over the last basket scored.

(*d*) Three boys are huddled over a handheld video game, which isn't supposed to be on school grounds. Answer & Explanation

4. Mrs. Carson took a taxi to meet her three friends for lunch. They were waiting for her outside the restaurant when she pulled up in the car. She was so excited to see her friends that she left her tote bag in the taxi. As the taxi pulled away, she and her friends took notice of the license plate number so they would be able to identify the car when they called the taxi company.

1. The four women seem to agree that the plate starts out with the letter J.
2. Three of them agree that the plate ends with 12L.
3. Three of them think that the second letter is X, and a different three think that the third letter is K.

The four license plate numbers below represent what each of the four women thinks she saw. Which one is most likely the license plate number of the taxi?

(*a*) JXK 12L (*b*) JYK 12L
(*c*) JXK 12I (*d*) JXX 12L

5. Zachary has invited his three buddies over to watch the basketball game on his wide-screen television. They are all hungry, but no one wants to leave to get food. Just as they are arguing about who should make the food run, a commercial comes on for a local pizze-ria that delivers. The phone number flashes on the screen briefly and they all try to remember it. By the time Zachary grabs a pen and paper, each of them recollects a different number.

1. All of the men agree that the first three numbers are 995.
2. Three of them agree that the fourth number is 9.
3. Three agree that the fifth number is 2.
4. Three agree that the sixth number is 6; three others agree that the seventh number is also 6.

Which of the numbers is most likely the telephone number of the pizzeria?

(*a*) 995-9266 (*b*) 995-9336
(*c*) 995-9268 (*d*) 995-8266

6. Mark is working with a realtor to find a location for the toy store he plans to open in his town. He is looking for a place that is either in, or not too far from, the center of town and one that would attract the right kind of foot traffic. Which of the following locations should Mark's realtor call to his attention?

(*a*) a storefront in a new high-rise building near the train station in the center of town whose occupants are mainly young, childless professionals who use the train to commute to their offices each day.
(*b*) a little shop three blocks away from the town's main street, located across the street from an elementary school and next door to an ice cream store
(*c*) a stand-alone storefront on a quiet residential street ten blocks away from the town's center
(*d*) a storefront in a small strip mall located on the outskirts of town that is also occupied by a pharmacy and a dry cleaner

7. The neighborhood block association has received many complaints about people knocking on doors and soliciting money for an unknown charity organization even though door-to-door solicitation is prohibited by local laws. Three residents have provided descriptions individuals who have come to their door asking for money.

Solicitor #1 is a white male, 20-25 years old, 5'9", 145 pounds, with very short brown hair. He was wearing a dark blue suit and carrying a brown leather briefcase.

Solicitor #2 is a white male, 25-30 years old, 6'2", 200 pounds, with a shaved-head. He was wearing a red T-shirt and jeans.

Solicitor #3 is a white male, approximately 23 years old, 5'10", slight build, with short brown hair. He was wearing a blue suit.

Three days after the block association meet- ing, a resident noticed a man knocking on doors in the neighborhood and phoned the police to report the illegal activity. This solic- itor was described as follows:

Solicitor #4 is a white male, 22 years old, 140 pounds, about 5'10", with short brown hair. He was carrying a briefcase and wearing a dark suit.

Based on this description, which of the three solicitations was also likely carried out by Solicitor #4?

(*a*) #1, #2, and #3
(*b*) #1, but not #2 and #3
(*c*) #1 and #3, but not #2
(*d*) #1 and #2, but not #3

8. Rita, an accomplished pastry chef who is well known for her artistic and exquisite wedding cakes, opened a bakery one year ago and is surprised that business has been so slow. A consultant she hired to conduct market research has reported that the local population doesn't think of her shop as one they would visit on a daily basis but rather a place they'd visit if they were celebrating a special occasion. Which of the following strategies should Rita employ to increase her daily business?

(*a*) making coupons available that entitle the coupon holder to receive a 25% discount on wedding, anniversary, or birthday cakes
(*b*) exhibiting at the next Bridal Expo and having pieces of one of her wedding cakes available for tasting
(*c*) placing a series of ads in the local newspaper that advertise the wide array of breads
(*d*) moving the bakery to the other side of town

9. Dr. Miller has a busy pediatric dentistry practice and she needs a skilled, reliable hygienist to keep things running smoothly. The last two people she hired were recommended by top dentists in the area, but they each lasted less than one month. She is now in desperate need of a hygienist who can

competently handle the specific challenges of her practice. Which one of the following candidates should Dr. Miller consider most seriously?

(*a*) Marilyn has been a hygienist for fifteen years, and her current employer, who is about to retire, says she is the best in the business. The clientele she has worked with consists of some of the wealthiest and most powerful citizens in the county.

(*b*) Lindy recently graduated at the top of her class from one of the best dental hygiene programs in the state. Prior to becoming a dental hygienist, Lindy spent two years working in a day care center.

(*c*) James has worked as a dental hygienist for three years in a public health clinic. He is very interested in securing a position in a private dental office.

(*d*) Kathy is an experienced and highly recommended dental hygienist who is also finishing up a degree in early childhood education, which she hopes will get her a job as a preschool teacher. She is eager to find a job in a pediatric practice, since she has always wanted to work with children.

10. Mrs. Jansen recently moved to Arizona. She wants to fill her new backyard with flowering plants. Although she is an experienced gardener, she isn't very well-versed in what plants will do well in the Arizona climate. Also, there is a big tree in her backyard making for shady conditions and she isn't sure what plants will thrive without much direct sunlight. Her favorite gardening catalog offers several backyard seed packages. Which one should Mrs. Jansen choose?

(*a*) The Rainbow Collection is ideal for North-east gardens. It includes a variety of colorful perennials that thrive in cool, moist conditions.

(*b*) The Greenhouse Collection will blossom year after year if planted in brightly lit locations and watered regularly.

(*c*) The Treehouse Collection will provide lush green plants with delicate colorful flowers that thrive in shady and partially shady locations.

(*d*) The Oasis Collection includes a variety of perennials that thrive in dry climates and bright sunlight.

EXPLANATORY ANSWERS

1.(*d*) : Since Eileen's husband does not enjoy fancy restaurants, choices a and c can be ruled out. Choice b, although casual, doesn't sound as though it would be the kind of special and memorable evening that Eileen is looking for. Choice d, which is owned by a former baseball star and is described as "charming" and "reminiscent of a baseball clubhouse", sounds perfect for Eileen's husband, who is described as a baseball fan and a man with simple tastes.

2.(*b*) : 2 and 3 possess most of the required traits. They both have red hair and brown eyes, are average-sized, and are in their forties. 1 is very tall and is only in her mid-twenties. She also has an olive complexion. 4 is of very slight build and is in her early thirties. She also has blue eyes.

3.(*b*) : Seeing four girls surrounding another girl, while in possession of her backpack, is the most suspicious of the incidents described.

4.(*a*) : The four women seem to agree that the plate starts out with the letter J. Three of them agree that the plate ends with 12L. Three of them think that the second letter is X, and a different three think that the third letter is K. The plate description that has all of these common elements is "Option A".

5.(*a*) : All of the men agree that the first three numbers are 995. Three of them agree that the fourth number is 9. Three agree that the fifth number is 2. Three agree that the sixth number is 6; three others agree that the seventh number is also 6. "Option A" is the best choice because it is made up of the numbers that most of the men agree they saw.

6.(*b*) : This option is both near the center of town and in a location (near a school and an ice cream store) where children and their parents are sure to be around. This is the only option that meets both of Mark's requirements.

7.(*c*) : The solicitor described as #2 has a shaved head and is much taller and heavier than the solicitors described as #1 and #3. Therefore, choices a and d, which include #2, can be ruled out. Solicitors #1, #3, and #4 have such similar descriptions that the correct answer is clearly choice c.

8.(*c*) : This is the only option that would encourage people to think of the bakery as a shop they would visit regularly and not just on special occasions.

9.(*b*) : The situation described indicates that Dr. Miller's practice presents some specific challenges, namely that it is a busy environment with a child clientele. There is also some indication that even highly recommended, experienced hygienists might not be cut out for Dr. Miller's office. There is nothing to suggest that Marilyn (choice a) or James (choice c) would be a good fit for Dr. Miller's practice. Kathy (choice d) has experience and she is also interested in working with children. However, the fact that she hopes to become a preschool teacher in the not-too-

distant future indicates that she might not be the kind of committed, long-term employee that Dr. Miller needs. Lindy (choice b), with her hands-on experience working with children as well as a degree from a prestigious dental hygiene program, is the most attractive candidate for the position based on the situation described

10.(c) : The Treehouse Collection is the only package that can thrive in shady locations. Choice a requires a Northeastern climate. Choices b and d require bright sunlight.

In this type of tests certain categories of information are given followed by certain criteria. Further, the candidates are given a few cause that needs to be analysed. They are required to take the right decision, from the given options, after comparing the information in each case with the given information and criteria.

DECISION MAKING

MULTIPLE CHOICE QUESTIONS

Directions (Qs. 1 to 5) : *Read the following information carefully and answer the questions given below it.*

Following are the criteria for admitting a student in the first year engineering course in a college.

The student must—

(i) have passed XII standard examination in science with at least 80% marks.

(ii) not be more than 20 years old as on 1. 8. 1998.

(iii) have secured at least 90 marks in the entrance test out of a total of 150 marks.

(iv) be able to pay Rs. 15,000 as tuition fees for the first semester and Rs. 5,000 admission charges at the time of taking admission.

In the case of a candidate, who satisfies all other criteria except at—

(a) *(iv)* above but can pay at least 60% of the stipulated fees, the case may be referred to the Admission Committee.

(b) *(iii)* above but has secured more than 95% marks in the XIIth standard examination, the case may be referred to Chairman–Admissions.

You are given the following cases as on 1. 8. 1998. Depending upon the information provided in each case and based on the criteria mentioned above, recommend your decision. You are not to assume anything. If the information provided is not adequate to take a decision, mark 'Data inadequate' as the answer.

1. Subodh Mohaptara was 19 years old as on 20th December, 1997. He has secured 98% marks in XIIth standard examination with science and 80 marks in the entrance test. He can pay the requisite tuition fees and admission charges.
(a) Admit
(b) Refer to Admission Committee
(c) Data inadequate
(d) Do not admit
(e) Refer to Chairman–Admissions

2. Reema Jaiswal was born on 20th July, 1978. She has secured 85% and 75% marks in XIIth standard with science and entrance test respectively. She can pay the requisite tuition fees and admission charges.
(a) Refer to Chairman–Admission
(b) Refer to Admission Committee
(c) Data inadequate
(d) Do not admit
(e) Admit

3. Ashok Dubey was born on 27th November, 1978. He has secured 90% marks in the XIIth standard examination with science and 95 marks in the entrance test. He can pay Rs. 10,000 tuition fees and Rs. 3,500 admission charges.
(a) Admit
(b) Data inadequate
(c) Refer to Admission Committee
(d) Do not admit
(e) Refer to Chairman–Admissions

4. Sudha Mirchandani has secured 95% marks in XIIth standard science stream and 70% marks in the entrance test. She can pay only 65% of the requisite tuition fees and admission charges.
(a) Do not admit
(b) Admit
(c) Data inadequate
(d) Refer to Chairman–Admissions
(e) Refer to Admission Committee

5. Salil Malhotra was born on 25th September in 1979. He has secured 85% and 95% marks in the XIIth standard examination in science stream and entrance test respectively. He can pay the requisite tuition fees and admission charges.
(a) Admit
(b) Do not admit
(c) Refer to Chairman–Admissions
(d) Refer to Admission Committee
(e) Data inadequate

Directions (Qs. 6 to 12) : *Read the following information to answer the given questions :*

Following are the criteria for selecting candidates for Research Fellowship :
The candidate must—

(i) be a post–graduate with minimum of 65% marks.
(ii) not be more than 30 years as on 15. 10. 1993.
(iii) have at least 3 years research experience.
(iv) have diploma in Statistics.
(v) have secured at least 50% marks in the entrance test.
(vi) have finalised the topic for research.

However, in case a candidate who fulfills all other criteria except

(a) (iii) above, but has M. Phil degree, should be referred to Dean.
(b) (iv) above, should be referred to Chairman.
(c) (i) above, but has at least 55% marks in post–graduation and 65% in the entrance test, should be given fellowship.
(d) (v) above, but has at lest 45% marks, should be wait–listed.

Based on these criteria and information provided below, decide the course of action in each case. You are not to assume anything. If the data provided is not adequate to decide the given course of action, your answer will be "data inadequate". These cases are given to you as on 15. 10. 1993.

6. 26 years old, Mamta Deo is a post graduate with 58%. She has got four years' research experience and has finalised topic for research. She got 70% marks in diploma in Statistics and 54% marks in the entrance examination.
(a) Fellowship not to be granted
(b) Refer to Dean
(c) Refer to Chairman
(d) Grant Fellowship
(e) Data inadequate

7. Shushila Nair has 65% marks in her post–graduation and is M. Phil. She has 5 years research experience. She has secured 65% in the entrance test and has finalised the research topic. Her date of birth is 11. 8. 65.
(a) Grant fellowship
(b) Wait–list
(c) Refer to Dean
(d) Refer to Chairman
(e) Data inadequate

8. Ameer Khan has got 58% in the entrance test. He has 68% in his post-graduation and 55% in M. Phil. He has got diploma in Statistics and has also finalised the topic for research.
(a) Grant Fellowship
(b) Refer to Dean
(c) Refer to Chairman
(d) Wait-list
(e) Data inadequate

9. 28 years old Neetu Singh is M. Phil with 60% marks. She has secured 70% marks in entrance examination and has finalised the topic for research. She has also got diploma in Statistics.
(a) Grant Fellowship
(b) Fellowship not to be granted
(c) Refer to Chairman
(d) Refer to Dean
(e) Data inadequate

10. Sadhana Suman has got diploma in Statistics with 60% marks and post-graduation with 56% marks. Her date of birth is 12. 12. 1968. She has got one year research experience and is still doing her M. Phil. She has secured 65% marks in entrance exam and has also finalised the research topic.
(a) Grant Fellowship
(b) Fellowship not to be granted
(c) Refer to Dean
(d) Data inadequate
(e) Wait-list

11. Amar Sikka is 28 years old and has got 65% marks in post-graduation and 60% marks in M. Phil. He has got 65% marks in entrance examination and has finalised the topic for research. He also has a diploma in Statistics.
(a) Grant Fellowship
(b) Fellowship not to be granted
(c) Refer to Dean
(d) Refer to Chairman
(e) Data inadequate

12. Madan Paul has got 5 years' research experience and has finalised the research topic. He has got 56% marks in post-graduation. His date of birth is 15. 2. 1966. He has also got diploma in Statistics. He got 70% marks in the entrance test.
(a) Grant Fellowship
(b) Fellowship not to be granted
(c) Refer to Dean
(d) Data inadequate
(e) None of these

Directions (Qs. 13 to 19) : *Read the following information to answer the given questions :*

Following are the conditions for selecting candidates for Research Fellowship :

The candidate must—

(i) be a post-graduate with minimum of 60% marks.
(ii) not be more than 30 years as on 1. 9. 1993.
(iii) have at least 3 years' research experience.

(iv) have diploma in statistics.

(v) have secured at least 55% marks in the entrance test.

(iv) have finalised the topic for research.

However, in the case of a candidate who fulfills all other criteria except—

(a) *(iii)* above but has M. Phil degree, should be given fellowship.

(b) *(iv)* above should be referred to Dean.

(c) *(i)* above but has atleast 55% marks in post–graduation, should be wait-listed.

(d) *(v)* above but has atleast 50% marks, should be referred to Chairman.

Based on these criteria and information provided below, decide the course of action in each case. You are not to assume anything. If the data provided is not adequate to decide the given course of action, your answer will be "data inadequate". These cases are given to you as on 1. 9. 1993.

13. Vijay Gupta is 24 years old and has got 58% marks in the entrance examination. He has secured 63% marks in his post-graduation and 55% marks in M. Phil. He has got diploma in Statistics and has also finalised the topic for research.
(a) Grant Fellowship
(b) Refer to Dean
(c) Refer to Chairman
(d) Wait-list
(e) Data inadequate

14. Ajoy Dwivedi has secured 65% marks in the post-graduation and has secured 5 years research experience. He has secured 65% marks in the entrance test and has finalised the research topic. His date of birth is 11. 8. 1965.
(a) Grant Fellowship
(b) Wait-list
(c) Refer to Dean
(d) Data inadequate
(e) None of these

15. Madan Soren has got diploma in Statistics with 60% marks and post-graduation with 56% marks. His date of birth is 12. 12. 1968. He has got 1 year research experience and is still doing his M. Phil. He has secured 60% marks in the entrance exam and has also finalised the research topic.
(a) Grant fellowship
(b) Fellowship not to be granted
(c) Refer to Dean
(d) Data inadequate
(e) Wait-list

16. 26 years old Mamta Kulkarni is M. Phil with 60% marks. She has secured 70% marks in the entrance examination and has finali-sed the topic for research. She has also got diploma in Statistics.
(a) Grant Fellowship
(b) Fellowship not to be granted
(c) Refer to Chairman
(d) Refer to Dean
(e) Data inadequate

17. Chander Manoj has got 5 years' research experience and has finalised the research topic. He has got 56% marks in post-graduation and 60% marks in the entrance test. His date of birth is 15. 2. 1966. He has also got diploma in Statistics.
(a) Grant Fellowship
(b) Fellowship not to be granted
(c) Refer to Dean
(d) Data inadequate
(e) None of these

18. Raman Hooda is 28 years old and has got 65% marks in Post-graduation and 60% marks in M. Phil. He has got 65% marks in the entrance examination and has finalised the topic for research. He also has a diploma in Statistics.
(a) Grant Fellowship
(b) Fellowship not to be granted
(c) Refer to Dean
(d) Refer to Chairman
(e) Data inadequate

19. 26 years old Janaki Deo is a post-graduate with 58% marks. She has got four years research experience and has finalised the topic for research. She got 70% marks in the diploma in Statistics and 54% marks in the entrance examination.
(a) Fellowship not to be granted
(b) Refer to Dean
(c) Refer to Chairman
(d) Grant Fellowship
(e) Data inadequate

Directions (Qs. 20 to 27) : *Read the following information carefully and answer the questions given below :*

Following are the criteria of promotion from Junior Officer's Cadre to Senior Officer's Cadre in an organisation :

The candidate must—

(a) have completed atleast 5 years in the organisation.

(b) have secured 65% marks in the written test for promotion.

(c) have secured 60% marks in the Group Discussion.

(d) have secured 70% marks in the interview.

(e) have good record of his work performance.

(f) have good communication skill and get along well with his colleagues.

(g) not be more than 40 years and less than 30 years as on 1. 9. 93.

(h) have good academic record with an average of at least 65% marks.

However, in the case of a candidate who—

(i) satisfies all other conditions except *(d)* above but has secured 75% marks in the written test and 65% marks in he Group Discussion, the case is to be referred to the General Manager (Personnel)–GM(P) for the decision.

(j) satisfies all other criteria except (*h*) above but has secured an average of more than 60% marks, the case is to be referred to the Managing Director (MD) of the organisation.

Now read the information provided in the case of each candidate in each of the questions given below and decide on the basis of the information provided and based on the above conditions, which of the courses of action you would suggest. These cases are given as on 5. 9. 1993. (Remember you are not to assume anything which is not provided in the question). If complete information is not provided, the answer would be Data inadequate.

20. 38 years old Rajesh has secured 65% marks in the written test for promotion, 73% marks in interview and 62% marks in Group Discussion. He has good record of his work performance, good communication skills and gets along well with his colleagues. He has good academic record with an average of 61% marks and has completed 7 years in the organisation.
(a) Refer to GM(P)
(b) Refer to MD
(c) Promote
(d) Do not promote
(e) Data inadequate

21. 34 years old Sudha has secured 60% marks in the written test for promotion, 72% marks in interview and 69% marks in Group discussion. She has good communication skill and gets along well with her colleagues. Her record of work performance is good and she has completed 6½ years in the organisation.
(a) Refer to MD
(b) Do not promote
(c) Refer to GM(P)
(d) Promote
(e) Data inadequate

22. Surekha has secured 70% marks in written test for promotion, 69% marks in Group Discussion and 72% marks in the interview. She has a good academic record with an average of 67% marks. She has good record of work performance and gets along well with her colleagues. She has good communication skill and has completed 7 years in the organisation.
(a) Do not promote
(b) Promote
(c) Refer to GM(P)
(d) Refer to MD
(e) Data inadequate

23. 39 years old Pawan has secured 66% marks in written promotion test and has a good academic record with an average of 62% marks. He has secured 65% marks in Group Discussion and 72% marks in interview. He has good record of his work performance, communication skill and gets along well with his colleagues. He has completed 6 years in the organisation.
(a) Do not promote
(b) Refer to MD
(c) Refer to GM(P)
(d) Promote
(e) Data inadequate

24. 34 years old Sudhir has secured 76% marks in the written test for promotion, 66% marks in Group Discussion and 67% marks in interview. He has good academic record with an average of 68% marks, good communication skill and gets along well with his colleagues. His work performance is good and he has completed 6 years in the organisation.
(a) Promote
(b) Refer to MD
(c) Refer to GM(P)
(d) Do not promote
(e) Data anadequate

25. 32 years old Manjula has good academic record with an average of 66% marks. She has secured 67% marks in Group Discussion, 75% marks in interview and 60% marks in written test for promotion. She has good communication skill and gets along well with her colleagues. She has good record of her work performance and has completed 7 years in the organisation.
(a) Do not promote
(b) Refer to MD
(c) Promote
(d) Refer to GM(P)
(e) Data inadequate

26. 31 years old Krishna secured 65% marks in written test for promotion, 72% marks in interview and 62% marks in Group Discussion. He has good academic record with an average of 67% marks and good communication skill. He has completed 9 years in the organisation. He gets easily annoyed and irritated with his colleagues and his record of work performance since the last two years is just average.
(a) Promote (b) Refer to GM(P)
(c) Refer to MD (d) Do not promote
(e) Data inadequate

27. 33 years old Neelima has secured 63% marks in Group Discussion, 71% marks in interview and 66% marks in written test for promotion. She hase good academic record with an average of 68% marks and has good communication skill. She gets along well with her colleagues and has good record of her work performance. She has completed 6 years in the organisation.

(a) Refer to GM(P)
(b) Do not promote
(c) Promote
(d) Refer to MD
(e) Data inadequate

EXPLANATORY ANSWERS

1. (e) : Criterion (iii) is not satisfied but Criterion (b) gives the decision.
2. (d) : Both Criterion (iii) and Criterion (b) are not satisfied.
3. (c) : Criterion (iv) is not satisfied but Criterion (a) gives the decision.
4. (c) : Criterion (ii) is not given.
5. (a)
6. (a) : Both Criterion (i) and Criterion (c) are not satisfied.
7. (d) : Criterion (iv) is not given but Criterion (b) gives the decision.
8. (e) : Both Criteria (ii) and (iii) are not given and Criterion (a) alone cannot give the decision.
9. (e) : Both Criterion (i) and Criterion (iii) are not given and criterion (a) alone cannot give the decision.
10. (b) : Both Criterion (iii) and Criterion (a) are not satisfied.
11. (c) : Criterion (iii) is not satisfied but Criterion (a) gives the decision.
12. (a) : Criterion (i) is not satisfied but Criterion (c) gives the decision.
13. (a) : Criterion (iii) is not satisfied but Criterion (a) gives the decision.
14. (c) : Criterion (iv) is not satisfied but Criterion (b) gives the decision.
15. (b) : Both Criterion (iii) and Criterion (a) are not satisfied.
16. (e) : Criterion (i) is not given and Criterion (c) is not satisfied.
17. (e) : Criterion (i) is not satisfied but Criterion (c) gives the decision of "wait–list." This option is not given.
18. (a) : Criterion (iii) is not satisfied but Criterion (a) gives the decision.
19. (a) : Both Criterion (i) and Criterion (iii) are not satisfied, Criterion (c) and Criterion (d) gives different decisions.
20. (b) : Criterion (h) is not satisfied but Criterion (j) gives the decision.
21. (b) : Criterion (b) is not satisfied.
22. (e) : Criterion (g) is not given.
23. (b) : Criterion (h) is not satisfied but Criterion (j) gives the desicion.
24. (c) : Criterion (d) is not satisfied but Criterion (i) gives the decision.
25. (a) : Criterion (b) is not satisfied.
26. (d) : Both Criterion (e) and Criterion (f) are not satisfied.
27. (c) :

CHAPTER 13

Statement Conclusion

In this reasoning pattern, a statement is given followed by two conclusions. The statement is to be taken as the fact. Then based on it one has to decide which of the conclusion(s) definitely follows or does not follow from the given statement.

MULTIPLE CHOICE QUESTIONS

Directions (Qs. 1 to 20): *In the following questions, each question has a statement followed by two conclusions. Taking the statement to be true, decide which of the given conclusions definitely follows from the given statement. Indicate your answer as (a) if only I follows; (b) if only II follows; (c) either I or II follows; (d) if neither I nor II follows; and (e) if both I and II follow.*

1. *Statement* : The Principal humiliated the teacher in the presence of students.
Conclusions I : The Principal did not like the teacher.
II : The teacher was not popular amongst his students.

2. *Statement* : Good health is dependent on right eating habits. Most of the people do not follow any rule regarding eating.
Conclusions I : Most of the people have poor health.
II : People are ignorant of proper eating habits.

3. *Statement* : Until our country achieves economic equality and political freedom, democracy would be meaningless.
Conclusions I : Political freedom and democracy go hand in hand.
II : Economic equality leads to real political freedom and democracy.

4. *Statement* : Black cloud follows thunder. Rains follow thunder.
Conclusions I : Thunder is the cause of rain.
II : Black cloud is the cause of thunder.

5. *Statement* : Practice is better than precept. Most doctors are heavy smokers.
Conclusions I : Most doctors cannot advise people not to smoke.
II : Doctors do not regard smoking as injurious.

6. *Statement* : Workers feel highly motivated when they get sense of involvement by participating in the management of companies.
Conclusions I : Workers should be motivated to produce more.
II : Workers should be allowed to participate in the management of companies.

7. *Statement* : Industrial revolution which first of all started in Europe has brought about modern age.
Conclusions I : Disparity between rich and poor results in revolution.
II : Revolution overhauls society.

8. *Statement* : America's defence secretary reiterated that they would continue to supply arms to Pakistan.
Conclusions I : Pakistan is incapable of manufacturing arms.
II : It would ensure peace in the region.

9. *Statement* : Poor people are more trust-worthy as compared to the rich. They can do wonders if they are taken into confidence.
Conclusions I : Poor people are wonderful people.
II : By and large rich people are not trustworthy.

10. *Statement* : Government has spoiled many top ranking financial institutions by appointing bureaucrats as Directors of these institutions.

Conclusions I: Government should appoint Directors of the financial institutes taking into consi-deration the expertise of the person in the area of finance.

II: The Director of the financial institute should have exper-tise commensurate with the financial work carried out by the institute.

11. *Statement* : The Constitutional amendment carried out just last month prohibits the employment of child labour in any organisation.

Conclusions I: The employers must now abide by this amendment to the Constitution.

II: Children below 14 years will now be engaged in acquiring education.

12. *Statement* : People who speak too much against the dowry are those who had taken it themselves.

Conclusions I: It is easier said than done.

II: People have double standards.

13. *Statement* : Vegetable prices are soaring in the market.

Conclusions I: Vegetables are becoming a rare commodity.

II: People cannot eat vegetables.

14. *Statement* : As far as the rate of literacy is concerned, there is hardly any difference between the States of Kerala and West Bengal, but one is ahead of the other in respect of the percentage of population unemployed.

Conclusions I: Unemployment is more in Kerala than in West Bengal.

II: West Bengal has higher unemployment than Kerala.

15. *Statement* : He tirelessly argues for the replacement of the present system of allocating work to the teaching staff in the department by another system which will give the teachers higher job satisfaction.

Conclusions I: No system is free from problems and therefore there should be no system.

II: Any system you may evolve but it should give higher job satisfaction to the teachers.

16. *Statement* : The unequal allocation of funds by the Government for literacy and employment generation programmes stands out clearly when we analyse the attitude of government towards these two areas.

Conclusions I: Government has more favourable attitude towards literacy programmes than employment generation progra-mmes.

II: Government has more favourable attitude towards employment generation programmes than literacy programmes.

17. *Statement* : Amul chocolates sold enough in comparison to all other chocolate brands in India.

Conclusions I: No other chocolate is sold in India.

II: The selling data of every chocolate brand is available in India.

18. *Statement* : Wearing Khadi is not only good for our health but also for our nation.

Conclusions I: Economy of India also depends upon Khadi sector.

II: It is difficult to maintain Khadi clothes.

19. *Statement* : Ideas given by our ancestors that were once discarded as uneconomical and unviable, turn out to be as functional and inevitable in present circumstances.

Conclusions I: In ancient period ideas were considered either completely functional or totally infeasible.

II: Ideas cannot change from time-to-time.

20. *Statement* : The Supreme Court gave a judgement that the maintenance of old age parents is the responsibility of the married girls, if they do not have brothers.

Conclusions I: Constitution is always interpreted to help oppressed people out.

II: Before the Supreme Court gave its verdict, a married girl must have denied to pay for the maintenance of her parents.

Directions (Qs. 21 to 25): *In the following questions, the symbols *, $\overset{*}{=}$,=, @ and $\underset{=}{@}$ are used with the following meanings :*

(*a*) * (*b*) means (*a*) is greater than (*b*),

(*a*) $\overset{*}{=}$ (*b*) means (*a*) is either greater than or equal to (*b*).

(*a*) = (*b*) means (*a*) is equal to (*b*).

(*a*) @ (*b*) means (*a*) is smaller than (*b*) and

(*a*) $\underset{=}{@}$ (*b*) means (*a*) is either smaller than or equal to (*b*).

Answer is given as:

(*a*) If only conclusion I is true;

(*b*) If only conclusion II is true;

(*c*) If either I or II is true;

(*d*) If neither I nor II is true;

(*e*) If both I and II are true.

21. *Statements* : T $\overset{*}{=}$ P, P @ S, P = M

Conclusions : *I.* S * M *II.* T @ S

22. *Statements* : R $\underset{=}{@}$ M, M * P, R $\overset{*}{=}$ L

Conclusions : *I.* M = L *II.* P = L

23. *Statements* : M = T, T $\underset{=}{@}$ Z, S * M

Conclusions : *I.* Z * M *II.* Z = M

24. *Statements* : L @ C, C * Z, Z $\underset{=}{@}$ F

Conclusions : *I.* C * F *II.* F = C

25. *Statements* : Z @ B, N $\overset{*}{=}$ S, B @ N

Conclusions : *I.* B = Z *II.* S $\underset{=}{@}$ B

EXPLANATORY ANSWERS

1. (*a*) : Only conclusion I follows. Conclusion II is not confirmed by the given statement.

2. (*a*) : Conclusion I definitely follows. Conclusion II is not confirmed by the given statement.

3. (*b*) : Only conclusion II follows. Conclusion I cannot be drawn from the given statement.

4. (*b*) : Only conclusion II follows. Conclusion I is wrong as rains are the cause of thunder.

5. (*e*) : Both conclusion I and conclusion II follow from the statements as the doctors who are heavy smokers indicate that they do not regard smoking as injurious and thus, cannot advise people not to smoke.

6. (*e*) : Both conclusions I and II follow from the statement as involvement of workers boosts production and benefits the companies.

7. (*b*) : Only conclusion II follows. Conclusion I is not related the statement.

8. (*d*) : Neither conclusion I nor conclusion II follows. Both the conclusions are unrelated to the statement.

9. (*b*) : Only conclusion II follows. Conclusion I is not related to the statement.

10. (*e*) : Both conclusion I and conclusion II follow.

11. (a) **:** Only conclusion I follows. Conclusion II is not related to the statement.

12. (e) **:** Both conclusion I and conclusion II follow as people who talk too much often do not practise what they say.

13. (d) **:** Neither conclusion I nor conclusion II is confirmed by the statement.

14. (d) **:** Neither conclusion I nor conclusion II follows as the precentage of unemployment in each state is not mentioned.

15. (b) **:** Only conclusion II follows. Conclusion I runs counter to the statement as a system is necessary.

16. (d) **:** Neither conclusion I nor conclusion II is confirmed by the statement.

17. (b) **:** Only conclusion II follows as the data of every chocolate brand shows the comparision of Amul chocolates with other brands. Coclusion I is not confirmed by the statement.

18. (a) **:** Only conclusion I follows. Conclusion II is not related to the statement.

19. (d) **:** Neither conclusion I, nor conclusion II follows; both the conclusions are unrelated.

20. (b) **:** Only conclusion II follows, because the Supreme Court judgement must have come in such a case and not in vacuum.

21. (a) **:** $T \geq P, P < S, P = M$
$\therefore S > M$

22. (d) **:** $R \leq M, M > P, R \geq L$
$\therefore L \leq R \leq M$

23. (c) **:** $M = T, T \leq Z, Z = M$
If $T = Z$, then $Z = M$
If $T < Z$, then $Z > M$

24. (d) **:** $L < C, C > Z, Z \leq F$
No relation can be established between C and F.

25. (d) **:** $Z < B, N \geq S, B < N$
No relation can be established between B, S and Z.

CHAPTER 14

Syllogistic Reasoning

In this reasoning pattern two statements are followed by few conclusions drawn. Four options (*a*), (*b*), (*c*) & (*d*) are given as answers. Based on the statement the candidate has to select the right answer in each question.

MULTIPLE CHOICE QUESTIONS

Directions (Q. 1–10) : *In each question given below two statements are followed by four conclusions numbered I, II, III and IV. You have to take the two given statements to be true even if they seem to be at variance from commonly known facts. Read the statements and conclusions and decide which of the conclusions logically follows from the two given statements, disregarding commonly known facts.*

1. **Statements:** All the phones are scales. All the scales are calculators.
   Conclusions:
   I. All the calculators are scales.
   II. All the phones are calculators.
   III. All the scales are phones.
   IV. Some calculators are phones.
   (*a*) Only I and IV (*b*) Only III and IV
   (*c*) Only II and IV (*d*) Only I and II

2. **Statements:** No door is dog. All the dogs are cats.
   Conclusions:
   I. No door is cat.
   II. No cat is door.
   III. Some cats are dogs.
   IV. All the cats are dogs.
   (*a*) Only II and IV (*b*) Only I and III
   (*c*) Only III and IV (*d*) Only III

3. **Statements:** Some tables are T.V. Some T.V. are radios.
   Conclusions:
   I. Some tables are radios.
   II. Some radios are tables.
   III. All the radios are T.V.
   IV. All the T.V. are tables.
   (*a*) Only II and IV (*b*) Only I and III
   (*c*) Only IV (*d*) None of the four

4. **Statements:** All men are vertebrates. Some mammals are vertebrates.
   Conclusions:
   I. All men are mammals.
   II. All mammals are men.
   III. Some vertebrates are mammals.
   IV. All vertebrates are men.
   (*a*) Only IV (*b*) Only II
   (*c*) Only III (*d*) Only I

5. **Statements:** All green are blue. All blue are white.
   Conclusions:
   I. Some blue are green.
   II. Some white are green.
   III. Some green are not white.
   IV. All white are blue.
   (*a*) Only I and II (*b*) Only I and III
   (*c*) Only I and IV (*d*) Only II and IV

6. **Statements:** Some pens are books. Some books are pencils.
   Conclusions:
   I. Some pens are pencils.
   II. Some pencils are pens.
   III. All pencils are pens.
   IV. All books are pens.
   (*a*) Only I and III (*b*) Only II and IV
   (*c*) All the four (*d*) None of the four

7. **Statements:** All the research scholars are psychologists. Some psychologists are scientists.
   Conclusions:
   I. All the research scholars are scientists.
   II. Some research scholars are scientists.
   III. Some scientists are psychologists.
   IV. Some psychologists are research scholars.
   (*a*) Only III and IV (*b*) None of the four
   (*c*) All the four (*d*) Only III

8. Statements: All the goats are tigers. All the tigers are lions.

Conclusions:

I. All the goats are lions.
II. All the lions are goats.
III. Some lions are goats.
IV. Some tigers are goats.

(*a*) All the four (*b*) Only I, II and III
(*c*) Only I, III and IV (*d*) Only II, III and IV

9. Statements: All members are students. No student is a girl.

Conclusions :

I. All students are members.
II. No members is a girl.
III. Some students are members.
IV. Some members are girls.

(*a*) Only I follows (*b*) Only I, II and III follow
(*c*) All follows (*d*) Only II and III follows

10. Statements : All soaps are clean. All clean are wet.

Conclusions :

I. Some clean are soaps.
II. No clean is soap.
III. Some wet are soaps.
IV. All wet are soaps.

(*a*) Only I follows
(*b*) Only I and II follow
(*c*) Only either III and IV follow
(*d*) Only I and III follow

Directions (Q. 11–15) : *Every question below has a few statements, followed by four conclusions numbered I, II, III and IV. You have to consider every given statement as true, even if it does not conform to the well known facts. Read the conclusions and then decide which of the conclusions can be logically derived.*

11. Statements: Some keys are staplers. Some staplers are stickers. All the stickers are pens.

Conclusions:

I. Some pens are staplers.
II. Some stickers are keys.
III. No sticker is key.
IV. Some staplers are keys.

(*a*) Only I and II
(*b*) Only II and IV
(*c*) Only II and III
(*d*) Only I and IV and either II or III

12. Statements: All the locks are keys. All the keys are bats. Some watches are bats.

Conclusions:

I. Some bats are locks.
II. Some watches are keys.
III. All the keys are locks.
IV. Some keys are locks.

(*a*) Only I and II (*b*) Only I and IV
(*c*) Only II and III (*d*) Only I and III

13. Statements: All the papers are books. All the bags are books. Some purses are bags.

Conclusions:

I. Some papers are bags.
II. Some books are papers.
III. Some books are purses.
IV. Some papers are purses.

(*a*) Only I and IV (*b*) Only II and III
(*c*) Only I and II (*d*) Only I and III

14. Statements: All the bottles are boxes. All the boxes are bags. Some bags are trays.

Conclusions:

I. Some bottles are trays.
II. Some trays are boxes.
III. All the bottles are bags.
IV. Some trays are bags.

(*a*) Only III and IV (*b*) Only I and II
(*c*) Only II and III (*d*) Only I and IV

15. Statements: Some rats are cats. Some cats are dogs. No dog is cow.

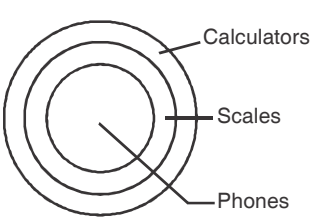
Conclusions:

I. No cow is cat.
II. No dog is rat.
III. Some cats are rats.
IV. Some dogs are cats.

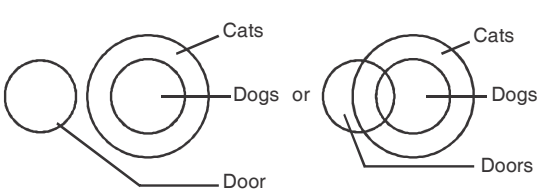
(*a*) Only I and IV (*b*) Only I and II
(*c*) Only I and III (*d*) Only III and IV

EXPLANATORY ANSWERS

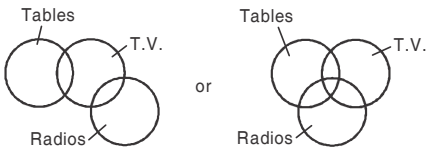
1. (*c*)



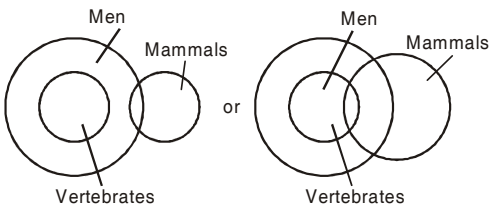
2. (*d*)



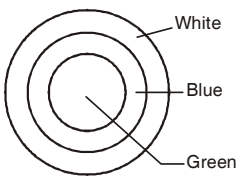
3. (*d*)



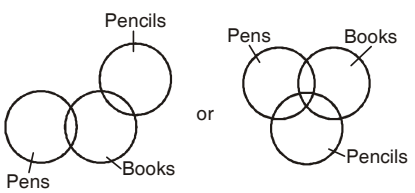
4. (*c*)



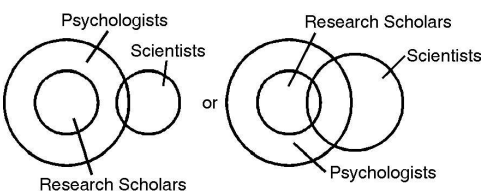
5. (*a*)



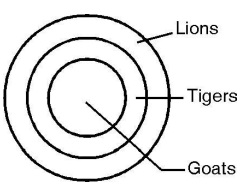
6. (*d*)



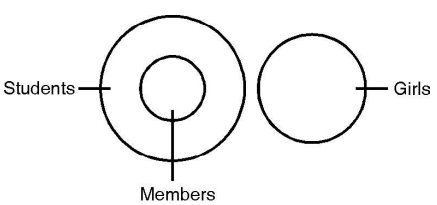
7. (*a*)



8. (*c*)

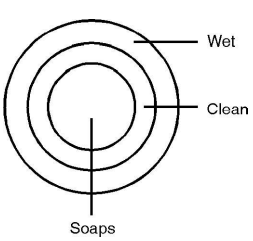


9. (*d*)



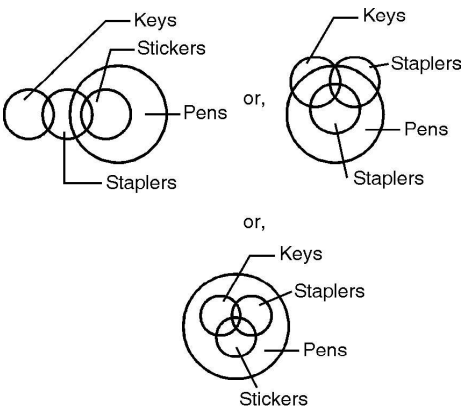
Since Members and Girls are disjoint, it follows that no members is girl. Since Members and Students have a common area, it follows that some student are members.

10. (*d*)

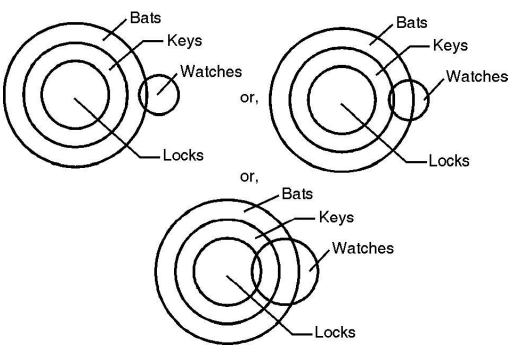


According to diagram, Clean and Soaps have a common area. So, some clean are soaps. Also wet and soaps have a common area. So, some wet are soaps.

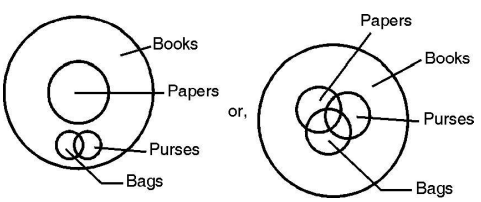
11. (*d*)



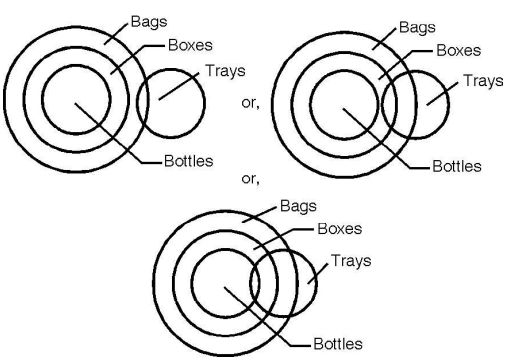
12. (*b*)



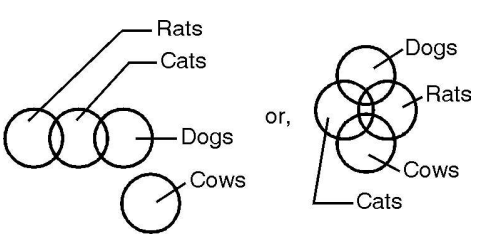
13. (*b*)



14. (*a*)



15. (*d*)



CHAPTER 15

Drawing Inferences

Questions on this type of reasoning have become quite common in competitive examinations. In this test, instead of a statement or proposition, a passage is given which is a congregation of many propositions coupled with arguments. Some inferences are given followed by the passage. The candidate has to decide whether the given inference follows, or does not follow in the light of the given passage.

SOLVED EXAMPLES

Given below are two passages followed by possible inferences which can be drawn from the facts stated in the passage. Each inference is examined separately in the context of the passage to decide upon its degree of truth or falsity. The answers are marked . . . .

(a) if the inference is "definitely true", *i.e.,* it properly follows from the statement of facts given.

(b) if the inference is "probably true," though not "definitely true" in the light of the facts given.

(c) if the "data are inadequate", *i.e.*, from the facts given you cannot say whether the inference is likely to be true or false.

(d) if the inference is "probably false", *i.e.*, though not "definitely false" in the light of the facts given.

(e) if the inference is "definitely false", *i.e.*, cannot possibly be drawn from the facts given or it contradicts the given facts.

PASSAGE I

The serious accident, in which a person was run over by a car yesterday, has again focussed attention on the most unsatisfactory state of street lighting. No one expects side roads to be provided with the same standard of lightings as a main road, but unless the council is prepared to make good its promise as regards road lighting, it will only be a question of time before there are further and perhaps fatal accidents.

1. The accident that occurred was fatal.

Ans. ***(e)*** **:** This conclusion cannot be drawn from the facts given.

2. Several accidents have so far taken place because of unsatisfactory lightings.

Ans. ***(a)*** **:** Mark the words 'again focussed attention on the most . . . lighting'.

3. There will not be a single accident on road if they are satisfactorily illuminated.

Ans. ***(c)*** **:** Data are insufficient. This statement is not confirmed by the paragraph.

4. It seems that the council has promised to improve the state of lighting on side roads.

Ans. ***(a)*** **:** Mark the words "the council is prepared to make good its promise as regards the road lighting."

5. The accident occurred at night.

Ans. ***(a)*** **:** It must be night because the passage deals with unsatisfactory state of street lighting.

MULTIPLE CHOICE QUESTIONS

Directions : *Below are given some passages followed by several possible inferences which can be drawn from the facts stated in each passage. You have to examine each inference separately in the context of the passage and decide upon its degree of truth or falsity.*

	Mark Answers	If you think...
(a)	"Definitely True"	the inference properly follows from the statement of facts given.
(b)	"Probably True"	the inference may be true in the light of the facts given but not definitely true.
(c)	"Data Inadequate"	from the facts given it cannot be said whether the inference is likely to be true or false.
(d)	"Probably False"	the inference is probably false in the light of the facts given though not definitely false.
(e)	"Definitely False"	the inference cannot possibly be drawn from the facts given or it contradicts the given facts.

PASSAGE 1

Indian granite industry is in peril in the absence of a uniform policy from the state governments, despite the thrust given by liberalisation policies of the union government. Compared to the remarkable progress in the field during the last three years, the absence of matching policies by state governments had put granite quarry owners and others involved in the industry on the verge of collapse in the international market. The policies differed from state to state, had created problems as far as loyalty, dead rent and duration of lease were concerned.

1. Each state having granite quarry has set up its own rules which are contrary to the interest of the industry.

2. Till three years ago, granite production in India was not profitable.

3. The granite production is largely controlled by individuals.

4. The granite produced in India does not match with the quality of international level.

5. The union government's liberalisation policy became applicable to granite industry only during the last three years.

PASSAGE 2

Steel production has always been burdened with costs much higher than in comparable plants overseas. On the one hand custom duty on almost all steel imports has been reduced, on the other excise duty has been raised. Domestic steel products are now uncompetitive which in turn has led to the demand that both the custom and excise rates should be reviewed to prevent sickness in the industry.

6. The steel industry in general is making losses as a fall out of the government policy.

7. The cost of production of steel in other countries is less than that in India.

8. India can compete with the foreign countries in re gard to the price of steel with a favourable government policy.

9. Foreign steel has become cheaper comparative to domestic steel.

10. The government is considering lowering of excise duty on steel products.

PASSAGE 3

The annual domestic consumption of plastics in India is expected to grow between 2.5 and 3 million tonnes by the end of the Ist balls of the century from the current level of about one million tonnes. The global consumption of plastics now stands at 100 million tonnes. To sustain the present growth pattern, India would need two additional polymer plants of 1,000 tonnes every year till the turn of the Ist half of this century. Entrepreneurs should now think in lines of globalisation and promote projects of international capacity and they would have to look at technology transfer as well as upgradation and strategic and creative alliances.

11. The total domestic consumption of plastics in India is about one per cent of the global consumption.

12. At present India does not import plastics.

13. India lacks in technological capabilities in producing plastics.

14. There is an expected growth of about .2 per cent in the plastic consumption every year.

15. Potentially India can be one of the major players in the production of plastics in the international market.

EXPLANATORY ANSWERS

1. (a) : The policies differed from state to state.
2. (c) : Remarkable progress during the last three years is mentioned in the paragraph but nothing suggests that the production was not profitable.
3. (a) : There is absence of a uniform policy from the state Governments.
4. (c) : According to the paragraph, absence of matching policies had put the quarry owners and others

involved in the industry on the verge of collapse in the international market. Nothing is mentioned about the granite quality produced in India or of the international level.

5. (e) : The inference does not relate to the facts given in the statement.

6. (d) : Government policy alone may not be responsible for the losses. Cost or quality factor may also be responsible.

7. (c) : The paragraph mentions that steel production in India has always been burdened with costs much higher than in comparable plants overseas. But nowhere in the paragraph it is mentioned that the cost of production of steel is less in other countries.

8. (a) : If the government reviews its policy, India can definitely compete with the foreign countries in regard to the steel price.

9. (a) : Customs duty on almost all steel products has been reduced.

10. (b) : There is a demand that both the customs and excise rates should be reviewed.

11. (a) : The global consumption of plastics is 100 million tonnes and current level of consumption in India is 1 million tonnes.

12. (c) : The paragraph does not mention about the import or export of plastics.

13. (a) : Entrepreneurs would have to look at technology transfer as well as upgradation and strategic and creative alliances.

14. (a) : The expected growth by end of the Ist half of this century is between 2.5 and 3 million tonnes. India needs 2 additional polymer plants of 1,000 tonnes per year.

15. (a) : By thinking in lines of globalisation and promoting projects of international capacity India can be one of the major players in the production of plastics in the international market.

CHAPTER 16

Trends

This type of questions are asked to assess the thinking pattern or mental trends of the candidate. These are simple questions but should be answered honestly and carefully.

MULTIPLE CHOICE QUESTIONS

Directions : *In the questions given below four alternatives have been given below each one of them. You have to select the right alternative according to your mind and mark it in your answer sheet.*

1. I like pre-defined rules and regulations.
(*a*) Sometimes (*b*) No
(*c*) Yes (*d*) No idea

2. I found a purse full of money in college premise. I:
(*a*) donated the amount among poor
(*b*) gave it to the principal
(*c*) offered it at temple
(*d*) None of these

3. I am punctual regarding
(*a*) going to bed (*b*) time
(*c*) meals (*d*) dating

4. I was travelling on a boat which capsized. Firstly, I:
(*a*) rescued others (*b*) saved myself
(*c*) closed my eyes (*d*) cursed my luck

5. When someone asks you for help in odd situations then:
(*a*) you give him/her all possible help
(*b*) you promise him/her help
(*c*) you do not help him/her
(*d*) you turn a deaf ear

6. In case my wristwatch is out of order, I:
(*a*) would try to repair it myself
(*b*) would give it to watchmaker
(*c*) would buy a new watch
(*d*) would throw it away

7. Often I change my opinion in the last moment.
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) No idea

8. Generally I am extrovert and well behaved.
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) No idea

9. I like to use new technique of work.
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) No idea

10. When someone considers you wrong then:
(*a*) you do not react
(*b*) you consider him/her wrong
(*c*) you try to ward off the misunderstanding on proper occasion.
(*d*) you pick a fight

11. The secret of my success is:
(*a*) hard labour (*b*) awakening in night
(*c*) gossiping (*d*) luck

12. If you are a female and you are talking with a male:
(*a*) You hide your age
(*b*) You are afraid
(*c*) You talk without hesitation
(*d*) You avoid talks

13. I do like rules and regulations.
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) No idea

14. Excellent ideas come to my mind:
(*a*) while working alone
(*b*) while working in a group
(*c*) while in sleep
(*d*) while in bathroom

15. Whenever my little baby cries loudly, then I
(*a*) beat him/her
(*b*) feed milk to him/her
(*c*) make him/her sleep
(*d*) ask my husband to handle him/her

16. When I see a mad person, I :
(*a*) approach towards him/her
(*b*) maintain distance from him/her
(*c*) throw stone at him/her
(*d*) start laughing at him/her

17. While driving my car I offer lift to people who ask for lift.
(*a*) Always (*b*) Sometimes
(*c*) Never (*d*) If she is a girl

18. When someone tries to convince you then:
(*a*) You get convinced
(*b*) You do not get convinced
(*c*) You hear him/her passionately
(*d*) You turn a deaf ear

19. Whenever someone knocks on my closed door then firstly I
(*a*) open the door
(*b*) peep through the lens fitted in the door
(*c*) do not open the door
(*d*) yell at him/her

20. I speak to others about my expectation and dreams.
(*a*) Rarely (*b*) Often
(*c*) Sometimes (*d*) Never

21. Any dispute can be solved by :
(*a*) quarrelling (*b*) court
(*c*) dialogue (*d*) money

22. When I do any foolish work then :
(*a*) I feel ashamed (*b*) I feel proud of myself
(*c*) Nothing happens (*d*) I weep

23. If I were correspondent of any newspaper then I would write on the following subject :
(*a*) Cinema and theatre
(*b*) Political events
(*c*) Sports
(*d*) Stock market

24. If I were not human being then :
(*a*) I wish to be a bird (*b*) I wish to be a horse
(*c*) I wish to be God (*d*) Can't say

25. Suppose, you have worn a new shirt and your friend passed a comment that it is not looking good on you. You :
(*a*) will change the shirt immediately
(*b*) will take it lightly as it is your style
(*c*) will not change the shirt but feel offended
(*d*) will start quarrelling

26. I wish to live alone always.
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) Never

27. I want to spend my spare (extra) time :
(*a*) in reading interesting books
(*b*) in reading comics
(*c*) in viewing films
(*d*) in gossiping

28. Before doing any work I ask myself 'Is it appropriate'?
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) Never

29. If I see the GOD, I will ask for
(*a*) huge wealth (*b*) honesty
(*c*) love (*d*) heaven

30. People call you selfish.
(*a*) Always (*b*) Sometimes
(*c*) Never (*d*) No idea

31. While talking to friends I do not like to express my very personal matters.
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) Never

32. Consultation with others helps me to take a decision.
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) Never

33. After failure:
(*a*) One repents
(*b*) One tries again to succeed
(*c*) Nothing special is happened
(*d*) Nothing in life remains

34. I want to be convinced by arguments.
(*a*) Yes (*b*) No
(*c*) Sometimes (*d*) Never

ANSWERS

1	2	3	4	5	6	7	8	9	10
(*c*)	(*b*)	(*b*)	(*b*)	(*a*)	(*b*)	(*b*)	(*a*)	(*a*)	(*c*)
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
(*a*)	(*c*)	(*a*)	(*a*)	(*b*)	(*b*)	(*b*)	(*a*)	(*b*)	(*a*)
21	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**
(*c*)	(*a*)	(*c*)	(*a*)	(*b*)	(*c*)	(*a*)	(*a*)	(*c*)	(*c*)
31	**32**	**33**	**34**						
(*c*)	(*a*)	(*b*)	(*a*)						

CHAPTER 17

Critical

In this type of reasoning, a statement is given and assumptions are drawn from it. An assumption is something assumed, supposed and taken for granted. The implicity of the two assumptions is in question. The implication means the hidden meaning, something which is derived from and as such based upon the statement.

MULTIPLE CHOICE QUESTIONS

Directions (Qs. 1 to 6): *In each question below are given two statements followed by two conclusions numbered I and II. You have to take the two given statements to be true even if they seem to be at variance from commonly known facts and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts. Read both the statements and—*

Give answer (a) if only conclusion I follows; give answer (b) if only conclusion II follows; give answer (c) if either I or II follows; give answer (d) if neither I nor II follows and give answer (e) if both I and II follows.

1. *Statements I :* All tomatoes are red.
II : All grapes are tomatoes.
Conclusions I : All grapes are red.
II : Some tomatoes are grapes.

2. *Statements I :* All painters are smilling.
II : Some authors are painters.
Conclusions I : All smiling authors are painters.
II : Some authors are smiling.

3. *Statements I :* All peons in this office are efficient.
II : Ramu is not efficient.
Conclusions I : Ramu is not peon in this office.
II : Ramu should be more efficient.

4. *Statements I :* All weavers are hard working.
II : No hard working men are foolish.
Conclusions I : No weavers are foolish.
II : Some foolish are weavers.

5. *Statements I :* All fishes are cars.
II : All cars are vegetables.
Conclusions I : Some vegetables are cars.
II : Some vegetables are fishes.

6. *Statements I :* Some dogs are pups.
II : All horses are pups.

Directions (Qs. 7 to 10): *In each question below is given a statement followed by three assumptions number I, II and III. An assumption is something supposed or taken for granted. You have to consider the statement along with the assumptions and decide which of the assumptions is implicit in the statement. Then decide which of the alternatives is the correct answer.*

7. *Statement :*
"Use Riya Cold Cream for fair complexion"—an advertisement.
Assumptions :
I. People like to use cream for fair complexion.
II. People are easily fooled.
III. People respond to advertisements.
(*a*) Only I is implicit.
(*b*) Only II is implicit.
(*c*) Only I and III are implicit.
(*d*) Only I and II are implicit.
(*e*) All are implicit.

8. *Statement :*
"Slogans against smoking in office should be put on the notice board"—an employee in an office suggests.
Assumptions :
I. The employee felt that his suggestion will be considered.
II. People smoke in the office.
III. Some people will stop smoking after reading the slogans.
(*a*) Only I is implicit.
(*b*) Only I and II are implicit.
(*c*) Only II and III are implicit.

(*d*) None is implicit.
(*e*) All are implicit.

9. *Statement :*
"I want to present him a book on techniques of yoga on his birthday"—A tells B.
Assumptions :
I. A and B will be invited for the birthday celebrations.
II. The person to whom the book is to be presented, is not keeping good health.
III. Book is the best gift for birthdays.
(*a*) Only I and II are implicit.
(*b*) Only II and III are implicit.
(*c*) Only I and III are implicit.
(*d*) None is implicit.
(*e*) All are implicit

10. *Statement :*
Keeping in view the financial constraint, the management institution has decided to charge at the time of providing employment in various organisations, a placement fee of ₹ 25000 from the organisation in which the student will be provided the employment.
Assumptions :
I. It will help in increasing the demand of the students belonging to the management institution.
II. The amount collected in this way will be purposeful.
III. It may be possible that the organisation providing employment may select less number of students in future.
(*a*) None follows.
(*b*) Only II and III follow.
(*c*) Only I follows.
(*d*) Only I and II follow.
(*e*) None of these

EXPLANATORY ANSWERS

1. (*e*) : When all tomatoes are red and all grapes are tomatoes, then all grapes are also red. When all grapes are tomatoes, then some tomatoes must be grapes. Therefore, both conclusions I and II are correct.

2. (*b*) : When all painters are smiling and some authors are painters, then some authors are smiling. Therefore, only conclusion II is correct.

3. (a) : When all the peons of the office are efficient, then Ramu cannot be a peon in this office. Therefore, only conclusion I is correct.

4. (*a*) : When all weavers are hardworking and no hardworking men are foolish, then no weavers are foolish. Therefore, only conclusion I is correct.

5. (*e*) : When all fishes are cars and all cars are vegetables, then all fishes will naturally be vegetables. This means that some vegetables are fishes. And when all cars are vegetables, then some vegetables will be cars naturally. Therefore, both the conclusions I and II are correct.

6. (*d*) : No relationship can be established between the two statements. Therefore, neither conclusion I nor conclusion II is correct.

7. (*c*) : The advertisement itself denotes that people like to use cream for fair complexion and they do respond to advertisements. Advertisements are for awareness of the product not for fooling people.

8. (*e*) : Suggestion for putting up the notice is made because some people must be smoking in office. Notice board is read by people in office and some may stop smoking after reading the slogans.

9. (*c*) : According to A presents are best gifts for birthdays and when A has bought the book he expects to be invited for the birthday celebration. Nothing is mentioned about health of the birthday person.

10. (*b*) : The amount collected will lessen the financial constraint and there is every possibility for selecting less number of students because of the fee charged.

CHAPTER 18

Emotional Intelligence

Emotional intelligence (EI) refers to the ability to perceive, control, and evaluate emotions. Emotional intelligence (EI) is the area of cognitive ability involving traits and social skills that facilitate interpersonal behaviour. Intelligence can be broadly defined as the capacity for goal-oriented adaptive behaviour; emotional intelligence focuses on the aspects of intelligence that govern self-knowledge and social adaptation.

Emotional Intelligence that is also called Emotional Intelligence Quotient or (EQ) narrates the capability, capacity, or deftness to understand. It evaluates and manages one's emotions.

MULTIPLE CHOICE QUESTIONS

Directions: *Answer the following questions by selecting the appropriate option.*

1. In my group of friends, I am generally aware of how each person feels about the other people in our social circle.
(*a*) Strongly Agree (*b*) Agree
(*c*) Disagree (*d*) Strongly Disagree

2. When I am upset, I can usually pinpoint exactly why I am distressed.
(*a*) Strongly Agree (*b*) Agree
(*c*) Disagree (*d*) Strongly Disagree

3. While there are some things that I would like to change, I generally like who I am.
(*a*) Strongly Agree (*b*) Agree
(*c*) Disagree (*d*) Strongly Disagree

4. When I make mistakes, I often berate and criticize myself and my abilities.
(*a*) Often (*b*) Sometimes
(*c*) Rarely (*d*) Almost Never

5. I feel uncomfortable in emotionally charged situations.
(*a*) Strongly Agree (*b*) Agree
(*c*) Disagree (*d*) Strongly Disagree

6. I tend to avoid confrontations. When I am involved in a confrontation, I become extremely anxious.
(*a*) Strongly Agree (*b*) Agree
(*c*) Disagree (*d*) Strongly Disagree

7. I am generally aloof and detached until I really get to know a person.
(*a*) Strongly Agree (*b*) Agree
(*c*) Disagree (*d*) Strongly Disagree

8. I tend to overreact to minor problems.
(*a*) Often (*b*) Sometimes
(*c*) Rarely (*d*) Almost Never

9. I feel confident about my own skills, talents, and abilities.
(*a*) Strongly Agree (*b*) Agree
(*c*) Disagree (*d*) Strongly Disagree

10. I would describe myself as a good judge of character.
(*a*) Strongly Agree (*b*) Agree
(*c*) Disagree (*d*) Strongly Disagree

11. When I am facing an unpleasant task, I tend to:
(*a*) Make a plan and work on it a little each day
(*b*) Get it over with as soon as possible
(*c*) Put it off until the last minute
(*d*) Don't do it at all

12. During a heated argument, I am more likely to:
(*a*) Stop the fight and agree to a short break before resuming the discussion.
(*b*) Shut down and stop responding to the other person.
(*c*) Give in and apologize in order to quickly end the argument.
(*d*) Start insulting the other person.

13. When making an important decision, I tend to:
(*a*) Follow my instincts
(*b*) Rely on direction from other people
(*c*) Go with the easiest option
(*d*) Guess randomly

14. Which of the following statements best describes you?
(*a*) I have an easy time making friends and getting to know new people.
(*b*) I get along well with others, but I have to really get to know someone before they become a true friend.
(*c*) I find it difficult to meet people and make friends.
(*d*) I cannot make friends.

15. You have invested a lot of time and energy into a project for one of your classes. While you feel confident about your work, your instructor gives you a C+ on the project. How do you deal with this situation?
(*a*) Decide the class is stupid and stop putting forth your best efforts.
(*b*) Berate and criticize your own work.
(*c*) Confront the instructor and ask for a better grade.
(*d*) Think about ways you could improve the project and apply these ideas to future schoolwork.

16. One of your best friends has suffered a miscarriage. How do you respond?
(*a*) Allow your friend to express her feelings and offer your support.
(*b*) Spend time with her, but avoid talking about her loss.
(*c*) Convince her to go out with some friends to get her mind off it.
(*d*) Give her some time to herself.

17. One of your co-workers has a habit that annoys you. The problem seems to be getting worse each day. How do you respond?
(*a*) Tell your co-worker what is bothering you.
(*b*) Make a complaint about the behaviour to your supervisor.
(*c*) Talk about your co-worker behind his back.
(*d*) Suffer in silence.

18. You've been feeling stressed out at work and haven't finished projects as quickly as you should. When your boss suddenly assigns you another large project, how do you feel?
(*a*) Anxious about getting all the work done.
(*b*) Overwhelmed by the task before you.
(*c*) Angry that your boss hasn't noticed how overworked you are.
(*d*) Depressed and sure that you can never finish it all.

19. If I am scheduled to meet a loved one at a certain time and that person is late, I get worried and eventually start to panic:
(*a*) Frequently (*b*) Sometimes
(*c*) Rarely (*d*) Never

20. Others do not want to spend time with me in public because my behaviour embarrasses them.
(*a*) Frequently (*b*) Sometimes
(*c*) Rarely (*d*) Never

21. I prevent being in situations where I need to show compassion and affection because I feel uncomfortable comforting others.
(*a*) Frequently (*b*) Sometimes
(*c*) Rarely (*d*) Never

22. When I am angry, I do not care about what I say or do and end up saying and doing things I regret later and need to apologize for.
(*a*) Frequently (*b*) Sometimes
(*c*) Rarely (*d*) Never

23. I feel frequently depressed and unhappy without really knowing why.
(*a*) Frequently (*b*) Sometimes
(*c*) Rarely (*d*) Never

24. If others point out my mistakes or give me negative feedback about myself, I feel ashamed, embarrassed and then become offensive and angry.
(*a*) Frequently (*b*) Sometimes
(*c*) Rarely (*d*) Never

25. Crying makes me feel better so I frequently cry when I am angry, ashamed, or embarrassed.
(*a*) Frequently (*b*) Sometimes
(*c*) Rarely (*d*) Never

ANSWERS

1	2	3	4	5	6	7	8	9	10
(*b*)	(*b*)	(*a*)	(*b*)	(*d*)	(*d*)	(*c*)	(*d*)	(*a*)	(*b*)
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
(*a*)	(*a*)	(*a*)	(*a*)	(*d*)	(*a*)	(*a*)	(*a*)	(*c*)	(*d*)
21	**22**	**23**	**24**	**25**					
(*d*)	(*d*)	(*d*)	(*d*)	(*d*)					

CHAPTER 19

Social Intelligence

Questions on social intelligence are asked to assess the common sense of the candidate in various social situations.

MULTIPLE CHOICE QUESTIONS

Directions : *Each of the following questions is followed by four alternatives. Select the most appropriate answer.*

1. In the examination hall, you find that your question paper is too tough to be answered satisfactorily by you. The best thing you can do is:
(*a*) try cheating from your neighbouring candidate.
(*b*) leave the paper and walk out.
(*c*) try attempting those questions first of which you know something.
(*d*) complain to the examiner about the toughness of the question paper.

2. Your best friend is annoyed with you for certain reasons. You will :
(*a*) try your best to reason out your friend's annoyance.
(*b*) go out and make new friends.
(*c*) show indifference.
(*d*) remind the friend of your good friendship.

3. You were invited to a party, but on the day of the party you are informed that the party has been cancelled. You will :
(*a*) try to find out the reason for its cancellation.
(*b*) decide that you will never go to that place ever again.
(*c*) not discuss the matter with anyone.
(*d*) hold the party at your place instead.

4. You find that the cooking gas cylinder is leaking. The first thing you would do is :
(*a*) switch off the light.
(*b*) close the knob of the cylinder.
(*c*) call the fire brigade for help.
(*d*) alert all the members at home.

5. While returning home from a far away place you find that your pocket has been picked. You will :
(*a*) try to hitch-hike to home.
(*b*) hire a taxi and pay on reaching home.
(*c*) go to the nearest police station and lodge an FIR.
(*d*) call home and ask someone to pick you from the place you made the phone call.

6. Your friend has not invited you to his marriage party, you will :
(*a*) ignore the whole affair.
(*b*) send him your best wishes.
(*c*) attend the ceremony.
(*d*) hold it against him.

7. You are interviewed for a new job. Which of the following questions is most important to you?
(*a*) Remuneration you will be paid.
(*b*) Opportunities for promotion.
(*c*) Scope to develop your ideas and use them to improve the working of the organisation.
(*d*) All the above are equally important.

8. You are walking down the street and suddenly you see two hundred-rupee notes on the pavement. What action will you take?
(*a*) Give the money to beggar.
(*b*) Pocket it yourself.
(*c*) Deposit it in the nearest police station.
(*d*) Leave it as it is.

ANSWERS

1	2	3	4	5	6	7	8
(*c*)	(*a*)	(*a*)	(*b*)	(*b*)	(*b*)	(*d*)	(*c*)

INDEXING ADDRESS MATCHING

Directions : *In each question below a combination of name and address is given in the first column at the left, followed by four such combinations, one each under the columns (a), (b), (c) and (d). You have to find out the combination which is exactly the same as the combination in the first column. The number of that column which contains that combination is the answer. If all the combinations are different, the answer is '(e)'.*

1. Triveni Atma
Opp Lal Banglow
Varanasi -221002

(*a*) Triveni Atma
Opp Lal Bangalow
Varanasi -221002

(*b*) Triveni Atma
Opp Lal Banglow
Varanasi -220012

(*c*) Triveni Atma
Opp Lal Banglow
Varanasi -221002

(*d*) Triveni Athma
Opp Lal Banglow
Varanasi -221002

2. Tara Lal Appa
Javagal street
Calicat 673005

(*a*) Tara Lal Appa
Javagal Street
Calicat 673005

(*b*) Tara Lal Appa
Javagal street
Calicut 673005

(*c*) Tara Lal Appa
Javagal street
Calicat 670035

(*d*) Tara Lal Appa
Javagal streat
Calicat 673005

3. Iqbal Rehman
Bhandri Gali
Post Box No -3097

(*a*) Iqbal Rehman
Bhandri Ghali
Post Box No -3097

(*b*) Iqbal Rehman
Bhandri Gali
Post Box No -3097

(*c*) Iqbal Rehman
Bhandri Gali
Post Box no -3097

(*d*) Iqbal Rahman
Bhandri Gali
Post Box No -3097

4. Jaganpa Shinde
Christ phot co.
Tel no -27363

(*a*) Jaganpa Shinde
Christ photo co.
Tel no -27363

(*b*) Jaganpa Shinde
Christ phot co.
Tel no -27363

(*c*) Jaganpa Shinde
Christ phot co.
Tel no -273633

(*d*) Jaganna Shinde
Christ phot co.
Tel no -27363

5. N.R. Savitri
Giri Girls hostal
Anapuram-167951

(*a*) N.R. Savitri
Giri Girls hostal
Anapuram-167951

(*b*) N.R. Savitri
Giri Girls hostel
Anapuram-167951

(*c*) N.R. Savitri
Giri Girls hostal
Anapuram-167851

(*d*) N.R. Savithri
Giri Girls hostal
Anapuram-167951

6. Madam Brulopher
Jung villa
Banjaram Hills

(*a*) Madam Bruloper
Jung villa
Banjaram Hills

(*b*) Madam Brulopher
Jung villa
Banjaram Hill

(*c*) Madam Brulopher
Jung Villa
Banjaram Hills

(*d*) Madam Brulopher
Jung villa
Banjaram Hills

7. Samartha sen
C 20/05 Guftga Bldg
B. No. - 1631

(*a*) Samartha sen
C 20/05 Guftga Blg
B. No. - 1631

(*b*) Samartha sen
C 200 Guftga Bldg
B. No. - 1631

(*c*) Samartha sen
C 20/05 Guftga Bldg
B. No. - 1631

(*d*) Samartha sen
C 20/05 Guflga Bldg
B. No. - 1631

8. Phiroz Gerabl
Harmit palace
Samaita nagar

(*a*) Phiroz Gerabi
Harmit palace
Samaita nagar

(*b*) Phiroz Gerabl
Harmit place
Samaita nagar

(*c*) Phiroz Gerabl
Harmit palace
Samaita nager

(*d*) Phiroz Gherabl
Harmit palace
Samaita nagar

9. Nitu gajadhar
Shersing Haveli
Jaipur -302006

(*a*) Nitu gajadhar
Shersing Haveli
Jaipur -302006

(*b*) Nitu gajadar
Shersing Haveli
Jaipur -302006

(*c*) Nitu gajadhar
Shersing Haveli
Jaipur -303006

(*d*) Nitu Gajadhar
Shersing Haveli
Jaipur -302006

ANSWERS

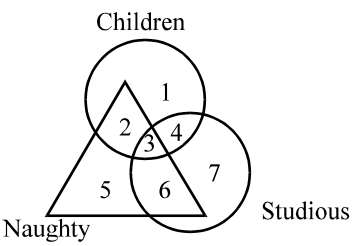
1	2	3	4	5	6	7	8	9
(*c*)	(*a*)	(*b*)	(*b*)	(*a*)	(*d*)	(*c*)	(*d*)	(*a*)

CHAPTER 20

Venn Diagrams

In these type of questions diagrammatic representation presents a logical illustration of particular class or statements based on which the questions are asked. A clear view of the diagram makes the concept clear for attempting such questions.

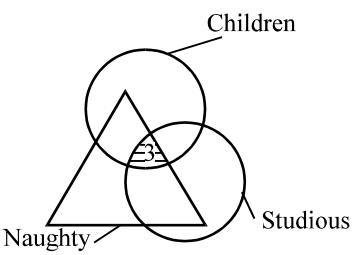
SOLVED EXAMPLE



Study the above diagram and specify the region representing children who are naughty as well as studious.

(*a*) 3 and 6 (*b*) 2 and 4
(*c*) only 3 (*d*) only 4

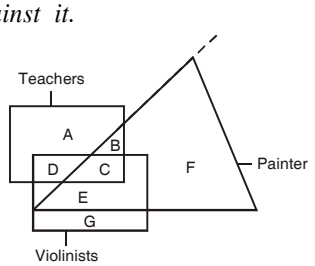
Ans. ***(c)*** **:** The explanation depicting children who are naughty as well as studious will be :



It is now clear that only region 3 represents all the three classes.

MULTIPLE CHOICE QUESTIONS

Directions (Qs. 1–3) : *In the following diagram, there are three figures interlocking each other – a rectangle, a square and a triangle. Each figure represents the class mentioned against it.*



Study the figure and answer the questions that follows.

1. Teachers who are painters but not violinists are represented by

(*a*) B (*b*) C
(*c*) D (*d*) F

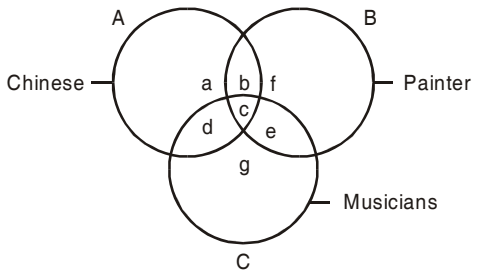
2. The region which represents painters and violinists but not teachers, is denoted by

(*a*) B (*b*) D
(*c*) E (*d*) F

3. Which letter represents teachers who are painters as well as violinists?

(*a*) B (*b*) C
(*c*) D (*d*) E

Directions (Qs. 4–6) : *In the figure given below, there are three interesting circles each representing certain section of people. Different regions are marked a-g. Read the statements in each of the following questions and choose the letter of the region which correctly represents the statements?*

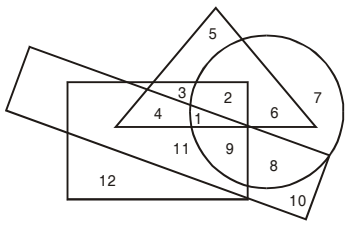


4. Chinese who are painters but not musicians?
(*a*) b (*b*) c
(*c*) d (*d*) g

5. Chinese who are musicians but not painters.
(*a*) d (*b*) c
(*c*) b (*d*) a

6. Painters who are neither Chinese nor musicians.
(*a*) b (*b*) c
(*c*) f (*d*) g

Directions (Qs. 7–10) : *In the following figure, the circle stands for employed, the square stands for hard-working, the triangle stands for rural and the rectangle stands for intelligent. Study the figure carefully and answer the questions that follow.*



7. Rural employed people who are neither intelligent nor hard-working are indicated by region.
(*a*) 10 (*b*) 9
(*c*) 6 (*d*) 4

8. Unemployed rural hard-working and intelligent people are indicated by region.
(*a*) 1 (*b*) 2
(*c*) 3 (*d*) 4

9. Rural people who are hard-working and employed but not intelligent are indicated by region.
(*a*) 1 (*b*) 2
(*c*) 3 (*d*) 4

10. Rural employed people who are neither intelligent nor hard-working are indicated by region.
(*a*) 2 (*b*) 4
(*c*) 6 (*d*) 9

EXPLANATORY ANSWERS

1. (*a*) : The persons satisfying the given conditions are represented by the region which is common to the rectangle and the triangle but not the square i.e. B.

2. (*c*) : The persons satisfying the given conditions are represented by the region which is common to the triangle and the square but is not a part of the rectangle i.e. E.

3. (*b*) : The required set of persons is represented by the letter denoting the region common to the rectangle, triangle and the square i.e. C.

4. (*a*) : The required region is the one which is common to the circles A and B and lies outside circle C i.e. b.

5. (*a*) : The required region is the one which is common to the circles A and C but is not a part of circle B i.e. d.

6. (*c*) : The required region is the one which lies inside the circle B but is not a part of either circle A or circle C i.e. f.

7. (*c*) : The required set of people is represented by the region which is common to the triangle and circle but is not a part of either the rectangle or the square i.e. 6.

8. (*d*) : The required set of people is represented by the region which lies outside the circle and is common to the triangle, square and rectangle i.e. 4.

9. (*b*) : The required set of people is represented by the region which is common to the triangle, square and circle but is not a part of the rectangle i.e. 2.

10. (*c*) : The required set of people is denoted by the region which is common to the triangle and the circle but is not a part of the rectangle i.e. 2.

NON-VERBAL

CHAPTER 1

Series/Figural Series

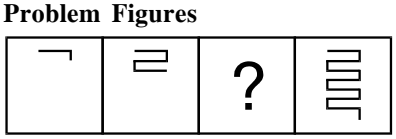
MISSING SERIES

This form of series is almost identical to the one mentioned earlier. Here too are given two sets of figures, the Problem Figures and the Answer Figures. The problem figures follow a particular pattern of movement which constitute the series. The only difference from the earlier mentioned set of series is that instead of depicting the last figure that continues the pattern here one of the middle figures needs to be depicted from-the answer figures. This type needs a little more concentration and brain work as the continuity is broken and has to be set right. Understand the set up of elements, pattern and figures in each set and try different styles and rules to find the answer.

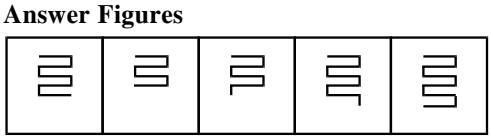
SOLVED EXAMPLES

In each question below there are two sets of figures, first problem figures and then follows the answer figures. One of the answer figures should fit into the box where a question mark is placed in the set of problem figures. The letter of the answer figure which should be considered as forming the series and should be placed in the question marked box is the answer.

1. Problem Figures



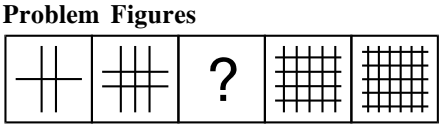
Answer Figures



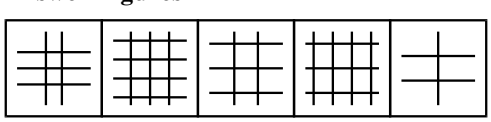
(*a*) (*b*) (*c*) (*d*) (*e*)

Answer (*a*) : Observe the set of problem figures. The design made of straight lines is becoming bigger at each step. In first figure there are two lines segments and in second figure three lines segments are increased. To continue the pattern four line segments should be increased so that further five line segments added in the last figure can complete the series. Answer figure (*a*) contains four more line segments and hence, is the right answer.

2. Problem Figures



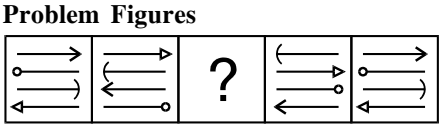
Answer Figures



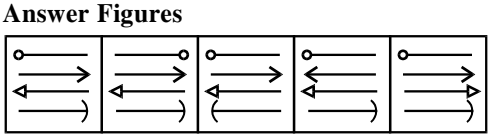
(*a*) (*b*) (*c*) (*d*) (*e*)

Answer (*d*) : Observe that at each step one vertical and one horizontal line is added. By this rule answer figure (*a*) fits in the question marked space. Note that answer figure (*b*) can also be considered in absence of option (*d*), but here the point to be noted is that the number of horizontal lines is one more than the number of vertical lines. So, answer figure (*d*), is the answer.

3. Problem Figures



Answer Figures



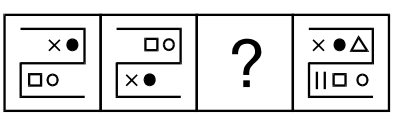
(*a*) (*b*) (*c*) (*d*) (*e*)

Answer (*a*) : Note that the fourth or the bottom element is made the first or the topmost element in the next figure. Similarly, the third element is made the second, the second element made the fourth and the first element made the third. Also, the direction of the elements is changed at each step. By the process mentioned above, answer figure A is the right choice to be considered as forming the series.

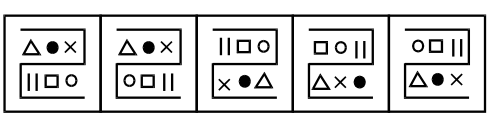
MULTIPLE CHOICE QUESTIONS

Directions : *In each of these questions, there are two sets of figures. The figures placed first are Problem Figures, and those follows are Answer Figures indicated by the letters (a), (b), (c), (d) and (e). A series is established if one of the five Answer Figures is placed at the question-marked space. Figures form a series if they change from left to right according to some specific rule. The letter of the Answer Figure which should be placed in the question-marked space is the answer. All the figures, i.e. three Problem Figures and one Answer Figure placed in the question-marked space should be considered as forming the series.*

1. Problem Figures

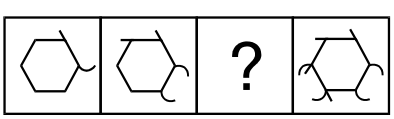


Answer Figures

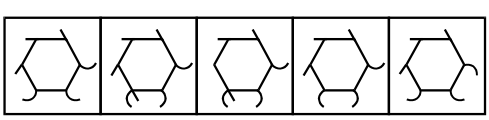


(*a*) (*b*) (*c*) (*d*) (*e*)

2. Problem Figures

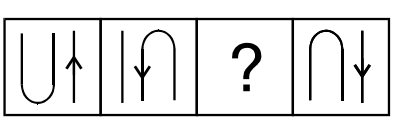


Answer Figures

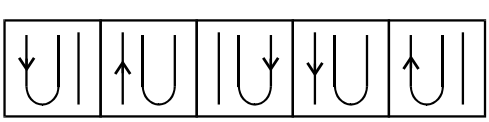


(*a*) (*b*) (*c*) (*d*) (*e*)

3. Problem Figures

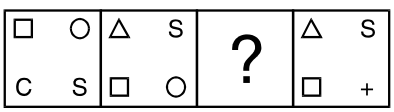


Answer Figures

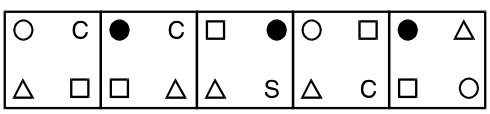


(*a*) (*b*) (*c*) (*d*) (*e*)

4. Problem Figures

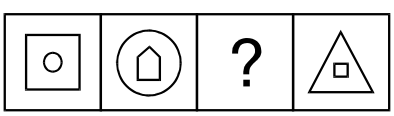


Answer Figures

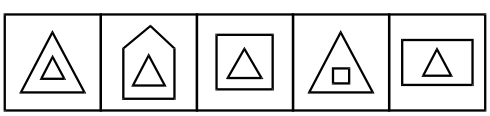


(*a*) (*b*) (*c*) (*d*) (*e*)

5. Problem Figures

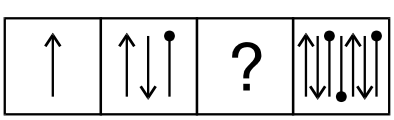


Answer Figures

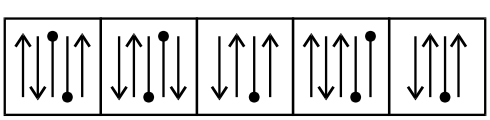


(*a*) (*b*) (*c*) (*d*) (*e*)

6. Problem Figures

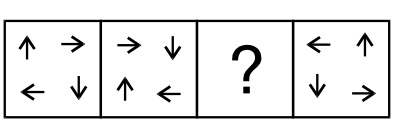


Answer Figures

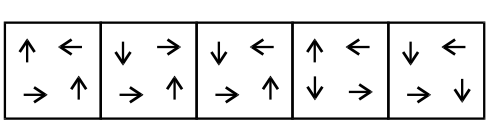


(*a*) (*b*) (*c*) (*d*) (*e*)

7. Problem Figures

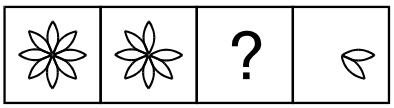


Answer Figures

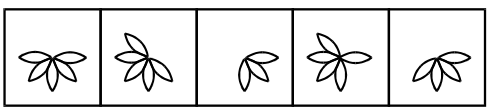


(*a*) (*b*) (*c*) (*d*) (*e*)

8. Problem Figures

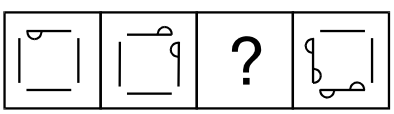


Answer Figures

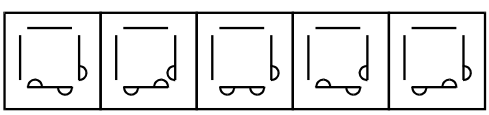


(*a*) (*b*) (*c*) (*d*) (*e*)

9. Problem Figures

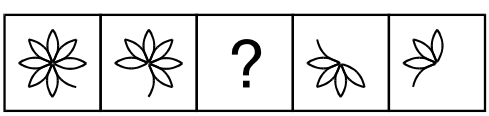


Answer Figures

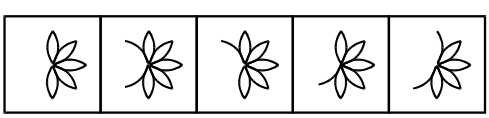


(*a*) (*b*) (*c*) (*d*) (*e*)

10. Problem Figures

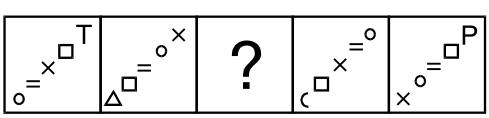


Answer Figures

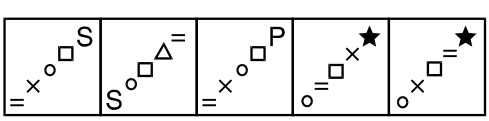


(*a*) (*b*) (*c*) (*d*) (*e*)

11. Problem Figures

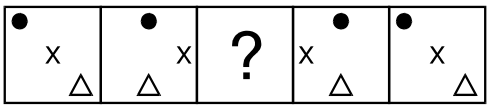


Answer Figures

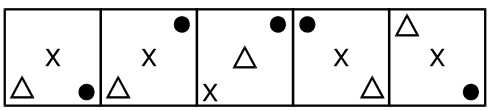


(*a*) (*b*) (*c*) (*d*) (*e*)

12. Problem Figures

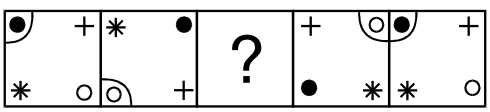


Answer Figures

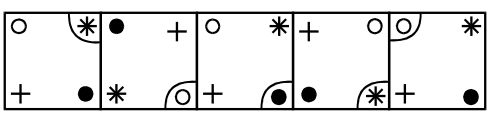


(*a*) (*b*) (*c*) (*d*) (*e*)

13. Problem Figures

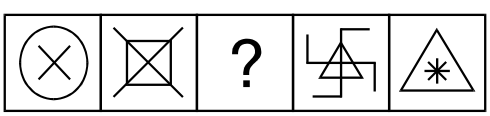


Answer Figures

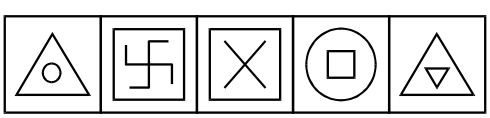


(*a*) (*b*) (*c*) (*d*) (*e*)

14. Problem Figures

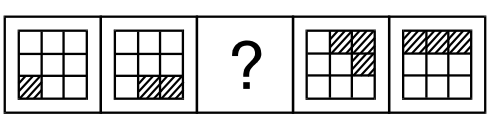


Answer Figures

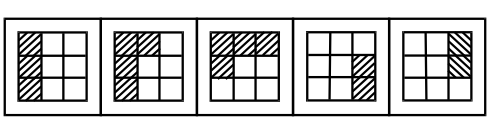


(*a*) (*b*) (*c*) (*d*) (*e*)

15. Problem Figures



Answer Figures



(*a*) (*b*) (*c*) (*d*) (*e*)

EXPLANATORY ANSWERS

1. (*c*) : From first problem figure to the second the elements on the top are shifted down and vice versa. In fourth problem figure there are three elements which, as per rule, are also shifted. So, in question marked space only option '(*c*)' can be considered as forming the series.

2. (*d*) : Anticlockwise one of the sides of the hexagon is extended and clockwise one arc is added. The direction of the arc is changed at each step. Answer figure 'D' is the right answer.

3. (*e*) : Both the elements are turned upside down, their places interchanged and the arrow head moved left from one element to the other. In the question marked space the 'U' shape and the arrowhead should be facing upwards, the line segment should be on the right and the arrowhead should be on the extreme left. To continue the series the next figure has the 'U' shape and the arrowhead facing downwards, the line segment on the right and the arrowhead on the extreme right. Option '(*e*)' fits into the question marked space.

4. (*c*) : At each step the places of two elements on the horizontal are interchanged and clockwise one element is made new. Option '(*c*)' fits in the pattern to complete the series.

5. (*b*) : At each step the enclosed figure is enlarged in the next and a new figure is placed inside the enlarged figure. Option '(*b*)' fits into the question marked space.

6. (*a*) : The arrow and the line with the dot are increased in a set pattern in opposite directions. The series they form is two arrows and two lines with the dot which is repeated. Answer figure '(*a*)' is the right choice.

7. (*c*) : Each arrow is turned 90° clockwise at each step. Option '(*c*)' fits into the question marked space.

8. (*a*) : The number of petals removed at each step is increased by one, i.e., the petals are removed in the order of one, two and three, leaving only two petals in the last figure option '(*a*)' is the right answer.

9. (*e*) : The lines are moved clockwise. First a semicircle is added to the adjacent line. Then the semicircles on the opposite sides are added one by one on the two lines. Answer figure '(*e*)' fits into the question-marked space.

10. (*c*) : Each time one petal is removed and the half petal is clockwise and anticlockwise alternately. Answer figure '(*c*)' completes the series.

11. (*a*) : At first step the fifth or the bottom most element is moved to the second place from top, the second element moved to the fourth place, the fourth element is moved to the third place, the third element is moved to the first or the topmost place and the element on the top which is made new is moved to the last or the fifth place. At second step i.e., from second problem figure to third problem figure the above process is reversed. The bottom most element is the first and the top most element is the last or fifth. Hereafter, the process is repeated from the beginning. Option '(*a*)' is the right answer.

12. (*b*) : The three elements are moved half step everytime-first till they reach the extreme right position and then back to the left. Answer figure '(*b*)' fits into the question-marked space.

13. (*c*) : The four elements are moved one step clockwise and the arc one step anti-clockwise. Option '(*c*)' is the right answer.

14. (*b*) : The smaller design is enlarged in the next and a new smaller design is placed in its centre. Option '(*b*)' fits into the question-marked space to continue the series.

15. (*d*) : The shaded portion is moved one step anticlockwise at each step and one extra portion is shaded alternately.

FIGURAL SERIES

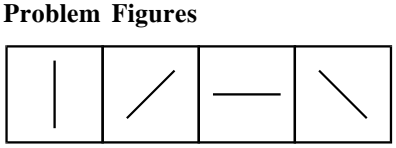
In this form of non-verbal series, which are the most common, four or five consecutive problem figures form a definite sequence and one is required to select the one figure from the given set of Answer Figures that will continue the same sequence.

One has to try different set of moves, changes, replacements, rotations, repetitions and a lot more variations to arrive at the logical pattern making the series. Practising alone will sharpen one's skill of solving such sequences.

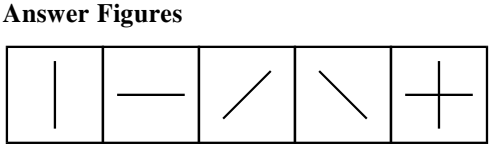
SOLVED EXAMPLES

In each of the questions given below, which one of the answer figures should come after the problem figure if the sequence were continued?

1. Problem Figures



Answer Figures



(*a*) (*b*) (*c*) (*d*) (*e*)

Answer (*a*) : All the figures are simple straight lines of the same size. Their directions and positions have changed.

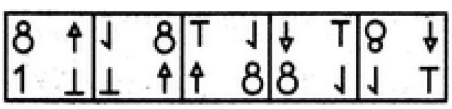
In the first figure, the line is in a vertical position, in the second, the line has moved 45° clockwise, in the third, the line has further moved 45° clockwise, and in the fourth, the line has further moved 45° clockwise. Thus, two facts are brought out: *(i)* the line moves clockwise, and *(ii)* the line moves 45° at each step.

Now the fourth figure (Problem Figures) should be moved 45° clockwise. It will be a vertical line. Thus, the next figure to continue the series will be a vertical straight line.

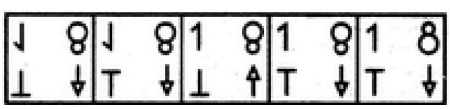
MULTIPLE CHOICE QUESTIONS

Directions : *In each of the following questions which one of the five answer figures given below should come after the problem figures if the sequence are continued?*

Problem Figures

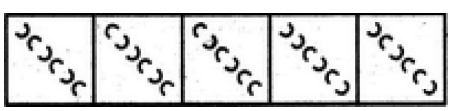
1. 

Answer Figures

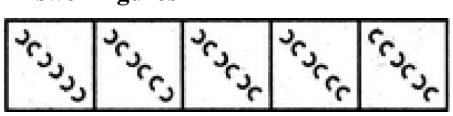


(*a*) (*b*) (*c*) (*d*) (*e*)

Problem Figures

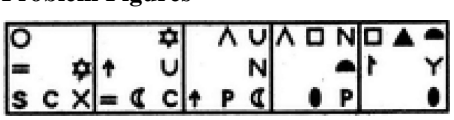
2. 

Answer Figures

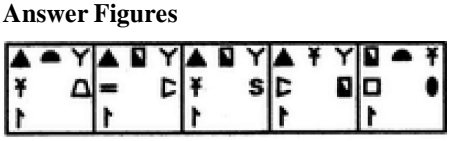


(*a*) (*b*) (*c*) (*d*) (*e*)

Problem Figures

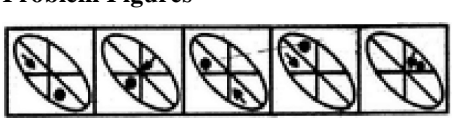
3. 

Answer Figures

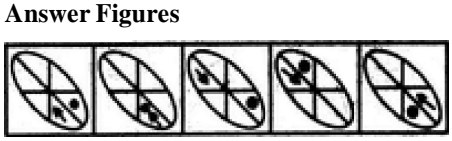


(*a*) (*b*) (*c*) (*d*) (*e*)

Problem Figures

4. 

Answer Figures



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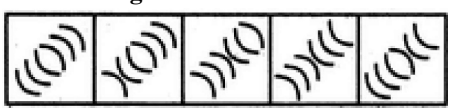
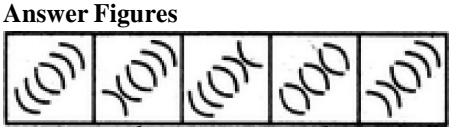
Problem Figures

5. 

Answer Figures



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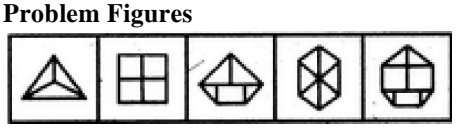
Problem Figures

6. 

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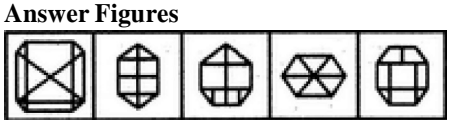

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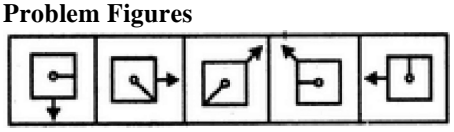
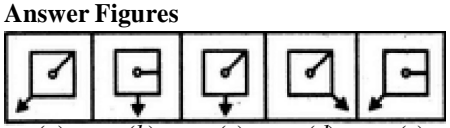
Problem Figures

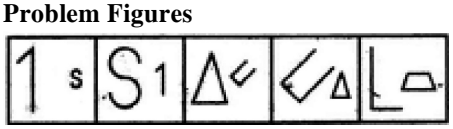
7. 

Answer Figures

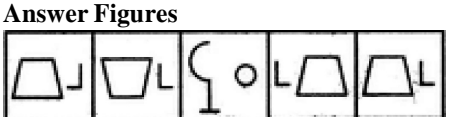


(*a*) (*b*) (*c*) (*d*) (*e*)

Problem Figures

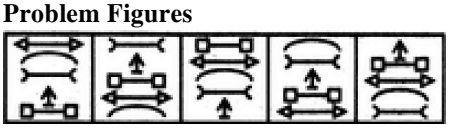
8. 

Answer Figures

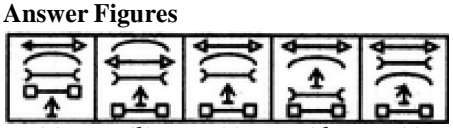


(*a*) (*b*) (*c*) (*d*) (*e*)

Problem Figures

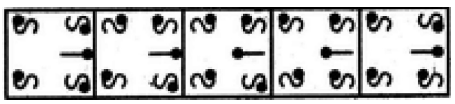
9. 

Answer Figures

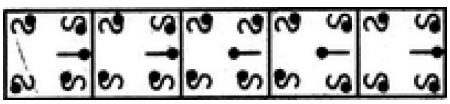


(*a*) (*b*) (*c*) (*d*) (*e*)

Problem Figures

10. 

Answer Figures



(*a*) (*b*) (*c*) (*d*) (*e*)

EXPLANATORY ANSWERS

1. (*d*) : In each step, all the elements move to the adjacent corner (of the square boundary) in a CW direction and the element that reaches the upper-left corner gets vertically inverted.

2. (*c*) : We can label the arcs as shown . The arcs get inverted in the sequence (1 & 2), (3, 4 & 5), (6 & 1), (2, 3 & 4), (5 & 6), ...

3. (*d*) : All the elements move half-a-side of the square boundary in ACW direction in each step. Also, first, third and fifth elements are replaced by new elements in one step and second, fourth and sixth elements are replaced by new elements in the next step. The two steps are repeated alternately.

4. (*a*) : In each step, the dot moves one space CW and the arrow moves two spaces CW.

5. (*c*) : One arc and four arcs get inverted alternately.

6. (*e*) : The number of parts increases by one along with the number of sides in the figure.

7. (*c*) : The pin rotates 45°CW and 90°CW alternately and moves one space (each space is equal to half-a-side of the square) and two spaces CW alternately. The arrow rotates 90°ACW and 45°ACW alternately and moves two spaces and one space.

8. (*e*) : In one step, the two elements interchange positions and the smaller element gets enlarged while the larger element gets reduced in size. In the next step, the smaller element is replaced by a new small element and the larger element is replaced by a new large element.

9. (*c*) : In each step, the elements move in the order .

10. (*b*) : The upper-left element gets laterally inverted in first, third, fifth. .... steps; the upper-right element gets rotated through 180° is first, fourth, seventh,.... steps; the lower-left element gets laterally inverted in second, fourth, sixth, ... steps; the lower-right element gets rotated through 180° in third, sixth,... steps and the pin at the middle-right position gets laterally inverted in every second step.

CHAPTER 2

Semantic Classification

Classification means arranging the given content in groups or classes having qualities of same kind. In classification type questions, the figures or items are sorted out in groups on the basis of their similarities in qualities in shapes, size, pattern, structure, genus, order, species, grade, style, constituents and other specifications, and thus the answer is found out.

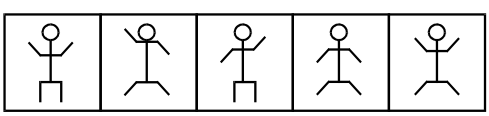
TYPE-I

Classification of this type does not have two sets of figures known as Problem Figures and Answer Figures; instead they have only one set of four or five figures known as Problem Figures. One of these Problem Figures is not like the other four figures. In other words, three or four of the Answer Figures belong to a class while one which is the odd figures, does not belong to it.

MULTIPLE CHOICE QUESTIONS

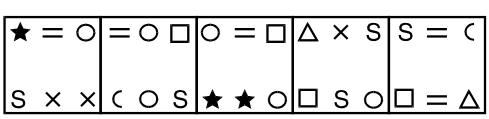
Directions : *In each of the following questions one of the figures is different from the rest. Spot the figure.*

1.



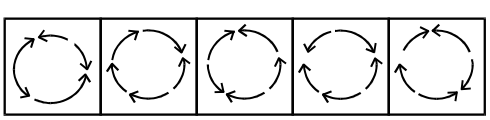
(*a*) (*b*) (*c*) (*d*) (*e*)

2.



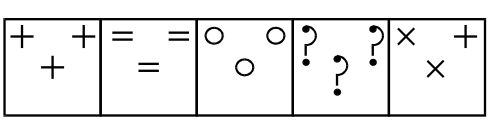
(*a*) (*b*) (*c*) (*d*) (*e*)

3.



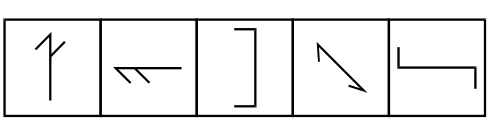
(*a*) (*b*) (*c*) (*d*) (*e*)

4.



(*a*) (*b*) (*c*) (*d*) (*e*)

5.



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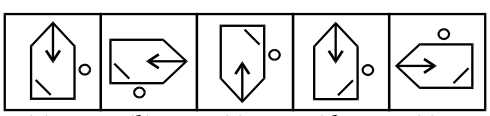
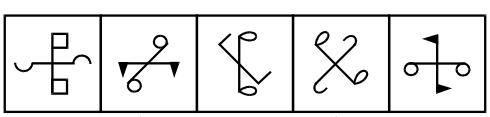


(*a*) (*b*) (*c*) (*d*) (*e*)

7.



(*a*) (*b*) (*c*) (*d*) (*e*)

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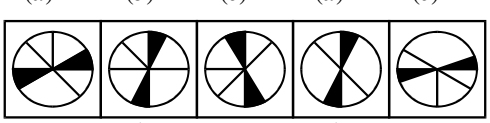

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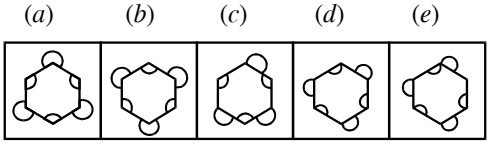
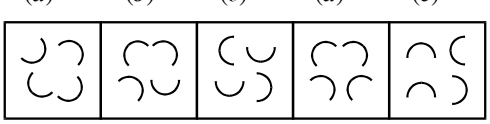


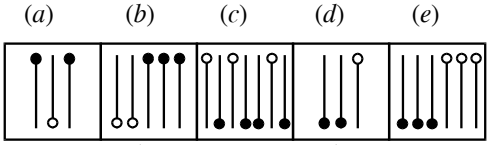
(*a*) (*b*) (*c*) (*d*) (*e*)

10.



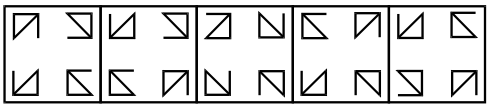
(*a*) (*b*) (*c*) (*d*) (*e*)

11.



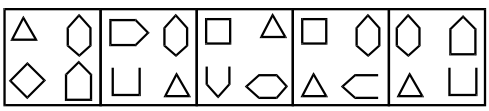
(*a*) (*b*) (*c*) (*d*) (*e*)

12.



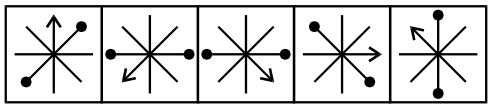
(*a*) (*b*) (*c*) (*d*) (*e*)

13.



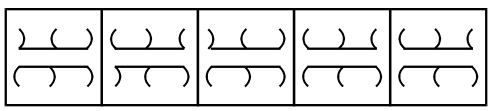
(*a*) (*b*) (*c*) (*d*) (*e*)

14.



(*a*) (*b*) (*c*) (*d*) (*e*)

15.



(*a*) (*b*) (*c*) (*d*) (*e*)

EXPLANATORY ANSWERS

1. (*d*) : Only in this figure all the lines making the hands and legs of the human shape are drawn downwards.

2. (*c*) : In all other figures only one set of elements is identical.

3. (*b*) : Only in this figure four arrows are pointing in same direction, and one arrow in its opposite direction. In other figures three arrows are in same direction and two in the opposite direction.

4. (*e*) : All other figures have three identical elements.

5. (*d*) : In all other figures two lines are parallelly drawn.

6. (*c*) : In all other figures the circle is on the left side of the arrow.

7. (*c*) : In all other figures one line has two elements on same side and the other line has two elements, one on either side. In this figure both the lines have two elements on same side.

8. (*d*) : Only in this figure one of the three sections in between the shaded sections is not marked.

9. (*e*) : In all other figures the elements inside as well as outside the hexagon are placed at equal distance. In this figure the outside element at the top is wrongly placed (It should be near the other corner of the same line).

10. (*d*) : In all other figures two elements are in same direction and the other two elements are opposite to each other.

11. (*e*) : Only in this figure the two types of elements are equal in number.

12. (*c*) : In all other figures the diagonal line in all other elements is drawn from the right end.

13. (*a*) : In all other figures one of the four elements has one open side.

14. (*c*) : In all other figures the arrow is to the left of the dot.

15. (*b*) : In all other figures two of the three curves on one of the lines are in the same direction and are adjacent.

CHAPTER 3

Figural Analogy

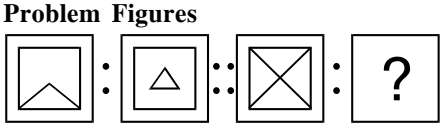
Figural Analogy is a process of reasoning between two parallel cases. It relates to agreement or correspondence in certain respects between two things. It is a process whereby the underlying relationship that exists between two figures, designs or patterns is determined. Under the process, one has to discover the features common to the two figures or designs. This common feature is a model or base. The question seeks solution on the basis of this model or base.

In non-verbal analogy questions, there are two sets of figures which are known as *(i)* Problem Figures, and *(ii)* Answer Figures. The Problem Figures are divided into two parts. The Answer Figures are given below the Problem Figures.

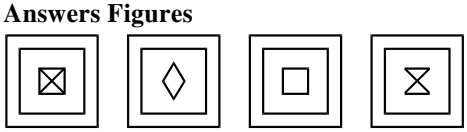
MULTIPLE CHOICE QUESTIONS

Directions : *The second figure in the first unit of the Problem Figures bears a certain relationship to the first figure. Similarly, one of the figures in the Answer Figures bears the same relationship to the first figure in the second unit of the Problem Figures. Locate the figure which would fit the question mark.*

1. Problem Figures

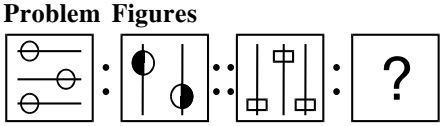


Answers Figures

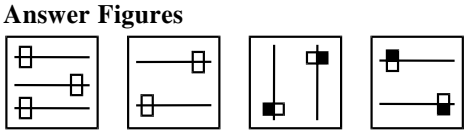


(*a*) (*b*) (*c*) (*d*)

2. Problem Figures

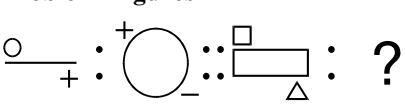


Answer Figures

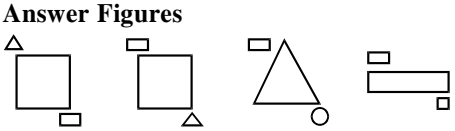


(*a*) (*b*) (*c*) (*d*)

3. Problem Figures

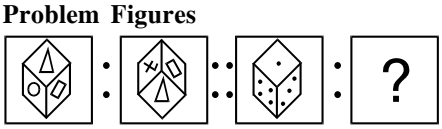


Answer Figures

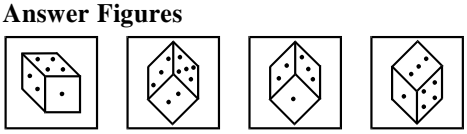


(*a*) (*b*) (*c*) (*d*)

4. Problem Figures

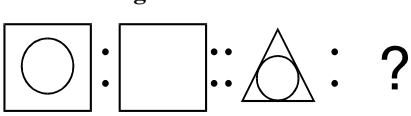


Answer Figures

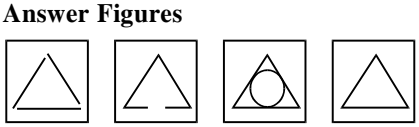


(*a*) (*b*) (*c*) (*d*)

5. Problem Figures



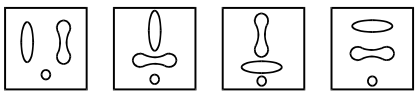
Answer Figures



(*a*) (*b*) (*c*) (*d*)

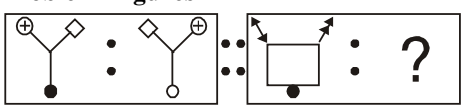
6. Problem Figures

Answer Figures

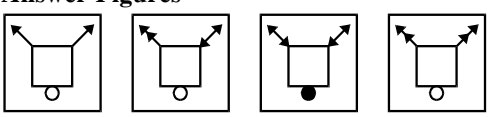


(*a*) (*b*) (*c*) (*d*)

7. Problem Figures

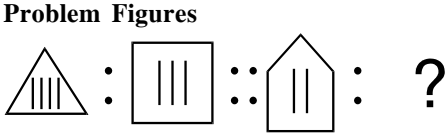


Answer Figures

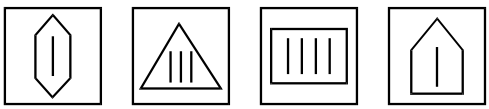


(*a*) (*b*) (*c*) (*d*)

8. Problem Figures

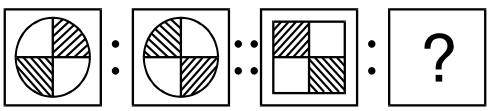


Answer Figures

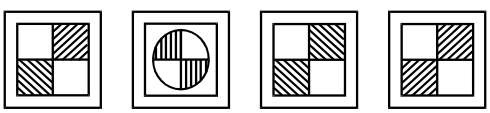


(*a*) (*b*) (*c*) (*d*)

9. Problem Figures



Answer Figures



(*a*) (*b*) (*c*) (*d*)

EXPLANATORY ANSWERS

1. (*d*) : The triangle in the first figure is moved to the centre of the second figure. Similarly, the two triangles joined at the apex are moved to the centre in answer figure.

2. (*d*) : The first figure is turned by 90° one of the bars is removed and opposite sides of the element attached to the bar are shaded to get the second figure.

3. (*a*) : The element at the bottom is moved to the diagonal corner, the element in the top is enlarged and moved to the centre and element in the middle is reduced and moved to the bottom right corner.

4. (*c*) : The view of the cube is changed from top to bottom. The design on the right side remains unchanged while the design on the left side is changed.

5. (*d*) : The inner shape in the first figure is removed to get the second figure.

6. (*b*) : The two half shapes placed vertically are turned upside down and joined, and this new shape is moved to the top. The two curved shapes placed horizontally are joined and this new shape is moved to the centre. One of the two remaining corner shapes is moved to the bottom.

7. (*b*) : The places of elements on the top are interchanged and the shade inside the circle is removed.

8. (*a*) : One of the vertical lines is removed and the number of lines making the second figure is increased by one.

9. (*a*) : First figure is rotated 90° anticlockwise to get the second figure.

CHAPTER 4

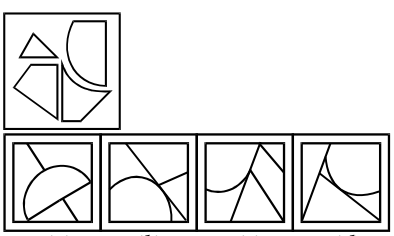
Spatial Visualization

In such questions, cut-out pieces are given alongwith the whole figure, that is the figure out of which the figures have been cut. By looking at the cut-out figures one has to find out the figure which may be constituted by putting the pieces together, i.e., one has to find out the figure of which the pieces have been cut. One has to be very imaginative and has to use space perception in finding out the solution. The whole process is mental and requires special skill in visualising different spatial patterns. It is not easy to develop this skill overnight but it can certainly be cultivated by practice and the method of trial and error.

MULTIPLE CHOICE QUESTIONS

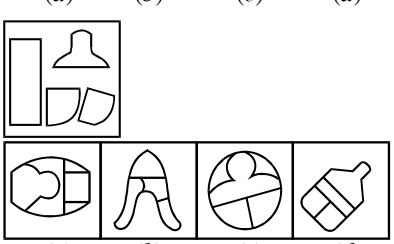
Directions (Qs. 1-5) : *Which one figure can be made out of given paper cut-outs?*

1.



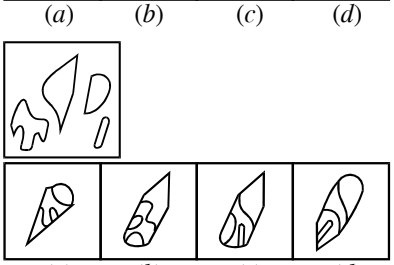
(*a*) (*b*) (*c*) (*d*)

2.



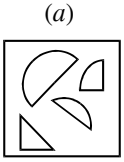
(*a*) (*b*) (*c*) (*d*)

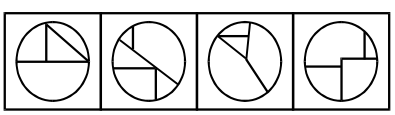
3.



(*a*) (*b*) (*c*) (*d*)

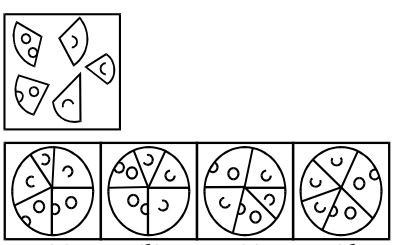
4.





(*a*) (*b*) (*c*) (*d*)

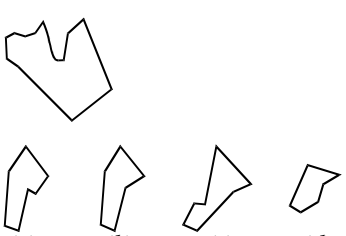
5.



(*a*) (*b*) (*c*) (*d*)

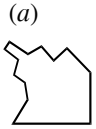
Direction (Qs. 6-10) : *In each of the following questions an irregular piece of paper has been cut into two pieces. One piece has been shown on the left while the other piece has been given as one of the four alternatives against it. Find the correct alternative:*

6.



(*a*) (*b*) (*c*) (*d*)

7.



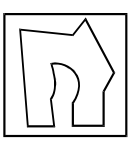
(*a*) (*b*) (*c*) (*d*)

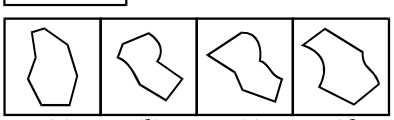
8.

(*a*) (*b*) (*c*) (*d*)

9.

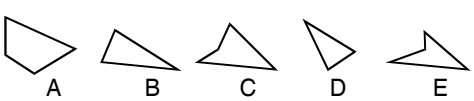
(*a*) (*b*) (*c*) (*d*)

10. 



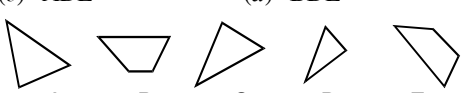
(*a*) (*b*) (*c*) (*d*)

Directions (Qs. 11-15) : *In each of the following questions five diagrams marked A to E are given. Three of these when put together form an equilateral triangle and have been given as one of the four alternatives under the question. Find the correct alternative in each case.*

11. 

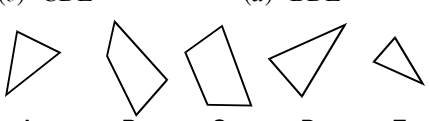
A B C D E

(*a*) ABE (*b*) BCE
(*c*) ADE (*d*) BDE

12. 

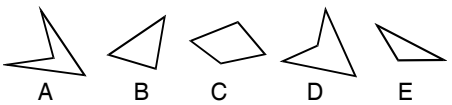
A B C D E

(*a*) ABC (*b*) BCD
(*c*) CDE (*d*) BDE

13. 

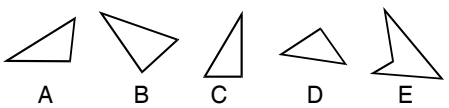
A B C D E

(*a*) BCD (*b*) CDE
(*c*) ABD (*d*) ABE

14. 

A B C D E

(*a*) ABD (*b*) ACD
(*c*) BDE (*d*) CDE

15. 

A B C D E

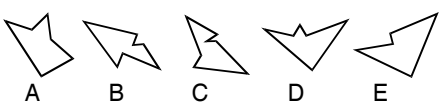
(*a*) ABC (*b*) ACE
(*c*) BDE (*d*) CDE

Directions (Qs. 16-20) : *In each of the following questions five diagrams A, B, C, D and E have been given. Three of these diagrams make a complete square which have been given as one of the four alternatives under it. Find the correct alternative in each case.*

16.

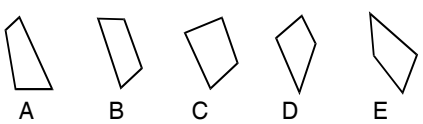
A B C D E

(*a*) ABC (*b*) BDE
(*c*) CDE (*d*) BCD

17. 

A B C D E

(*a*) ACD (*b*) BDE
(*c*) BCE (*d*) CDE

18. 

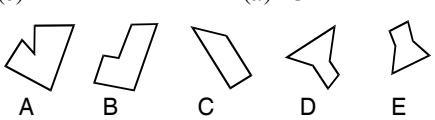
A B C D E

(*a*) ACD (*b*) BCD
(*c*) ACE (*d*) CDE

19.

A B C D E

(*a*) ABC (*b*) ACE
(*c*) ADE (*d*) CDE

20. 

A B C D E

(*a*) BDE (*b*) ABC
(*c*) ACD (*d*) BCD

ANSWERS

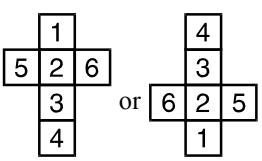
1	2	3	4	5	6	7	8	9	10
(*b*)	(*d*)	(*c*)	(*a*)	(*b*)	(*b*)	(*c*)	(*a*)	(*d*)	(*c*)
11	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
(*c*)	(*d*)	(*d*)	(*b*)	(*b*)	(*d*)	(*b*)	(*c*)	(*c*)	(*d*)

CHAPTER 5

Space Visualization

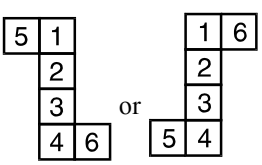
In these type of questions, a template or a layout of a cube, dice or a box is given, which can be folded to produce different patterns. To solve these questions what is required is a clear study of the given layout and the selection of one figure, from the alternative patterns which can be made from the given layout. To attempt such problems understand the unfolded patterns given below:

Layout 1.



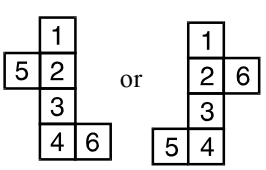
The opposite sides are :
1—3, 2 — 4 and 5 — 6

Layout 2.



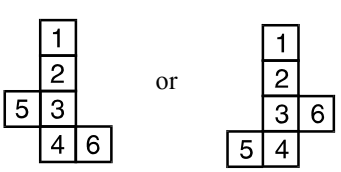
The opposite sides are :
1 — 3, 2 — 4 and 5 — 6

Layout 3.



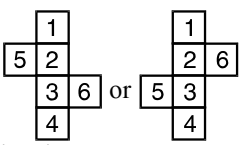
The opposite sides are :
1 — 3, 2 — 4 and 5 — 6.

Layout 4.



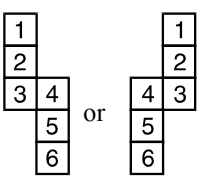
The opposite sides are :
1 — 3, 2 — 4 and 5 — 6

Layout 5.



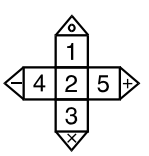
The opposite sides are :
1 — 3, 2 — 4 and 5 — 6

Layout 6.

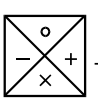


The opposite sides are :
1 — 3, 2 — 5 and 4 — 6

Layout 7.

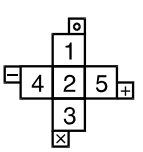


The opposite sides are :

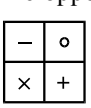


— 2, 1 — 3 and 4 — 5. Here, side 6 is divided into four parts

Layout 8.



The opposite sides are



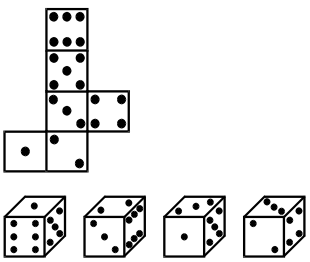
— 2, 1 — 3 and 4 — 5. Here, side 6 is divided into four parts.

Observe from the above layouts that all sides except the opposite side are adjacent sides. Also keep in mind that the three visible sides of the option figures are one of the opposite sides of each opposite pair.

MULTIPLE CHOICE QUESTIONS

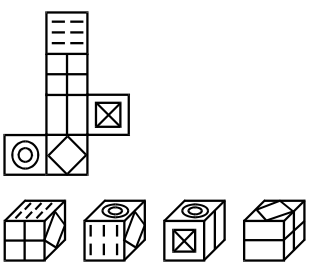
Directions : *The figure is folded to produce different box patterns. Study the pattern to know if they can be produced from given figure and select the answer from the alternatives.*

1.



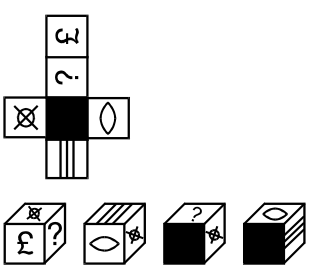
(*a*) (*b*) (*c*) (*d*)

2.



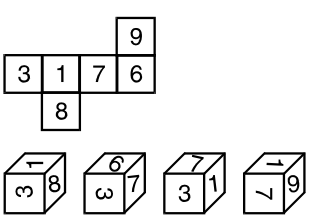
(*a*) (*b*) (*c*) (*d*)

3.



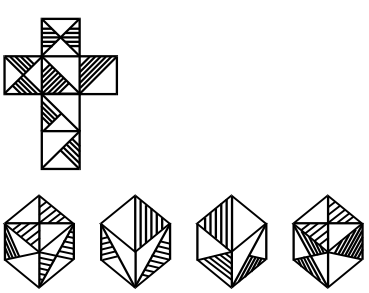
(*a*) (*b*) (*c*) (*d*)

4.



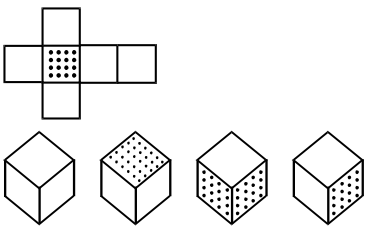
(*a*) (*b*) (*c*) (*d*)

5.



(*a*) (*b*) (*c*) (*d*)

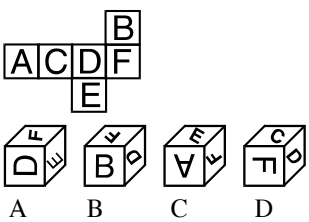
6.



A B C D

(*a*) A, B and D (*b*) B and D
(*c*) B, C and D (*d*) A and D

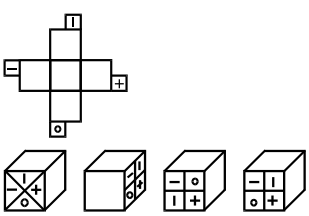
7.



A B C D

(*a*) A and B (*b*) A and D
(*c*) B and C (*d*) All four

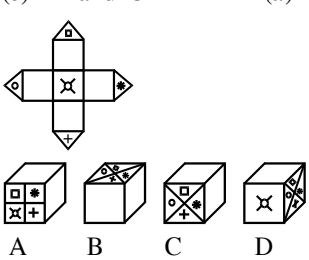
8.



A B C D

(*a*) B and D (*b*) A and D
(*c*) B and C (*d*) C and D

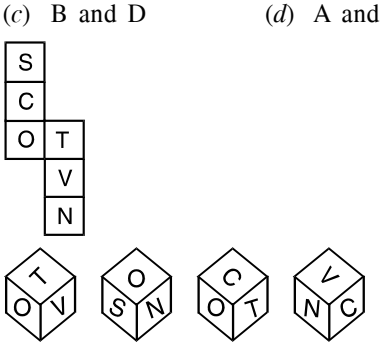
9.



A B C D

(*a*) A and C (*b*) B and C
(*c*) B and D (*d*) A and D

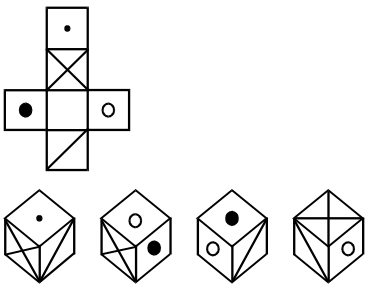
10.



A B C D

(*a*) B and C (*b*) A and D
(*c*) A and C (*d*) All four

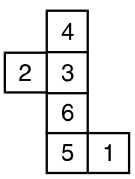
11.

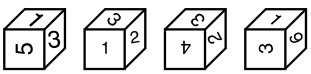


A B C D

(*a*) A and D (*b*) B, C and D
(*c*) All four (*d*) None of the above

12.

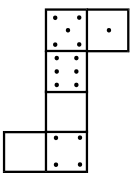


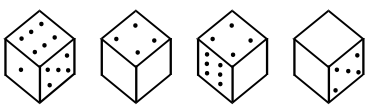


A B C D

(*a*) A and C (*b*) C and D
(*c*) B and C (*d*) B and D

13.





A B C D

(*a*) A and C (*b*) A and B
(*c*) B and C (*d*) B and D

EXPLANATORY ANSWERS

(All answers are based on number pattern of the sides as in the layout given in the beginning of this section)

1. (*d*) : The given figure is same as layout 4. The sides adjacent to top side 3 are in order 2, 5, 4, 6 — of these sides, 4 and 6 are seen on left and right sides respectively.

2. (*b*) : The given figure is same as layout 4. The sides adjacent to top side 5 are in order 4, 3, 2, 1 —of these sides 1 and 4 are seen on left and right sides respectively.

3. (*d*) : The given figure is same as layout 1. The sides adjacent to top side 5 are in order 4, 3, 2, 1 — of these sides 2 and 1 are seen on left and right sides respectively.

4. (*a*) : The given figure is same as layout 3. The sides adjacent to top side 2 are in order 1, 5, 3, 6 — of these sides 1 and 5 are seen on left and right sides respectively.

5. (*c*) : The given figure is same as layout 1. The sides adjacent to top side 6 are in order 1, 2, 3, 4 — of these sides 2 and 3 are seen on left and right sides respectively.

6. (*a*) : The given figure is same as layout 1. The top, left and right sides in figure option (a) are 1, 4 and 5 respectively (other combinations of sides for this figure are also possible); in figure option (b) 2, 1 and 5 respectively (other combination of sides for this figure are also possible; and in figure option (d) 1, 5 and 2 respectively (other combinations of sides for this figure are also possible).

7. (*a*) : The given figure is same as layout 4. In option figure (a) the top side 4 has side 3 on left and side 5 on right. In option figure (b) the top side 4 has side 6 on its left and side 3 on right.

Note : in option figure (c) the sides are correct but the printing of letter on right side is incorrect.

8. (*a*) : The given figure is same as layout 8. Option figures (b) and (d) contain the correct joints of side 6.

9. (*b*) : The given figure is same as layout 7. Option figures (a) and (c) contain the correct joints of side 6.

10. (*c*) : The given figure is same as layout 6. In option figure (a) the top side 4 has side 3 on left and side 5 on right. In option figure (c) the top side 2 has side 3 on left and side 4 on right.

11. (*d*) : The given figure is same as layout 1. None of the figure options can be made from the given figure.

12. (*b*) : The given figure is same as layout 3. In option figure (c) the top side 2 has side 1 on left and side 5 on right. In option figure (d) the top side 6 has side 2 on left and side 3 on right.

13. (*b*) : The given figure is same as layout 2. In option figure (a) the top side 2 has side 6 on left and side 1 on right. In option figure (b) the top side 4 has side 3 on left and side 5 on right.

CHAPTER 6

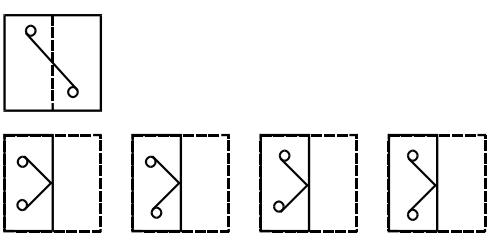
Pinch Hole/Paper Folding & Unfolding

These type of questions are based on a piece of paper which is folded and cut or punched in a particular manner. One of the option figures either resembles the pattern that would be formed when the paper is unfolded or resembles the form in which the paper is folded and cut or punched.

MULTIPLE CHOICE QUESTIONS

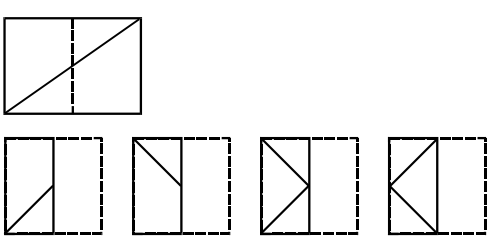
Directions (Qs. 1-5) : *In each one of the following problems, a square transparent sheet with a pattern is given. Figure out from amongst the four alternatives as to how the pattern would appear when the transparent sheet is folded at the dotted line.*

1.



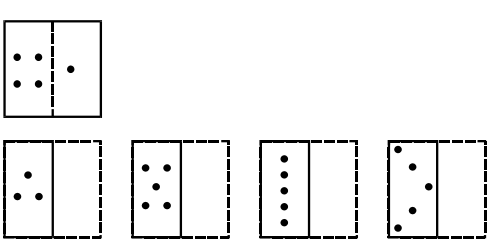
(*a*) (*b*) (*c*) (*d*)

2.



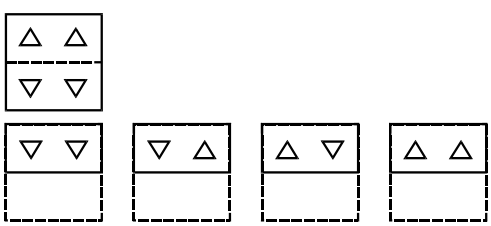
(*a*) (*b*) (*c*) (*d*)

3.



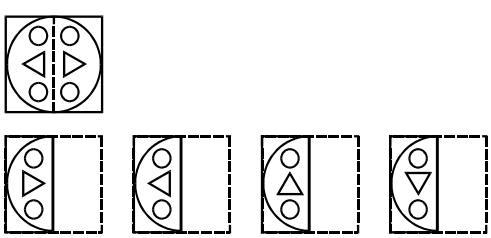
(*a*) (*b*) (*c*) (*d*)

4.



(*a*) (*b*) (*c*) (*d*)

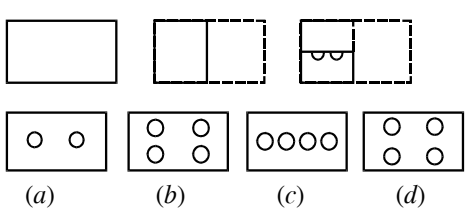
5.



(*a*) (*b*) (*c*) (*d*)

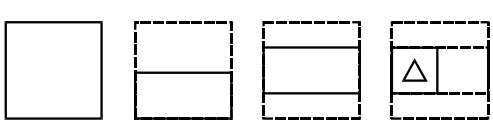
Directions (Qs. 6-13) : *In each of the following questions a piece of paper has been folded and then punched. From the given options figure out the correct response which shows how it will appear when opened.*

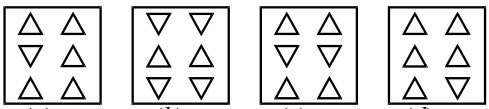
6.



(*a*) (*b*) (*c*) (*d*)

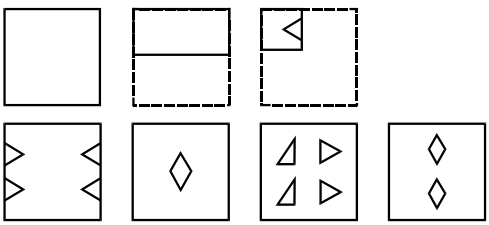
7.





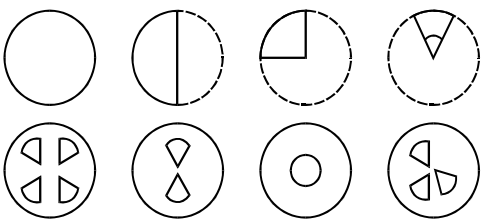
(*a*) (*b*) (*c*) (*d*)

8.



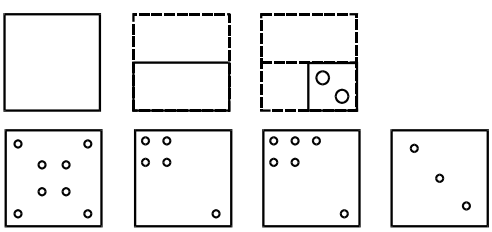
(*a*) (*b*) (*c*) (*d*)

9.



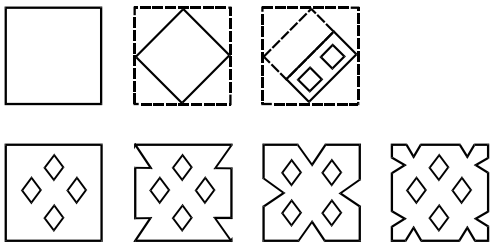
(*a*) (*b*) (*c*) (*d*)

10.



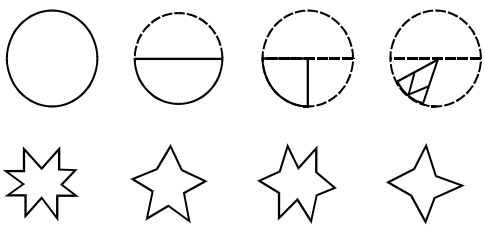
(*a*) (*b*) (*c*) (*d*)

11.



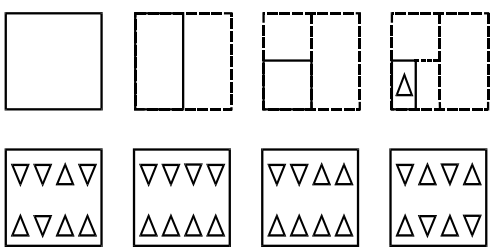
(*a*) (*b*) (*c*) (*d*)

12.



(*a*) (*b*) (*c*) (*d*)

13.

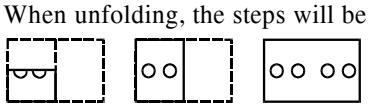


(*a*) (*b*) (*c*) (*d*)

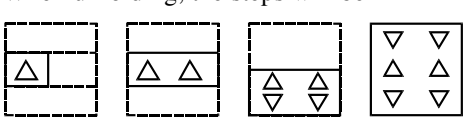
EXPLANATORY ANSWERS

1. (*d*) **2. (*c*)**
3. (*b*) **4. (*d*)**
5. (*b*)

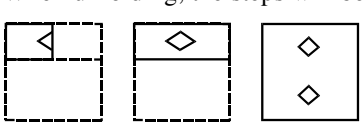
6. (*c*) : When unfolding, the steps will be :



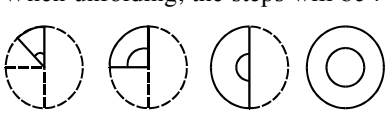
7. (*b*) : When unfolding, the steps will be :



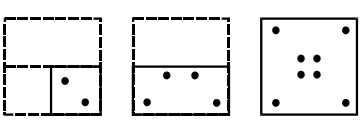
8. (*d*) : When unfolding, the steps will be :



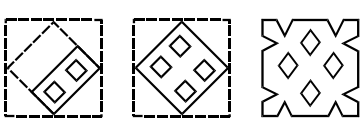
9. (*c*) : When unfolding, the steps will be :



10. (*a*) : When unfolding, the steps will be :

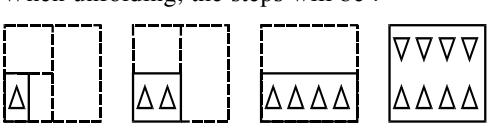


11. (*d*) : When unfolding, the steps will be :



12. (*a*) : When unfolding, the steps will be :

13. (*b*) : When unfolding, the steps will be :



CHAPTER 7

Figural Pattern Folding and Completion

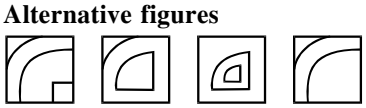
In these type of questions an incomplete figure pattern is given followed by alternative figures of which one will complete the given figure pattern. These figure patterns are mainly based on symmetries.

MULTIPLE CHOICE QUESTIONS

Directions : *In each question, which one of the alternative figures will complete the given figure pattern?*

1. Pattern

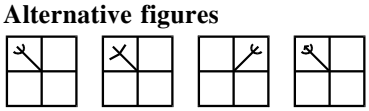
Alternative figures



(*a*) (*b*) (*c*) (*d*)

2. Pattern

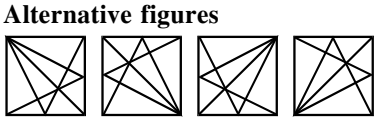
Alternative figures



(*a*) (*b*) (*c*) (*d*)

3. Pattern

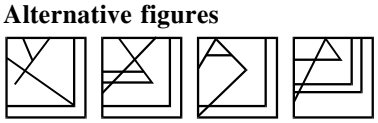
Alternative figures



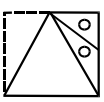
(*a*) (*b*) (*c*) (*d*)

4. Pattern

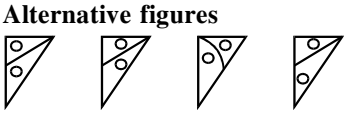
Alternative figures



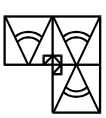
(*a*) (*b*) (*c*) (*d*)

5. Pattern 

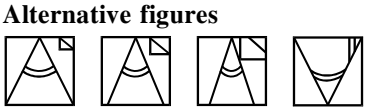
Alternative figures



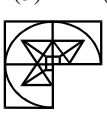
(*a*) (*b*) (*c*) (*d*)

6. Pattern 

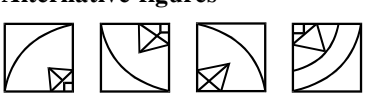
Alternative figures



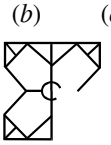
(*a*) (*b*) (*c*) (*d*)

7. Pattern 

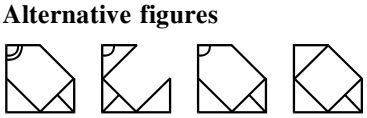
Alternative figures



(*a*) (*b*) (*c*) (*d*)

8. Pattern 

Alternative figures

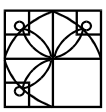


(*a*) (*b*) (*c*) (*d*)

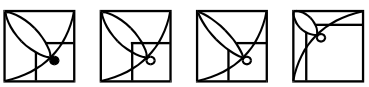
9. Pattern

Alternative figures

(*a*) (*b*) (*c*) (*d*)

10. Pattern 

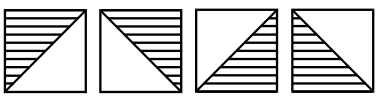
Alternative figures



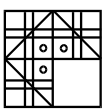
(*a*) (*b*) (*c*) (*d*)

11. Pattern

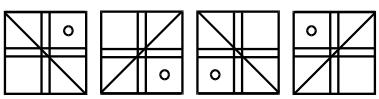
Alternative figures



(*a*) (*b*) (*c*) (*d*)

12. Pattern 

Alternative figures

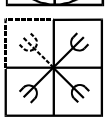


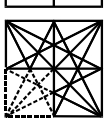
(*a*) (*b*) (*c*) (*d*)

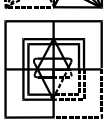
EXPLANATORY ANSWERS

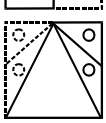
All the completed figures will look like this:

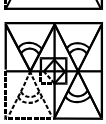
1. (*b*) :

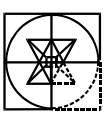
2. (*a*) : 

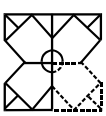
3. (*d*) : 

4. (*d*) : 

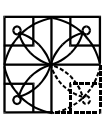
5. (*a*) : 

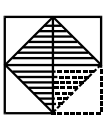
6. (*a*) : 

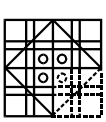
7. (*b*) : 

8. (*c*) : 

9. (*a*) :

10. (*b*) : 

11. (*a*) : 

12. (*d*) : 

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CHAPTER 8

Visual Memory

These type of problems are based on the mirror images or reflections of number, letters and figures. While attempting such questions one must be able to visualise clearly the questioned reflections, be they on vertical plane or on horizontal plane. Study the chart and information given below. The visualisation of letters and numbers is easier than the visualisation of figures for the simple reason that the figures have many forms and all cannot be summed up.

Horizontal Mirror Images (HMI) of Numbers

Number	*HMI*	*Number*	*HMI*
0	0	5	5
1	1	6	6
2	2	7	7
3	3	8	8
4	4	9	9

Note : HMI of 0 and 8 remain unchanged

Vertical Mirror Images (VMI) of Numbers

Numbers :	0	1	2	3	4	5	6	7	8	9
VMI :	0	1	2	3	4	5	6	7	8	9

Note : VMI of 0, 3 and 8 remain unchanged.

Exceptions in style need caution. Example 3 will be 3, or 8 will be 8.

Horizontal Mirror Images of Capital Letters

Letter	HMI	Letter	HMI	H letter	HMI
A	A	J	J	S	S
B	B	K	K	T	T
C	C	L	L	U	U
D	D	M	M	V	V
E	E	N	N	W	W
F	F	O	O	X	X
G	G	P	P	Y	Y
H	H	Q	Q	Z	Z
I	I	R	R		

Note : HMI of A, H, I, M, O, T, U, V, W, X and Y remain unchanged.

Exceptions in style need caution. Example : A will be A, or X will be X.

Vertical Mirror Images of Capital Letters

Letters :	A	B	C	D	E	F	G	H	I	J	K	L	M
VMI :	A	B	C	D	E	F	G	H	I	J	K	L	M
Letters :	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
VMI :	N	O	P	Q	R	S	T	U	V	W	X	Y	Z

Note : VMI of C, D, E, H, I, K, O and X remain unchanged.

Horizontal Mirror Images of Small Letters

Letter	HMI	Letter	HMI	Letter	HMI
a	a	j	j	s	s
b	d	k	k	t	t
c	c	l	l	u	u
d	b	m	m	v	v
e	e	n	n	w	w
f	f	o	o	x	x
g	g	p	q	y	y
h	h	q	p	z	z
i	i	r	r		

Note : HMI of o, v, w and x remain unchanged.

Vertical Mirror Images of Small Letters

Letter :	a	b	c	d	e	f	g	h	i	j	k	l	m
VMI :	a	b	c	d	e	f	g	h	i	j	k	l	m
Letter :	n	o	p	q	r	s	t	u	v	w	x	y	z
VMI :	n	o	p	q	r	s	t	u	v	w	x	y	z

Note : VMI of c, o and x remain unchanged. Letter 1 has exceptions: if it is a straight vertical line – 1 then it remains unchanged.

MULTIPLE CHOICE QUESTIONS

Directions (Qs. 1 to 15) : *In each question below which is the exact horizontal mirror image?*

1. DuST
(*a*) DuSTD (*b*) TSuD
(*c*) TSuD (*d*) DuST

2. CHAIR
(*a*) RIHAC (*b*) CHAIR
(*c*) RIAHC (*d*) CHAIR

3. WHOM
(*a*) MOHW (*b*) WOHM
(*c*) MOHW (*d*) MOHW

4. plaque
(*a*) pIaque (*b*) pIqbue
(*c*) qlapue (*d*) pIaque

5. brows
(*a*) drows (*b*) drows
(*c*) sword (*d*) sword

6. flying
(*a*) gniyIf (*b*) gnIyf
(*c*) gniyIf (*d*) gniyIf

7. 4379
(*a*) 9734 (*b*) 4379
(*c*) 9734 (*d*) 9734

8. 57182
(*a*) 57182 (*b*) 57182
(*c*) 57182 (*d*) 57182

9. 69430
(*a*) 09469 (*b*) 09469
(*c*) 09469 (*d*) 09469

10. 2JKS
(*a*) SK12 (*b*) SJK2
(*c*) SJK2 (*d*) SJK2

11. P9Yf3
(*a*) ɛfY9P (*b*) ɛfY9P
(*c*) ɛfY9P (*d*) ɛfY9P

12. GZ5QRh
(*a*) hRQ5ZG (*b*) hRQ5ZG
(*c*) hRQ5ZG (*d*) hRQ5ZG

13. 2$%CH
(*a*) HC%$2 (*b*) HC%$2
(*c*) HC%$2 (*d*) HC%$2

14. 7↑FN8
(*a*) 8NF↑7 (*b*) 8NF↑7
(*c*) 8NF↑7 (*d*) 8NF↑7

15. yk19G
(*a*) yk19G (*b*) yk19G
(*c*) yk19G (*d*) yk19G

ANSWERS

1	2	3	4	5	6	7	8	9	10
(*c*)	(*b*)	(*a*)	(*a*)	(*c*)	(*d*)	(*b*)	(*a*)	(*d*)	(*c*)
11	**12**	**13**	**14**	**15**					
(*d*)	(*b*)	(*c*)	(*a*)	(*d*)					

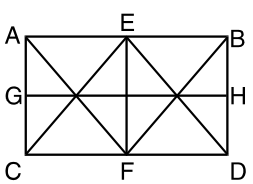
CHAPTER 9

Discrimination

In these problems one has to count the geometrical figures in a given complex figure. A little bit of systematic approach is needed to get the correct number of the asked figure. The shapes of all geometrical figures must be clear in mind.

SOLVED EXAMPLES

1. How many straight lines are used to make the figure given below?



(*a*) 8 (*b*) 6
(*c*) 10 (*d*) 12

Answer (*c*) : The method of counting is given below.

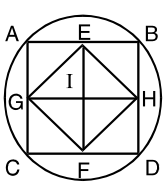
The horizontal lines are AB, GH and CD i.e. – 3 lines, the vertical lines are AC, EF and BD i.e. – 3 lines, the diagonal lines are CE, FB, AF and ED i.e. – 4 lines, therefore the total number of straight lines is

3 + 3 + 4 = 10

2. How many square are there is this figure?

(*a*) 4 (*b*) 6
(*c*) 8 (*d*) 5

Answer (*b*) : The squares are counted in this manner.



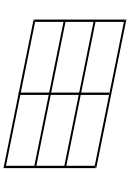
There is one main square ABCD divided into four parts by lines EF and GH. So, all the 5 squares are ABCD, AEGI, GICF, EBIH and IHFD. The square in the middle is EGHF. The total number of squares are 5 + 1 = 6

MULTIPLE CHOICE QUESTIONS

1. How many triangles are there in the figure given below?

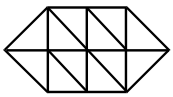
(*a*) 24 (*b*) 27
(*c*) 25 (*d*) 26

2. How many parallelograms are there in this figure?



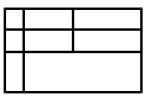
(*a*) 9 (*b*) 13
(*c*) 15 (*d*) 18

3. How many triangles are there in this figure?



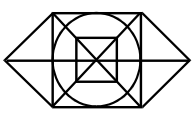
(*a*) 16 (*b*) 17
(*c*) 18 (*d*) 19

4. The number of rectangles in this figure are.



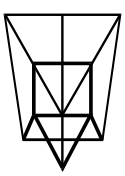
(*a*) 21 (*b*) 24
(*c*) 23 (*d*) 25

5. How many squares are hidden in this figure?



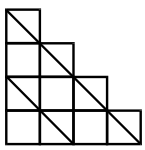
(*a*) 7 (*b*) 8
(*c*) 9 (*d*) 10

6. The number of triangles in this figure are.



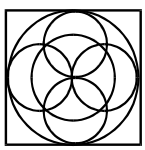
(*a*) 19 (*b*) 16
(*c*) 21 (*d*) 15

7. How many squares are there in the figure given below?



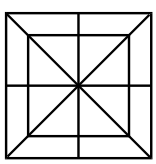
(*a*) 10 (*b*) 11
(*c*) 13 (*d*) 14

8. The number of circles in this figure is



(*a*) 6 (*b*) 5
(*c*) 2 (*d*) 3

9. How many triangles are there in the figure given below?

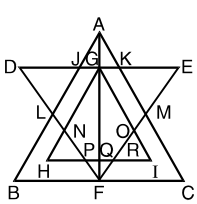


(*a*) 28 (*b*) 36
(*c*) 24 (*d*) 32

10. How many straight lines are needed to draw the figure in question 9?
(*a*) 10 (*b*) 12
(*c*) 11 (*d*) 13

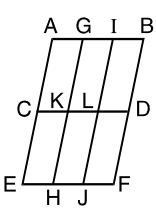
EXPLANATORY ANSWERS

1. (*a*) :



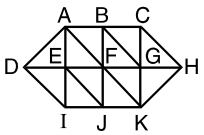
- The main triangles making the figure are ABC, DEF and GHI *i.e.,* – 3 triangles
- The simplest triangles are AJG, AGK, KEM, DJL, NHP, PQF, QFR and ORI *i.e.,* – 8 triangles
- The triangles formed by the bisecting line AF are ABF, AFC, GHQ, GQI, DGF and GFE *i.e.,* – 6 triangles
- The triangles formed inbetween the three triangles AJK, ALF, AMF, DGN, DGF, LBF, MFC, GEO, GNF and GOF – *i.e.,* 10 triangles
- So, the total number of triangles is
  3 + 8 + 6 + 10 = 27

2. (*d*) :



- The main parallelogram is ABEF *i.e.,* 1 parallelogram
- When divided into half by line CD the main figure has ABCD and CDEF *i.e.,* 2 parallelograms
- When further lines GH and IJ are drawn, the parallelograms are AGEH, GIJH and IBJF *i.e.,* – 3 parallelograms.
- The simplest parallelogram are AGCK, CKEH, GIKL, KLHJ, IBLD and LDJF *i.e.* – 6 parallelograms
  Other parallelograms are AICL, CLEJ, GBKD, KDHF, AIEJ and GBHF – *i.e.,* 6 parallelograms
  So, the total number of parallelograms is
  1 + 2 + 3 + 6 + 6 = 18

3. (*a*) :



The simplest triangles are ADE, DEI, AEF, ABF, EIJ, EFJ, BFG, BCG, FJK, FGK, CGH and GHK – *i.e.,* – 12 triangles

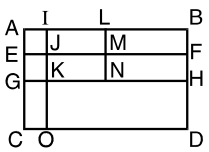
The bisected triangles are ADI and CHK – *i.e.* – 2 triangles

Other triangles are AIK and ACK *i.e.,* – 2 triangles

So, the total number of triangles is

12 + 2 + 2 = 16

4. (*c*) :



The main rectangle is ABCD – *i.e.,* – 1 rectangle

The simplest rectangles are AIEJ, ILJM, LBMF, EJGK, JMKN, MFNH, GKCO and KHOD *i.e.* – 8 rectangles.

The rectangles which have two parts are ALEM, IBJF, EMGN, JFKH, AIGK, IKLN, LBNH, EJCO and GHCD *i.e.* – 9 rectangles.

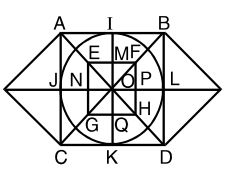
The rectangles which have three parts are AICO, ABEF and EFGH *i.e.* – 3 rectangles

The rectangles which have four parts are ALGN and IBKH *i.e.* – 2 rectangles

So, the total number of rectangles

1 + 8 + 9 + 3 + 2 = 23

5. (*d*) :



The main squares are ABCD and EFGH *i.e.,* – 2 squares

The simplest outer squares are AIJO, IBOL, JOCK and OLKD *i.e.,* – 4 squares

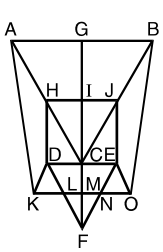
The simplest inner square are EMNO, NOGQ, MFOP and OPQH *i.e.,* – 4 squares

There are no other squares formed in the figure

So, the total number of squares is

2 + 4 + 4 = 10

6. (*b*) :



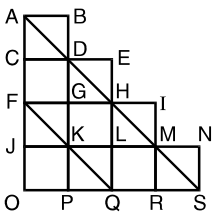
The main triangles are : ABC, DEF, LNF, and HJC *i.e.* 4 triangles

The simplest triangles are : HIC, IJC, HDC, JCE, DKL, LMF, MFN and NOE *i.e.* – 8 triangles

Other triangles are : AGC, GBC, DCF and CEF – *i.e.* 4 triangles

So, the total number of triangles is 4 + 8 + 4 = 16

7. (*c*) :

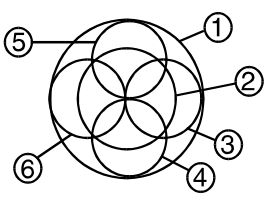


The simplest squares are : ABCD, CDFG, DEGH, FGJK, GHKL, HILM, JKOP, KLPQ, LMQR and MNRS *i.e.* – 10 squares.

Other squares are : CEJL, FHOQ and GIPR *i.e.* – 3 squares

So, the total number of squares is 10 + 3 = 13

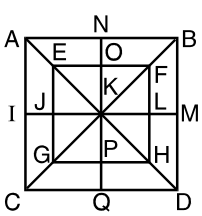
8. (*a*) :



There are two main circles and four smaller circles intersecting each other.

So, the total number of circles is 2 + 4 = 6

9. (*d*) :



The larger triangles are : ABC, BCD, ABD and ACD *i.e.* – 4 triangles

The smaller triangles are : EFH, EGH, EFG and FGH *i.e.* – 4 triangles.

The simplest triangles are : EJK, EOK, OFK, JKG, FKL, KLH, KGP and KPH *i.e.* – 8 triangles

The bisected triangles are: AKC, ABK, CKD, KBD, EKG, EKF, KHG, KHF, i.e., –8 triangle.

Other triangles are : ANK, NKB, KBM, KMD, KQD, KQC, KCI, IKA *i.e.* – 8 triangles.

So, the total number of triangles is

4 + 4 + 8 + 8 + 8 = 32

10. (*b*) : The horizontal lines are : AB, EF, KL, GH and CD *i.e.* – 5 lines.

The vertical lines are AC, EG, IJ, FH and BD *i.e.* – 5 lines.

The diagonal lines are : AD and BC *i.e.* – 2 lines.

So, the total number of lines used to draw this figure is 5 + 5 + 2 = 12

CHAPTER 10

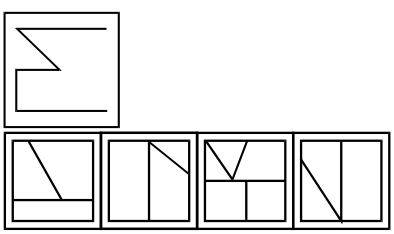
Embedded Figures

In these type of questions a figure form is given followed by alternative figures. In one of these figure options the given form is embedded. Practice of visualisation comes handy in attempting such easy questions.

MULTIPLE CHOICE QUESTIONS

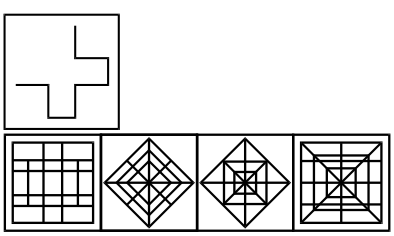
Directions (Qs. 1 to 6) : *In the questions given below a figure is given. From the given alternatives select the one in which the given figure is embedded.*

1.



(*a*) (*b*) (*c*) (*d*)

2.



(*a*) (*b*) (*c*) (*d*)

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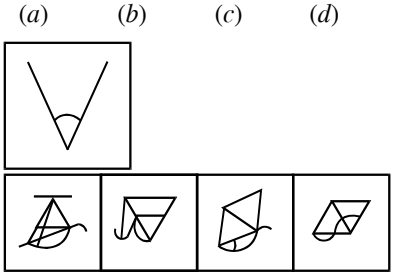

(*a*) (*b*) (*c*) (*d*)

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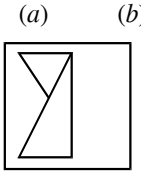

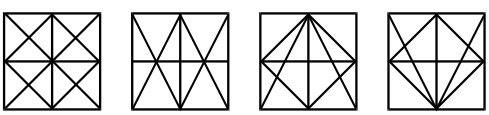

(*a*) (*b*) (*c*) (*d*)

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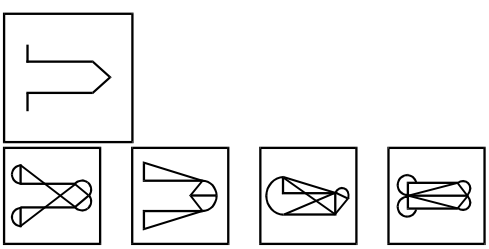

(*a*) (*b*) (*c*) (*d*)

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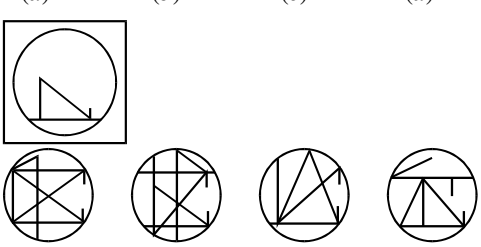
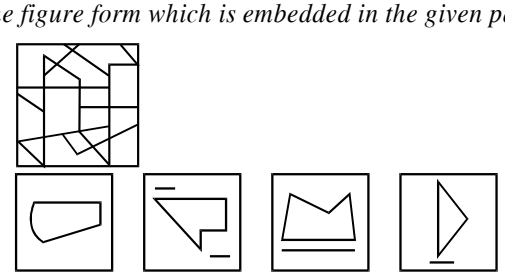


(*a*) (*b*) (*c*) (*d*)

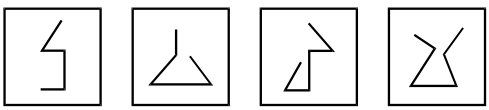
Directions (Qs. 7 to 10) : *In each question given below find the figure form which is embedded in the given pattern.*

7.

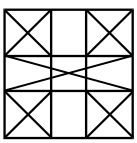


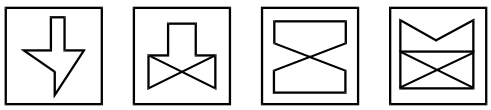
(*a*) (*b*) (*c*) (*d*)

8.

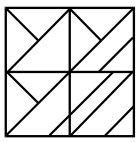


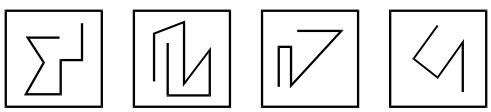
(*a*) (*b*) (*c*) (*d*)

9. 



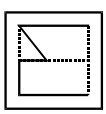
(*a*) (*b*) (*c*) (*d*)

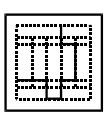
10. 

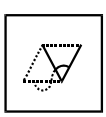


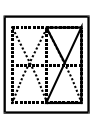
(*a*) (*b*) (*c*) (*d*)

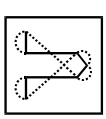
EXPLANATORY ANSWERS

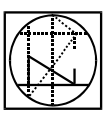
1. (*a*) : 

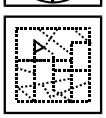
2. (*a*) : 

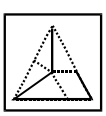
3. (*d*) : 

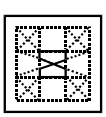
4. (*b*) : 

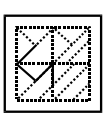
5. (*a*) : 

6. (*b*) : 

7. (*d*) : 

8. (*b*) : 

9. (*c*) : 

10. (*d*) : 

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