RAILWAY RECRUITMENT BOARD

RRB

TECHNICIAN GRADE-I SIGNAL PRACTICE BOOK

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Tentative Subject-wise break-up of questions and marks for CBT of Technician Gr-I Signal		
Subjects	**No. of Questions**	**Marks for Each Section**
General Awareness	10	10
General Intelligence and Reasoning	15	15
Basics of Computers and Applications	20	20
Mathematics	20	20
Basic Science & Engineering	35	35
Total	100	100

1. Duration : 90 minutes (with 30 minutes extra time for PwBD candidates using scribe).
2. The Subject-wise distribution give above is merely indicative. The question papers may vary.

PRACTICE SET - 1

1. In which projects did ISRO succeeded in September 2014?
(a) Launched policy load vehicle
(b) Launched synchronous satellite
(c) Launched rockets to mars
(d) Mars orbiter spacecraft successfully entered orbit around planet Mars.

2. Sachin Tendulkar scored his 100th international cricket century against which team?
(a) England (b) Australia
(c) Bangladesh (d) Pakistan

3. In which of the following states is the Gambhira- a popular dance, performed using various wooden masks?
(a) Rajasthan (b) Telangana
(c) West Bengal (d) Gujarat

4. Kailash Satyarthi was the founder of:
(a) Bachpan Bachao Andolan
(b) Sabko Padhao Andolan
(c) Stree Bachao Andolan
(d) Beti Padhao Andolan

5. Securities sold by the Central Bank with a clear specification of repurchase date and price is called .....
(a) outright open market operations
(b) Interest Rate Swap
(c) repurchase agreement
(d) reverse repo

6. How many members nominated by the President of India to the Rajya Sabha?
(a) 12 (b) 10
(c) 8 (d) 6

7. Which of the following is the lowermost layer of the earth's atmosphere?
(a) Thermosphere (b) Mesosphere
(c) Stratosphere (d) Troposphere

8. Which of the following is NOT a Himalayan Mountain Pass connecting Uttarakhand with Tibet ?
(a) Shipki La (b) Mana Pass
(c) Mangsha Dhura (d) Niti Pass

9. ____was Bairam Khan son, who became an important person in Akbar court.
(a) Abdul Rahim Khan -i- Khanan
(b) Amir Khusrow
(c) Abul Fazl
(d) Birbal

10. The Tri-Color which was hoisted in Stuttgart by Madam Cama was smuggled into British India by:
(a) Indulal Yagnik (b) Bhikaji Cama
(c) Kishan Singh (d) Veer Savarkar

11. Select the option that is related to the third term in the same way as the second term is related to the first term.
Book : Reading :: Poetry : ?
(a) Rhyming (b) Singing
(c) Recitation (d) Teaching

12. If
'A # B' means 'A is the father of B,
'A $ B' means 'A is the mother of B,
'A @ B' means 'A is the husband of B,
'A % B' means 'A is the wife of B,
'A =B' means 'A is the brother of B
then how is P related to V in the following expression?
P @ Q $ U = R % S # V
(a) Paternal grandfather
(b) Maternal grandfather
(c) Father's brother
(d) Mother's brother

13. If J denotes addition, G denotes subtraction, M denotes multiplication and B denotes division, then which of the following equations will not be correct?
(a) 6M5J4B2G10 = 22 (b) 4G16B2J6M5 = 26
(c) 6B2M8G10J4 = 20 (d) 8M2G6B3J7= 21

14. Statements:
Politicians marry only beautiful girls. X is beautiful.
Conclusions:
1. X will marry a politician
2. X won't marry a politician
(a) Only conclusion 1 follows
(b) Only conclusion 2 follows
(c) Either 1 or 2 follows
(d) Both 1 and 2 follow

15. Consider the given statement and decide which of the given assumption is/are implicit in the statement :
Statement:
"We use platinum, the lustrous metal, for jewellery"_____ An advertisement
Assumption:
I. Platinum is a lustrous metal
II. Platinum is use for making jewellery
(a) Only assumption II implicit
(b) Neither assumption I nor II is implicit
(c) Only assumption I is implicit
(d) Both assumption I and II are implicit

16. A question and three statements labelled (I), (II) and (III) are given, You have to decide which statement(s) is/are sufficient to answer the question.
Question: Who is the shortest among A, B, C, D and E?

Statement :
I. A is taller than E but shorter than D.
II. B is shorter than C but taller than E.
III. D is taller than C and A is taller than B.
(a) Statements I, II and III are insufficient
(b) Statements I and II together are sufficient.
(c) Statements I and III together are sufficient
(d) Statements I, II and III together are sufficient

17. From among the given options, select the word which cannot be formed using the letters of the given word.
LAUGHTER
(a) GRUNT (b) GATE
(c) HATE (d) RATE

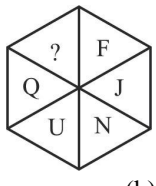
18. Select the option that is related to the third term in the same way as the second term is related to the first term.
India : Tiger :: Nepal :?
(a) Lion (b) Cow
(c) Rhinoceros (d) Leopard

19. In a certain code language, PAINT is coded as 83527 and SCORE is coded as 49061. How would you code RECENT in the same language?
(a) 921235 (b) 190985
(c) 648497 (d) 619127

20. Three pairs are similar in one way and one pair is different from following four pair of terms. Which one is different from other three?
(a) Captain : Team
(b) Boss : Gang
(c) Prime Minister : Cabinet
(d) Artist : Troupe

21. Select the number from among the given options that can replace the question mark (?) and continue the given series.
113, 115, 119, 125, 133, ?
(a) 143 (b) 152
(c) 147 (d) 141

22. Study the given pattern carefully and select the letter that can replace the question mark (?) in it



(a) P (b) Q
(c) M (d) O

23. One day, Rekha was standing facing the east. She then turned 90 degrees right and then turned 45 degrees in the anti-clockwise direction. She then turned 90 degrees clockwise. Which direction is she facing now?
(a) North-east (b) South-west
(c) North (d) South

24. A family consists of 7 people with three couples. The artist is married to the politician and they have three children. The teacher is the sister-in-law of the accountant, who is the wife of the engineer. The doctor and businessman are brothers. Who among the following could be the husband of the teacher?
(a) Engineer (b) Doctor
(c) Politician (d) Accountant

25. If 'A' represents 'subtraction', 'B' represents 'Multiplication', 'C' represents 'division' and 'D' represents 'addition', then what is the value of (3 B 4 D 5 A 6) C 1?
(a) 1 (b) 11
(c) 0 (d) 10

26. Who built the analytical engine, one of the early computing devices?
(a) John Napier (b) Herman Hollerith
(c) Blaise Pascal (d) Charles Babbage

27. Which of the following is a special purpose application software?
(a) Payroll system (b) Linux
(c) Windows
(d) Database management system

28. Which of the following input devices is used as a personal computer peripheral or general control device consisting of a hand - held stick that rotates around a loose and moves the screen cursor around rotates?
(a) Microphone (b) MICR
(c) Biometric (d) Joystick

29. Which of the following types of mouse uses laser rays for cursor movement on the computer screen?
(a) Optical (b) Electrical
(c) Gyroscopic (d) Mechanical

30. Which among the following statements is/are correct with respect to types of memory?
A. Internal processor memories
B. Primary memory or main memory
C. Secondary or auxiliary memory
(a) All of the options
(b) Both B and C
(c) Both A and B
(d) Both C and A

31. Where is the cache memory located?
(a) RAM (b) CPU
(c) CU (d) Monitor

32. The main memory of a computer is made using which of the following technique?
(a) Magnetic (b) Optical
(c) Semi-conductor (d) Vacuum tube

33. Which of the following communication protocols is used to interconnect network devices on the internet?
(a) HTTP (b) FTP
(c) TCP/IP (d) WWW

34. **A cell phone connected to a Bluetooth headset or a mobile computer connected to a portable Bluetooth thermal printer is an example of a _____.**
(a) SAN (b) MAN
(c) PAN (d) LAN

35. **Which of the following is a disadvantage of the Dial-up Internet Access method when compared with DSL and cable modem?**
(a) Low speed
(b) Limited perimeter
(c) Security risk
(d) Expensive

36. **The term 'wide ', 'Mirrored,' 'Narrow' describe which of the following options in MS word 365 in terms of the layout the document?**
(a) Breaks (b) Margins
(c) Size (d) Orientation

37. **In MS - Word 365 which of the following function keys, if possible repeats the last command or action?**
(a) F3 (b) F1
(c) F4 (d) F2

38. **Select the correct sequence of steps showing how to double underline text in MS Word.**
(a) a-select text.
b-click Insert tab; then on arrow of 'Font' group.
c-Select Underline Style as double line.
(b) a- select text.
b- click page Layout tab; then click on arrow of 'Font' group.
c-Select Underline Style as double line.
(c) a- Select text.
b- Click Home tab; then click on arrow of 'Font' group.
c- Select Underline style as double line.
(d) a- Select text.
b- Click Layout tab; then click on arrow of 'Font' group.
c- Select Underline as double line.

39. **Which of the following terms is a world-wide network of computers also known as network of networks?**
(a) VLAN (b) MAN
(c) Internet (d) World Wide Web

40. **If you are replying to an email, which of the following fields are filled in automatically?**
(a) "To" and "From" field both
(b) Only "From" field
(c) Neither "To" field nor "From" field
(d) Only "To" field

41. **What does HTTPS stand for?**
(a) Hyper Text Transport Protocol Secure
(b) Hyper Text Transfer Protocol Secure
(c) Hyper Transfer Tariff Protocol System
(d) Hyper Transport Tariff Protocol System

42. **Which of the following is not a web browser?**
(a) Netscape (b) Military
(c) Yandex (d) Opera

43. **Which of the following is not web mail provider?**
(a) upGrad (b) Yahoo
(c) Outlook (d) Google

44. **Which of the following keyboard shortcuts is used to activate the first tab when multiple tabs are opened in Google Chrome?**
(a) Ctrl + 1 (b) Alt + 9
(c) Alt + 1 (d) Ctrl + 9

45. **Which of the following characteristics refers to the use of technology to complete a task with as little human interaction as possible?**
(a) Remembrance power
(b) No EQ
(c) No IQ
(d) Automation

46. **Which of the following numbers is NOT divisible by 9 ?**
(a) 49104 (b) 77832
(c) 35253 (d) 45390

47. **$(64 \times 5^4) - (5^4 \times 16) = ?$**
(a) 40,000 (b) 35,000
(c) 30,000 (d) 25,000

48. **Which of the following fractions is the largest?**
$\frac{7}{9}, \frac{6}{7}, \frac{22}{25}$ **and** $\frac{11}{13}$
(a) $\frac{11}{13}$ (b) $\frac{22}{25}$
(c) $\frac{7}{9}$ (d) $\frac{6}{7}$

49. **The value of** $\frac{3}{15}+\frac{13}{14}-\frac{19}{21}+\frac{31}{35}-\frac{23}{30}$ **=?**
(a) $\frac{8}{21}$ (b) $\frac{1}{3}$
(c) $\frac{2}{5}$ (d) $\frac{12}{35}$

50. **The LCM of the numbers 36, 54, 72 and 96 is :**
(a) 1064 (b) 764
(c) 864 (d) 964

51. **What is the largest number by which, dividing 63, 77 and 98, gives remainders 3, 5 and 2 respectively?**
(a) 10 (b) 9
(c) 6 (d) 8

52. **x and y are in direct proportion and y = 92.5 when x = 37. What will be the value of y when x = 16?**
(a) 32 (b) 40
(c) 48 (d) 24

53. **The current population of a town is 15,625. It increases by 8% and 12% in two successive years but decreases by 22% in the third year. What is the population of the town at the end of the third year?**
(a) 13,230 (b) 15,120
(c) 14,742 (d) 14,042

54. **The length of the three sides of a triangle are 12 cm, 15 cm and 21 cm, respectively, Find the area (in cm^2) of the triangle.**
(a) $36\sqrt{6}$ (b) $30\sqrt{6}$
(c) $72\sqrt{6}$ (d) $48\sqrt{6}$

55. **Paras can complete 40% of the work in 8 days while Deepti & Paras together can complete 10% of the work in a day. Find the time taken by Deepti alone to complete the work.**
(a) 23 days (b) 21 days
(c) 22 days (d) 20 days

56. **Two buses from a house run at a speed of 25 km/h at an interval of 15 minutes. How much more speed (km/h) does a woman coming from the opposite side of the house have to walk so that the buses meet at an interval of 10 minutes.**
(a) 12 (b) 12.25
(c) 12.5 (d) 12.75

57. **The compound interest on a sum of money at 5% per annum for 3 years is ₹ 6305 Find the simple interest (in ₹) for the same sum at the same rate of interest for the same number of years.**
(a) ₹4,000 (b) ₹6,000
(c) ₹5,000 (d) ₹3,600

58. **If the cost price of an item is ₹4,500 and its selling price is ₹3,500 then the loss percentage is :**
(a) $44\frac{2}{9}\%$ (b) $55\frac{2}{9}\%$
(c) $22\frac{2}{9}\%$ (d) $33\frac{2}{9}\%$

59. **What is the sum of the first 25 odd numbers?**
(a) 150 (b) 625
(c) 250 (d) 144

60. **Simplify** $\sqrt{\frac{1+\cos A}{1-\cos A}}$
(a) sec A + tan A
(b) sec A – tan A
(c) cosec A – cot A
(d) cosec A + cot A

61. **The scores obtained by 10 students in a test are 82, 60, 62, 63, 78, 75, 86, 75, 91, 46**
Find the arithmetic mean of their scores.
(a) 70.6 (b) 71.8
(c) 72.2 (d) 72.8

62. **The positive square root of** $\left(6+2\sqrt{3}\right)\left(6-2\sqrt{3}\right)$ **is _____.**
(a) 12 (b) $6\sqrt{2}$
(c) 24 (d) $2\sqrt{6}$

63. **Three times the present age of P is 25 years more than the present age of Q. After 10 years, twice the age of Q will be 18 years less than thrice the age of P. Find the present age (in years) of Q.**
(a) 21 (b) 16
(c) 19 (d) 17

64. **Two pipes A and B can fill a tank in 21 hours and 18 hours, respectively. If both the pipes are opened simultaneously, then the time taken to fill the tank is:**
(a) $9\frac{27}{39}$ hours (b) $11\frac{27}{39}$ hours
(c) $10\frac{27}{39}$ hours (d) $8\frac{27}{39}$ hours

65. **An amount of ₹ 1,470 is shared between Anant and Mohan in the ratio 3:4. What is the amount received by Mohan?**
(a) ₹ 1,050 (b) ₹ 630
(c) ₹ 1,650 (d) ₹ 840

66. **Which one of the following physical quantities is a vector quantity?**
(a) Gravitational Potential energy
(b) Electric Power
(c) Electric current
(d) Dipole Moment

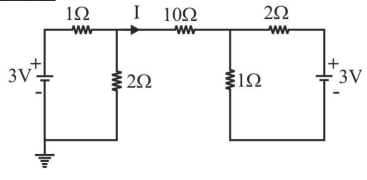
67. **A 10 N force is applied on a body which produces in it an acceleration of 2 m/s^2. The mass of the body is**
(a) 5 kg (b) 10 kg
(c) 15 kg (d) 20 kg

68. **A car accelerates uniformly from 5 ms^{-1} to 10ms^{-1} in five seconds. Find the acceleration of the car**
(a) 1 ms^2 (b) 1 ms^{-2}
(c) 1 ms^1 (d) 1 ms^{-1}

69. **An object of mass 10kg is moving with a uniform velocity of 6ms^{-1}. What is the kinetic energy possessed by the object**
(a) 180J (b) 18J
(c) 360J (d) 1800J

70. **The efficiency of a heat energy can never be**
(a) 10% (b) 80%
(c) 100% (d) 50%

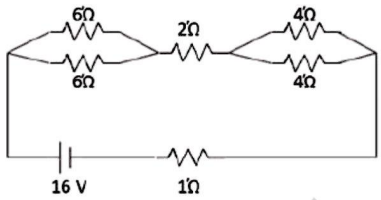
71. **Consider the circuit shown in the figure. The current I flowing through the 10Ω resistor is _____.**



(a) 0A (b) 10A
(c) 0.1A (d) 1A

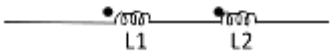
72. What is the dimensional formula of mutual induction?
(a) $[M\ L\ T^{-2}\ A^{-1}]$
(b) $[M\ L^2\ T^{-1}\ A^{-3}]$
(c) $[M\ L^2\ T^{-2}\ A^{-2}]$
(d) $[M\ L^2\ T^{-1}\ A^{-2}]$

73. A network of resistors is connected to a 16 V battery with an internal resistance of 1 Ω, as shown in the figure. Compute the equivalent resistance of the network.



(a) 13 Ω (b) 8 Ω
(c) 12 Ω (d) 7 Ω

74. If 'M' is the mutual inductance between two coils connected in series cummulatively coupled, the equivalent inductance is



(a) $L_{eq} = L_1 + L_2 + 2M$ (b) $L_{eq} = L_1 = L_2 - 2M$
(c) $L_{eq} = L_1 + L_2 - 2M$ (d) None of the above

75. In a two-watt power meter, for all lagging power factors, first meter shows positive and second meter shows negative reading. What is the power factor?
(a) 0 to 0.5 (b) 0.866 to 1
(c) 0 to 1 (d) 0.5 to 1

76. What is the unit of magnetic field intensity?
(a) Volt per meter (b) Ampere per meter
(c) Volt per square meter (d) Weber per meter

77. Which of the following provides maximum capacitance in the smallest space with the least cost?
(a) Electrolytic capacitor (b) Paper
(c) Ceramic (d) Mica

78. Magnetic flux can be measured by-
(a) Capacitive pick-up
(b) Inductive pick-up
(c) Resistive pick-up
(d) Hall effect pick-up

79. A parallel plate capacitor with plates separated by distance 1 mm is filled with dielectric with relative permittivity 2. The electric field inside the capacitor when it is connected to 1V Battery is
(a) 1 N/C
(b) 1000 N/C
(c) 2000 N/C
(d) 500 N/C

80. Which material has the highest electrical conductivity?
(a) Aluminium (b) Steel
(c) Silver (d) Lead

81. The operating temperature of PVC, paper, silk or cotton without impregnation is:
(a) 105ºC (b) 180ºC
(c) 155ºC (d) 90ºC

82. A resistor reads following colours from left to right: brown, black, red, golden. What is the value of the resistor?
(a) 100 Ω with plus-or-minus 5% tolerance.
(b) 1 kΩ with plus-or-minus 5% tolerance.
(c) 100 kΩ with plus-or-minus 5% tolerance.
(d) 10 kΩ with plus-or-minus 5% tolerance.

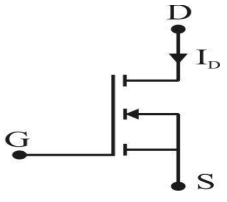
83. Match items in Group 1 with items in Group II, most suitably :

Group - 1		Group - II	
(A)	LED	(i)	Heavy doping
(B)	Avalanche photodiode	(ii)	Coherent radiation
(C)	Tunnel diode	(iii)	Spontaneous emission
(D)	Laser	(iv)	Current gain

(a) (A)-(i), (B)-(ii), (C)-(iv), (D)-(iii)
(b) (A)-(ii), (B)-(iii), (C)-(i), (D)-(iv)
(c) (A)-(iii), (B)-(iv), (C)-(i), (D)-(ii)
(d) (A)-(ii), (B)-(i), (C)-(iv), (D)-(iii)

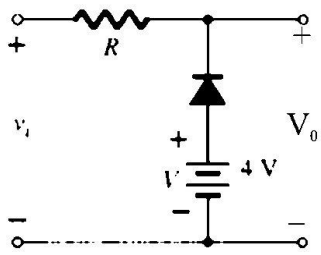
84. The value of current gain (α) lies in the range of :
(a) 1 to 99
(b) 0.9 to 0.998
(c) 0.9 to 1
(d) 0 to 0.998

85. What does the following symbol represent?



(a) N– channel depletion MOSFET
(b) Silicon Controlled rectifier
(c) P–channel enhancement MOSFET
(d) N–channel enhancement MOSFET

86.



Which of the following circuits is represented by the given figure?

(a) Series clipper (b) Clamper
(c) Shunt clipper (d) Amplifier

87. When emitter bypass capacitor in a CE amplifier is removed, it considerably reduces:

(a) Input resistance
(b) Output load resistance
(c) Emitter current
(d) Voltage gain

88. In an amplifier, the coupling capacitors are employed for

(a) Limiting the bandwidth
(b) Matching the impedance
(c) Preventing of DC mixing with input or output
(d) Controlling the output

89. Which of the following options represents the effect current shunt feedback on input impedance (Z_i) and output impedance (Z_0)?

(a) Z_i - Increase, Z_0- Decreases
(b) Z_i - Decreases, Z_0-Increases
(c) Z_i - Increases, Z_0-Increases
(d) Z_i - Decrease, Z_0- Decreases

90. A simple PN junction diode is connected in the feedback path of an inverting op-amp. The circuit can be used as _____.

(a) high-pass filter (b) log amplifier
(c) low-pass filter
(d) tuner in AM communication

91. What is the operation of pin 4 of the 555 timer IC?

(a) Output
(b) Control Voltage
(c) Reset
(d) Threshold voltage

92. The ratio of maximum displacement deviation to full scale deviation of the instrument is known as :

(a) Static sensitivity
(b) Dynamic deviation
(c) Linearity
(d) Precision or accuracy

93. A galvanometer is converted to a voltmeter by….

(a) Adding a high resistance in series with the galvanometer
(b) Adding a low resistance across with the galvanometer
(c) Increase the number of turns of the galvanometer coil
(d) Decreases the number of turns of the galvanometer coil

94. A power factor meter has

(a) one current and one pressure circuit
(b) one current circuit and two pressure circuits
(c) two current circuits and two pressure circuits
(d) two current circuits and one pressure circuit

95. A Wheatstone bridge is balanced if?

(a) The ratio of resistors on one side of the bridge is one while the ratio of resistors on the other side is infinity
(b) The ratio of resistors on one side of the bridge is greater than the ratio of resistors on the other side
(c) The ratio of resistors on one side of the bridge equals to the ratio of resistors on the other side
(d) None of the above

96. Strain gauge converts ____ into ____ signals.

(a) electrical signals; mechanical
(b) mechanical displacement; electrical
(c) mechanical displacement; vibrational
(d) force; mechanical

97. What is the value of K in the given number system expression?

$(347)_{16} = (3515)_K$

(a) 6 (b) 5
(c) 7 (d) 4

98. A_____ is a well-defined relationship between binary variables specified by either a boolean equation or a truth table

(a) Boolean function
(b) Boolean algebra
(c) logical equation
(d) logical relationship

99. How many control lines do we have in a 32 : 1 MUX?

(a) 32 (b) 1
(c) 4 (d) 5

100. The digital logic family that has the lowest propagation delay time is :

(a) ECL (b) TTL
(c) CMOS (d) NMOS

SOLUTION : PRACTICE SET- 1

ANSWER KEY

1. (d)	11. (c)	21. (a)	31. (b)	41. (b)	51. (c)	61. (b)	71. (a)	81. (d)	91. (c)
2. (c)	12. (b)	22. (c)	32. (c)	42. (c)	52. (b)	62. (d)	72. (c)	82. (b)	92. (c)
3. (c)	13. (c)	23. (b)	33. (c)	43. (a)	53. (c)	63. (d)	73. (d)	83. (c)	93. (a)
4. (a)	14. (c)	24. (b)	34. (c)	44. (a)	54. (a)	64. (a)	74. (a)	84. (b)	94. (b)
5. (a)	15. (d)	25. (b)	35.(a)	45. (d)	55. (d)	65. (d)	75. (a)	85. (d)	95. (c)
6. (a)	16. (d)	26. (d)	36. (b)	46. (d)	56. (c)	66.(d)	76. (b)	86. (c)	96. (b)
7. (d)	17. (a)	27. (a)	37. (c)	47. (c)	57. (b)	67. (a)	77. (a)	87. (d)	97. (a)
8. (a)	18. (b)	28. (d)	38. (c)	48. (b)	58. (c)	68. (b)	78. (d)	88.(c)	98. (a)
9.(a)	19. (d)	29. (a)	39. (c)	49. (d)	59. (b)	69. (a)	79. (c)	89. (b)	99. (d)
10. (a)	20. (d)	30. (a)	40. (a)	50. (c)	60. (d)	70. (c)	80. (c)	90. (b)	100. (a)

SOLUTION

1. (d)
Mars orbiter spacecraft successfully entered into an orbit around planet Mars projects did ISRO succeed in September 24, 2014.

2. (c)
The former Indian Cricket team batsman Sachin Tendulkar made his 100th century against Bangladesh. Sachin is the only person in the world to have 100 centuries in ICC test and One day international matches.

3. (c)
Famous folk dances and their concerned states are as follow:

State		Folk Dances
Rajasthan	–	Ghumar, Chakri, Ganagor, Jhulan, Leela, Jhuma, Suisini, Ghapal, Bhavai
Telangana	–	Perani Thandvam or Perani Shivtan Davam
West Bengal	–	Kathi, Gambhira, Dhali, Jatra, Baul, Marasia, Mahal, Keertam
Gujarat	–	Garba, Dandiya Ras, Tippani Jurium, Bhavai

4. (a)
Kailash Satyarthi was the founder of 'Bachpan Bachao Andolan'. He founded the Bachpan Bachao Andolan in 1980. Kailash Satyarthi was awarded the Nobel Peace Prize in 2014 along with Malala Yousafzai for his struggle against the suppression of children and young people and right of children to education. The book titled 'COVID-19: Crisis of Civilisation and Solutions' is penned by Kailash Satyarthi.

5. (a)
Securities sold by the central Bank with a clear specification of repurchase date and price is called open market operations.

6. (a)
Article 80 consists of the council of states.
The council of states shall consist of-
(a) Twelve members to be nominated by the president in accordance with the provisions of the clause (3); and
(b) Not more than two hundred and thirty eight representatives of the states and of the Union Territories. Rajya Sabha members are elected for 6 years and 1/3 of its members retire every second year.

7. (d)
The troposphere is the lowest layer of our atmosphere. extending roughly to a height of 8 km. near the poles and about 18 km. at the equator. All changes in climate and weather take place in this layer.
Others layers of atmosphere–

Stratosphere	-	13-50 km
Mesosphere	-	50-80 km
Thermosphere	-	80-400 km
(Ionosphere is part of this layer)		
Exosphere	-	400km-above

Exosphere is the highest layer of the atmosphere.

8. (a)
Shipki La Pass is located through Sutlej Gorge. It connects Himachal Pradesh with Tibet. It is
India's third border post for trade with China after Lipu Lekh and Nathula Pass.

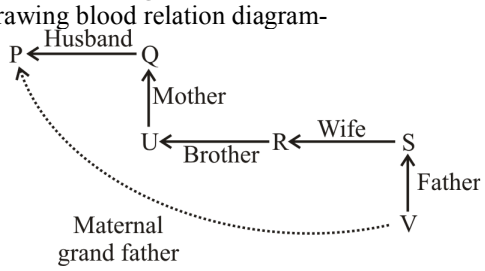
State/Union territory	Pass
Jammu and Kashmir	Burzail pass, Banihal Pass, Pir-Panjal Pass
Ladakh	Zoji La, Chang-La, Khardung La
Himachal Pradesh	Rohtang Pass, Shipki La, Bara-lacha La
Uttarakhand	Niti Pass, Mana Pass,Muling La, Mangsha Dhura
Arunachal Pradesh	Diphu pass,Pangsau Pass, Bomdi-La

9.(a)
Bairam Khan's son was Abdul Rahim-Khan-i-Khanan, who was one of the Navratnas of Akbar. Akbar gave him the title of Khan-i-Khanan due to his prestigeous performance in Gujarat war. Rahim was a brilliant scholar of Arabian, Turkey, Persian and Sanskrit language. Rahim was born in 1556 in Delhi.

10. (a)
Madam Bhikaji Cama unfurled the first version of the Indian National flag-a tricolour of green, saffron, and red stripes-at the International Socialist Congress held at Stuttgart, Germany, in 1907. She is also known as the 'Mother of Indian Revolution'. One thousand representatives from across the world had come to attend the conference. Madam Bhikaji Cama became the first person to hoist Indian flag on foreign soil in that conference. The same flag was later smuggled into India by socialist leader Indulal Yagnik and is now on display at the Maratha and Kesari Library in Pune.

11. (c)
Just as, book is read. Same as, poetry is read as recitation.

12. (b)
Expression $\rightarrow$ P @ Q $ U = R % S # V
On drawing blood relation diagram-



Hence, it is clear from above diagram that P is V's maternal grandfather.

13. (c)
Given,
$J \rightarrow (+)$, $G \rightarrow (-)$
$M \rightarrow (\times)$, $B \rightarrow (\div)$
From option (a)
6M5J4B2G10 = 22

$$6 \times 5 + 4 \div 2 - 10 = 22 \Rightarrow 6 \times 5 + \frac{4}{2} - 10 = 22$$

$$32 - 10 = 22$$

22 = 22 This is equal

From option (b)
4G16B2J6M5 = 26
$4 - 16 \div 2 + 6 \times 5 = 26$

$$4 - \frac{16}{2} + 30 = 26$$

$-4 + 30 = 26$
26 = 26 This is equal too
From option (c)
6B2M8G10J4 = 20
$6 \div 2 \times 8 - 10 + 4 = 20$

$$\frac{6}{2} \times 8 - 10 + 4 = 20$$

$24 - 10 + 4 = 20$
$14 + 4 = 20$
18 = 20 This is not equal
So option (c) will not be correct.

14. (c)
It is clear from the statement that politician only marry beautiful girls and 'X' is a beautiful girl but depends on 'X' that she may or may not marry a politician. Hence, option (c) is true.

15. (d)
According to the question it is clear from the statement that assumption I and II both are implicit.

16. (d)
From statement-I,
D>A>E
From statement-II,
C>B>E
From statement-III,
D>C
A>B
From statement (I), (II) and (III),
D>C/A>B>E
It is clear that E is the shortest.
Hence, the statement I, II and III together are sufficient to answer the given question.

17. (a)
The word GRUNT can't be formed from 'LAUGHTER' because it doesn't contain letter 'N'.

18. (b)
Just as, Tiger is the National animal of India. Similarly, Cow is the National animal of Nepal.

19. (d)
According to the question,

P	$\rightarrow 8$	and,	S $\rightarrow 4$
A	$\rightarrow 3$		C $\rightarrow 9$
I	$\rightarrow 5$		O $\rightarrow 0$
N	$\rightarrow 2$	,	R $\rightarrow 6$
T	$\rightarrow 7$		E $\rightarrow 1$

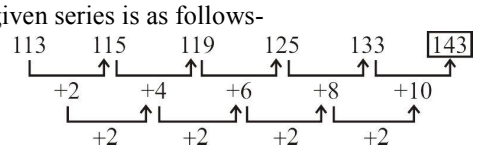
On using the given code

R	$\rightarrow 6$
E	$\rightarrow 1$
C	$\rightarrow 9$
E	$\rightarrow 1$
N	$\rightarrow 2$
T	$\rightarrow 7$

Hence, RECENT = 619127

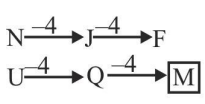
20. (d)
Just as, Team's head is called Captain. Gang's head is called Boss. Cabinet's head is called Prime Minister whereas Troupe word is used for group of artist. So, option (d) is different.

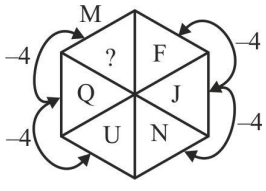
21. (a)
The given series is as follows-



Hence, $\boxed{? = 143}$

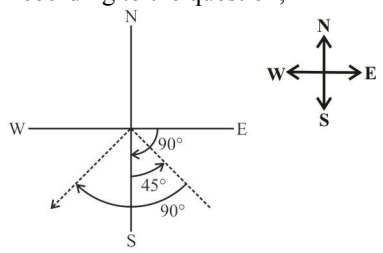
22. (c)
According to the question,





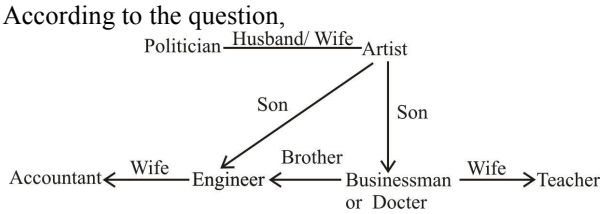
Hence, $\boxed{? = M}$

23. (b)
According to the question,



Hence, Rekha is facing South-West direction now.

24. (b)
According to the question,



So, Doctor may be the husband of Teacher because Artist is married to Politician and Accountant is married to Engineer and it is said that there are only three married couples and Business man is not in option.

25. (b)
Given,

(3 B 4 D 5 A 6) C1

[A → –, B → ×, C → ÷, D → +]

On changing the sign-

$(3 \times 4 + 5 - 6) \div 1 = ?$

$= (12 + 5 - 6) \div 1$

$= (17 - 6) \div 1$

$= 11 \div 1 = 11$

26. (d)
The analytical engine was built by Charles Babbage. Blaise Pascal built the first calculator machine.
Herman Hollerith invented an electromechanical tabulating of punch card machine.

27. (a)
Payroll software is an on-premises or cloud - based solution that manages, maintains and automates payments to employees.

28. (d)
Joystick is an input device which works like a trackball. The ball has a stick attached to it that rotates on a base and reports its angle or direction to the CPU. It is used in video games, simulator training etc.

29. (a)
Optical mouse uses a laser to detect the movement of the mouse. An optical mouse uses LEDs, optical sensor, and digital signal processing in place of traditional mouse ball and electromechanical transducers.

30. (a)
Memory is a device in a computer where instruction and other data are stored, their types are as follows.

- Internal Processor Memory
- Primary Memory or Main Memory
- Secondary or Auxiliary Memory

Register is a type of internal processor memory while main memory is RAM, but both of them interact directly with the processor. There are two types of primary memory RAM and ROM. Secondary memory is also called auxiliary memory. In this data can be stored for a long time.

31. (b)
Cache memory is an extremely fast memory that act as a buffer between RAM and the CPU. It holds frequently requested data and instructions so that they are immediately available to the CPU when needed, cache is usually located inside the CPU Chip.

32. (c)
A semiconductor substance lies between the conductor and insulator. It control and manage the flow of electric current in electronic equipment and devices. As a result, it is a popular component of electronic chips made for computing components and a variety of electronic devices, including solid state storage.

33. (c)
TCP/IP Transmission Control Protocol/Internet Protocol is an application layer protocol that enables application programs and Internet devices to exchange messages over a network.

34. (c)
A cell phone connected to a Bluetooth headset or a mobile computer connected to a portable Bluetooth thermal printer is an example of a Personal Area Network (PAN). PAN is a computer network that is used to connect personal devices such as laptops, mobile phones, media players and play stations. This network was developed by Thomas Zimmerman. This network helps in communication.

35.(a)
Dial-up Internet access is a low-speed Internet connection when compared with DSL (Digital Subscriber Line) and cable modem.
Dial-up connections use a standard phone line and analog modem to access the Internet at data transfer rates of up to approximately 56–64 Kbps. Dial-up connections are the cheapest way to access the Internet, but they are also the slowest connections.

36. (b)
The Margins options in the Page Setup group of MS Word, page layout includes wide, Mirrored, Narrow, Normal, Moderate, default and custom.
Apply a predefined margin setting
(1) Select Layout - Margins
(2) Select the margin measurements you want.
(3) You can also create custom margins.

37. (c)
F4 → Repeat the last command or action, if possible.
F1 → Displays the word help Task Pane.
F2 → Move the selected text or graphic.
Shift + F3 → switch case.
F5 → Display the Go to dialog box.

38. (c)
The correct sequence of steps which adds to double underline text in MS Word are
a – select text
b – Click Home tab; then click on arrow of 'Font' group.
c – Select underline style as double line.

39. (c)
The internet is a World Wide Network of computers which is also called a network of networks.

40. (a)
If an email user wants to reply an email then he would filled "To" and "From" field both automatically.
To → Email address of receiver
From → Email address of sender

41. (b)
HTTPS is short form of Hyper Text Transfer Protocol Secure. It is the secure version of HTTP. It is used to secure communication internet.

42. (c)
Yandex is a search engine.
Search engines - Google, Bing, Yahoo, DuckDuckGo, Baidu, Ask.com, Never.
Web browser - Chrome, Firefox, Opera, Microsoft Edge, Safari, Vivaldi, Brave, Netscape Navigator, Mosaic, Internet Explorer, Chromium etc.

43. (a)
Google, Outlook and Yahoo are web mail provider, these are usually free e-mail accounts that operate from a website, whereas upGrad is not related to Webmail.

44. (a)
Table for chrome tab action

Action	**Shortcut**
Active the first tab	Ctrl + 1
Active the right most tab	Ctrl + 9
Move tabs right or left	Ctrl + Shift +Pg Dn
	Ctrl + Shift + Pg Up

45. (d)
In general usage, automation can be defined as a technology concerned with performing a process by means of programmed commands combined with automatic feedback control to ensure proper execution of the instructions.

46. (d)
Divisibility rule of 9 : A number whose sum of its digit is exactly divisible by 9 then the number is always divisible by 9.
from options -
(a) 49104 → 4 + 9 + 1 + 0 + 4 = 18, divisible by 9.
(b) 77832 → 7 + 7 + 8 + 3 + 2 = 27, divisible by 9.
(c) 35253 → 3 + 5 + 2 + 5 + 3 = 18, divisible by 9.
(d) 45390 → 4 + 5 + 3 + 9 + 0 = 21, not divisible by 9.

47. (c) From question-
$(64 \times 5^4) - (5^4 \times 16)$
$= (64 \times 625) - (625 \times 16)$
$\Rightarrow 40{,}000 - 10{,}000 = 30{,}000$

48. (b) From question-
$\frac{7}{9} = 0.777$
$\frac{6}{7} = 0.857$
$\frac{22}{25} = 0.88$
$\frac{11}{13} = 0.846$
Hence, fraction $\frac{22}{25} = 0.88$ is the largest in which.

49. (d)
$\frac{3}{15} + \frac{13}{14} - \frac{19}{21} + \frac{31}{35} - \frac{23}{30}$
(LCM of 15, 14, 21, 35 and 30 is 210)
$= \frac{42 + 195 - 190 + 186 - 161}{210}$
$\Rightarrow \frac{423 - 351}{210}$
$\Rightarrow \frac{72}{210} = \frac{12}{35}$
Hence, the required value is $\frac{12}{35}$.

50. (c)
The LCM of the numbers 36, 54, 72 and 96 is
$36 = 2 \times 2 \times 3 \times 3$
$54 = 2 \times 3 \times 3 \times 3$
$72 = 2 \times 2 \times 2 \times 3 \times 3$
$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$
Hence the LCM of 36, 54, 72, 96
$= 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$
$= 32 \times 27$
$= 864$

51. (c)
According to the question,
$63 - 3 = 60$
$77 - 5 = 72$
$98 - 2 = 96$
So, the required number = HCF of 60, 72 and 96.
$60 = 2 \times 2 \times 3 \times 5$
$72 = 2 \times 2 \times 2 \times 3 \times 3$
$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$
HCF = $2 \times 2 \times 3 = 12$
While 12 is not in the option but 12 will be divisible by 6.
So, option (c) is required answer.

52. (b)
$\frac{x}{y} = \frac{37}{92.5} = \frac{1}{2.5}$
When $x = 16$
then $\frac{16}{y} = \frac{1}{2.5}$
$y = 40$

53. (c)
Population increased in two successive years by 8% and 12% respectively.
Increase percentage in 2 years = $8 + 12 + \frac{12 \times 8}{100} = 20.96$
Population decreased in 3rd year = 22%
Compound increases in 3rd year = $20.96 - 22 - \frac{20.96 \times 22}{100}$
$= -5.65\%$
Thus, the population of the town at the end of 3rd year

$$= 15625 \times \frac{(100-5.65)}{100}$$

$$= 15625 \times \frac{94.35}{100} = 14742.18 \approx 14742$$

54. (a)

Given,

Length of the three sides of a triangle are-

a = 12 cm, b = 15 cm, c = 21 cm

Semi-perimeter(s) $= \frac{a+b+c}{2}$

$$= \frac{12+15+21}{2} = \frac{48}{2}$$

$$= 24 \text{ cm}$$

Hence, Area of triangle (Δ) $= \sqrt{s(s-a)(s-b)(s-c)}$

$$= \sqrt{24(24-12)(24-15)(24-21)}$$

$$= \sqrt{24 \times 12 \times 9 \times 3}$$

$$= 36\sqrt{6} \text{ cm}^2$$

55. (d)

Paras can complete 40% of work in 8 day then,

Time taken by Paras to complete whole work

$$= 8 \times \frac{100}{40}$$

$$= \frac{5}{2} \times 8$$

$$= 20 \text{ days}$$

(Deepti + Paras) can do 10% of work in 1 day.

Then, they can complete whole work $= 1 \times \frac{100}{10}$

$$= 10 \text{ days}$$

According to the question,

Then, $\frac{1}{10} = \frac{1}{20} + \frac{1}{\text{Deepti}}$

$$\frac{1}{\text{Deepti}} = \frac{1}{10} - \frac{1}{20} = \frac{2-1}{20} = \frac{1}{20}$$

Hence Time taken by Deepti to complete the whole work = 20 days

56. (c)

Speed of bus = 25 km./hr.

Let the speed of woman = x km/h

Distance = D, Time = 15 minutes $= \frac{15}{60} = \frac{1}{4}$ hours

then new time interval = 10 minutes $= \frac{10}{60} = \frac{1}{6}$ hours

Then relative speed $(S) = \frac{D}{T}$

$\Rightarrow$ $D = S \times T$

$$D = 25 \times \frac{1}{4}$$

$\because$ $D = \frac{25}{4}$ .....(i)

$D = \frac{25+x}{6}$ .....(ii)

From equation (i) and equation (ii)

$$\frac{25+x}{6} = \frac{25}{4}$$

$$25 + x = \frac{150}{4}$$

$$x = \frac{150}{4} - 25$$

$$x = \frac{150-100}{4}$$

$$x = \frac{50}{4}$$

Speed of woman (x) = 12.5 Km./hr.

57. (b)

Let amount = ₹P

Given,

r = 5% yearly

n = 3 years

C.I. $= P\left[\left(1+\frac{r}{100}\right)^n - 1\right]$

$$6305 = P\left[\left(1+\frac{5}{100}\right)^3 - 1\right]$$

$$6305 = P\left[\frac{21}{20} \times \frac{21}{20} \times \frac{21}{20} - 1\right]$$

$$6305 = P\left[\frac{9261-8000}{8000}\right]$$

$$6305 = P\left[\frac{1261}{8000}\right]$$

$$P = 5 \times 8000$$

$$P = ₹40{,}000$$

S.I. $= \frac{P \times r \times t}{100}$

$$= \frac{40000 \times 5 \times 3}{100} = ₹6000$$

58. (c)

The cost price of an item (CP) = ₹4500

Selling price (SP) = ₹ 3500

loss% $= \frac{CP-SP}{CP} \times 100$

$$= \frac{4500-3500}{4500} \times 100$$

$$= \frac{1000}{4500} \times 100$$

$$= \frac{1000}{45}$$

$$= 22\frac{2}{9}\%$$

59. (b)

The first 25 odd numbers will be 1,3,5,7,9.....49 respectively which are in the arithmetic progression.

Where first term (a) = 1

and common difference (d) = 3 – 1 = 2

And number of terms (n) = 25

So, sum of n numbers of term in arithmetic progression

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

$$= \frac{25}{2}[2\times 1 + (25-1)\times 2]$$

$$= \frac{25}{2}\left[2 + (24)\times 2\right]$$

$$= \frac{25}{2}[2 + 48]$$

$$= \frac{25\times 50}{2}$$

$$= 25 \times 25 = 625$$

Hence, sum of the first 25 odd number = 625

60. (d)

$$\sqrt{\frac{1+\cos A}{1-\cos A}}$$

$$= \sqrt{\frac{1+\cos A}{1-\cos A}\times\frac{1+\cos A}{1+\cos A}}$$

$$= \sqrt{\frac{(1+\cos A)^2}{\sin^2 A}}$$

$$= \frac{1+\cos A}{\sin A}$$

$$= \frac{1}{\sin A} + \frac{\cos A}{\sin A}$$

$$= \text{cosec}A + \cot A$$

61. (b)

$$\text{Arithmetic Mean} = \frac{\text{Total sum of Scores}}{\text{Number of Students}}$$

$$= \frac{82+60+62+63+78+75+86+75+91+46}{10}$$

$$= \frac{718}{10}$$

$$= 71.8$$

62. (d)

square root of $\left(6+2\sqrt{3}\right)\left(6-2\sqrt{3}\right)$

$$= \sqrt{\left(6+2\sqrt{3}\right)\left(6-2\sqrt{3}\right)}$$

$$= \sqrt{(6)^2 - \left(2\sqrt{3}\right)^2}$$

$$= \sqrt{36-12}$$

$$= \sqrt{24}$$

$$= 2\sqrt{6}$$

63. (d)

Let the present age of P be x years and the present age of Q be y years.

According to the question -

$3x - 25 = y$

$3x - y = 25$ ..... (i)

After 10 years age of P = (x + 10) years

After 10 years age of Q = (y + 10) years

Then

$3(x + 10) = 2(y + 10) + 18$

$3x - 2y = 8$ ..... (ii)

on solving equation (i) and (ii) -

$6x - 2y = 50$ ..... (on multiplying 2 in equation (i))

$$\underline{-3x \mp 2y = -8}$$

$3x = 42$

$x = 14$

Putting the value of x in equation (i) -

$42 - y = 25$

or

$y = 17$ years

Hence the present age of Q is 17 years

64. (a)

Part filled by pipe A in hour $= \frac{1}{21}$ part

Part filled by B in 1 hour $= \frac{1}{18}$ part

Part filled by both (A + B) in 1 hour

$$= \frac{1}{21} + \frac{1}{18} = \frac{6+7}{126} = \frac{13}{126}$$

So, time taken to fill the tank $= \frac{126}{13} = 9\frac{9\times 3}{13\times 3}$

$$= 9\frac{27}{39} \text{ hours.}$$

65. (d)

Given, Amount ₹ 1,470

Anant : Mohan

3 : 4

Mohan's Share $= \frac{4}{7}\times 1470 = ₹\,840$

66.(d)

Dipole moment - The product of the charge and the distance between the two charges is called dipole moment. It is a vector quantity.

$$\vec{P} = q\times\vec{d}$$

Where, p = dipole moment

q = charge

d = distance.

Electric Current - The rate of flow of charge is called electric current. It is a scalar quantity.

Gravitational Potential Energy- The energy stored in an object due to its position above the earth's surface is called gravitational potential energy. It is scalar quantity.

Electric Power: It is electrical energy per unit time.It is a scalar quantity.

67. (a)

Given,

F = 10 Newton

Acceleration (a) = 2 m/s^2

The mass of the body = ?

$F = m \times a$

$10 = m \times 2$

$m = 5$ kg

68. (b)

Given :

Initial velocity = 5 m/sec.

Final velocity = 10 m/sec.

Time = 5sec.

ΔV = Final velocity – Initial velocity

= 10 – 5

= 5 m/sec.

$$\text{Acceleration of car (a)} = \frac{\Delta V}{t}$$

$$= \frac{5\,m/sec}{5\,sec}$$

$= 1$ m/sec^2 or, $1 ms^{-2}$

69. (a)

Given,

Mass (m) = 10 kg

Velocity (v) = 6 m /sec.

We know that, Kinetic Energy (K.E) = $\frac{1}{2}mv^2$, where m is mass and v is the velocity

$$\Rightarrow \quad K.E = \frac{1}{2}\times 10\times 6\times 6$$

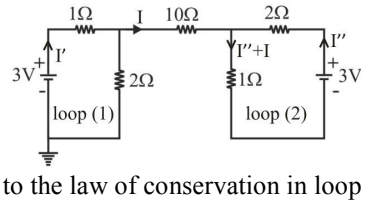
So, K.E = 180 Joule

70. (c)

Heat energy is the result of the movement of tiny particles called atoms, molecules or ions in solids, liquid and gases.

- Heat energy can be transferred from one object to another. Its transfer or flow is done by the difference in temperature between the two bodies.
- According to second law of thermodynamics, it is impossible to get 100% of efficiency because of environmental changes and some other factors. So, the efficiency of a heat energy can never be 100%.

71. (a)



According to the law of conservation in loop (1)

$I' = I'-I$

$I = 0A$

According to the law of conservation in loop (2)

$I'' = I''+I$

$I = 0A$

It proves that, there is no current flowing through 10Ω resistance because not a complete path for current flow.

72. (c)

As we know that,

Magnetic flux $\phi = LI$

$$\text{So,} \quad \text{Mutual inductance}(L) = \frac{\phi}{I} = \frac{[BA]}{[I]}$$

$$[B] = \left[M^1T^{-2}A^{-1}\right]$$

$$[A] = \left[L^2\right]$$

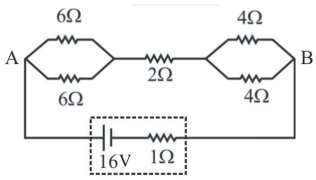
$$[I] = [A]$$

Dimensional formula of mutual inductance

$$L = \frac{\left[M^1T^{-2}A^{-1}\right]\left[L^2\right]}{[A]}$$

$$\boxed{L = \left[M^1L^2T^{-2}A^{-2}\right]}$$

73. (d)



$$R_{AB} = R_{eq} = \frac{6\times 6}{6+6} + 2 + \frac{4\times 4}{4+4}$$

$$= 3 + 2 + 2$$

$$\boxed{R_{eq} = 7\Omega}$$

74. (a)

Equivalent inductance with the combination of two inductor either in same polarity or opposite polarity may be defined as

$$L_{eq} = L_1 + L_2 \pm 2M$$

For series cumulatively coupled the equivalent inductance

$$\boxed{L_{eq} = L_1 + L_2 + 2M}$$

75. (a)

In a two-watt power meter, for all lagging power factors, first meter shows positive and second meter shows negative reading. 0 to 0.5 is the power factor.

76. (b)

Ampere per meter is the unit of magnetic field intensity.

$$H = \frac{NI}{\ell}$$

Where,

H = magnetic field intensity

N = Number of turn

I = coil current

ℓ = length of the coil

77. (a)
Electrolytic capacitor provide maximum capacitance in the smallest space with the least cost.
- This type of capacitors are usually polarized. They provide very high capacitance (Usually more than 1μF)

78. (d)
Magnetic flux can be measured by hall effect pick-up.
Hall effect- When a current (I) carrying conductor, placed in a transverse magnetic field (B), an electric field E is induced in the conductor which is per-perpendicular to both I and B. This phenomenon is called the hall effect.
(i) The carrier concentration of charge is measure by hall effect.
(ii) Measures magnetic flux.
(iii) Hall voltage and current density are measured.

79. (c)
Capacitance of a capacitor filled with dielectric-

$$C=\frac{\varepsilon A}{d}$$

$$C=\frac{\varepsilon_0\varepsilon_r A}{d}$$

Store charge (Q) = CV
Electric field inside a parallel plate capacitor-

$$E=\frac{Q}{\varepsilon_0 A}=\frac{CV}{\varepsilon_0 A}$$

$$E=\frac{\varepsilon_0\varepsilon_r AV}{\varepsilon_0 d.A}=\frac{\varepsilon_r V}{d}=\frac{2\times1}{1\times10^{-3}}$$

$$E = 2000\ N/C$$

80. (c)
Silver has the highest electrical conductivity. It is a conducting material with a large number of free electrons. Due to large number of free electron it has a high electrical conductivity. The resistivity of silver is $1.59\times10^{-8}\ \Omega m$ and the conductivity is $6.29\times10^{7}\ \Omega^{-1}m^{-1}$

81. (d)
The operating temperature of PVC, paper, silk or cotton without impregnation is 90ºC.

Insulation classes	Maximum permissible temperature
Y	90ºC
A	105ºC
E	120ºC
B	130ºC
F	155ºC
H	180ºC
C	180ºC above

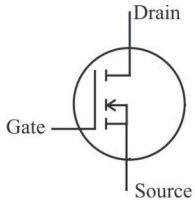
82. (b)
Colour coding of resistance–
Brown→ 1
Black→ 0
Red→ 10^2
golden→ ±5%
$R = 10\times10^2 \pm 5\%$
$R = 1k\Omega \pm 5\%$

83. (c)

	Group - I		Group - II
(A)	LED	(iii)	Spontaneous emission
(B)	Avalanche Photodiode	(iv)	Current gain
(C)	Tunnel diode	(i)	Heavy doping
(D)	Laser	(ii)	Coherent radiation

84. (b)
The current gain of a transistor in CB configuration is defined as the ratio of collector current (I_C) to the emitter current (I_E). The current gain of a transistor is CB configuration is less than unity. The value of current gain lies in the range of CB configuration is 0.9 to 0.998.

85. (d)
The given symbol of n-channel enhancement MOSFET,



In enhancement mode there is no channel between drain and source. It is formed by given positive gate source voltage.

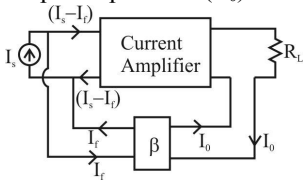
86. (c)
Negative shunt clipper circuit is represented by the given figure.
Shunt clipper-
- In shunt clipper, the diode is connected in parallel with the output load resistance.
- The operating principles of the shunt clipper are near opposite to the series clipper

Types of shunt clipper-
- Positive shunt clipper
- Negative shunt clipper

87. (d)
With the removal of emitter bypass capacitor the effect of emitter resistor is predominant and gain will be reduced.

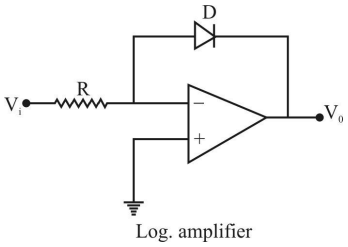
88.(c)
The main purpose of using coupling capacitor is to prevent d.c. mixing with input and output. These capacitor block unwanted dc components and decouple or insolate dc from input and output.

89. (b)
Current shunt feedback has input impedance (Z_i) decreases and output impedance (Z_0) increases.



90. (b)

A simple PN junction diode is connected in the feedback path of an inverting op-amplifier, the circuit can be used as log amplifier.



Log. amplifier

$$V_o = -\eta V_T \ell_n \frac{V_i}{I_o R}$$

Where,

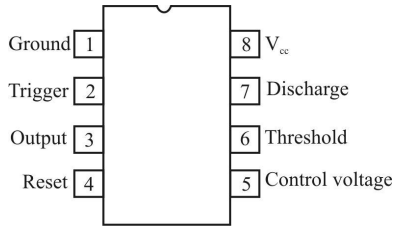
η = Recombination factor

V_T = Thermal voltage

I_o = Reverse saturation current

91. (c)

Reset is the operation of pin 4 of the 555 timer IC.



92. (c)

The ratio of maximum displacement deviation to full scale deviation of the instrument is known as linearity.

93. (a)

A galvanometer is converted to a voltmeter by adding a high resistance in series with the galvanometer.

- A galvanometer is converted to an ammeter by adding a low resistance in parallel with the galvanometer.

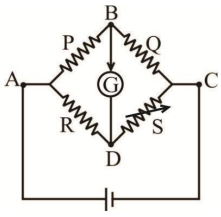
94. (b)

A power factor meter has one current circuit and two pressure circuits.

- The meter has two identical pressure coils. Both the coils are pivoted on spindle.
- A power factor meter has no control springs.

95. (c)

A Wheatstone bridge is balanced if the ratio of resistance on one side of the bridge equals to ratio of resistors on the other side.



$$\frac{P}{Q} = \frac{R}{S}$$

96. (b)

Strain gauge converts mechanical displacement into electrical signals. A strain gauge type transducer converts physical quantity such as load, pressure or displacement into mechanical strain on the strain generating body (elastic body) and the mechanical strain is converted into electrical output using strain gauges mounted on the elastic body.

97. (a)

$(347)_{16} = (3515)_K$

$3\times16^2 + 4\times16^1 + 7\times16^0 = 3\times K^3 + 5\times K^2 + 1\times K^1 + 5\times K^0$

$3\times256 + 4\times16 + 7\times1 = 3K^3 + 5K^2 + K + 5$

$768 + 64 + 7 = 3K^3 + 5K^2 + K + 5$

$839 = 3K^3 + 5K^2 + K + 5$

$3K^3 + 5K^2 + K + 5 - 839 = 0$

$3K^3 + 5K^2 + K - 834 = 0$

Putting K=6 in this equation satisfies the equation. Thus K=6 a factor of the given equation.

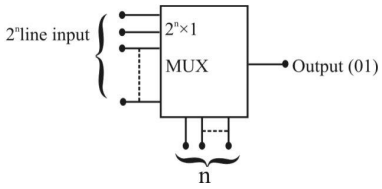
Therefore K = 6

98. (a)

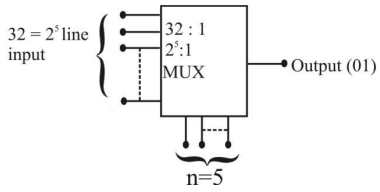
A Boolean function operation of binary variables can be described by mean of appropriate mathematical function called Boolean function.

- An implementation of a Boolean function requires the use of logic gates.

99. (d)



n = number of select line or control lines



n=5 select line or control lines

32:1 MUX have a 5 control lines

100. (a)

logic family	Propagation delay by time
ECL	2 ns
TTL	10 n s
CMOS	70 n s
RTL	12 n s
I^2L	25-100 n s
HTL	90 n s
DCTL	10 n s

So, ECL has the lowest propagation delay time.

PRACTICE SET - 2

1. **Who was the first person to walk on the Moon?**
   (a) Katherine Johnson
   (b) Neil Armstrong
   (c) Buzz Aldrin
   (d) George Tailor
2. **Indentify the Indian batsman who scored three consecutive test centuries in his first three International Cricket test matches.**
   (a) Virat Kohli
   (b) Sachin Tendulkar
   (c) Mohammad Azharuddin
   (d) Rahul Dravid
3. **Below are fours pairs, each representing a state and a folk dance. Which pairing of state and folk dance in incorrect?**
   (a) Assam– Bihu
   (b) Chhatisgarh–Dagla
   (c) Gujarat– Garba
   (d) Uttarakhand–Tapali
4. **What was the real name of the Hindi literary writer Munshi Premchand?**
   (a) Atmaram
   (b) Sachchidanand
   (c) Dhanpat Rai
   (d) Nawab Rai
5. **Which regulatory body is the only note issuing authority in India?**
   (a) Reserve Bank of India
   (b) Small Industries Development Bank of India
   (c) Securities and Exchange Board of India
   (d) Insurance Regulatory and Development Authority of India
6. **During a no-confidence motion against his own government, the Prime Minister of India cannot participate in voting, if he-**
   (a) Is a Rajya Sabha Member.
   (b) Is prohibited by opposing parties of the Lok Sabha.
   (c) Is in a majority
   (d) Is a member of the Lok Sabha.
7. **The amount of carbon dioxide in the atmosphere is :**
   (a) 71% (b) 21%
   (c) 0.03% (d) 0.3%
8. **_____is a type of crescent-shaped sand dune formed in desert regions where the wind direction is very constant.**
   (a) Blowhole (b) Bluff
   (c) Bergschrund (d) Barchan
9. **Which of the following was not Akbar's nine gems or navratna?**
   (a) Ustad Ali Khan (b) Raja todarmal
   (c) Abul fazal (d) Fakir Aziao Din
10. **Who shot dead Rand, the commissioner of Police, Pune due to failure to check the plague in India at the end of the 19th century in India?**
    (a) Damodar Chapekar (b) Veer Savarkar
    (c) Bhagat Singh (d) Vasudev B. Phadke
11. **Rafting is related to water as Skiing is related to**
    (a) Ice (b) Surface
    (c) Sceeze (d) Sky
12. **B's mother is the daughter of F. C is the son of F and D, G is the son of C and E. D is the mother of R. How is F related to G?**
    (a) Father's mother (b) Brother
    (c) Father's father (d) Mother's father
13. **If '÷' is replaced with '+', '×' is replaced with '–' '+' is replaced with '×' and '–' is replaced with '÷', then what will be the value of the given expression?**
    8 + 5 × 54 – 9 ÷ 3 = ?
    (a) 44 (b) 46
    (c) 37 (d) 33
14. **Statement:**
    This scale is transparent.
    Conclusion:
    1. The scale is made up of glass.
    2. The scale is made up of plastic.
    (a) Only II follow
    (b) Both I and II follows
    (c) Only I follow
    (d) Neither I nor II follow
15. **Consider the given statement and decide which of the given assumptions is/are implicit in the statement.**
    Statement :
    "The Indian cricket team is expected to win the World Cup in 2019" –Mahendra Singh Dhoni.
    Assumptions :
    1. Indian cricket team is good
    2. Indians want the Indian cricket team to win the World Cup 2019
    (a) Neither assumption 1 nor 2 is implicit
    (b) Only assumption 1 is implicit
    (c) Only assumption 2 is implicit
    (d) Both assumptions 1 and 2 are implicit

16. **Question :**
Who is smallest in age among A, B, C and D?
Statements :
1. A is greater than D and B
2. C is greater than A
(a) Both statement are not sufficient
(b) Only statement 2 is sufficient
(c) Both statement together are sufficient
(d) Only statement 1 is sufficient

17. **From among the given options, select the word which cannot be formed using the letters of the given word.**
DAUGHTER
(a) DATE (b) HURT
(c) TOUGH (d) GET

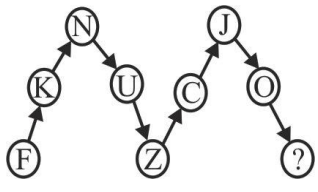
18. **The option which is related to the third word. In the same way as the second word is related to the first word is -**
Poem : Verse :: Book: ?
(a) Story (b) Page
(c) Printing (d) Language

19. **In a code language, if KARAN is written as 45, then how will ARUN be written as in that language?**
(a) 54 (b) 56
(c) 41 (d) 42

20. **Four words have been given, out of which three are alike in some manner and one is different. Select the odd one.**
(a) Chalk (b) Marker
(c) Book (d) Pen

21. **In the series 11, 19, 27, 35, 43, …….. which of the following will NOT be a number of the series?**
(a) 195 (b) 434
(c) 107 (d) 307

22. **Study the given pattern carefully and select the letter that can replace the question mark (?) in it,**



(a) P (b) S
(c) R (d) L

23. **Umesh is standing facing the south-west direction. He then takes a 90° clockwise turn. After that, he takes a 135° clockwise turn. He finally takes a 90° anticlockwise turn. In which direction is he facing now?**
(a) West (b) North
(c) North-east (d) North-west

24. **Geet and Anshuman are the children of Aditya's Mother's brother. Roop has only one brother-Manjeet and no sister. Ayushman is the son of Rajkumar. Ayushman is the Manjeet's father. Roop's husband and Manjeet's wife have no siblings. If Aditya is Roop's son, how is Manjeet related to Geet?**
(a) Father (b) Uncle
(c) Husband (d) Mother's brother

25. **If Q means addition, J means multiplication, T means Subtraction and K means division, then find the value**
18K 6J 7Q 5T 2
(a) 30 (b) 34
(c) 26 (d) 24

26. **ENIAC, EDVAC, etc are examples of _____ generation computers.**
(a) Third (b) First
(c) Second (d) Fourth

27. **Which of the following statements is incorrect with reference to the visual display unit (VDU) of a computer system?**
(a) VDU creates images by arranging tiny dots known as pixels, in a rectangular pattern
(b) VDU is the primary output device of a computer
(c) VDU has differences between cathode-ray tube and flat-panel display
(d) The size of the pixel determines the clarity of the image displayed on the VDU

28. **Which of the following statements is correct about the output devices of a computer?**
(a) It is used to send data to the computer
(b) Mouse is an output device
(c) It converts digital data into a form understandable by humans
(d) It converts data into digital form

29. **Which of the following statements is incorrect regarding computer output devices?**
(a) It converts digital data into a form that is human understanding
(b) It converts data into digital form
(c) It receives data from the computer system for display
(d) Printer is an output device

30. **Moving data from one system buffer to the process and reading data from the I/O device to the other buffer may be performed simultaneously in which of the following buffering schemes?**

(a) Circular buffering
(b) User-level buffering
(c) Double buffering
(d) Single buffering

31. In a multitasking system, the ____ is a fixed amount of RAM that is allocated as a temporary holding area, so, that the CPU can perform calculations on the data before transferring the data to a particular device.
(a) Helix (b) Wizard
(c) Bounce (d) Buffer

32. Which of the following is a communication service provided by the internet?
(a) Gopher (b) Archie
(c) Telnet (d) FTP

33. Which of the following statements is false about HTTPS?
(a) It ensures protection against man-in-the - middle attacks
(b) Due to the use of encryption, communication between two hosts using HTTPS is secure
(c) It is more secure than HTTP
(d) It cannot be used for financial transaction

34. Which layer protocol is in DNS internet architecture?
(a) Transport (b) Application
(c) Data Link (d) Network

35. In MS - Word 365 which the following refers to the use of a short, dashed line to break a word when it reaches the edge of a document or container?
(a) Hyphenation (b) Strikethrough
(c) Wrap text (d) Merge and Center

36. Which of the following options best describes the words regular, bold and Italic in MS Word 365?
(a) Font Size (b) Color
(c) Effects (d) Size

37. In MS - word 365, when we click on 'Delete' option in the Mini toolbar, which is displayed by right - clicking on the table cell, row or column which you want to delete. If you click, which of the following option is not available?
(a) Delete Rows (b) Delete Columns
(c) Delete Cells (d) Delete Pages

38. Match the points under the column 'LIST-I to those under the column 'LIST-II'.

List-I	List-II
a)Email server	i) A free email (Webmail) tool provided by Microsoft
b) LinkedIn	ii) Postfix
c) Orkut	iii) A social networking portal for business professionals
d) Hotmail	iv) The service was designed to help users meet new and old friends.

(a) a-ii, b-iii, c-i, d-iv
(b) a-iii, b-ii, c-iv, d-i
(c) a-ii, b-iii, c-iv, d-i
(d) a-ii, b-iv, c-iii, d-i

39. Verification of a login name and password on a computer is known as.....
(a) Authentication (b) Synchronization
(c) Identification (d) Accessibility

40. Which of the following is a computer based application for exchanging message between users?
(a) e-kyc (b) e-mail
(c) e-aadhar (d) e-sharm

41. Which of the following is a graphical web browser developed by Apple?
(a) Edge (b) Chrome
(c) Safari (d) Firefox

42. Which of the following is an incorrect statement about search engines?
(a) Bing was launched by Microsoft in 2009.
(b) Google search engine was originally known as Backrub
(c) AltaVista was launched by Apple.
(d) Ask was launched in 1996.

43. Which of the following web browsers was developed by Apple?
(a) Mozilla Firefox (b) Safari
(c) Opera (d) Internet Explorer

44. Which of the following operations refers to the process of converting information, corresponding text, numbers photos or music into digital data that can be manipulated by electronic devices?
(a) Normalization (b) Unification
(c) Regularization (d) Digitization

45. Several studies have shown that _____video games have negative effects on the younger generation.
(a) puzzle (b) violent
(c) racing (d) adventure

46. If the number 6484y6 is divisible by 8, then find the least value of y?
(a) 3 (b) 4
(c) 1 (d) 7

47. Simplify the following expression :
$(15 \div 3) - [\{(19 - 1) \div 2\} - \{5 \times 20 - (7 \times 9 - (-2))\}]$
(a) 21 (b) 31
(c) – 21 (d) 35

48. **Find the greatest fraction out of $-\frac{3}{2},\frac{3}{2},\frac{11}{4},\frac{5}{2}$:**

(a) $\frac{3}{2}$ (b) $\frac{11}{4}$

(c) $\frac{5}{2}$ (d) $-\frac{3}{2}$

49. **Which of the following fraction will be subtracted from $\frac{3}{4}$ to give the result $\frac{5}{12}$?**

(a) $\frac{1}{3}$ (b) $\frac{2}{8}$

(c) $\frac{1}{6}$ (d) $\frac{2}{3}$

50. **The LCM of 6, 9 and x is 72. Which of the given options can be a possible value of x?**

(a) 18 (b) 12

(c) 36 (d) 24

51. **The LCM of $\frac{2}{3},\frac{4}{9},\frac{7}{12},\frac{3}{5}$ is:**

(a) 98 (b) 94

(c) 84 (d) 86

52. **The difference of two numbers is equal to 30% of their sum find the ratio of the larger number to the smaller number.**

(a) 15 : 7 (b) 13 : 7

(c) 2 : 1 (d) 17 : 15

53. **The total population of a village is 4,000. The number of males and females increases by 10% and 20% respectively and consequently the population of the village becomes 4500. What was the number of males in the village prior to the new members coming in?**

(a) 2500 (b) 3000

(c) 4000 (d) 2000

54. **In any triangle ABC, a + b + c = 2s with usual notation, then the value of $\sin\left(\frac{A}{2}\right)$ is**

(a) $\sqrt{\frac{(s-b)(s-c)}{s(s-a)}}$ (b) $\sqrt{\frac{(s-c)(s-a)}{ac}}$

(c) $\sqrt{\frac{(s-b)(s-c)}{bc}}$ (d) $\sqrt{\frac{s(s-a)}{bc}}$

55. **A and B can complete a piece of work in 10 days and 12 days respectively. If they work on alternate days beginning with A, then in how many days will the work be completed?**

(a) 10 (b) $10\frac{1}{2}$

(c) $10\frac{1}{4}$ (d) $10\frac{5}{6}$

56. **Two cars A and B starting at the same time meet each other in opposite direction after t hours and after arriving they reach their destination after 5 hours and 6 hours. If the speed of car A is 55 km/hr, what will be the speed of the car B?**

(a) $66\sqrt{12}\,\text{km/hr}$ (b) $110\sqrt{3}\,\text{km/hr}$

(c) $\frac{110}{\sqrt{6}}\,\text{km/hr}$ (d) $\frac{55}{6}\sqrt{30}\,\text{km/hr}$

57. **Amount of ₹1250 becomes ₹1550 in 4 years. What is the rate of simple interest?**

(a) 4% (b) 6%

(c) 8% (d) 1%

58. **A shopkeeper sells wheat at ₹20/kg that he purchased at ₹18/kg and he gives only 900 gm of wheat instead of 1 kg while selling. The actual percentage profit of the shopkeeper is:**

(a) 22.45 % (b) 24.45 %

(c) 23.45 % (d) 20.45 %

59. **What is the sum of the following two series?**
(8 + 27 + 64 + ... +1000) + (2 + 4 + 6 + ... + 20)

(a) 3136 (b) 3134

(c) 3135 (d) 3133

60. **In a triangle ABC, tanA + tanB + tanC = ?**

(a) 1

(b) -tanA.tanB.tanC

(c) tanA.tanB + tanB.tanC + tanC.tanA

(d) tanA.tanB.tanC

61. **The following table gives a frequency distribution whose arithmetic mean is 33. Find the product of the possible values of k from the distribution.**

Value (X)	Frequency (f)
29	4
30	3
30 + k	3k
34	2
62	1

(a) 5 (b) 2

(c) 3 (d) 4

62. **The square root of 519841 is-**

(a) 721 (b) 629

(c) 631 (d) 731

63. **Two years ago, the ratio of the respective ages of subash and Pranav was 4 : 5. Three years hence, this ratio will become 5 : 6. The present age of Pranav is-**

(a) 22 years (b) 25 years

(c) 20 years (d) 27 years

64. **If two flood gates A and B work together then the reservoir will be filled in 6 hours gate A fills the reservoir 5 hour faster than gate B. The fast flood gate A will fill the reservoir in how many hours?**
(a) 5 Hours (b) 10 Hours
(c) 7 Hours (d) 13 Hours

65. **Two numbers are in the ratio 3 : 2. If 8 and 6 are subtracted from the first and the second number respectively, the ratio becomes 8 : 5. The numbers are :**
(a) 32, 24 (b) 24, 16
(c) 40, 30 (d) 3, 2

66. **Which of the following is not a vector quantity?**
(a) Speed (b) Velocity
(c) Displacement (d) Acceleration

67. **If a force of 250 N acts on a body at rest, the momentum required is 125 kgm/s. The time for which the force acts on the body is**
(a) 0.5 s (b) 0.2 s
(c) 0.1 s (d) 0.3 s

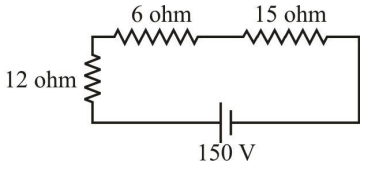
68. **A particle starts moving from rest under uniform acceleration. It travels a distance 'x' in the first two seconds and a distance 'y' in the next two seconds. If y = nx, then n =**
(a) 1 (b) 3
(c) 2 (d) 4

69. **An electric motor is marked 2 HP. The work done by the electric motor in 3 seconds will be nearly.**
(a) 373 J (b) 497 J
(c) 1.5 kJ (d) 4.4 kJ

70. **The heat generated while transferring 96000 coulomb of charge is one hour through a potential difference of 50 V is**
(a) 4.8×10^4 J (b) 1.33×10^3J
(c) 4.8×10^6J (d) 1.33×10^4 J

71. **What is the unit of electric potential?**
(a) Volt (b) Ampere
(c) Newton per meter (d) Volt per meter

72. **Find the voltage across the 6 ohm resistor.**



(a) 150V (b) 181.6 V
(c) 27.27 V (d) 54.48 V

73. **A light bulb is rated for 60 W, 240 V. Find the resistance of the bulb.**
(a) 960 Ω (b) 4 Ω
(c) 1000 Ω (d) 860 Ω

74. **The property of a material which opposes the creation of magnetic flux in it**
(a) Resistance (b) Reluctance
(c) Permeance (d) Conductance

75. **What happens to the energy meter if supply is more than rated value?**
(a) It will run slow.
(b) It will run fast.
(c) It will remain constant
(d) It will stop

76. **Electric flux is a _____field, and its density is a _____field.**
(a) vector, vector (b) vector, scalar
(c) scalar, scalar (d) scalar, vector

77. **The coils on the iron core have coefficient of coupling _____.**
(a) equals to unity (b) zero
(c) from 0.05 to 0.3 (d) 0.5

78. **According to Ampere's circuital Law the line integral of H about any closed path is exactly _____ to the direct current enclosed by that path.**
(a) Double (b) Equal
(c) 4 Times (d) Half

79. **The induced e.m.f in a coil of 0.08 mH carrying 2A current is reversed in 0.4 seconds**
(a) 0.16 mV (b) 0.4 mV
(c) 0.8 mV (d) 0.064 mV

80. **A material is said to have become superconductor when**
(a) its resistance becomes negative
(b) its resistance becomes very small
(c) its resistance decreases
(d) its resistance becomes zero

81. **For an insulating material, dielectric strength and dielectric loss should be respectively :**
(a) High and high (b) Low and high
(c) High and low (d) Low and low

82. **When a semiconductor is doped with a p-type impurity, each impurity atom will :**
(a) Acquire negative charge
(b) Acquire positive charge
(c) Remain electrically neutral
(d) Give away one electron

83. **Tunnel diode and Avalanche photodiode are operated in _____ bias and _____ bias respectively.**
(a) Reverse, reverse.
(b) Reverse, forward
(c) Forward, reverse
(d) Forward, forward

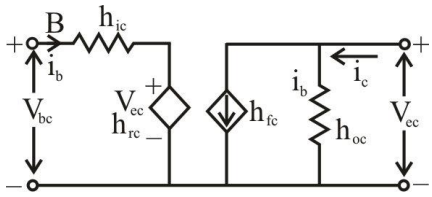
84. **The emitter region in N-P-N junction transistor is more heavily doped than the base region so that**
(a) The flow across the base region will be mainly due to electrons
(b) The flow across the base region will be mainly due to holes
(c) Base current will be high
(d) There will be increase recombination in base region

85. **An n-channel E-MOSFET is turned ON, the gate-to-source voltage must be _____.**
(a) less than $V_{threshold}$
(b) greater than V_{peak}
(c) less than V_{peak}
(d) greater than $V_{threshold}$

86. **We get percentage ripple if multiply _____ with 100.**
(a) Ratio of the input resistance and input voltage
(b) Product of AC current and DC current
(c) Ratio of AC rms voltage to DC voltage
(d) Addition of the AC and DC component of given signal

87. **The main advantage of emitter follower is:**
(a) Voltage gain is less than unity.
(b) Output impedance is high and input impedance is low.
(c) Voltage gain is very high.
(d) Output impendence is low and input impedance is high.

88. **Identify the above configuration of circuit?**



(a) hybrid equivalent circuit of common base
(b) hybrid equivalent circuit of common Emitter
(c) hybrid equivalent circuit of common collector
(d) Inverse hybrid equivalent circuit of common base

89. **Voltage series feedback (also called series shunt feedback) results in :**
(a) Increase in both input and output impedance.
(b) Decrease in both input and output impedance.
(c) Increase in input impedance and decrease in output impedance.
(d) Decrease in input impedance and increase in output impedance.

90. **Slew rate of output op amp refers to**
(a) Maximum rate of change of output voltage.
(b) Maximum time required by the output to go from zero to 90% of final value
(c) Large signal voltage gain
(d) Maximum rate at which input can change

91. **_____ multivibrator is used as a gating circuit and as a delay element.**
(a) Astable (b) Monostable
(c) Bistable (d) Oscillator

92. **A 0-200 V voltmeter has an accuracy of 0.75% of full scale reading. If voltage measured is 100 V, the error is-**
(a) 3% (b) 2%
(c) 1.5% (d) 0.75%

93. **Which is an example of Absolute Instrument?**
(a) Indicating Ammeter
(b) Deflecting voltmeter
(c) Tangent galvanometer
(d) Digital meter

94. **Which of the following types of instruments are not used as ammeters or voltmeters?**
(a) PMMC (b) Hotwire
(c) Moving coil (d) Electromagnetic

95. **Which of the following methods can not be used to measure capacitance?**
(a) De-Sauty's Bridge (b) Schering Bridge
(c) Wien Bridge (d) Anderson's Bridge

96. **_____ is used to measure pressure directly.**
(a) Rotameter (b) LVDT
(c) Strain gauge (d) Bourdon tube

97. **The binary equivalent of $(FA)_{16}$ is :**
(a) 1010 1111 (b) 1111 1010
(c) 1000 1111 (d) 1111 1000

98. **The function F = ABC'+ABC+A'BC+A'BC' can be reduced to which one of the following?**
(a) F = A (b) F = AB
(c) F = ABC (d) F = B

99. **For a full Adder**
(a) Sum = XY ⊕ YZ ⊕ ZX
Carry = X.Y.Z
(b) Sum = X.Y.Z
Carry = X ⊕ Y ⊕ Z
(c) Sum = X ⊕ Y ⊕ Z
Carry = X.Y.Z
(d) Sum = X ⊕ Y ⊕ Z
Carry = XY + YZ + ZX

100. **CMOS offers high ……..**
(a) Switching (b) gain
(c) Input impedance (d) Output impedance

SOLUTION : PRACTICE SET- 2

ANSWER KEY

1. (b)	11. (a)	21. (b)	31. (d)	41. (c)	51. (c)	61. (b)	71. (a)	81. (c)	91. (b)
2. (c)	12. (c)	22. (c)	32. (c)	42. (c)	52. (b)	62. (a)	72. (c)	82. (c)	92. (c)
3. (d)	13. (c)	23. (b)	33. (d)	43. (b)	53. (b)	63. (d)	73. (a)	83. (c)	93. (c)
4. (c)	14. (d)	24. (a)	34. (b)	44. (d)	54. (c)	64. (b)	74. (b)	84. (a)	94. (d)
5. (a)	15. (b)	25. (d)	35. (a)	45. (b)	55. (d)	65. (b)	75. (b)	85. (d)	95. (d)
6. (a)	16. (a)	26. (b)	36. (a)	46. (c)	56. (d)	66. (a)	76. (d)	86. (c)	96. (d)
7. (c)	17. (c)	27. (d)	37. (d)	47. (b)	57. (b)	67. (a)	77. (a)	87. (d)	97. (b)
8. (d)	18. (b)	28. (c)	38.(c)	48. (b)	58. (c)	68. (b)	78. (b)	88. (c)	98. (d)
9. (a)	19. (a)	29. (b)	39. (a)	49. (a)	59. (b)	69. (d)	79. (b)	89. (c)	99. (d)
10. (a)	20. (c)	30. (c)	40. (b)	50. (d)	60. (d)	70. (c)	80. (d)	90. (a)	100. (c)

SOLUTION

1. (b)
Neil Armstrong was the first man to put feet on the moon. He reached on the moon on 21st July, 1969 via Apolo-11 mission. Neil was an American. In 2019 China sent 2 rovers via its Lunar mission.

2. (c)
Mohd. Azharuddin made three consecutive centuries in his first three test matches. His international playing career came to an end when he was found to be involved in a match-fixing scandal in 2000 and subsequently banned by the BCCI for life. In 2012, the Andhra Pradesh High Court lifted the life ban.

3. (d)

Famous folk dances and their concerned states are as follow:

Name of States	Folk Dances
Assam	Bihu, Bichhua, Natpuja, Maharas, Kaligopal, Bagurumba, Naga dance, Khel Gopal, Tabal Chongli, Canoe, Jhumura Hobjanai
Chhattisgarh	Tapali, Goudi, Karma, Jhumar, Dagla, Pali, Navrani, Diwari, Mundari
Gujarat	Garba, Dandiya Ras, Tippani Juriun, Bhavai.
Uttarakhand	Garhwali, Kumayuni, Kajari, Jhora, Raslila, Chappeli.

4. (c)
Premchand, pseudonym of Dhanpat Rai Srivastava, (born July 31, 1880, Lamhi, near Varanasi, India—died October 8, 1936, Varanasi), was an Indian author of novels and short stories in Hindi and Urdu who pioneered in adapting Indian themes to Western literary styles.
He is regarded as one of the foremost Hindi writers of the early twentieth century. His works include Godaan, Karmabhoomi, Gaban, Mansarovar, Idgah.

5. (a)
Reserve Bank of India is the only note issuing authority in India. It is India's central bank and regulatory body responsible for regulation of the Indian banking system. The Reserve Bank of India was established on 1st April 1935 as per Reserve Bank of India Act 1934.

6. (a)
According to Article 75 (3) of the Indian Constitution, the council of ministers is collectively responsible to the Lok Sabha, that is, the council of minister can remain in office only if a majority is elected in this house. The cabinet, including the Prime Minister, has to resign when a motion of no confidence is passed against it. Only members of Lok Sabha can participate in the motion of no confidence, so the Prime Minister cannot participate in voting if he is a Rajya Sabha member.

7. (c)
Different types of gases present in the air and their percentage-
Nitrogen – 78.8%
Oxygen – 20.95%
Argon – 0.93%
Carbon dioxide – 0.03%

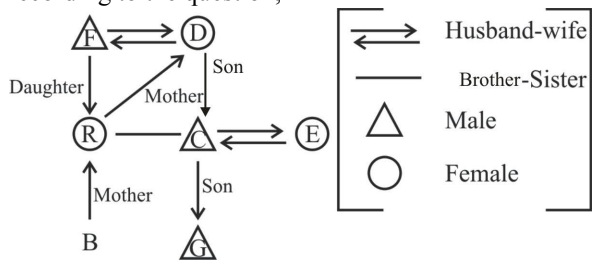
8. (d)
Barchan is a type of crescent-shaped sand dune formed in desert regions where the wind direction is very constant.

9. (a)
Nine gems of Akbar's court were Abul Fazal, Tansen, Birbal, Todarmal, Mansingh, Abdul Rahim Khan-i-Khana, Fakir Aziano-Din, Mulla Do-Piyaza and Faizi.

10. (a)
In 1897, the Plague Commissioner had resorted to tyranny and force while managing the epidemic of plague in Pune. As a revenge the Chapekar brothers, Damodar and Balkrishna, shot him dead on 22 June1897. Damodar, Balkrishna and Vasudev these three brothers and their associate Vinayak Ranade were hanged to death.

11. (a)
Just as rafting is related to water, in the same way Skiing is related to Ice/Snow.

12. (c)
According to the question,



Hence, It is clear from above that F is father's father of G.

13. (c)
Given,

$\div \rightarrow +$
$\times \rightarrow -$
$+ \rightarrow \times$
$- \rightarrow \div$

Expression $= 8 + 5 \times 54 - 9 \div 3$
On changing the symbols,

$8 \times 5 - 54 \div 9 + 3$
$= 40 - 6 + 3$
$= 37$

14. (d)
According to the statement conclusion I states that the scale is made of glass. So, it is not necessary that the scale can be made of plastic iron etc. Conclusion II states that the scale is made of plastic. So, it is also not necessary that the scale is made of plastic because such information does not come out of the statement.

15. (b)
According to the question it is clear from the statement that only assumption 1 is implicit.

16. (a)
Given that,
A > D, A > B and C > A
but information is insufficient related to D and B. Hence both the statements are not sufficient to answer the question.

17. (c)
The word TOUGH can't be formed from letter DAUGHTER because it doesn't contain the letter 'O'.

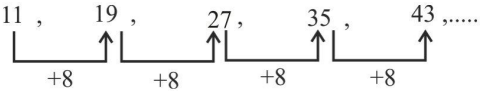
18. (b)
Just as Verse comes under Poem, in the same way Page comes under Book.

19. (a)

Just as,	Same as,
K A R A N	A R U N
11+1+18+1+14 = 45	1+18+21+14 = 54

20. (c)
Pen, Marker and Chalk is used for writing, while Book is used for reading. Hence option (c) is different among all.

21. (b)
The given series is as follows-



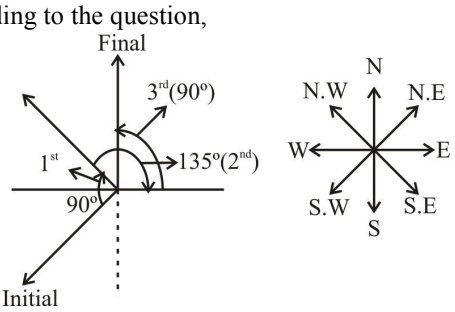
Since adding 8 to each number gives each subsequent number. And in each number, when divided by 8, 3 remainder is obtained, while in option (b) 434, when divided by 8, 2 remainder is obtained.
Hence option (b) is odd.

22. (c)
The series is as follows–

$F \xrightarrow{+5} K \xrightarrow{+3} N \xrightarrow{+7} U$
$U \xrightarrow{+5} Z \xrightarrow{+3} C \xrightarrow{+7} J$
$J \xrightarrow{+5} O \xrightarrow{+3} \boxed{R}$

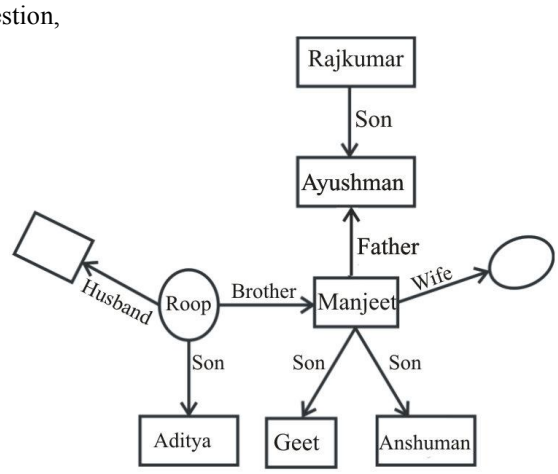
Hence, $\boxed{? + R}$

23. (b)
According to the question,



Hence, it is clear from above that Umesh is facing North direction.

24. (a)
On drawing blood relation diagram according to the question,



Hence, it is clear from above diagram that Manjeet is father of Geet.

25. (d)
Given,

18K 6J 7Q 5T 2
[Q = +, J = ×, T = – , K = ÷]

According to the question, on changing signs-
$18 \div 6 \times 7 + 5 - 2$
$3 \times 7 + 3 = 24$

26. (b)
ENIAC, EDVAC and EDSAC are examples of the first generation of computers. ENIAC was the first general purpose programmable computer, developed during World War II with the aim of helping to calculate artillery firing tables.

27. (d)
The size of the pixel determines the clarity of the image displayed on the VDU.

28. (c)
Output devices are hardware components of a computer system that displays or presents information to the user or another machine. They convert digital data generated by computer in to human - readable or machine readable form. Ex- Monitors, Printers, Speakers, Projectors, Headphones etc. Mouse is an input device. So, option (c) is correct.

29. (b)
Output device is a component of computer system which displays data or instructions as result after processing. Example - Monitor, Printer, Speaker, Plotter video card. It converts digital data into a form that is human understandable.

30. (c)
A buffer is a memory area that store data temporarily. Buffering is an act of storing data temporarily in the buffer.

Double buffering– In double buffering two buffer are used in the place of one. In this buffering the producer produces one buffer while the consumer consumes another buffer, simultaneously. So the producer not needs to wait for filling the buffer.

31. (d)
Buffer Memory, is a temporary storage area in the main memory (RAM) that stores data transferring between two or more devices or between an application and a device. Buffering compensates for the difference in transfer speeds between the sender and receiver of the data.

32. (c)
Telnet is an application layer protocol that enables one computer to connect to local computer. It is a used as a standard TCP/IP protocol for virtual terminal service. It provides bi-directional text - oriented communication in the network.

33. (d)
HTTPS is short form of Hyper Text Transfer Protocol Secure. It is secure version of the HTTP protocol which is used for communication between a web browser and a websites. HTTPS uses encryption protocols, such as SSL (Secure Sockets Layer) or its successor, TLS (Transport Layer Security) to establish a secure connection. It can be used for financial. Transaction, so statement (d) is false to HTTPS.

34. (b)
The full name of DNS is 'Domain Name System'. It converts domain names to IP addresses.
The full name of OSI model is 'Open System Inter Connection. It was developed by ISO in 1984 and this model consists of 7 layers.
(i) Physical layer
(ii) Data link layer
(iii) Network layer
(iv) Transport layer
(v) Session layer
(vi) Presentation layer
(vii) Application layer
Protocols like HTTP, FTP, SMTP and NFS are used in the application layer. DNS is an application layer protocol in the internet architecture.

35. (a)
In MS word 365, hyphenation refers to the use of a short dashed line to break up a word when it reaches the edge of a document or container.

36. (a)
Font size option best describes the words- regular, Bold and Italic in MS Word 365.

37. (d)
In MS word 365 when we see the mini toolbar which is displayed when we right click in those table cell row or column. In this, on clicking 'Delete' option the following options are displayed -
→ Delete cell
→ Delete columns
→ Delete Rows
→ Delete Table.

38.(c)
Postfix is a hugely-popular Mail Transfer Agent (MTA) designed to determine routes and send emails. LinkedIn is a social networking site or portal designed specifically for the business community/professionals. Orkut was a social networking service owned and operated by Google. This service was designed to help users meet new and old friends and maintain existing relationships. Accounts such as hotmail, outlook, MSN etc. are provided by Microsoft.

39. (a)
The process of verifying the login name and password is known as authentication.

40. (b)
Email is a computer based application. It allows an internet user to send a message in formatted manner (mail) to the other internet user in any part of world.

41. (c)
Safari is a web browser developed by Apple. It is built into Apple's operating systems, including Mac OS, iOS, and iPad OS are used Apple's open source browser engine website.

42. (c)
About search engine Bing, Google search engine, Ask are correct based on the given statements, while AltaVista is incorrect because it was not launched by Apple, AltaVista was launched by Digital Equipment Corporation on December 15, 1995.

43. (b)
Safari is a graphical web browser developed by Apple that is based on open-source software such as WebKit. It was first released for desktop in 2003 with Mac OSx Panther on Mac. It was presented first time with iphone in 2007 with iOS devie for mobile.

44. (d)
Digitization refers to the process of converting analog information such as text numbers, photos or music into digital data that can be manipulated by electronic devices.

45. (b)
Several studies have shown that violent video games have negative effects on the younger generation.

46. (c)
Divisibility rule of 8 - If the last three digits of the given number are divisible by 8 then it will be divisible by 8.
On putting Least value of y = 1
Number = 648416

$$\text{Divided by} = \frac{416}{8} = 52$$

47. (b)
$(15 \div 3) - [\{(19 - 1) \div 2\} - \{5 \times 20 - (7 \times 9 - (-2))\}]$
$= 5 - [\{18 \div 2\} - \{100 - (63 + 2)\}]$
$= 5 - [9 - \{100 - 65\}]$
$= 5 - [9 - 35]$
$= 5 + 26$
$= 31$

48. (b)

$$-\frac{3}{2} = -1.5$$

$$\frac{3}{2} = 1.5$$

$$\frac{11}{4} = 2.75$$

$$\frac{5}{2} = 2.5$$

It is clear that greatest fraction is $\frac{11}{4}$

49. (a)

Let the fraction be $\frac{1}{x}$,
According to the question,

$$\frac{3}{4} - \frac{1}{x} = \frac{5}{12}$$
$$-\frac{1}{x} = \frac{5}{12} - \frac{3}{4}$$
$$-\frac{1}{x} = \frac{20 - 36}{48}$$
$$-\frac{1}{x} = \frac{-16}{48}$$
$$\frac{1}{x} = \frac{1}{3}$$

Hence the required fraction is $\frac{1}{3}$.

50. (d)
LCM = 72
$= 2 \times 2 \times 2 \times 3 \times 3$
Number = 6, 9, x
$6 = 2 \times 3$
$9 = 3 \times 3$
HCF = 3

$$\text{Number } x = \frac{72}{3}$$

Hence it is clear that x = 24

51. (c)

$$\text{L. C. M of } \frac{2}{3}, \frac{4}{9}, \frac{7}{12}, \frac{3}{5}$$

$$\frac{\text{L.C.M. of numerator}}{\text{H.C.F. of denominator}} = \frac{\text{L.C.M. of 2, 4, 7 and 3}}{\text{H.C.F. of 3, 9, 12 and 5}}$$
$$= \frac{4 \times 7 \times 3}{1}$$
$$= 84$$

52. (b)
Let the larger number and smaller number be x and y respectively.
According to the question,

$$(x - y) = (x + y) \times \frac{30}{100}$$

$10(x-y) = 3(x+y)$
$10x-10y = 3x+3y$
$7x = 13y$
$x : y = 13 : 7$

53. (b)
Let, the no. of males = x
And number of females = y
From the initial part of the question,
$x + y = 4000$
$x = 4000 - y$ ... (1)
From the second part of the question,

$$x + x \times \frac{10}{100} + y + y\frac{20}{100} = 4500$$
$$\frac{110x + 120y}{100} = 4500$$

$110x + 120y = 450000$ ...(2)
On putting the value of x from eq^{n}–1 in eq^{n} –2,
$110 (4000 - y) + 120y = 450000$
$440000 - 110y + 120y = 450000$
$10y = 10000$
$y = 1000$
$\therefore$ Number of females $(y) = 1000$
And number of males $(x) = 4000 - y$
$= 4000 - 1000 = 3000$

54. (c)
Given-
$a + b + c = 2s$ ...(i)
Area of triangle $= \frac{1}{2} bc \sin A$
By formula:-

$$\text{Area of triangle} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\frac{1}{2}bc\sin A = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\sin A = \frac{2\times\sqrt{s(s-a)(s-b)(s-c)}}{bc} \quad \left\{\begin{matrix}\text{formula} - \\ \sin x = 2\sin\frac{x}{2}\cos\frac{x}{2}\end{matrix}\right\}$$

$$\sin\frac{A}{2}\cos\frac{A}{2} = \frac{\sqrt{s(s-a)(s-b)(s-c)}}{bc} \quad \text{... (ii)}$$

We know that-

$$\cos A = \frac{b^2+c^2-a^2}{2bc}$$

$$2\cos^2\frac{A}{2} - 1 = \frac{b^2+c^2-a^2}{2bc} \quad \left(\begin{matrix}\text{Formula} - \cos 2A = 2\cos^2 A - 1 \\ \cos A = 2\cos^2\frac{A}{2} - 1\end{matrix}\right)$$

$$2\cos^2\frac{A}{2} = \frac{b^2+c^2-a^2+2bc}{2bc}$$

$$\cos^2\frac{A}{2} = \frac{(b+c-a)(b+c+a)}{4bc}$$

$$\cos^2\frac{A}{2} = \frac{(2s-a-a)2s}{4bc} \qquad [\text{From equ}^{n}\text{(i)}]$$

$$\cos^2\frac{A}{2} = \frac{(2s-2a)2s}{4bc}$$

$$\cos^2\frac{A}{2} = \frac{s(s-a)}{bc}$$

$$\cos\frac{A}{2} = \sqrt{\frac{s(s-a)}{bc}}$$

Putting the value of $\cos\frac{A}{2}$ in equation (ii)-

$$\sin\frac{A}{2}\sqrt{\frac{s(s-a)}{bc}} = \frac{\sqrt{s(s-a)(s-b)(s-c)}}{bc}$$

$$\boxed{\sin\frac{A}{2} = \sqrt{\frac{(s-b)(s-c)}{bc}}}$$

55. (d)

According to the question -

LCM of 10 and 12 = 60

Total work = 60 unit

1 day's work of A = 6 unit

1 day's work of B = 5 unit

2 day's work of (A + B) = 11 unit

$\times 5 \quad = \times 5$

By A+B → 10 days = 55 unit

Remaining work = 60 – 55

= 5 unit

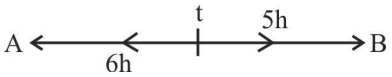
Time taken by A to complete 5 unit work = $\frac{5}{6}$ day

Hence required time = $\left(10+\frac{5}{6}\right)$ days

$= 10\frac{5}{6}$ days

56. (d)

Given,



Time taken to reach destination after meeting (A) = 5 hr.

Time taken to reach destination after meeting (B) = 6 hr.

Speed of A = 55 Km./hr.

Let Speed of B = x Km./hr.

$$\therefore \frac{S_B}{S_A} = \sqrt{\frac{t_A}{t_B}}$$

$$\frac{x}{55} = \sqrt{\frac{5}{6}}$$

$$x = 55\times\sqrt{\frac{5}{6}}$$

$$x = 55\times\sqrt{\frac{5\times 6}{6\times 6}}$$

$$x = \frac{55}{6}\times\sqrt{30}$$

$$x = \frac{55}{6}\sqrt{30} \text{ km/hr}$$

57. (b)

According to the question,

Principal (P) = ₹1250

Amount (A) = ₹1550

Time (T) = 4 years

A = SI + P

$$1550 = \frac{P\times R\times T}{100} + 1250$$

$$1550 = \frac{1250\times 4\times R}{100} + 1250$$

$$1550 = \frac{5000\times R}{100} + 1250$$

$50R = 1550 - 1250$

$$R = \frac{300}{50}$$

$R = 6\%$

58. (c)

Cost price of 1000 gm wheat = ₹18

$$1\text{gm cost price} = ₹\frac{18}{1000}$$

Selling price of 900 gm = ₹ 20

$$1\text{gm selling price} = ₹\frac{20}{900}$$

Actual profit percentage $= \dfrac{\left(\dfrac{20}{900}-\dfrac{18}{1000}\right)}{\dfrac{18}{1000}}\times 100$

$= \dfrac{\dfrac{20000-16200}{900000}}{\dfrac{18}{1000}}\times 100$

$= \dfrac{3800\times 1000}{900000\times 18}\times 100$

$= \dfrac{3800}{162}$

$= 23.45\%$

59. (b)

$(8 + 27 + 64 + ... + 1000) + (2 + 4 + 6 + ... + 20)$

$= [(2)^3+(3)^3+(4)^3+ ..... +(10)^3] + 2(1+2+3+ ..... +10)$

$= [\{(1)^3 + (2)^3 + (3)^3 + (4)^3+.....+ (10)^3\} - (1)^3] +2$ $(1+2+3+ ..... + 10)$

$\because$ The sum of cubes of the first 'n' natural numbers $= \left[\dfrac{n(n+1)}{2}\right]^2$

And, sum of the first 'n' natural numbers $= \dfrac{n(n+1)}{2}$

$= \left[\dfrac{10(10+1)}{2}\right]^2 - 1 + 10(10+1)$

$= (5 \times 11)^2 - 1 + 10 \times 11$

$= (55)^2 - 1 + 110$

$= 3025 - 1 + 110$

$= 3024 + 110$

$= 3134$

60. (d)

$\tan A + \tan B + \tan C = ?$

$A + B + C = 180°$

$A + B = 180° - C$

$\tan (A+B) = \tan (180° - C)$

$\dfrac{\tan A + \tan B}{1 - \tan A \cdot \tan B} = -\tan C$

$\tan A + \tan B = -\tan C + \tan A \cdot \tan B \cdot \tan C$

$\tan A + \tan B + \tan C = \tan A \cdot \tan B \cdot \tan C$

61. (b)

Value (x)	Frequency (f)	f×x
29	4	116
30	3	90
30+k	3k	$90k+3k^2$
34	2	68
62	1	62
	$\Sigma f = 10+3k$	$\Sigma fx = 336+90k+3k^2$

We know that,

Arithmetic Mean $= \dfrac{\Sigma fx}{\Sigma f}$

$33 = \dfrac{336+90k+3k^2}{10+3k}$

$330 + 99k = 336 + 90k + 3k^2$

$3k^2 + 90k - 99k + 336 - 330 = 0$

$3k^2 - 9k + 6 = 0$

$k^2 - 3k + 2 = 0$

$(k - 2)(k - 1) = 0$

$k = 2, 1$

Hence, the number of possible value of k = 2

62. (a)

Square root of 519841

	721
7	519841
+7	49
142	298
+2	284
1441	1441
+ 1	1441
1442	×× ××

Hence the square root of 519841 is 721.

63. (d)

Let the ages of Subhash and Pranav 2 years ago be 4x and 5x years respectively.

Then,

The present age of Subhash = 4x + 2

The present age of Pranav = 5x + 2

According to the question,

$\dfrac{4x+2+3}{5x+2+3} = \dfrac{5}{6}$

$\Rightarrow \dfrac{4x+5}{5x+5} = \dfrac{5}{6}$

$\Rightarrow 24x + 30 = 25x + 25$

$\Rightarrow 25x - 24x = 30 - 25$

$\therefore \ x = 5$

Hence the present age of Pranav = 5 × 5 + 2

= 25 + 2

= 27 years

64. (b)

Suppose flood gate A will fill the reservoir in x hrs. So flood gate B will fill the reservoir in (x + 5) hrs.

As per the question,

$\dfrac{1}{x} + \dfrac{1}{x+5} = \dfrac{1}{6}$

$\dfrac{x+5+x}{x^2+5x} = \dfrac{1}{6}$

$12x + 30 = x^2 + 5x$

$x^2 - 7x - 30 = 0$

$x^2 - 10x + 3x - 30 = 0$

$(x - 10)(x+3) = 0$

$\boxed{x = 10}$

Hence fast flood gate A will fill the reservoir in 10 hours.

65. (b)

Let the numbers be 3x and 2x respectively.

According to the question-

$$\frac{3x-8}{2x-6}=\frac{8}{5}$$

$15x-40=16x-48$

$x = 8$

Hence the first number $= 3\times8 = 24$

And second number $= 2\times8 = 16$

66. (a)

Vector Quantity - A physical quantity which has both magnitude and direction. Displacement, velocity, acceleration, momentum, force, weight are examples of vector Quantity.

Scalar quantity- A scalar quantity only has a magnitude. Some common examples of scalar quantity are mass, speed, volume, temperature, density etc.

67. (a)

Given that,

$F = 250$ N

Change in momentum = Impulse (ΔP) = 125 Kgm/s

$\Delta t = ?$

$\Delta P = F\times\Delta t$

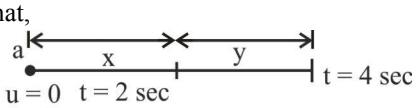
$$\Delta t = \frac{\Delta P}{F}$$

$$\Delta t = \frac{125}{250}$$

$\Delta t = 0.5$ sec

68. (b)

Given that,



$$S = ut+\frac{1}{2}\times at^2$$

$$x = \frac{1}{2}a\times4$$

$x = 2a$ .... (i)

and $$S = ut+\frac{1}{2}\times at^2$$

$$x+y = \frac{1}{2}\times a\times4\times4$$

$x + y = 8a$ .... (ii)

From equation (i) and (ii), we get

$x + y = 8a$

$2a + y = 8a$

$y = 6a$

Given, $y = nx$

$y = 3 \times 2a$

$\Rightarrow$ $n = 3$

69. (d)

Given:

Power of the motor (P) = 2 HP

Time (t) = 3 sec

From the work done formula- $W = P \times t$

$= 2 \times 746 \times 3$ [$\because$ 1 HP = 746 W]

$= 4476$ Joule

$= 4.4$ kJ

70. (c)

Given,

$V = 50$ V

$Q = 96000$

$t = 1$ hour $= 3600$ sec

We know that-

$$H = V\,I\,t = \frac{V\times Q.t}{t} = V\times Q = 50\times96000$$

$\Rightarrow$ $$\boxed{H = 4.8\times10^6\,J}$$

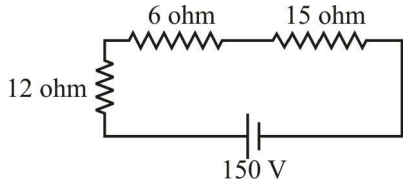
71. (a)

Electrical potential : The amount of work needed to move a unit charge from a reference point to specific point against an electric field known as electric potential.

$$V = \frac{W}{q}$$

The unit of electric potential is 'volt' or joule/coulomb.

72. (c)



Total resistance $= 12 + 6 + 15 = 33\Omega$

$\therefore$ Current $(I) = \frac{V}{R} = \frac{150}{33} = 4.54$

$\therefore$ Voltage of 6Ω $(V) = 4.54 \times 6 = 27.27$V

73. (a)

Given that,

$P = 60$ W, $V = 240$ V, $R = ?$

$$P = \frac{V^2}{R}$$

$$60 = \frac{240\times240}{R}$$

$$R = \frac{240\times240}{60}$$

$$\boxed{R = 960\Omega}$$

74. (b)

Reluctance is the property of a material which opposes the creation of magnetic flux in it.

$$\boxed{\text{Reluctance}(S) = \frac{MMF}{\phi}}$$

The unit of reluctance is 1/Henry or Ampere turn/Weber

75. (b)

If the voltage supply to the energy meter is higher than the rated value, the energy meter will typically run faster because the current flowing through the meter will be higher than what the meter is calibrated for, causing the meter to register more energy usage than is actually being consumed. This can result in an over-billing of energy usage to the customer. It important to

make sure that the voltage supply to the energy meter is within the rated range to ensure accurate energy usage measurement.

76. (d)

Electric flux is a scalar quantity.

$$\boxed{\phi = EA\cos\theta}\ Nm^2/C$$

Electric flux density (D) is a vector quantity

$$\boxed{\vec{D} = \varepsilon\vec{E}}\ C/m^2$$

77. (a)

The coil on the iron core have co-efficient of coupling equal to unity.

$$\boxed{k = \frac{M}{\sqrt{L_1 L_2}}}$$

Where,

k = coefficient of coupling.
M = Mutual inductance
L_1 = Inductance of primary coil
L_2 = Inductance of secondary coil

78. (b)

According to ampere's circuital law, the line integral of H about any closed path is exactly equal to the direct current enclosed by that path.

Ampere's circuit law-

$$\oint H.dl = I$$

79. (b)

Given,

L = 0.08 mH
I = 2A and Δt = 0.4 sec

$$\text{e.m.f.} = L\frac{di}{dt} = L\times\frac{\Delta I}{\Delta t}$$

$$\text{e.m.f.} = 0.08\times10^{-3}\times\frac{2}{0.4}$$

$$\text{e.m.f.} = 0.4\times10^{-3}\ \text{Volt}$$

e.m.f. = 0.4mV

80. (d)

A material is said to have become superconductor when its resistance becomes zero. A superconductor is a material that attains, Superconductivity a state of matter with no electrical resistance. In a superconductor an electric current can persist indefinitely.

For Superconducting material (μ_r) = 0, Susceptibility (χ) = Negative,

81. (c)

For an insulating material dielectric strength and dielectric loss should be respectively high and low. An electrical insulator is a material in which electric current does not flow freely. The atoms of the insulator have tightly bound electron which cannot readily move.

82. (c)

When a semiconductor is doped with a p-type impurity each impurity atom will remain electrically neutral because they have large number of holes and small number of free electron but total number of hole is equal to total number of accepter ion which have opposite charge to the hole.

83. (c)

Tunnel diode and Avalanche photodiode are operated in forward bias and reverse bias respectively.

84. (a)

The emitter region in NPN junction transistor is more heavily doped than the base region the flow across the base region will be mainly due to electron.

Doping level- Base < collector < Emitter.

Transistor has three region-

Emitter-

- Highly doped and medium area.

Collector-Moderate doping and largest area.

- **Base-** lightly doping and small area.

85. (d)

The n-channel E-MOSFET will be ON when the value of gate to source voltage is greater than threshold voltage.

- Threshold voltage also known as gate to source voltage.
- In n-channel E only MOSFET, Threshold voltage (V_T) should be positive.

86. (c)

The ripple factor is the ratio between the rms value of the ac voltage and average value of dc voltage of the rectifier.

$$\%\,\text{Ripple factor} = \frac{\text{rms value}}{\text{dc or average value}}\times100$$

87. (d)

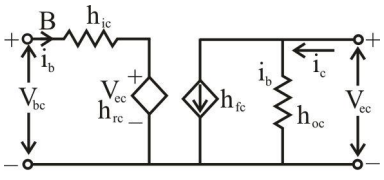
The main advantage of emitter follower –

- It has low output impedance.
- It has high input impedance.

Common collector configuration is also known as emitted follower or voltage buffer.

88. (c)

Given circuit is a hybrid equivalent circuit of common collector.



89. (c)

Voltage series feedback results in increase in input impedance and decrease in output impedance. Voltage series feedback is also known as shunt driven series-fed feedback, i.e. a parallel series circuit.

90. (a)

$$\boxed{\text{Slew Rate}(S) = \left.\frac{dV_o}{dt}\right|_{\text{maximum}}\ \text{Volt}/\mu s}$$

Slew rate of output op amp refers to maximum rate of change of output voltage.

91. (b)

Monostable multivibrator is used as a gating circuit and as a delay element.

Monostable multivibrator is a one-shot multivibrator that has only one stable state as once externally triggered it returns back to its first stable state. It is generally used to convert short sharp pulses into much wider ones for timing applications.

92. (c)

Given -

Accuracy = 0.75%

Measured Value (V) = 100V

Full Scale deflection voltage (V_{FSD}) = 200V

% Limiting error

$$= \frac{\text{Accuracy\%} \times \text{Full Scale deflection voltage}}{\text{Measured Value}}$$

$$= \frac{0.75\% \times 200}{100} = 1.5\ \%$$

93. (c)

Type of instruments -

- Primary or absolute instruments
- Secondary instruments

Tangent galvanometer is an example of absolute instruments.

Absolute instruments - These are those instruments which gives the value of the quantity that has to be measured in terms of physical constants and their deflection only. They do not need to be calibrated and do not need any comparison with other standard instruments. Absolute instruments are used in laboratories as standardizing instruments, while secondary instruments are used in everyday work. In secondary instrument quantity being measured is given directly by the deflection of the instrument.

94. (d)

Electromagnetic instruments are not used as ammeters or voltmeters.

The various type of instruments are used as ammeters and voltmeters are -

- Moving iron type
- Moving coil type
- Hot-wire type
- Induction type
- Electrodynamometer type
- Thermocouple type
- Rectifier type

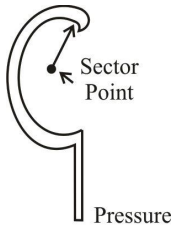
95. (d)

Anderson's bridge method can not be used to measure capacitance.

De-Sauty's bridge	- Suitable for perfect capacitor
Schering bridge	- Dielectric loss in a capacitor
Wien bridge	- Frequency and capacitance
Anderson's bridge	- Inductance

96. (d)

Bourdon tube is used to measure pressure directly.



Bourdon Tube

- Bourdon tubes are made up of an elliptically flattened tube. One end of the tube is sealed or closed. The other end is open so that fluid can enter. When the fluid whose pressure is to be measured enters the tube. The tube tends to straighten out an amount of pressure applied. This causes a displacement, which is amplified further and used to move a pointer on scale.

97. (b)

$(FA)_{16} = (?\ )_2$

$F \rightarrow 15 \rightarrow 1111$

$A \rightarrow 10 \rightarrow 1010$

So, $(FA)_{16} = (1111\ \ 1010)_2$

98. (d)

F = ABC' + ABC + A'BC + A'BC'

F = AB (C' + C) + A'.B(C + C')

F = AB + A'B

F = B (A + A')

F = B

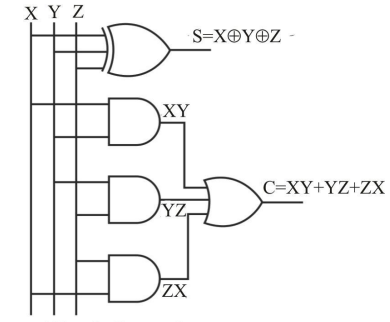
99. (d)

For a full adder

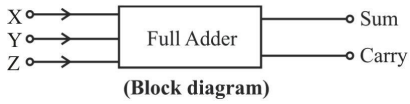
SUM = X ⊕ Y ⊕ Z

Carry = XY + YZ + ZX

The full adder is used to add three 1 bit binary numbers X,Y and Z. The full adder has three input states and two output states are sum and carry.



(Circuit diagram)



(Block diagram)

100. (c)

Input impedance of CMOS is high and output impedance is low. Its switching speed is less. Because its propagation delay is maximum.

PRACTICE SET - 3

1. What is the name of India's first planned manned space flight?
(a) Vayuyaan (b) Gagan Viman
(c) Pushpakyaan (d) Gaganyaan

2. Who is the first batsman in the history of cricket to score 3 ODI double centuries?
(a) Sachin Tendulkar (b) Virender Sehwag
(c) Virat Kohli (d) Rohit Sharma

3. Raut Nacha is a famous tribal dance of which state ?
(a) Jharkhand (b) Chhattisgarh
(c) Odisha (d) Madhaya Pradesh

4. Who among the following is called 'Meera of modern India"?
(a) Kamala Das (b) Mahasweta Devi
(c) Aashapurna Devi (d) Mahadevi Verma

5. Which of the following depict the characteristics of the Reserve Bank of India?
A. It issue the currency of the country
B. It controls money supply of the country through various methods.
C. It acts as a banker to the government.
D. It accepts deposits from the public and lends out part of these funds to those who want to borrow.
(a) A, B and D (b) A, B and C
(c) B, C and D (d) A, C and D

6. The quorum required for the constitution of the Lok Sabha meeting is ____ of the total members of the House-
(a) Half (b) Two thirds
(c) Sixth (d) Tenth

7. At which of these places is the thickness of the troposphere the greatest?
(a) Above Mountains (b) South Pole
(c) North Pole (d) Equator

8. Phumdis, the floating islands are the unique features of which of the following lakes?
(a) Pangong Lake (b) Loktak Lake
(c) Sambhar Lake (d) Chilika Lake

9. Shah Jahan's daughter ——— participated in many architectural projects of the new capital of Shajahanabad (Delhi).
(a) Begum Ishrat (b) Gulbadan Begum
(c) Roshanara (d) Jahanara

10. With which of the following is the comment 'no dalil, no vakil, no appeal' associated?
(a) Charter Act (b) Rowlatt Act
(c) Regulating Act (d) Pitt's India Act

11. Select the option that is related to the sixth letter-cluster in the same way as the first letter-cluster is related to the second letter-cluster and the third letter-cluster is related to the fourth letter-cluster.
OSU : LQT ::IKL : FIK :: ? : JTB
(a) MVC (b) MWC
(c) NVD (d) NUD

12. Rubi and Juhi are sisters. Krishna is Juhi's father's father. Reshma is the mother of Arvind. Arvind is the father of Rohit, who is the only brother of Rubi. How is Krishna related to Rohit?
(a) Father's father (b) Mother's brother
(c) Mother's father (d) Father

13. If '<' means '–', '>' means '+', and '$' means '÷', then what would be the value of the following expression?
37 > 165 $ 3 < 5
(a) 95 (b) 63
(c) 72 (d) 87

14. Statements: There is an increase in the price of essential commodities due to a strike by the transporters.
Conclusions:
1. Government should buy their own vehicles to transport the essential goods.
2. Government should negotiate with transporters to withdraw the strike.
(a) Neither 1 nor 2 follows
(b) Both 1 and 2 follows
(c) Only conclusion 2 follows
(d) Only conclusion 1 follows

15. Consider the given question and decide which of the given assumptions is/are implicit in the question.
Question :
Could India become a terror free country in future?
Assumptions:
1. India has declared a zero-tolerance policy
2. India's security establishment is working hard on all the fronts
(a) Both assumptions 1 and 2 are implicit
(b) Either assumption 1 or 2 is implicit
(c) Only assumption 1 is implicit
(d) Only assumption 2 is implicit

16. Question:-
M, A, N and K are standing in a row. On the basis of following information, we arranged them from smallest to largest, then who stands at end.
Statement:
1. A is smaller than K.
2. M is smaller than A.
(a) Both statement 1 and 2 are not sufficient
(b) Both statement 1 and 2 are sufficient
(c) Statement 1 alone is sufficient
(d) Statement 2 alone is sufficient

17. The given table shows the number of students in a hostel speaking different languages:

Languages	Hindi	English	Marathi	Tamil	Bengali	Total
Number of Students	25	22	12	9	4	72

Which language is spoken by atleast 1 out of 3 students residing in the hostel?
(a) English (b) Marathi
(c) Hindi (d) Tamil

18. **Select the option that is related to the third term in the same way as the second term is related to the first term.**
Mason : Builds :: Mechanic : ?
(a) Cars (b) Tools
(c) Factory (d) Repairs

19. **If A is equal to 1, M is equal to 13 and R is equal 18, how would you spell MISSION?**
(a) 129191991314 (b) 149191991314
(c) 139191991514 (d) 139191991314

20. **Four awards have been listed, out of which three are alike in some manner and one is different. Select the odd one.**
(a) Padma Vibhushan (b) Padma Bhushan
(c) Param Vir Chakra (d) Padma Shri

21. **Select the number from among the given options that can replace the question mark (?) in the following series.**
3, 78, 9, 69, 15, 60, ?
(a) 19 (b) 23
(c) 22 (d) 21

22. **Study the given pattern carefully and select the letter from among the given options that can replace the question mark (?) in it.**

C	O	L
D	T	P
F	?	I

(a) O (b) S
(c) T (d) P

23. **Anita is standing facing the north direction. Then, she turns 135° anticlockwise. After that, she turns 90° clockwise. In which direction is she facing now?**
(a) North-east (b) South-west
(c) North-west (d) South-east

24. **Jean and Catherine are the maternal aunts of Cinderella. Charles is the husband of Cinderella. Isabella is the mother of mother-in-law of Charles. How is Isabella related to Jean?**
(a) Mother (b) Maternal Aunt
(c) Grand mother (d) Sister

25. **If G stands for 'add', H stands for 'multiply', J stands for 'subtract' and K stands for 'division' then find the value of**
125 J 110 K 5 G 7 H 2
(a) 117 (b) 133
(c) 89 (d) 114

26. **Electronic Numerical Integrator and Computer (ENIAC) was first binary programmable computer based on____.**
(a) Blaise Pascal's concept
(b) Von Neumann's architecture
(c) Charles Babbage's architecture
(d) Turing's machine concept

27. **The default layout of most keyboards is called -**
(a) ALPHBET (b) QWERTY
(c) ASCII (d) IEEE

28. **In which of the following types of keyboard, both the M and L keys are present on the same row and the L key is present to the left of the M key?**
(i) AZERTY
(ii) QWERTY
(a) Only (i) (b) (i) and (ii) both
(c) Only (ii) (d) Neither (i) nor (ii)

29. **A device that allows you to take to a computer (such as a mouse or keyboard) is a/an _____ device.**
(a) Storage (b) Process
(c) Input (d) Output

30. **Which of the following is an example of volatile memory?**
(a) Hard drive (b) ROM
(c) RAM (d) Flash memory

31. **Which of the following statements related to primary memory of a computer is INCORRECT?**
(a) RAM is a component of Arithmetic Logic Unit (ALU)
(b) The CPU interacts directly with the primary memory.
(c) Random Access Memor (RAM) is a volatile primary memory.
(d) ROM is a non-volatile primary memory.

32. **Which of the following memories needs to be refreshed continuously at certain time intervals?**
(a) Cache Memory (b) Secondary
(c) SRAM (d) DRAM

33. **What does the Internet OSI Model stand for?**
(a) Open System Interconnection Model
(b) Open Service International Model
(c) Open Space Internet Model
(d) Open Software Internet Model

34. **Protocols that require a logical connection to established between two devices before transferring data are called:**
(a) Connection-oriented protocols
(b) Link-to-connection protocols
(c) Data transfer protocols
(d) Broadcasting protocols

35. **Consider the following communication technologies:**
1. Closed-Circuit Television
2. Radio Frequency Identification
3. Wireless Local Area Network
Which of the above are considered Short-Range devices/technologies?
(a) 1 and 2 only (b) 2 and 3 only
(c) 1 and 3 only (d) 1, 2 and 3

36. **Which of the following is the correct sequence of turning off bullets and numbering in MS Word 365?**
1. Select auto correct options and then click the auto format as you type tab.

2. File > Options > proofing
3. Select ok.
4. Select or clear automatic bulleted lists or automatic numbered list.
(a) 1, 2, 3, 4 (b) 2, 4, 1, 3
(c) 2, 1, 3, 4 (d) 2, 1, 4, 3

37. 'Screenshot' option is available in ------- tab of MS - Word 2010.
(a) Home (b) Review
(c) Insert (d) Design

38. Which of the following options in MS Word 365 is used to create your table by creating cell, row and column borders?
(a) Create table (b) Quick table
(c) Draw table (d) Insert table

39. If you use a font that is not supported by the browser, the original text
(a) Will be the one displayed using only the 'Arial' font
(b) Will be displayed with a distinctive background
(c) Will display in default font
(d) Will not be displayed

40. Which among the following is used to navigate through hypermedia structures?
(a) Nodes (b) Keys
(c) None of these (d) Buttons

41. Which among the following notation is usually used to represent an IP address in under stable format?
(a) Binary notation
(b) Hexadecimal notation
(c) Dotted-decimal notation
(d) Octal notation

42. Which of the following statement(s) is/are true about web browsers?
(i) They are application software that is used to search, retrieve and display information available on the World Wide Web.
(ii) They send requests to web servers across the Internet using HTTP.
(a) Both (i) and (ii) (b) Neither (i) nor (ii)
(c) Only (ii) (d) only (i)

43. Which of the following statements is/are true?
(i) Yahoo is a web portal, which is one of the main features of web search portal.
(ii) Google and Bing both are search engines.
(a) Neither (i) nor (ii) (b) Only (i)
(c) Only (ii) (d) Both (i) and (ii)

44. World Wide Web was the first web browser, named _____ to avoid any confusion with the World Wide Web.
(a) Nexus (b) Firefox
(c) Safari (d) Internet Explorer

45. Which of the following refers to communication by electronic means to place power in the hands of citizens to determine what laws need to be made and how these laws should be written?
(a) e-banking (b) e-marketing
(c) e-governance (d) e-mobility

46. How many numbers between 1 and 700 are completely divisible by 17?
(a) 42 (b) 41
(c) 45 (d) 46

47. Find the value of $72 \div 4 \times \{8 \times 4 - (14 - 19)\}$
(a) 666 (b) 444
(c) 222 (d) 1296

48. Find the greatest among these fractions.
5/11, 3/15, 12/11, 4/7, 9/12
(a) 12/11 (b) 3/15
(c) 9/12 (d) 4/7

49. A fraction when added to $\frac{7}{3}$, gives 4. Find the fraction.
(a) $1\frac{2}{3}$ (b) $\frac{11}{2}$ (c) $-\frac{1}{2}$ (d) $\frac{2}{3}$

50. LCM of $2^4 \times 3^4 \times 5^3$ and $2^2 \times 3^6 \times 5^5 \times 7^2$ is
(a) $2^3 \times 3^5 \times 5^4 \times 7$ (b) $2^2 \times 3^2 \times 5^2 \times 7^2$
(c) $2^6 \times 3^{10} \times 5^8 \times 7^2$ (d) $2^4 \times 3^6 \times 5^5 \times 7^2$

51. What is the LCM of $\frac{6}{25}, \frac{4}{45}$ and $\frac{3}{35}$?
(a) $\frac{1}{5}$ (b) $\frac{12}{5}$
(c) $\frac{210}{12}$ (d) $\frac{12}{210}$

52. If $(m + n) : (m - n) = 7 : 3$, then $(m^3 + n^3) : (m^3 - n^3) = ?$
(a) 133 : 117 (b) 117 : 13
(c) 117 : 133 (d) 17 : 133

53. The population of a town increased by 10% and 20% in two successive years, but decreased by 25% in the third year. Find the ratio of the population in the third year to that of 3 year ago.
(a) 100 : 99 (b) 99 : 100
(c) 2 : 1 (d) 1 : 1

54. The perimeter of an isosceles triangle is 32 cm. Its base is $\frac{6}{5}$ times of equal sides. Find the area of triangle.
(a) 39 cm^2 (b) 64 cm^2
(c) 48 cm^2 (d) 57 cm^2

55. X does 25% of a work in 20 days. Y joins up with X and they together do the remaining work in 15 days. So in how many days can Y alone do the same work?
(a) 30 days (b) $25\frac{1}{2}$ days
(c) $26\frac{2}{3}$ days (d) $26\frac{1}{3}$ days

56. Akshita covers a distance of 300 km at the speed of 50km/h, then 360 km at 30 km/h and another 420km at 60km/h. If her average speed for the whole journey is k km/h, then how much time (in hours) will she take to cover 216 km at k km/h?
(a) 5 hours (b) 7 hours
(c) 6 hours (d) 4 hours

57. **The simple interest on a principal amount is Rs. 192 for a period of 2 years at the rate of 8% per annum. The principal amount is :**
(a) ₹ 1,000 (b) ₹ 1,400
(c) ₹ 1,200 (d) ₹ 1,600

58. **Mahathi purchases a cooker at $\frac{9}{10}$th of its marked price and sold it for 8% more than its marked price. Find the gain percentage.**
(a) 20% (b) 14%
(c) 10% (d) 16%

59. **The ratio of the sum of the first three terms of the geometric progression (G.P.) and the sum of the first six terms is 125 : 152. What is the common ratio of G.P.**
(a) $\frac{4}{5}$ (b) $\frac{5}{3}$ (c) $\frac{5}{4}$ (d) $\frac{3}{5}$

60. **Solve the following equation-**
$\frac{\tan A}{1+\sec A}+\frac{1+\sec A}{\tan A}=?$
(a) 2 sec A (b) 2 cos A
(c) 2 sin A (d) 2 cosec A

61. **Find the missing value of p for the following distribution, whose mean is 12.58.**

x:	5	8	10	12	p	20	25
f:	2	5	8	22	7	4	2

(a) 20 (b) 15
(c) 10 (d) 13

62. **The square root of 10816 is:**
(a) 106 (b) 96
(c) 114 (d) 104

63. **The present ages of Maya and Meera are in the ratio of 6 : 5 and after fifteen years the ratio will be 9 : 8. Meera's age is:**
(a) 30 years (b) 35 years
(c) 20 years (d) 25 years

64. **Two pipes 'P' and 'Q' together can fill a tank in 4 hrs. When both the pipes are opened individually then Q takes 6 hours more as compared to P to fill the tank. P alone can fill the tank in how much time?**
(a) 5 hours (b) 6 hours
(c) 8 hours (d) 7 hours

65. **Umesh and Kapil donated ₹750 and ₹975 respectively. The ratio of the amount of donation by Umesh to that by Kapil is:**
(a) 13 : 10 (b) 10 : 13
(c) 3 : 1 (d) 1 : 3

66. **$kgms^{-1}$ is the SI unit of ——**
(a) Momentum (b) Pressure
(c) Force (d) Velocity

67. **Two spheres of masses m and M are situated in air and the gravitational force between them is F. The space between the masses is now filled with a liquid of specific gravity 3. The gravitational force will now be**
(a) F/3 (b) F/9
(c) 3F (d) F

68. **An object of mass 3 kg is at rest. Now a 6 N force is applied on the object for 3 second. Find the velocity of the object acquired by it in m/s.**
(a) 12 (b) 6
(c) 9 (d) 8

69. **Dams are constructed to collect water flowing in high altitude river. The stored water has a lot of**
(a) Both KE and PE
(b) Kinetic energy (KE)
(c) Potential energy (PE)
(d) Neither KE nor PE

70. **The specific heat capacity of water is**
(a) 540 J/kg°C (b) 4186 J/kg°C
(c) 2260 J/kg°C (d) 335 J/kg°C

71. **What is the colour code of a 180k ohm resistor with a 5% tolerance?**
(a) Black, Yellow, Gray, Golden
(b) Black, Yellow, Green, Golden
(c) Brown , Gray, Yellow, Golden
(d) Brown, Green, Yellow, Golden

72. **An electronic circuit wire of conductivity 5.8×10^7 mho/m is subjected to an electric field of 40 mV/m. What will be its current density?**
(a) 2.32×10^6 A/m^2 (b) 1.16×10^6 A/m^2
(c) 4.64×10^6 A/m^2 (d) 4.30×10^6 A/m^2

73. **If 5000 kW power is transmitted at 220 kV in place of 11 kV. Reduction in current will be-**
(a) 90% (b) 95%
(c) 5% (d) 10%

74. **The force acting on electrons causing it to move directionally in an electrical circuit is called:**
(a) electromotive force
(b) gravitational force
(c) fundamental force
(d) electromagnetic force

75. **Energy meters fall into the category of:**
(a) indicating instruments
(b) absolute instruments
(c) integrating instruments
(d) recording instruments

76. **Two vectors have magnitude 15 units and 10 units the magnitude of the resultant vector of these two vectors can never be,**
(a) 3 units (b) 5 units
(c) 8 units (d) 12 units

77. **What is the approximate value of capacitance (in Farad) of earth if (radius = 6,400 km)?**
(a) 0.0000007 (b) 0.000007
(c) 0.00007 (d) 0.0007

78. **The direction of motion of a conductor in a magnetic field is given by**
(a) Fleming's left hand rule
(b) Maxwell's right hand rule
(c) Ampere's rule
(d) Kirchhoff's law

79. **Permeability is analogous to**
(a) Resistivity (b) Retentivity
(c) Conductivity (d) Coercivity

80. **5×10^{16} electrons pass across the section of a conductor in 1 minute 20 sec. The current flowing is :**
(a) 1 mA (b) 0.1 mA
(c) 0.01 mA (d) 10 mA

81. **In which of the following material's resistance is independent of change in temperature?**
(a) Brass
(b) Platinum
(c) Tungsten
(d) Alloys of Constantan and Manganin

82. **In the energy band diagram of a p-type semiconductor :**
(a) The acceptor band is near the conduction band.
(b) The acceptor band is near the valence band.
(c) The donor band is near the conduction band.
(d) The donor band is near the valence band.

83. **Negative resistance characteristics is exhibited by a :**
(a) Zener diode (b) Schottky diode
(c) Photo diode (d) Tunnel diode

84. **In a BJT transistor to maintain a fixed operating point, the bias stabilization/ compensation is achieved by using–**
(a) Diode Compensation
(b) Resistor Compensation
(c) Thermistor Compensation
(d) Both diode and Thermistor compensation

85. **The principle of operation of a VMOS device is similar to that of …….**
(a) Insulated gate bipolar transistor
(b) Enhancement MOSFET
(c) Depletion MOSFET
(d) Junction FET

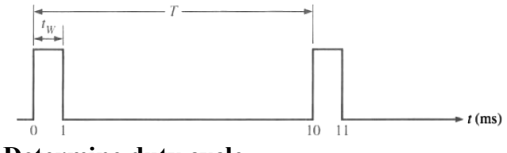
86. **Which of the following in clamper circuit don't have a required component?**
(a) Diode (b) Resistor
(c) Capacitor (d) D.C. supply

87. **In a common base connection $I_E = 2mA$, $I_C = 1.9\,mA$. The value of base current is**
(a) 0.25 A (b) 3.80 mA
(c) 0.10 mA (d) 0 mA

88. **Highest operating frequency can be expected in the case of:**
(a) Bipolar transistor
(b) JFET
(c) MOSFET
(d) All the other given options have nearly same frequency

89. **Which is known as Regenerative feedback?**
(a) Negative feedback
(b) Positive feedback
(c) Direct feedback
(d) Recycling feedback

90.



Determine duty cycle.
(a) 15% (b) 5%
(c) 10% (d) 1%

91. **Which of the following is NOT a feature of LM723 Voltage Regulator IC?**
(a) It is a 16-pin line package IC
(b) It's Regulated Output ranges from 3V to 37V
(c) It's Output current is 150 mA without exterior pass transistor
(d) It includes Current Regulator

92. **What is the definition of accuracy?**
(a) A measure of how often an experimental value can be repeated
(b) The closeness of significant figures used in a measurement
(c) The number of significant figures used in a measurement
(d) None of these

93. **The most efficient form of damping employed in electric instruments is:**
(a) Air friction damping
(b) Fluid friction damping
(c) Eddy current damping
(d) None of the above

94. **A voltmeter having a resistance of 1000 kilo ohms is used to measure voltage in an electrical circuit. In order to increase its range three times resistance to be added in series will be _____.**
(a) 5000 kilo ohms (b) 2000 kilo ohms
(c) 3000 kilo ohms (d) 1000 kilo ohms

95. **The scale of a meggar is calibrated between:**
(a) Zero to 100 (b) Zero to 10,000
(c) Zero to 1,00,000 (d) Zero to infinity

96. **Which of the following are the features of a capacitive transducer?**
I. Highly sensitive to measure small displacements
II. Can be used to measure force and pressure
III. Can be used to measure humidity
IV. Can be used as strain gauge
(a) I and II only (b) I, II and III only
(c) I, II and IV only (d) II, III and IV only

97. **Find the excess - 3 code for decimal 12:**
(a) 01010100 (b) 0010010
(c) 01000110 (d) 01000101

98. **Boolean Expression A+1 =1, and A. 0 = 0**
Which type of Boolean Algebra Law or Rule represents the above expression?
(a) Identity (b) Idempotent
(c) Annulment (d) Double Negation

99. **A full adder can be made of**
(a) Two half adders
(b) Two half adders and a NOR gate
(c) Two half adders and a OR gate
(d) Two half adders and a AND gate

100. **Among the following logic families, the one having the lowest power dissipation and highest noise margin is**
(a) Schottky TTL (b) TTL
(c) ECL (d) CMOS

SOLUTION : PRACTICE SET- 3

ANSWER KEY

1. (d)	11. (a)	21. (d)	31. (a)	41. (c)	51. (b)	61. (b)	71. (c)	81. (d)	91. (a)
2. (d)	12. (a)	22. (a)	32. (d)	42. (a)	52. (a)	62. (d)	72. (a)	82. (b)	92. (b)
3. (b)	13. (d)	23. (c)	33. (a)	43. (d)	53. (b)	63. (d)	73. (b)	83. (d)	93. (c)
4. (d)	14. (c)	24. (a)	34. (a)	44. (a)	54. (c)	64. (b)	74. (a)	84. (d)	94. (b)
5. (b)	15. (a)	25. (a)	35. (d)	45. (c)	55. (c)	65. (b)	75. (c)	85. (b)	95. (d)
6. (d)	16. (a)	26. (b)	36. (d)	46. (b)	56. (a)	66. (a)	76. (a)	86. (d)	96. (b)
7. (d)	17. (c)	27. (b)	37. (c)	47. (a)	57. (c)	67. (d)	77. (d)	87. (c)	97. (d)
8. (b)	18. (d)	28. (a)	38. (c)	48. (a)	58. (a)	68. (b)	78. (a)	88. (a)	98. (c)
9. (d)	19. (c)	29. (c)	39. (c)	49. (a)	59. (d)	69. (c)	79. (c)	89. (b)	99. (c)
10. (b)	20. (c)	30. (c)	40.(a)	50. (d)	60. (d)	70. (b)	80. (b)	90. (c)	100. (d)

SOLUTION

1. (d)

ISRO's Gaganyaan mission is India's maiden manned space mission. Gaganyaan is an Indian crewed orbital spacecraft intended to be the formative spacecraft of the Indian Human Spaceflight Programme. The first crewed mission was originally planned to be launched by ISRO's GSLV Mk III in December 2021, but it has now been pushed back to no earlier than 2023.

2. (d)

Rohit Sharma is the only player to have scored three One-day International(ODI) matches double centuries including 209, 264 and 208. Sachin Tendulkar was the first male cricketer who scored the first double century (200) in the ODI against South Africa in 2010.

3. (b)

Raut Nacha is a ceremonial dance performed mainly by the tribal community of Chhattisgarh. It is performed during the "dev udhni ekadashi", after the Diwali festival.

Famous folk dance of Chhattisgarh are Saila, Sua Nacha, Karma, Panthi, Gendi etc.

4. (d)

Mahadevi Verma is widely regarded as the "Modern Meera". She is considered one of the four major pillars of Chhayawadi era in Hindi literature. Her creations are as:- Nihar, Rashmi, Neerja, Sandhyageet & Path ke Sathi etc.

5. (b)

The mains characteristics of the Reserve Bank of India are as follows : It issues the currency of the country, controls money supply of the country through various methods, and acts as a banker of the government.

6. (d)

The quorum required to constitute a meeting of the Lok Sabha is the 1/10th of the total members of the house. According to Article 100 (3), quorum of Lok Sabha or Rajya Sabha is 1/10 of the total number of members. The same number is also necessary for the recognition of the main opposition party.

7. (d)

The troposphere is the lowermost layer of the atmosphere. Its average height is 13 km and extends roughly to a height of 8 km near the poles and about 18 km at the equator. The Thickness of the troposphere is greatest at the equator because heat is transported to great heights by strong convectional currents.

8. (b)

Loktak is the largest freshwater lake of Northeast India located in Manipur. It is known for its floating circular swamps, which are called phumdis. Located on this phumdi Keibul Lamjao National Park is the only floating national Park in the world.

9. (d)

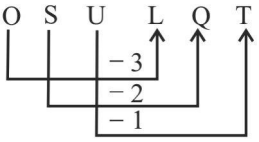
Jahanara (Shah Jahan's daughter) participated in many architectural projects of the new capital established at Shahjahanabad, Delhi. Jahanara, Roshan Ara, were sisters. Roshanara supported Aurangzeb in the war of succession. Gulbadan Begum was the daughter of Babur who wrote 'Humayunnama'.

10. (b)

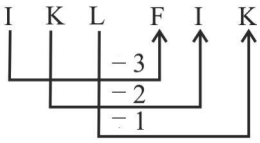
The Rowlatt Act said that any Indian could be detained without trial. This was preventive detention, meaning that the government would hold any citizen in jail without any crime having been committed. Essentially, it means that if someone inside the government suspects that a citizen might commit a crime later, that citizen can be put in jail. Indians were outraged by such a law and one Lahore newspaper described the Rowlatt Act with the headline: 'No dalil, No vakil, No appeal'.

11. (a)

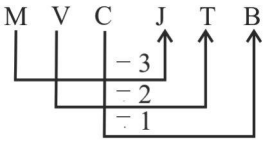
Just as,



and,



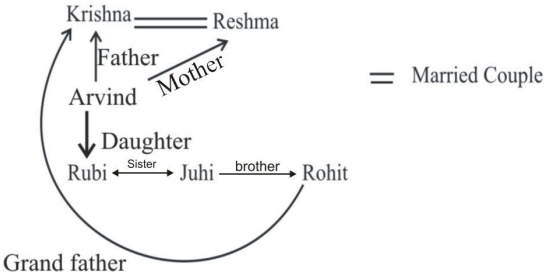
Same as,



Hence, ? = MVC

12. (a)

On drawing blood relation diagram according to the question,



Hence, Krishna is Grandfather (Father's father) of Rohit.

13. (d)

Given,

$< \Rightarrow -$

$> \Rightarrow +$

$\$ \Rightarrow \div$

On changing the symbol,

$37 > 165 \$ 3 < 5$

$= 37 + 165 \div 3 - 5$

$= 37 + 55 - 5$

$= 92 - 5$

$= 87$

14. (c)

Statement: The prices of essential commodities have increased due to strike by transporters. Hence, the statement concludes that the government should negotiate with the strike workers to stop the strike. Hence, it is clear that only conclusion 2 is true.

15. (a)

Since, India has declared a zero-tolerance policy thus, off course in a given course of time India will emerges as a terror free country provided that all our security intelligence are working with might and main. Hence, both assumptions 1 and 2 are implicit.

16. (a)

Statement:

I. K > A

II. A > M

Thus, M < A < K

Hence, both statements 1 and 2 are not sufficient to answer the question.

17. (c)

Total number of student = 72

$$\frac{72}{3} = 24 \text{ (Group)}$$

Thus, in the 24 group which is of 3-3 student must have spoken Hindi because, the total number of Hindi speakers is 25.

18. (d)

Just as, Mason builds home. Similarly, Mechanic repairs mechanical equipments.

19. (c)

Given, A = 1, M = 13 and R = 18 then,

M	I	S	S	I	O	N
↓	↓	↓	↓	↓	↓	↓
13	9	19	19	9	15	14

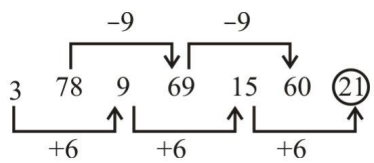
20. (c)

Param Vir Chakra is the honour given for the extraordinary valor and sacrifice of the soldiers. It was also given to the soldiers posthumously.

While, the Padma Vibhushan, Padma Bhushan and Padma Shri awards are given for exceptional and outstanding work in any field.

21. (d)

The given number series is as follows.

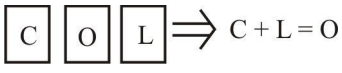


Hence, ? = 21

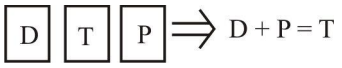
22. (a)

In the given pattern,

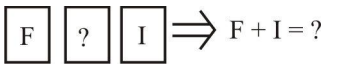
Just as,



And,



Same as,

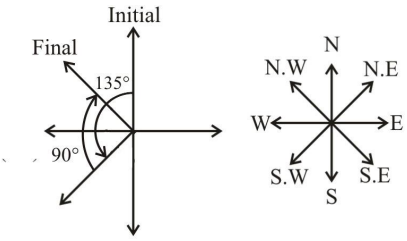


So, ? = F + I = O

Note: The given letters are added with their place value in English alphabet.

23. (c)

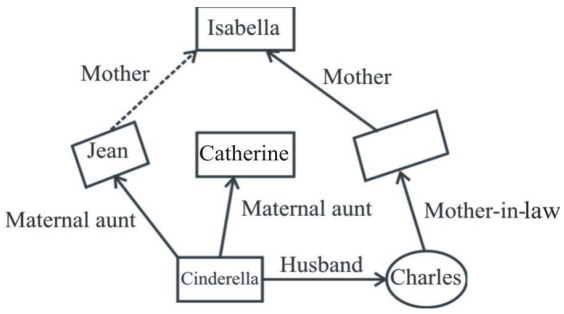
According to the question,



Hence, it is clear from above that Anita is facing in North-west direction.

24. (a)

According to the question blood relation diagram is follows as:



Hence, it is clear from above diagram that Isabella is mother of Jean.

25. (a)

Given,

G = +

H = ×

J = –

K = ÷

125 J 110 K 5 G 7 H 2 = ?

On changing letters by mathematical symbol,

125 – 110 ÷ 5 + 7 × 2 = ?

= 125 – 22 + 14

= 117

26. (b)

Electronic Numerical Integrator and Computer (ENIAC) was the first binary programmable computer based on Von Neumann's architecture. ENIAC was designed by John Mauchly and J. Presper Eckert. ENIAC was completed in 1945 and first put to work for practical purpose on December 10, 1945.

27. (b)

The default layout of most keyboards is QWERTY. It was first designed by shells and Glidden typewriter in 1868.

28. (a)

AZERTY is a keyboard layout. It is very similar to the QWERTY keyboard layout. It is mainly used in France and Belgium. In AZERTY, both the M and L keys are present in the same row and the L key is present to the left of the M key.

29. (c)

Input devices like keyboard, Mouse, Touchpad etc. are used to give instructions to the computer.

30. (c)

Random Access Memory (RAM) is an example of volatile memory because all its data is lost when the power supply is off.

Another example of volatile memory is cache memory.

31. (a)

RAM is a component of primary memory. Primary memory is a volatile memory and is the main memory of the computer and is also called temporary memory. The data and instruction processed by the CPU is used to store.

32. (d)

The full form of DRAM is Dynamic Random Access Memory. It needs to be refreshed constantly to maintain the data, otherwise it will lose the data. DRAM is slower than SRAM. SRAM does not need to be refreshed frequently DRAM is cheaper than SRAM.

33. (a)

The OSI Stands for Open System Interconnection Model. It is a conceptual model from the International Organization for standardization (ISO) that provides a common basis for the coordination of standards development for the purpose of systems Interconnection.

34. (a)

A connection-oriented protocols is a communication protocol that established a reliable/ dedicated connection between two devices before transmitting data.

35. (d)

Closed Circuit Television (CCTV), Radio Frequency Identification and Wireless Local Area Network (WLAN) are all communication technologies. **CCTV-** It is known as video surveillance. It transmits the signal to a specific location using a video camera.

RFID– It uses electromagnetic fields to automatically identify and track the tag attached to the object. It consists of a small radio transponder, radio, receiver and transmitter.

WLAN– WLAN is a type of wireless local network that connects two or more devices together.

36. (d)

The correct sequence to turn off automatic bullets and numbering is as follows:

2,1, 4,3.

37. (c)

To take a screenshot in MS Word 2010 follow the step -

1. Click the insert tab at the top of the window.
2. Click the screenshot drop-down menu, then choose the open window from which you want to pull the screenshot.

38. (c)
Draw table option is used to create a table by creating cell, row and column manually, whereas create table, quick table and insert table create table by get command.

39. (c)
If we use a font which is not supported by the browser, then the original text will be displayed in the default font.

40.(a)
Nodes are used to navigate or transfer data from one place to another, through hypermedia structures.

41. (c)
Dotted-decimal notation is usually used to represent an IP address in an under stable format. IP4 address is written most of the times in dotted-decimal notation.

42. (a)
A web browser is application software that is used to search, retrieve and display information available on the World Wide Web and to send requests to web servers across the Internet using HTTP. Microsoft Edge, Internet Explorer, Mozila Firefox, Opera, Safari etc. are examples of web browser

43. (d)
Yahoo is a web service provider. It provides a web portal. Google and Bing both are search engines.

44. (a)
The World Wide Web was the first web browser, which was later named Nexus to avoid any confusion with World Wide Web. It was invented by 'Tim Berners-Lee' in 1990.

45. (c)
Electronic governance refers to the functioning of government with the application of Information and Communication Technology (ICT). There are 4 types of participation in e-governance.
(1) G2C (Government to citizen)
(2) G2B (Government to Business)
(3) G2G (Government to Government)
(4) G2E (Government to Employee)

46. (b)
Numbers between 1 and 700 which are exactly divisible by 17.
17, 34 .....697.
$l = a + (n-1) \times d$
$697 = 17 + (n-1) \times 17$
$680 = (n-1) \times 17$
$40 = n - 1$
$n = 41$
Hence, required number (n) = 41

47. (a)
$72 \div 4 \times \{8 \times 4 - (14 - 19)\}$
$= 72 \div 4\{8 \times 4 - (-5)\}$
$= 72 \div 4\{8 \times 4 + 5\}$
$= 72 \div 4\{32 + 5\}$
$= 72 \div 4 \times 37$
$= 18 \times 37$
$= 666$

48. (a)
$\frac{5}{11} = 0.45,\ \frac{3}{15} = 0.2,\ \frac{12}{11} = 1.09,\ \frac{4}{7} = 0.57,\ \frac{9}{12} = 0.75$
Hence, the required largest fraction will be $= \frac{12}{11}$

49. (a)
Let the required fraction be x.
According to the question,
$\Rightarrow \frac{x}{1} + \frac{7}{3} = 4$
$\Rightarrow \frac{3x+7}{3} = 4$
$\Rightarrow 3x + 7 = 4 \times 3$
$\Rightarrow 3x + 7 = 12 \Rightarrow 3x = 12 - 7 \Rightarrow 3x = 5$
$\Rightarrow x = \frac{5}{3} = \left(1\frac{2}{3}\right)$
Hence, the required fraction is $1\frac{2}{3}$.

50. (d)
Given,
$2^4 \times 3^4 \times 5^3 = 2^2 \times 2^2 \times 3^2 \times 3^2 \times 5^3$
$2^2 \times 3^6 \times 5^5 \times 7^2 = 2^2 \times 3^2 \times 3^2 \times 3^2 \times 5^5 \times 7^2$
LCM $= 2^4 \times 3^6 \times 5^5 \times 7^2$

51. (b)
Given fractions $= \frac{6}{25}, \frac{4}{45}, \frac{3}{35}$
L.C.M. of fractions $= \frac{\text{L.C.M. of Numerator}}{\text{H.C.F. of Denominator}}$
L.C.M. of Numerator $\Rightarrow$
$6 = 2 \times 3$
$4 = 2 \times 2$
$3 = 1 \times 3$
L.C.M. $= 2 \times 2 \times 3 = 12$
H.C.F. of Denominator $\Rightarrow$
$25 = 5 \times 5$
$45 = 5 \times 3 \times 3$
$35 = 5 \times 7$
HCF $= 5$
Hence, L.C.M. of given fraction $= \frac{12}{5}$

52. (a)

Given,

$$\frac{m+n}{m-n}=\frac{7}{3}$$

On putting,

$m + n = 7$ and $m - n = 3$

$m = 5$ and $n = 2$

then, $\frac{m^3+n^3}{m^3-n^3}=\frac{(5)^3+(2)^3}{(5)^3-(2)^3}$

$$=\frac{125+8}{125-8}$$

$$\frac{m^3+n^3}{m^3-n^3}=\frac{133}{117}$$

Hence, $(m^3 + n^3) : (m^3 - n^3) = 133 : 117$

53. (b)

Let the population of the town is x.

Population after three years,

$$x\times\frac{(100+10)}{100}\times\frac{(100+20)}{100}\times\frac{(100-25)}{100}$$

$$x\times\frac{110}{100}\times\frac{120}{100}\times\frac{75}{100}=\frac{99x}{100}$$

$$\frac{\text{Population in third year}}{\text{Population before three years}}=\frac{\frac{99x}{100}}{x}$$

$$=\frac{99x}{100}\times\frac{1}{x}=\frac{99}{100}=99:100$$

54. (c)

Let the side of isosceles triangle is x.

According to the question-

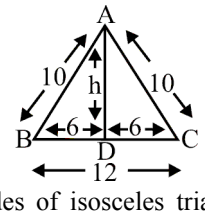
$$x+x+\frac{6x}{5}=32$$

$$\Rightarrow \quad 2x+\frac{6x}{5}=32$$

$$\Rightarrow \quad 10x + 6x = 32 \times 5$$

$$\Rightarrow \quad x=\frac{32\times5}{16}$$

$x = 10$



Sides of isosceles triangles are 10, 10 and 12 cm respectively.

$AD^2 = AB^2 - BD^2$

$= 10^2 - 6^2$

$AD = \sqrt{64} = 8$ cm.

Hence, height = 8 cm.

Area of isosceles triangle $=\frac{1}{2}\times$ base $\times$ height

$$=\frac{1}{2}\times12\times8=6\times8=48\ \text{cm}^2$$

55. (c)

X can complete 25% of a work $=\frac{1}{4}$ part in 20 days

$\therefore$ X will complete whole work = 80 days

$$\text{Remaining work}=1-\frac{1}{4}=\frac{3}{4}\text{ part}$$

Both complete $\frac{3}{4}$ part of work together in 15 days

$\therefore$ Both will complete whole work together

$$=15\times\frac{4}{3}=20\text{ days}$$

$\therefore$ One day work of Y $=\frac{1}{20}-\frac{1}{80}=\frac{4-1}{80}=\frac{3}{80}$ part

Y will complete the work $=\frac{80}{3}=26\frac{2}{3}$ days

56. (a)

Let time taken by Akshita covered distance is t_1, t_2 and t_3.

$$t_1=\frac{300}{50}=6\text{ h}$$

$$t_2=\frac{360}{30}=12\text{ h}$$

$$t_3=\frac{420}{60}=7\text{ h}$$

$$\text{Average speed}=\frac{\text{Total distance}}{\text{Total Time}}$$

$$k=\frac{300+360+420}{6+12+7}$$

$$k=\frac{1080}{25}$$

$k = 43.2$ km/h

According to the question,

$$=\frac{216}{43.2}$$

= 5 Hours.

57. (c)

Let the principal amount be ₹ P

Given,

R = 8%

T = 2 years

SI = ₹ 192

$\because \quad SI=\frac{P\times R\times T}{100}$

$\Rightarrow \quad 192 = \frac{P \times 8 \times 2}{100}$

$\Rightarrow \quad P = \frac{192 \times 100}{16}$

$P = ₹\ 1200$

58. (a)

Let the marked price of cooker $= ₹x$

Then cost price $= x \times \frac{9}{10} = \frac{9x}{10}$

And selling price $= x \times \frac{108}{100}$

$= ₹\frac{27x}{25}$

$\text{Profit percentage} = \frac{\text{S.P} - \text{C.P}}{\text{C.P}} \times 100$

$= \frac{\frac{27x}{25} - \frac{9x}{10}}{\frac{9x}{10}} \times 100$

$= \frac{270x - 225x}{\frac{250}{\frac{9x}{10}}} \times 100$

$= \frac{45x \times 10}{250 \times 9x} \times 100$

Profit percentage $= \frac{5}{25} \times 100$

$= 20\%$

59. (d)

$\frac{\text{Sum of the six terms of geometric progression}}{\text{Sum of the three terms of geometric progression}} = \frac{152}{125}$

$\frac{\frac{a(r^6 - 1)}{r - 1}}{\frac{a(r^3 - 1)}{r - 1}} = \frac{152}{125}$

$\frac{r^6 - 1}{r^3 - 1} = \frac{152}{125}$

$\frac{(r^3 - 1)(r^3 + 1)}{(r^3 - 1)} = \frac{152}{162}$

$1 + r^3 = \frac{152}{125}$

$r^3 = \frac{152}{125} - 1, \qquad r^3 = \frac{152 - 125}{125}$

$r^3 = \frac{27}{125}, \qquad r = \frac{3}{5}$

60. (d)

From question,

$\frac{\tan A}{1 + \sec A} + \frac{1 + \sec A}{\tan A} = ?$

$= \frac{\sin A / \cos A}{1 + \frac{1}{\cos A}} + \frac{1 + \frac{1}{\cos A}}{\sin A / \cos A}$

$= \frac{\sin A}{1 + \cos A} + \frac{\cos A + 1}{\sin A}$

$= \frac{\sin^2 A + 1 + \cos^2 A + 2\cos A}{\sin A(1 + \cos A)} \quad [\because \sin^2 A + \cos^2 A = 1]$

$= \frac{2(1 + \cos A)}{\sin A(1 + \cos A)} = \frac{2}{\sin A}$

$= 2 \text{ cosec } A$

61. (b)

$\sum fx = 5 \times 2 + 8 \times 5 + 10 \times 8 + 12 \times 22 + 7 \times p + 20 \times 4 + 25 \times 2$

$= 10 + 40 + 80 + 264 + 7p + 80 + 50$

$= 524 + 7p$

$\Sigma f = 2 + 5 + 8 + 22 + 7 + 4 + 2$

$= 50$

$\because \quad \text{Mean} = \frac{\Sigma f.x}{\Sigma f}$

$12.58 = \frac{524 + 7p}{50}$

$7p = 629 - 524$

$7p = 105$

$p = 15$

62. (d)

The square root of 10816

	104
1	10816
+1	1
20	08
+0	00
204	816
4	816
	×××

Hence, the required square root is 104.

63. (d)

Let present age of Maya = 6x years

And present age of Meera = 5x years

According to the question,

$\frac{6x + 15}{5x + 15} = \frac{9}{8}$

$48x + 120 = 45x + 135$

$3x = 15$

$x = 5$

So, the present age of Meera = 5 × 5 = 25 years

64. (b)

Suppose pipe P takes x hours to fill the cistern

then Q will take time to fill cistern = x + 6 hrs

filled part by (P + Q) in 1 hour = $\frac{1}{4}$

filled part by P in 1 hour = $\frac{1}{x}$

filled part by Q in 1 hour = $\frac{1}{x+6}$

According to the question,

$$\frac{1}{x}+\frac{1}{x+6}=\frac{1}{4}$$

$$\frac{(x+6)+(x)}{x(x+6)}=\frac{1}{4}$$

$(2x + 6) \times 4 = x^2 + 6x$

$8x + 24 = x^2 + 6x$

$x^2 - 2x - 24 = 0$

$x^2 - (6-4)\, x - 24 = 0$

$(x^2 - 6x) + (4x - 24) = 0$

$x(x - 6) + 4\,(x - 6) = 0$

$(x + 4)\,(x - 6) = 0$

$x - 6 = 0,\ x = 6$

Hence P can fill the tank in 6 hours

65. (b)

Given:

Amount donated by Umesh = ₹750

Amount donated by Kapil = ₹975

Ratio of the amount donated by Umesh and Kapil

$$= \frac{750}{975}=\frac{30}{39}=\frac{10}{13}$$

$= 10 : 13$

66. (a)

Momentum - It is the product of the mass and velocity of an object whose change with respect to time gives force.

$P = m \times v$

Where P = momentum

m = mass of object

v = velocity

- The S.I. unit of momentum is kg-m/sec. and dimension is $[MLT^{-1}]$.

67. (d)

Gravitational force is given by

$$F = \frac{GMM}{R^2}$$

Clearly the Gravitational force is dependent only on mass of objects and distances between them. It does not depend on any medium between them. Hence, the force will remain same i.e. F.

68. (b)

Given,

An object of mass (m) = 3 kg

Force (F) = 6 N

time (t) = 3 second

v =?

From Newton's second law.

$$F = m\left(\frac{v-u}{t}\right)$$

$$\Rightarrow 6 = 3\left(\frac{v-0}{3}\right) \Rightarrow \boxed{v = 6\,m/s}$$

69. (c)

The energy possessed by a body (or water) by virtue of its position or height is called as potential energy .

- The water stored in dam posses potential energy.
- Kinetic energy is possessed by flowing water.

70. (b)

Specific heat capacity of water = 4186 J/kg°C

71. (c)

Colour	Digit	Multiplier	Tolerance
Black	0	$10^0 = 1$	
Brown	1	$10^1 = 10$	± 1%
Red	2	10^2	± 2%
Orange	3	10^3	
Yellow	4	10^4	
Green	5	10^5	
Blue	6	10^6	
Violet	7	10^7	
Grey	8	10^8	
White	9	10^9	
Gold	–	$10^{-1} = 0.1$	± 5%
Silver	–	$10^{-2} = 0.01$	± 10%

$ab \times 10^{C} \pm$ tolerance

Colour code of 180 k□□

$18 \times 10^4 \pm 5\%$

Brown, gray, yellow, golden

72. (a)

Given that -

Conductivity $(\sigma) = 5.8 \times 10^7$ mho/m

Electric field (E) = 40 m V/m

$\therefore$ Electric current density $(J_C) = \sigma E$ A/m^2

$= 5.8 \times 10^7 \times 40 \times 10^{-3}$

$= 232 \times 10^4$

$= 2.32 \times 10^6$ A/m^2

73. (b)

Given that- P = 5000 kW, V_1 = 11kV

V_2 = 220 kV

We know that -

$$P = VI$$

So, $$I_1 = \frac{P}{V_1}$$

$$= \frac{5000}{11} = 454.54\ A$$

So, $I_2 = \frac{P}{V_2} = \frac{5000}{220} = 22.72\ A$

Reduction in current−

$$= \frac{I_1 - I_2}{I_1} \times 100$$

$$= \frac{454.54 - 22.72}{454.54} \times 100$$

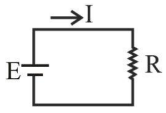
$$= \frac{431.81}{454.54} \times 100$$

Percentage reduction in current = 95%

74. (a)

Electromotive Force (EMF)- When a battery is connected to a circuit, electrons move from anode to cathode through the circuit. The force due to which electrons move from one place to another place is called electromotive force. The voltage of the battery is equal to the electromagnetic force.

The force is responsible for the flow charge through the circuit which is known as electric current.



$$E = \frac{\Delta W}{\Delta Q} = \frac{J}{C} = V$$

The unit of electromotive force = J/C or volt.

75. (c)

Energy meter is an integrating type instrument.

Integrating type instrument – These instruments give the integration of the inputs applied over a particular period of time.

Example- Watt hour meter, Energy meter

76. (a)

Maximum resultant of two vector = A+B

= 15+10

= 25

Minimum resultant of two vector = A - B

= 15 - 10 = 5

Hence, resultant vector must be in between 5 and 25, so 3 units can not be resultant of two vector.

77. (d)

Given,

R = 6400 km = 6.4 × 10^6m

Capacitance (C) = $4\pi\varepsilon_0 R = \frac{1}{9\times10^9} \times 6.4\times10^6$

$$C = \frac{6.4\times10^6}{9\times10^9} = 0.711\times10^{-3}\ F$$

$$\boxed{C = 0.000711\ F}$$

78. (a)

The direction of motion of a conductor in a magnetic field is given by Fleming's left hand rule. According to this rule when a current-carrying conductor is placed in an external magnetic field, the conductor experiences a force perpendicular to both the field and the direction of current flow.

79. (c)

Permeability is analogous to conductivity.

$$\text{Permeability} \propto \frac{1}{\text{reluctivity}},\ \text{conductivity} \propto \frac{1}{\text{Resistivity}}$$

80. (b)

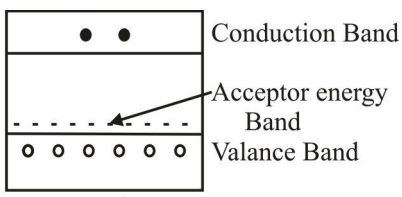
Q = it and Q = ne where e = 1.6×10^{-19} C

$$i = \frac{ne}{t} \Rightarrow \frac{5\times10^{16}\times1.6\times10^{-19}}{80} = 0.1mA$$

81. (d)

Alloy of Constantan and Manganin resistance is independent of change in temperature. Constantan is also known as Eureka. It is alloy of copper and nickel. Manganin is made of a mixture of copper manganese and nickel. Temperature has no effect on these alloy.

82. (b)

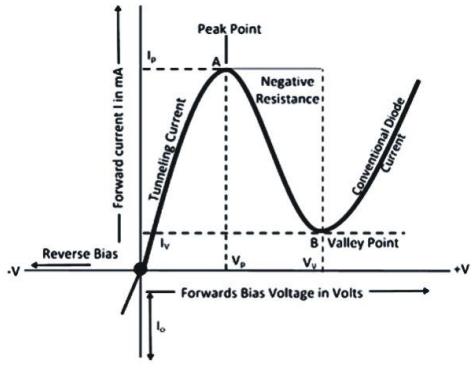


P-Type semiconductor

In P-type semiconductor acceptor energy band is near the valance band.

83. (d)

Tunnel diode has negative resistance characteristics. This diode is made by germanium or gallium arsenide. Doping is high in both its P and N region due to which the depletion region becomes very narrow. If the depletion region is too narrow then the charge carriers tunnel through the barrier.



84. (d)

In a BJT transistor to maintain a fixed operating point the bias stabilization/compensation is achieved by using both diode and thermistor compensation. The purpose of the biasing is to switch on the BJT to work in the active region such that the DC collector current remains constant.

Independents of-

- β
- Temperature
- Load variation.

Diode compensation-

- Diode compensation for instability due to V_{BE} variation
- Diode compensation for instability due to I_{CO} Variation.

Thermistor compensation-

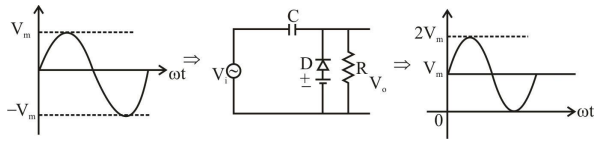
- A thermistor is a temperature-sensitive device.
- It is a negative temperature coefficient.

85. (b)

A Vertical Metal Oxide Semiconductor (VMOS) is a type of metal oxide semiconductor transistor its principle of operation is similar to that of the enhancement MOSFET.

86. (d)

Diode, capacitor and resistor are necessary for clamper circuit. Clamper is called a restorer since it adds DC voltage to wave, inserts DC. also. a positive clamper adds a positive D.C voltage, shifting the wave up, and vice versa for the negative clamper



87. (c)

Given that,

I_E= 2mA , I_C=1.9 mA

I_B=?

$\therefore I_B=I_E-I_C$

$I_B=(2-1.9)$ mA

$I_B=0.10$mA

88. (a)

Highest operating frequency can be expected in the case of bipolar transistor. BJT is current controlled device. It has low input impedance and high output Impedance.

89. (b)

- Positive feedback is known as regenerative feedback.
- Negative feedback is known as degenerative feedback.

Gain of positive feedback,

$$A_f = \frac{A}{1-A\beta}$$

Positive feedback increases gain. Due to which the distortion increases.

90. (c)

From wave form,

T_{on} = 1 ms

T = 10 ms

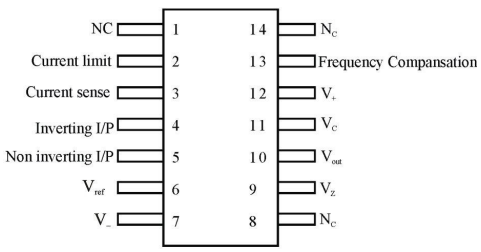
$[T = T_{ON} + T_{OFF}]$

$$\therefore \text{ Duty cycle} = \frac{T_{ON}}{T} = \frac{1}{10}$$

$$\% \text{ Duty cycle} = \frac{1}{10} \times 100 = 10\%$$

91. (a)

LM 723 Voltage Regulator IC is 14 pin dual in line package IC.

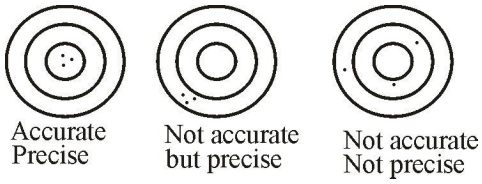


- LM723 voltage regulatior is generally used for series voltage regulator applications.
- It can be used as both positive and negative voltage regulator.

92. (b)

The closeness of significant figures used in a measurement is called accuracy.

Example -



93. (c)

Eddy current damping is a most efficient form of damping employed in electric instruments.

(i) Air friction damping - Moving iron, electrodynomometer type instruments.

(ii) Fluid friction damping - Electrostatic voltmeter uses fluid friction damping.

(iii) Eddy current damping - Used in PMMC instruments.

Controlling torque - The controlling torque is provided by spring or gravity control.

- Gravity controlling torque is used in vertically mounted instruments only.

$$\boxed{T_C \propto \sin\theta}$$

- Hair spring is used to provides the controlling torque in both horizontal and vertical position.

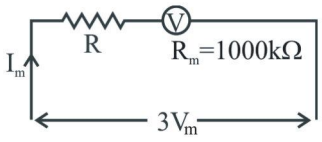
$$\boxed{T_C \propto \theta}$$

94. (b)

Given,

Meter resistance, $R_m = 1000\ k\Omega$

And in order to increase its range three times a resistance to be added in series.



To be measured $3V_m$,

$V_m = I_m . R_m$ ..... (i)

$I_m (R+R_m) = 3V_m$

$I_mR + I_mR_m = 3V_m$

$I_mR = 3V_m - I_m R_m$ $(V_m = I_m . R_m)$

$I_m R = 2I_m R_m$

$R = 2 \times 1000$

$R = 2000\ k\Omega$

95. (d)

Megger works on the principle of electromagnetic induction. The scale of a megger is calibrated between zero to infinity. It can be used to measure high value of resistance. e.g.

(i) Insulation resistance of cable.

(ii) Resistance in motor winding.

(iii) Resistance of Transformer winding.

96. (b)

Features of a capacitive transducer - Highly sensitive to measure small displacements.

- Can be used to measure force and pressure.
- Can be used to measure humidity.
- Capacitive transducer used for dynamic measurement.

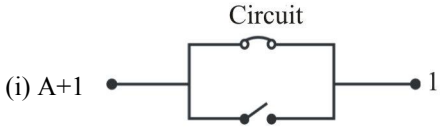
97. (d)

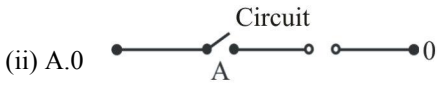
Excess - 3 code is obtained by adding 3 to each bit of any decimal number.

Decimal Number	1	2
Adding	+3	+3
Excess - 3 code	4	5
	↓	↓
	0100	0101
Excess - 3 code	01000101	

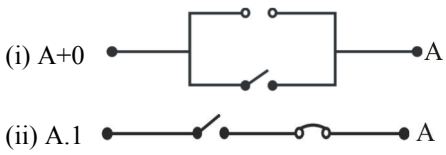
98. (c)

Annulment :

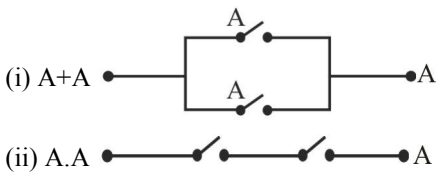




Identity ⇒



Idempotent ⇒

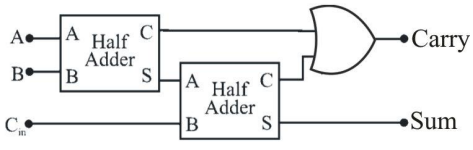


Double Negative

NOT $\overline{A} = A$

99. (c)

A full adder can be made from two half adders and an OR gate. A & B connected to the input of the first half adder and the output before the input of the second adder. Sum and carry C are the two carry output of an OR Gate.



100. (d)

CMOS has the least power dissipation and largest Noise margin among the following logic families, in CMOS margin logic p-type and n-type MOSFETs are fabricated on the same chip. Although CMOS is low compared to other logic families, its main advantage is almost zero power consumption no matter whether the output is High or Low.

PRACTICE SET - 4

1. What is the Electric Power Generation Capability of Chandrayaan-2's Rover-Pragyan?
(a) 50 W (b) 25 W
(c) 75 W (d) 100 W

2. The Chinaman style of bowling in Cricket has been named after:
(a) An Indian bowler of Chinese origin
(b) An Australian bowler of Chinese origin
(c) An English bowler of Chinese origin
(d) West Indies bowler of Chinese origin

3. The Sikkimese are known for their amazing mask dance. What is this dance form called in Sikkim?
(a) Purulia Chhau (b) Mukha Bhaona
(c) Cham (d) Padayani

4. The first woman to swim the English Channel was:
(a) An Indian (b) A French
(c) A British (d) An American

5. In which year was the nationalization of banks
(a) 1969 (b) 1967
(c) 1968 (d) 1970

6. How many ministers can be included in the Union Council of Ministers?
(a) 15% of the total members of Lok Sabha
(b) 50% of the total members of Lok Sabha
(c) 10% to 15% of the total members of Lok Sabha
(d) As desired by the Prime Minister of India

7. Which of the following options has the correct types of planetary winds?
(a) Local Winds and Periodic Winds
(b) Trade Winds and Periodic Winds
(c) Trade Winds, Westerlies and Polar Easterlies
(d) Polar Winds and Westerlies

8. Umiam lake is also known as Barapani lake which is located in state ?
(a) Rajasthan
(b) Uttarakhand
(c) Meghalaya
(d) Madhya Pradesh

9. _____became an independent kingdom under the rule of Chinkilich khan, also known as Nizam-ul-mulk.
(a) Mysore (b) Hyderabad
(c) Awadh (d) Bengal

10. Rabindranath Tagore returned his Knighthood award because of the ——.
(a) Jallianwala Bagh Tragedy
(b) Kakori Episode
(c) Chauri Chaura Episode
(d) Execution of Bhagat Singh

11. Select the option in which the numbers share the same relationship as that shared by the given pair of numbers.
11 : 132
(a) 6 : 48 (b) 9 : 93
(c) 8 : 72 (d) 7 : 61

12. Abu's watch is 4:50, where the minute needle is towards the north-east. What direction is the hour needle?
(a) East (b) South-West
(c) South (d) South-East

13. Interchanging which two sign will make the following equation correct
5 × 15 ÷ 7 – 20 + 4 = 77
(a) – and + (b) × and ÷
(c) + and ÷ (d) + and ×

14. Statement: Public sector smoking has increased in the current year.
Conclusions:
1. Government should ban public sector smoking.
2. Government should create awareness about ill effects of public sector smoking.
(a) Only conclusion 1 follows
(b) Only conclusion 2 follows
(c) Neither 1 nor 2 follows
(d) Both 1 and 2 follow

15. Consider the given statement and decide which of the given assumptions is/are implicit in the statement.
Statement :
Many farmers are taking up organic farming
Assumptions
I. Organic farming is easy to practice
II. Organic farming is more beneficial to farmers
(a) Neither assumption I nor II is implicit
(b) Only assumption II is implicit
(c) Either assumption I or II is implicit
(d) Only assumption I is implicit

16. Read the given information and statements carefully and decide which option is True with respect to the statement.

If a sum of money is lent at simple interest, then the:
Statements:

1. **Money gets doubled in 6 years if the rate of Interest is 16%.**
2. **Money gets doubled in 5 years if the rate of interest is 18%.**

(a) Both statements 1 and 2 are incorrect
(b) Only statement 1 is correct
(c) Only statement 2 is correct
(d) Statement 1 and 2 are correct

17. **Which point on the given number line represents $\frac{6}{5}$?**

(a) S (b) W
(c) K (d) R

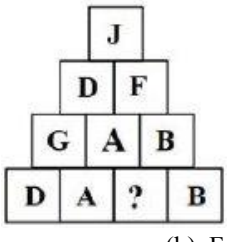
18. **Select the option that is related to the third term in the same way as the second term is related to the first term.**
Dog : Guard : : Horse : ?
(a) Cart (b) Saddle
(c) Stable (d) Ride

19. **In a certain code language. 'MISTAKE' is written as 'LHRUBLF' and 'PROBLEM' is written as 'OQNCMFN'. How will 'STRANGE' be written in the language?**
(a) TUSBMFD (b) RSQBOHF
(c) RSQBMFD (d) TUSAOHF

20. **Four letter-clusters have been given out of which three are alike in some manner and one is different. Select the one that is different.**
(a) GEM (b) JHQ
(c) KIQ (d) YWE

21. **Select the letter-cluster from among the given options that can replace the question mark (?) in the following series.**
DI, GO, LU, OA, TG, ?
(a) WM (b) UL
(c) WL (d) YM

22. **Which letter will replaces the question mark in the given diagram?**



(a) C (b) F
(c) A (d) D

23. **If all the directions are moved 135 degrees clockwise, then which new direction does the original south point to?**
(a) North-East (b) South-West
(c) South-East (d) North-West

24. **Pushpa introduced her friends to Sujeeta and Radha by saying, 'Radha's maternal grandmother's only son-in-law is Sujeeta's father. From the options given below, how is Sujeeta related to Radha"?**
(a) Mother-in-law (b) Maternal aunt
(c) Sister (d) Mother

25. **If '+' means 'division', '÷' means 'subtraction', '–' means 'multiplication' and '×' means 'addition', then what is the value of X in the following equation?**
200 + 10 – 25 × 60 ÷ 20 = X
(a) 560 (b) 500
(c) 540 (d) 520

26. **In which generation were computers bulky, vacuum based and costly?**
(a) Fourth generation (b) Fifth generation
(c) First generation (d) Third generation

27. **Which of the following is an Input device?**
(a) Joystick (b) Plotter
(c) Coder (d) Printer

28. **Which of the following comprise(s) the input devices?**
(a) keyboard
(b) mouse
(c) both keyboard and mouse
(d) None of these

29. **Which among the following input devices consists of a stick which pivots on a base and reports its angle or direction of the CPU?**
(a) Microphone (b) Light pen
(c) Keyboard (d) Joystick

30. **Semiconductor memory, Dynamic RAM (DRAM) stores each bit of information in a _____.**
(a) diode (b) encoder
(c) capacitor (d) resistor

31. **Which of the following is widely used for implementing main memory?**
(a) Magnetic drum memory
(b) Magnetic core memory
(c) Static RAM
(d) Dynamic RAM

32. **Which of the following statement is incorrect regarding computer memory?**
(a) Before processing, the program and data are loaded into primary memory
(b) RAM is a non - volatile memory
(c) The CPU of the computer cannot directly access the hard disk
(d) RAM is a primary memory

33. Which of the following statement are correct?

(i) GSM mobiles support the transmission of both data and voice.

(ii) In CDMA mobiles, customer information is stored in the headset or phone

(a) Only (i) (b) Both (i) and (ii)

(c) Neither (i) nor (ii) (d) Only (ii)

34. Which of the following statement is wrong?

(i) Congestion control protocols ensure that the sender cannot send data faster than the limit on which the receiver can receive data.

(ii) Flow-control protocols ensure that the sender cannot send data faster than the network can transmit data.

(a) Neither (i) nor (ii)

(b) Both (i) and (ii)

(c) Only (ii)

(d) Only (i)

35. Which of the following statements is/are FALSE.

(i) The full form of SIM used in mobile phones is Subscriber Identity Module.

(ii) The size of micro and nano SIM cards is the same.

(a) Neither (i) nor (ii) (b) Both (i) and (ii)

(c) Only (ii) (d) Only (i)

36. The full form of SIM is?

(a) Subscriber Identity Module

(b) Subscriber Identity Machine

(c) Self Identity Machine

(d) Self Identity Module

37. Which of the following tabs MS- Word 365 has options likes Save, Save as, Open a New Document etc?

(a) Data (b) Review

(c) Home (d) File

38. Which of the following main menu items in MS-Word 2007 includes the 'Watermark' command?

(a) Page layout (b) Insert

(c) Home (d) References

39. Which of the following is the keyboard shortcut to save the contents of the currently open Word document in MS Word 2007?

(a) Alt + S (b) Shift + S

(c) Ctrl +Alt + S (d) Ctrl + S

40. In email, to search for messages after 02/22/2021, which of the following option should be entered?

(a) newer than : 02/22/2021

(b) newer : 02/22/2021

(c) after than : 02/22/2021

(d) after : 02/22/2021

41. Which of the following options is the correct sequence to print an entire web page in Google Chrome browser?

(a) Open the web page -> Press Ctrl + A -> Right click on the page and left click on 'Print'

(b) Open the web page -> click on page Setup -> Click on the 'Print' icon

(c) Open the web page -> Press Ctrl + S -> Right click on the page and left click on 'Print'

(d) Open the web page -> Click on Print Preview -> Click on the 'Print' icon

42. In the context of searching content on the Internet which of the following facts is NOT true?

(a) Use quotation marks

(b) Use complex search terms

(c) Use specific keywords

(d) Vary your search engine

43. The _____ browser was a text based browser, invented in _____.

(a) Lynx; 1985 (b) Safari; 1985

(c) Lynx; 1992 (d) Safari; 1992

44. Match the columns.

Web Browsers	Manufacturer
(i) Chrome	(a) Microsoft
(ii) Edge	(b) Apple
(iii) Safari	(c) Google

(a) (i)-(a), (ii)-(b), (iii)-(c)

(b) (i)-(c), (ii)-(b), (iii)-(a)

(c) (i)-(c), (ii)-(a), (iii)-(b)

(d) (i)-(b), (ii)-(a), (iii)-(c)

45. Which of the following provides a software interface that allows you to click on WWW hyperlinked resources?

(a) Browser (b) IP Address

(c) URL (d) URI

46. How many numbers between 300 and 1000 are divisible by 7?

(a) 994 (b) 301 (c) 101 (d) 100

47. Simplify the given expression using BODMAS :

$$\frac{4}{11}\times\frac{121}{16}\times 24(75^2-55^2)\times\frac{1}{100}$$

(a) 1736 (b) 1726

(c) 1746 (d) 1716

48. Arrange the following fractions in the ascending order.

$$\frac{2}{3},\frac{4}{8},\frac{5}{9}\text{ and }\frac{9}{11}$$

(a) $\frac{4}{8}<\frac{5}{9}<\frac{2}{3}<\frac{9}{11}$ (b) $\frac{5}{9}<\frac{2}{3}<\frac{4}{8}<\frac{9}{11}$

(c) $\frac{5}{9}<\frac{2}{3}<\frac{9}{11}<\frac{4}{8}$ (d) $\frac{4}{8}<\frac{5}{9}<\frac{9}{11}<\frac{2}{3}$

49. **The square root of a positive fraction, when added to 1, is $3\frac{1}{4}$. Find the fraction.**

(a) $2\frac{1}{4}$ (b) $6\frac{1}{4}$

(c) $5\frac{1}{16}$ (d) $3\frac{1}{16}$

50. **Find the LCM of 24, 96 and 36.**

(a) 576 (b) 216

(c) 288 (d) 144

51. **Find the LCM of 0.63, 10.5, 2.1 and 4.20.**

(a) 63 (b) 0.63

(c) 6.30 (d) 6300

52. **If (3x+2y) : (3x-2y) = 5 : 3 then find x : y.**

(a) $\frac{4}{3}$ (b) $\frac{32}{3}$

(c) $\frac{16}{3}$ (d) $\frac{8}{3}$

53. **Vimal secured 46% marks in the exam and failed to qualify in the exam by 10 marks. If he secured 52% marks, he would have secured 8 marks more than what was the minimum qualifying marks. What were the minimum marks one had to score to qualify in the exam?**

(a) 148 (b) 146

(c) 156 (d) 138

54. **The sides of a triangle are 16 m, 12 m and 20 m. Find altitude of the triangle.**

(a) 9.2 m (b) 9.6 m

(c) 9.4 m (d) 9.8 m

55. **A and B can do a work in 18 days. B and C can do the same work in 15 days. While A and C can do the work in 12 days. Working together, how much time will they take to complete the work ?**

(a) $8\frac{27}{37}$ (b) $11\frac{27}{37}$

(c) $9\frac{27}{37}$ (d) $10\frac{27}{37}$

56. **Nidhi takes 3 hours 45 minutes to walk from one place and return to the same place by bicycle, it takes 4 hours 20 minutes to walk. So how long will it take to get on the cycle.**

(a) 3 hours 10 minutes

(b) 3 hours 35 minutes

(c) 3 hours 45 minutes

(d) 3 hours 15 minutes

57. **P_1, P_2 and P_3 are invested at 4%, 6% and 8% respectively in such a way that the simple interest received from all the three amounts at the end of the year are equal. If the sum of the three invested amounts is ₹2600, find the values of P_1, P_2 P_3 respectively.**

(a) ₹1100, ₹800, ₹ 700

(b) ₹1200, ₹ 600, ₹ 800

(c) ₹1000, ₹ 900, ₹ 700

(d) ₹1200, ₹ 800, ₹ 600

58. **A shopkeeper sells an article at 20% profit. If he had bought the article at 10% less and sold it at ₹18 more than the previous selling price, he would have made 40% profit. What is the original cost price of the article? (in ₹)**

(a) ₹ 350 (b) ₹ 320

(c) ₹ 300 (d) ₹ 280

59. **Find the HCF of $(x^4 - y^4)$, $(x^8 - y^8)$ and $(x^2 - y^2)$**

(a) (x – y) (x + y)

(b) (x – y) (x + y) (x + y)

(c) (x – y) (x + y) (x – y) (x + y)

(d) (x + y) (x + y)

60. **If $\tan\theta = \frac{5}{6}$, then what is the value of $\frac{12\sin\theta - 5\cos\theta}{12\sin\theta + 5\cos\theta}$?**

(a) $\frac{2}{3}$ (b) $\frac{1}{3}$

(c) $\frac{3}{4}$ (d) $\frac{1}{4}$

61. **Find out the mean of the given below data–**
$1, \frac{1}{2}, \frac{1}{2}, \frac{3}{4}, \frac{1}{4}, 2, \frac{1}{2}, \frac{1}{4}, \frac{3}{4}$

(a) $\frac{15}{18}$ (b) $\frac{13}{18}$

(c) $\frac{7}{9}$ (d) $\frac{8}{9}$

62. **$\sqrt{0.00069169}$ = ?**

(a) 0.00243 (b) 0.000243

(c) 0.0263 (d) 0.243

63. **After 4 years, the total age of the two members of a family will be 64 years. Four years ago the ratio of their age was 3 : 1. Find the age of the younger member.**

(a) 10 (b) 16

(c) 12 (d) 15

64. **A pipe can fill a tank in 7/4 hours while the other pipe can empty the full tank in 21/8 hours. Both pipes were opened at that time when the tank was 2/3 empty. How much time will be taken to fill the tank?**

(a) 3 hours 20 minute (b) 3 hours 30 minute

(c) 3 hours 45 minute (d) 3 hours 15 minute

65. **The ratio of the number of females to that of male employees in a small company is 2 : 3 If the number of male employees in the company is 90, then the total number of employees working in the company is:**

(a) 120 (b) 90
(c) 130 (d) 150

66. Which among the following is a derived unit ?
(a) Length (b) Density
(c) Time (d) Mass

67. The quantity of motion of a body is best represented by
(a) Its velocity
(b) Its speed
(c) Its mass
(d) Its linear momentum

68. When light travels from one medium to another, which of the following does not change?
(a) Wavelength (b) Intensity
(c) Velocity (d) Frequency

69. A pump is required to lift 600 kg of water per minute from a well 25 m deep and to eject it with a speed 50m/s. If g = 10m/s^2, the power required to perform the above task is
(a) 20 kW (b) 15 kW
(c) 10 kW (d) 22.5 kW

70. Find the specific latent heat of vaporisation of 1.25 g of (in Jg^{-1}), if it releases 250 joules of heat when it condenses at its boiling point of 196° C.
(a) 500 (b) 200
(c) 312.5 (d) 469

71. Which of the following formulas represents ohm's law?
(a) V = C.Q (b) V= I. R
(c) $V = \frac{L}{I}$ (d) $V = \frac{I}{R}$

72. The unit of absolute permittivity of a medium is:
(a) Joule/Coulomb (b) Newton/Meter
(c) Farad/Meter (d) Farad/Coulomb

73. The capacitive reactance of a 0.01 micro farad capacitor to a frequency of 100 kHz will be:
(a) 0.006 Ohm (b) 15Ohm
(c) 115 Ohm (d) 159 Ohm

74. Two coil with a coefficient of coupling of 0.5 between them are connected in series so as to magnetic in the same direction and in the opposite direction the corresponding value of total Inductances are 1.9 H and 0.7H, respectively identify the self inductances of the two coils.
(a) 0.6 H and 0.5 H
(b) 0.5 H and 0.9 H
(c) 0.9 H and 0.4 H
(d) 0.8 H and 0.6 H

75. _____ is a measuring device which can evaluate and record the electrical power passing through a circuit in a certain time. By implementing it, we can know how much amount of electrical energy is used by a consumer or a residence or an electrically powered device or a business.
(a) Watt hour meter (b) DC meter
(c) AC meter (d) Air flow meter

76. Identify the correct relationship between magnetic field intensity (H) and magnetic flux density (B), with standard notations of relative permeability (μ_r) and permeability in free space (μ_0).
(a) $H = \mu_r\mu_0 B$ (b) $H = (\mu_r/\mu_0)B$
(c) $B = (\mu_r/\mu_0)H$ (d) $B = \mu_r\mu_0 H$

77. The value of electric field at a distance of 1m from an infinite line with charge density 1 C/m is
(a) $2\pi\varepsilon_0$ (b) $1/2\pi\varepsilon_0$
(c) $\varepsilon_0/2\pi$ (d) $2\pi/\varepsilon_0$

78. A hollow sphere of charge does not produce an electric field at-
(a) Interior point (b) outer point
(c) Beyond 2 meters (d) none of the above

79. The direction of induced e.m.f. in a conductor (or coil) can be determined by-
(a) Work law
(b) Ampere's law
(c) Fleming's right hand rule
(d) Fleming's left hand rule

80. The composition of constantan is:
(a) Cu = 60% and Ni = 40%
(b) Cu = 43%, Ni = 17% and Mn = 40%
(c) Sn = 23.43%, Cu = 43.67% and Ni = 32.9%
(d) Mn = 65% and Zn = 35%

81. Which of the following options is a thermosetting polymer?
(a) PVC (b) Nylon
(c) Teflon (d) Bakelite

82. In an N-type semiconductor, there are
(a) No minority carrier
(b) Immobile negative ion
(c) Immobile positive ion
(d) Holes as majority carrier

83. The color of light emitted by a LED depends on
(a) Its forward bias voltage
(b) Its reverse bias voltage
(c) Value of series resistance in the circuit
(d) Type of semiconductor material

84. Transistor biasing configuration works best at relatively_____.
(a) High power supply voltage
(b) Low power supply voltage
(c) High power supply current
(d) Low power supply current

85. Which of the following transistors can be used in enhancement mode
(a) UJT (b) MOSFET
(c) JFET (d) NPN transistor

86. A clipper circuit is also known as
(a) limiter circuit
(b) Clamper circuit
(c) Chopper circuit
(d) Charger circuit

87. In a single stage amplifier D.C and A.C load lines:
(a) are always parallel
(b) Are perpendicular to each other
(c) Cross each other at Q-point
(d) Are inclined but do not cross each other

88. The ac load line of a transistor circuit
(a) Is steeper than its dc load line
(b) Is same as its dc load line
(c) Never intersects the dc load line
(d) Is steeper than its dc load line but intersect at Q point

89. The most commonly used feedback arrangement in cascaded amplifier is:
(a) frequency series feedback
(b) voltage shunt feedback
(c) current shunt feedback
(d) voltage series feedback

90. An operational amplifier has a differential gain of 100 and a common mode gain of 0.01. Its CMRR will be:
(a) 20 dB (b) 40 dB
(c) 60 dB (d) 80 dB

91. Which type of SMPS is provided for output supply in inverted nature and either more or less than the input supply?
(a) Buck (b) Boost
(c) Buck-boost (d) High regulated

92. The current sensitivity of a meter is expressed in:
(a) Ampere/Division
(b) Ampere
(c) Ohm/Volt
(d) Ohm/Ampere

93. Electrodynamometer is a _____instrument where magnetic field in which coil moves, is provided by two ____.
(a) transfer-type, permanent magnets
(b) constant-type, permanent magnets
(c) transfer-type, fixed coils
(d) constant-type, fixed coils

94. Electrostatic-type instruments are primarily used as:
(a) Wattmeters
(b) Ohmmeters
(c) Voltmeters
(d) Ammeters

95. Two wattmeter method of power measurement is suitable for
(a) both balanced and unbalanced load
(b) balanced load only
(c) delta connected load
(d) unbalanced load

96. Gauge factor of a strain gauge is–
(a) (dR/dL) × (L/R)
(b) (dL/dR) × (R/L)
(c) (dL/dR) × (L/R)
(d) (dR/dL)

97. Express –39 in 8-bit 2's complement form.
(a) 10101001 (b) 01101010
(c) 01000101 (d) 11011001

98. The Boolean function F(A, B, C, D) = ∑ (0, 6, 8, 13, 14) with don't care conditions d(A, B, C, D) = ∑ (2, 4, 10) can be simplified to :
(a) $F = \bar{B}\bar{D} + C\bar{D} + AB\bar{C}$
(b) $F = \bar{B}\bar{D} + C\bar{D} + AB\bar{C}D$
(c) $F = A\bar{B}\bar{D} + C\bar{D} + AB\bar{C}$
(d) $F = \bar{B}\bar{D} + C\bar{D} + ABCD$

99. Read the following statements
i. Gate is a combinational logic.
ii. JK Flip-flop in toggle mode is not combinational logic.
iii. MSJK Flip-flop suffers from race-around.
iv. Counters are sequential circuits.
Which is correct?
(a) i, ii (b) i, ii ,iv
(c) ii, iii, iv (d) i, ii, iii

100. Duty cycle for repetitive waveform is defined as?
(a) Ratio of ON time to Total time
(b) Sum of ON time and OFF time
(c) Ratio of OFF time to ON time
(d) Ratio of Total time to ON time

SOLUTION : PRACTICE SET- 4

ANSWER KEY

1. (a)	11. (c)	21. (a)	31. (d)	41. (a)	51. (a)	61. (b)	71. (b)	81. (d)	91. (c)
2. (d)	12. (d)	22. (a)	32. (b)	42. (b)	52. (d)	62. (c)	72. (c)	82. (c)	92. (c)
3. (c)	13. (c)	23. (a)	33. (b)	43. (c)	53. (a)	63. (b)	73. (d)	83. (d)	93. (c)
4. (d)	14. (d)	24. (c)	34. (b)	44. (c)	54. (b)	64. (b)	74. (c)	84. (b)	94. (c)
5. (a)	15. (b)	25. (c)	35. (c)	45. (a)	55. (c)	65. (d)	75. (a)	85. (b)	95. (a)
6. (a)	16. (a)	26. (c)	36. (a)	46. (d)	56. (a)	66. (b)	76. (d)	86. (a)	96. (a)
7. (c)	17. (d)	27.(a)	37. (d)	47. (d)	57. (d)	67. (d)	77. (b)	87. (c)	97. (d)
8. (c)	18. (d)	28. (c)	38. (a)	48. (a)	58. (c)	68. (d)	78. (a)	88. (d)	98. (b)
9. (b)	19. (b)	29. (d)	39. (d)	49. (c)	59. (a)	69. (b)	79. (c)	89. (d)	99. (b)
10. (a)	20. (b)	30. (c)	40. (d)	50. (c)	60. (b)	70. (b)	80. (a)	90. (d)	100. (a)

SOLUTION

1. (a)
Chandrayaan 2 was the second Lunar exploration mission which has been developed by the Indian Space Research Organization. It had three main components namely the Pragyan Rover, Vikram Lander, and orbiter. According to ISRO, the Pragyan Rover is capable of conducting in-situ payload experiments. It weighs a total of 27 kg and has an electric power generation capacity of 50w.

2. (d)
The term is traditionally believed to have originated with the former West Indies Spinner Ellis Achong. Back in 1933, England hosted West Indies in a Test match in Old Trafford. Achong bowled an unexpected delivery from his wrist which got a sharp turn after pitching outside off and got the English batsman Walter Robins stumped. From then, left-arm wrist spinners have been referred to as Chinaman bowlers.

3. (c)
The Sikkimese are known for their amazing mask dance called Cham or Lama dances. It is the most famous dance of Sikkim and performed by Buddhist lamas (monks) during special occasions like the Pang Lhabsol festival. During Pang Lhabsol festival, the Sikkimese remind mount Khangchendzonga of the promise made to the 8th century Saint Guru Padmasambhava to protect Sikkim forever.

4. (d)
Gertrude Ederle becomes first women (U.S.) to swim English Channel on August 6, 1926. She swim 21 miles from Dover, England to Cape Griz-Nez across the English Channel, which separates Great Britain from the north western tip of France.

5. (a)
In the year 1969, the Government of India did nationalization of banks. Nationalization of Banks was implemented under the Banking Companies (Acquisition and Transfer of undertakings) Act of 1970. The ordinance came into force on 19 July 1969. 14 banks were Nationalized in 1969 while 6 more Banks were Nationalized in 1980.

6. (a)
As per Indian Constitution, Article 75(1-A) states the limit on minister. According to this article the total number of ministers including Prime Minister, in the Council of Ministers shall not exceed fifteen percent, of the total number of members of the House of the People. This provision was added by the 91st Amendment Act, of 2003.

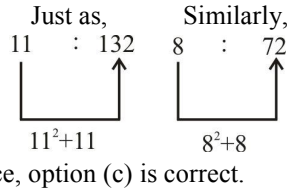
7. (c)
There are three main types of planetary winds - the trade winds, the westerlies and the easterlies. Planetary or permanent winds blow from high pressure belts to low pressure belts in the same direction throughout the year. They blow over vast area of continents and oceans.

8. (c)
Umiam lake is a reservoir located in Shillong, capital of India's north-eastern state of Meghalaya. It is also called Barapani lake. This artificial lake has been constructed by intercepting water of Umiam lake, coming from the southern Khari mountain.

9. (b)
After the death of Aurangzeb on 3 March, 1707 AD. When the Mughal ruler became weak, the Nizam of Hyderabad declared freedom of himself from Mughal Empire. He established the independent Hyderabad state in 1724 AD.

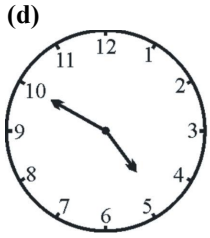
10. (a)
On 3rd June 1915, Nobel Laureate, Bangla writer and Poet Ravindranath Tagore was given the "Knighthood" title by the British government. But in agitation against the famous Jallianwala Bagh Massacre he returned the "Knighthood" title.

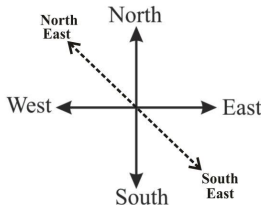
11. (c)



Hence, option (c) is correct.

12. (d)





If the minute needle indicated North-West, then the hour needle will indicate South-East direction.

13. (c)

Given,

$$5 \times 15 \div 7 - 20 + 4 = 77$$

On interchanging the signs from option (c),

$$5 \times 15 + 7 - 20 \div 4 = 77$$
$$5 \times 15 + 7 - 5 = 77$$
$$75 + 7 - 5 = 77$$
$$77 = 77$$

Hence, option (c) is correct.

14. (d)

The government should prohibit smoking in public places because smoking causes serious and fatal disease. It is not only fatal for those who smoke but also for those who come in contact with smoke. Therefore the government should be aware of smoking in public places and its ill effects. So, the increase in smoking in public places can be stopped. Thus, here both conclusion (1) and conclusion (2) follow the statement.

15. (b)

Many farmers do organic farming, farmers doing organic farming will be given 10 thousand rupees per acre by the Government. Not only this, when the farmers crops are ready, the government will make separate arrangements to buy them in the mandis. So that organic farming is more beneficial for the farmers. Therefore only assumption II is implicit in the statement.

16. (a)

Let ₹100 be the money lent at simple interest, then

According to statement 1,

$$\text{Simple interest} = \frac{100 \times 16 \times 6}{100}$$

Simple interest = ₹96

Amount = 100 + 96 = ₹196

According to the statement 2,

$$\text{Simple interest} = \frac{100 \times 18 \times 5}{100}$$

Simple interest = ₹90

Amount = 100 + 90 = ₹190

Hence, it is clear that statement (1) and statement (2) both are wrong.

17. (d)

$\frac{6}{5} = 1.2$

On the given number line $\frac{6}{5} = 1.2$ represents by point by paint R.

18. (d)

Just as, a dog is related to protect in the same way a horse is related to ride.

19. (b)

Just as,

$M \xrightarrow{-1} L$
$I \xrightarrow{-1} H$
$S \xrightarrow{-1} R$
$T \xrightarrow{+1} U$
$A \xrightarrow{+1} B$
$K \xrightarrow{+1} L$
$E \xrightarrow{+1} F$

And,

$P \xrightarrow{-1} O$
$R \xrightarrow{-1} Q$
$O \xrightarrow{-1} N$
$B \xrightarrow{+1} C$
$L \xrightarrow{+1} M$
$E \xrightarrow{+1} F$
$M \xrightarrow{+1} N$

Same as,

$S \xrightarrow{-1} R$
$T \xrightarrow{-1} S$
$R \xrightarrow{-1} Q$
$A \xrightarrow{+1} B$
$N \xrightarrow{+1} O$
$G \xrightarrow{+1} H$
$E \xrightarrow{+1} F$

20. (b)

From options-

(a) $G \xrightarrow{-2} E \xrightarrow{+8} M$

(b) $J \xrightarrow{-2} H \xrightarrow{+9} Q$ (Different)

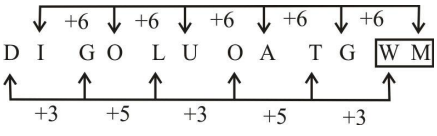
(c) $K \xrightarrow{-2} I \xrightarrow{+8} Q$

(d) $Y \xrightarrow{-2} W \xrightarrow{+8} E$

Hence, option (b) is odd one.

21. (a)

The given series is as follows-



22. (a)

Just as,

J = 10

And,

D, F
↓ ↓
4 + 6 = 10

And,

G A B
↓ ↓ ↓
7 + 1 + 2 = 10

Similarly,

D A ? B
↓ ↓ ↓ ↓
4 + 1 + ? + 2 = 10

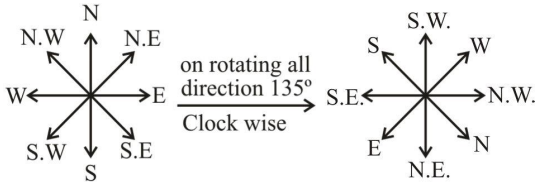
? = 10 – 7

? = 3

Hence, ? = C

23. (a)

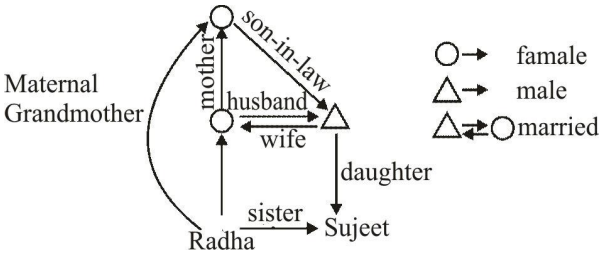
According to the question,



Hence, it is clear that North-east is facing in South direction now.

24. (c)

The blood relation diagram is a follows-



Hence, it is clear from the blood relation diagram that Sujeeta is the sister of Radha.

25. (c)

Given equation-

200 + 10 – 25 × 60 ÷ 20 = X

+ means ⟶ ÷

÷ means ⟶ –

– means ⟶ ×

× means ⟶ +

On changing the sign as per question,

= 200 ÷ 10 × 25 + 60 – 20

= 20 × 25 + 60 – 20

= 500 + 60 – 20

= 540

Hence, X = 540

26. (c)

First Generation Computers were bulky, vacuum tube based and expensive. Magnetic drums were used for storage in the first generation computers. These computers were based on punched cards.

27.(a)

Joystick is an input device which works like a trackball. A stick is attached to the ball through, which it is rotated. It is used in video games, simulator training etc.

28. (c)

Both keyboard and mouse are input devices, which are used to give instructions to the computer.

29. (d)

Joystick is an input device consists of a stick which pivots on a base and reports its angles or direction of the CPU.

30. (c)

Dynamic Random Access Memory (DRAM) is a type of semiconductor memory that stores each bit of information in a capacitor. DRAM stores each bit of data in a separate passive electronic component, which is inside an integrated circuit board. A bit in every electronic component has two states (concepts) of value called 0 and 1.

31. (d)

RAM is a type of memory that temporarily stores data and instructions to perform the task currently being run by the CPU. It is of two types -

(i) DRAM (ii) SRAM.

The full form of DRAM is Dynamic Random Access Memory. This is volatile memory. It is used as main memory in computers because the data of DRAM is always changing so it needs to be refreshed.

32. (b)

Computer memory is a physical device which is used to temporarily and permanently store information, instructions and data in a computer. There are mainly two type of computer memory.

(i) Primary memory

(ii) Secondary memory.

Primary memory also two types - RAM and ROM.

RAM is a volatile memory, hence option (b) statement is incorrect and all other statement are correct.

33. (b)

GSM stands for Global System for Mobile communication. It is a digital cellular technology whose used to transmit mobile voice and data services. CDMA stands for Code Division Multiple Access. CDMA based devices do not require a SIM card, it uses an ESN (Electronic Serial Number). In CDMA mobile, the customer's information is stored in his/her headset or phone. Hence, both the given statement are correct.

34. (b)

Flow control in data communication is the process of managing the rate of data transmission between two nodes by preventing a faster sender from over whelming a slower receiver. Provides a mechanism for the receiver to control the transmission speed by which the sender is able to transmit data through the network. Cannot sent data faster than a limit. Congestion-control protocols have a problem that can occur at any time in a packet switched network. This can happen when there are too many packets in a subnet within the network. This a situation arising in the network layer where the message traffic is so high that it significantly slows down the response time of the network.

35. (c)
The full form of SIM is subscriber Identity Module. It is used in mobile phone. Micro sim card is the smaller form of regular sim card and nano sim card has the smallest size hence statement (ii) is wrong.

36. (a)
SIM stands for Subscriber Identity Module.

37. (d)
File tabs has New, Open, Save, Save as, Print etc. options which is used for create a new file, open existing file and print file etc.

38. (a)
In MS Word 2007, click Watermark on the Page Layout tab, and then click on Printed Watermark. Click Picture Watermark or Text Watermark in the Printed Watermark dialog box.

39. (d)
In MS Word 2007, the Ctrl + S keyboard shortcut is used to save the contents of the currently open Word document.
Shortcut key-
Ctrl + Alt + S = Splits the current document.
Alt + Shift + C = Deletes the Document Windows partition.

40. (d)
To find emails after a specific date use YYYY/MM/DD . For ex. if you are trying to find emails before or after September 1, 2021 type before: 2021-09-01 or after: 2021-09-01 in the search bar and press enter. You can combine the two keywords to find emails between two dates.

41. (a)
To print the entire webpage in Google Chrome browser use the following procedure:
→ Open the web page
→ Use/press Ctrl + A shortcut key
→ Right click on the page and left click on print.

42. (b)
We can use quotation marks, choose specific keywords and change our search engine to search for content on the Internet but we can not use complex term in browser.

43. (c)
The Lynx browser was a text based browser invented in 1992. A text - based web browser is a web browser that renders only the text of web page and ignores most graphic content.

44. (c)
Google Chrome is a web browser developed by Google on December 11, 2008 through open source code. Microsoft Edge is a web browser developed by Microsoft that was released in July 2015. Microsoft Edge replaced Internet Explorer 11 as the default browser in Windows 10, and Edge was also released for Android and iOS in 2017 and for Mac OS in 2019.
Safari is a graphical web browser developed by Apple. It is primarily open source software and primarily based on WebKit. It supports macOS, iOS and iPodOS and Safari has become the third most popular desktop browser.

45. (a)
A browser is a software program used to locate, retrieve, and display information available on the World Wide Web and provides an interface that allows clicking on hyperlinked resources on the World Wide Web.

46. (d)
Total number of numbers between 1 and 1000 which are divisible by 7

$$= \frac{1000}{7} = 142$$

Total number of numbers between 1 and 300 which are divisible by 7

$$= \frac{300}{7} = 42$$

Hence, Total number of numbers between 1 and 300 which are divisible by 7 between 300 and 1000

$$= 142 - 42 = 100$$

47. (d)

$$\frac{4}{11} \times \frac{121}{16} \times 24\left(75^2 - 55^2\right)\frac{1}{100}$$

From BODMAS,

$$= \frac{11}{4} \times 24\left[(75+55)(75-55)\right] \times \frac{1}{100}$$

We know that, $\left[\because a^2 - b^2 = (a+b)(a-b)\right]$

$$= 66 \times (130 \times 20) \times \frac{1}{100}$$

$$= 66 \times 2600 \times \frac{1}{100}$$

$$= 1716$$

48. (a)
From question,

$$\underset{0.67}{\frac{2}{3}}, \quad \underset{0.50}{\frac{4}{8}}, \quad \underset{0.55}{\frac{5}{9}} \text{ and } \underset{0.81}{\frac{9}{11}}$$

(Ascending order),

$$\underset{\frac{4}{8}}{0.50} < \underset{\frac{5}{9}}{0.55} < \underset{\frac{2}{3}}{0.67} < \underset{\frac{9}{11}}{0.81}$$

49. (c)

Let the fraction be $= \frac{x}{y}$

According to the question,

$$\sqrt{\frac{x}{y}} + 1 = 3\frac{1}{4}$$

$$\sqrt{\frac{x}{y}}=\frac{13}{4}-1$$

$$\sqrt{\frac{x}{y}}=\frac{9}{4}$$

$$\frac{x}{y}=\frac{81}{16},\quad \frac{x}{y}=5\frac{1}{16}$$

50. (c)

Finding the LCM by using common division method,

2	24, 96, 36
2	12, 48, 18
2	6, 24, 9
2	3, 12, 9
2	3, 6, 9
3	3, 3, 9
3	1, 1, 3
	1, 1, 1

The required LCM = 2 × 2 × 2 × 2 × 2 × 3 × 3 = 288

51. (a)

According to the question,

$$0.63=\frac{63}{100},10.5=\frac{105}{10},2.1=\frac{21}{10},4.20=\frac{420}{100}=\frac{42}{10}$$

So, the LCM of $\frac{63}{100},\frac{105}{10},\frac{21}{10}\ and\ \frac{42}{10}$

$$=\frac{LCM\ of\ 63,105,21,42}{HCF\ of\ 100,10,10,10}$$

$$=\frac{21\times3\times5\times2}{10}=\frac{630}{10}=63$$

52. (d)

$$\frac{3x+2y}{3x-2y}=\frac{5}{3}$$

$$9x+6y=15x-10y$$

$$16y=6x$$

$$\frac{x}{y}=\frac{16}{6}\ \text{or}\ \frac{x}{y}=\frac{8}{3}$$

53. (a)

Let total marks be x.

According to the question,

$$x\times46\%+10=x\times52\%-8$$

$$(x\times52\%)-(x\times46\%)=10+8$$

$$\frac{x\times52}{100}-\frac{x\times46}{100}=18$$

$$\frac{52x-46x}{100}=18$$

$$\frac{6x}{100}=18$$

$$6x=1800$$

$$x=300$$

On putting the value of x

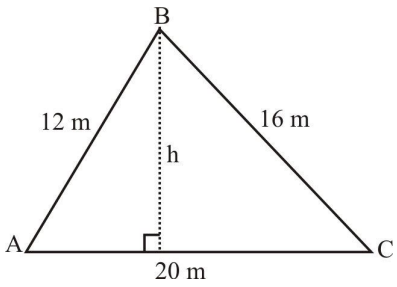
Minimum qualifying marks = (300 × 46%) + 10

$$=\left(\frac{300\times46}{100}\right)+10$$

= 138 + 10

= 148 marks

54. (b)



Area of the triangle $=\sqrt{s(s-a)(s-b)(s-c)}$

Where $s=\frac{a+b+c}{2}$

$$s=\frac{16+12+20}{2}=24$$

$$\therefore \text{Area}=\sqrt{24(24-16)(24-12)(24-20)}$$

$$=\sqrt{24\times8\times12\times4}$$

$$=96\,m^2$$

$$\therefore \text{The altitude}\ (h)=\frac{2\times\text{area}}{\text{base}}$$

$$=\frac{2\times96}{20}$$

$$=\frac{96}{10}=9.6\,m$$

55. (c)

$$\text{One day's work of (A + B)}=\frac{1}{18}\text{ part}$$

$$\text{One day's work of (B + C)}=\frac{1}{15}\text{ part}$$

$$\text{One day's work of (C + A)}=\frac{1}{12}\text{ part}$$

$$\text{One day's work of 2 (A + B + C)}=\frac{1}{18}+\frac{1}{15}+\frac{1}{12}$$

$$\text{One day's work of (A + B + C)}=\frac{37}{180}\times\frac{1}{2}=\frac{37}{360}\text{ part}$$

Time taken by (A + B + C) to complete the work

$$=\frac{1}{37/360}$$

$$=9\frac{27}{37}\text{ part}$$

56. (a)

Time taken by Nidhi to reach T one side on foot + another side by cycle = 3 hours 45 minutes

$\Rightarrow 3+\frac{45}{60}=3+\frac{3}{4}=\frac{15}{4}$

Time taken by her to reach both sides

$\Rightarrow 4 \text{ hours } 20 \text{ minutes } = 4+\frac{20}{60}=\frac{13}{3}$

Time taken to walk one side $=\frac{13}{3}\times\frac{1}{2}=\frac{13}{6}$

time taken to reach another side by cycle $=\frac{15}{4}-\frac{13}{6}$

$=\frac{45-26}{12}=\frac{19}{12}$ hour

time taken to travel both side by cycle $=\frac{19}{12}\times 2=\frac{19}{6}$

$3 \text{ hours } \frac{1}{6}\times 60=3 \text{ hours } 10 \text{ minutes}$

57. (d)

Let simple interest (S.I) = ₹x

Time (T) = 1 Years

For P_1

$S.I=\frac{P_1\times R\times T}{100}$

$x=\frac{P_1\times 4\times 1}{100}$

$P_1 = 25x$

For P_2

$x=\frac{P_2\times 6\times 1}{100}$

$P_2=\frac{50x}{3}$

For P_3

$x=\frac{P_3\times 8\times 1}{100}$

$P_3=\frac{25x}{2}$

$P_1 + P_2 + P_3 = 2600$

$25x+\frac{50x}{3}+\frac{25x}{2}=2600$

$\frac{150x+100x+75x}{6}=2600$

$325x = 2600 \times 6$

$x = ₹48$

$P_1 = 25x = 25 \times 48 = ₹1200$

$P_2=\frac{50x}{3}=\frac{50}{3}\times 48=₹800$

$P_3=\frac{25x}{2}=\frac{25}{2}\times 48=₹600$

58. (c)

Let Cost price of the article = ₹x

Selling price $=\frac{x\times 120}{100}$

$=₹\ \frac{6x}{5}$

According to the question,

Cost price of the article if he bought 10% less $=\frac{90x}{100}$

$=₹\ \frac{9x}{10}$

Selling price $=\frac{6x}{5}+18$

Again, Selling price = Cost price $\times\frac{100+\text{Profit}}{100}$

$\frac{6x}{5}+18=\frac{9x}{10}\times\frac{100+40}{100}$

$\frac{6x}{5}+18=\frac{9x}{10}\times\frac{140}{100}$

$\frac{90+6x}{5}=\frac{63x}{50}$

$900 + 60x = 63x$

$3x = 900$

$x = ₹ 300$

59. (a)

$x^4 - y^4 = (x^2 - y^2)(x^2 + y^2)$

$= (x - y)(x + y)(x^2 + y^2)$

$x^8 - y^8 = (x^4 - y^4)(x^4 + y^4)$

$= (x^2 - y^2)(x^2 + y^2)(x^4 + y^4)$

$= (x - y)(x + y)(x^2 + y^2)(x^4 + y^4)$

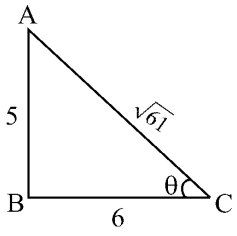
$x^2 - y^2 = (x - y)(x + y)$

HCF of $(x^4 - y^4)(x^8 - y^8)$ and $(x^2 - y^2) = (x - y)(x + y)$

60. (b)

Given,

$\tan\theta=\frac{5}{6}$ then $\frac{12\sin\theta-5\cos\theta}{12\sin\theta+5\cos\theta}=?$



From Pythagoras theorem,

$AC^2 = AB^2 + BC^2$

$AC^2 = 5^2 + 6^2$

$AC^2 = 61$

$AC = \sqrt{61}$

$\therefore \sin\theta=\frac{5}{\sqrt{61}},\ \cos\theta=\frac{6}{\sqrt{61}}$

$=\frac{12\sin\theta-5\cos\theta}{12\sin\theta+5\cos\theta}$

$$= \frac{12\times\frac{5}{\sqrt{61}} - 5\times\frac{6}{\sqrt{61}}}{12\times\frac{5}{\sqrt{61}} + 5\times\frac{6}{\sqrt{61}}}$$

$$= \frac{\frac{60-30}{\sqrt{61}}}{\frac{60+30}{\sqrt{61}}}$$

$$= \frac{\frac{30}{\sqrt{61}}}{\frac{90}{\sqrt{61}}}$$

$$= \frac{30}{\sqrt{61}}\times\frac{\sqrt{61}}{90} = \frac{1}{3}$$

61. (b)

$$\text{Mean} = \frac{\text{Sum of numbers}}{\text{number of terms}}$$

$$= \frac{1+\frac{1}{2}+\frac{1}{2}+\frac{3}{4}+\frac{1}{4}+2+\frac{1}{2}+\frac{1}{4}+\frac{3}{4}}{9}$$

$$= \frac{\frac{4+2+2+3+1+8+2+1+3}{4}}{9} = \frac{26}{36} = \frac{13}{18}$$

62. (c)

From given number,

$$\sqrt{0.00069169} = \sqrt{\frac{69169}{100000000}}$$

$$= \sqrt{\frac{69169}{100000000}} = \sqrt{\frac{263\times263}{10000\times10000}} = \frac{263}{10000} = 0.0263$$

63. (b)

Let the age of younger member = y years

And age of elder member = x years

First condition-

$$x + 4 + y + 4 = 64$$

$$x + y = 56 \qquad \text{----(i)}$$

Second condition-

$$\frac{x-4}{y-4} = \frac{3}{1}$$

$$x - 4 = 3y - 12$$

$$x - 3y = -8 \qquad \text{----(ii)}$$

From equation (i) and (ii),

$$x + y = 56$$

$$x - 3y = -8$$

$$- \quad + \quad +$$

$$4y = 64$$

$$y = 16$$

Hence, the age of younger member = y = 16 years

64. (b)

Suppose it takes t hours to fill the tank.

According to the question-

$$\frac{t}{\frac{7}{4}} - \frac{t}{\frac{21}{8}} = \frac{2}{3}$$

$$\frac{4t}{7} - \frac{8t}{21} = \frac{2}{3}$$

$$\Rightarrow \frac{12t-8t}{21} = \frac{2}{3}$$

$$\Rightarrow \frac{4t}{21} = \frac{2}{3}$$

$$\Rightarrow t = \frac{2\times21}{3\times4}$$

$$\Rightarrow t = \frac{7}{2}\text{h}$$

$$\Rightarrow t = 3\frac{1}{2}$$

$$\Rightarrow t = 3 : \frac{1}{2}\times60$$

$$\Rightarrow t = 3\text{h} : 30\,\text{min}$$

Hence it will take 3 hours 30 minutes to fill the tank.

65. (d)

Let the number of female and male employees in company = 2x and 3x

According to the question-

$3x = 90 \Rightarrow x = 30$

$\therefore$ Total number of employees in company = (3x + 2x)

= 5 × 30 = 150

66. (b)

Derived Unit :- The combination of two base units is called derived units.

- Density is derived unit because it is a combination of two basic units mass and volume and it is given by kg/m^3.

67. (d)

$\Rightarrow$ The quantity of motion of a body is best represented by 'its linear momentum'.

$$\boxed{P = m\times V}$$

Where,

P = Momentum

m = Mass

V = Velocity

68. (d)

Whenever light goes from one medium to another (from air to glass), the frequency of light and phase of light does not change. However, the velocity of light and wavelength of light change.

69. (b)

Given mass to be lift M = 600kg

Depth of well (h) = 25 m

Speed (v) = 50 m/s

$g = 10\ m/s^2$

Total energy required = kinetic energy + Potential energy

$$E = \frac{1}{2}Mv^2 + Mgh$$

$$= \frac{1}{2}\times 600\times(50)^2 + 600\times 25\times 10 = 900000\ J$$

$$\text{Power required} = \frac{\text{Work}}{\text{Time}} = \frac{\text{Energy}}{\text{time}} = \frac{900000}{60} = 15kW$$

70. (b)

Latent heat:- Latent heat is the heat required to change the state of unit mass of a substance at a constant temperature is called latent heat of the substance. It is denoted by L.

$$Q = mL$$

or $$L = \frac{Q}{M}$$

Given that m = 1.25 gm

$$Q = 250\ J$$

$$\text{Then, latent heat } (L) = \frac{Q}{M} = \frac{250}{1.25} = 200$$

71. (b)

Ohm's law states that the current through conductor between two points is directly proportional to the voltage across the two points.

According to ohm's law-

$$I \propto V$$

$$I = \frac{V}{R}, \qquad V = IR$$

72. (c)

$$\because F = \frac{1}{4\pi\varepsilon}\frac{Q\times Q}{r^2}$$

$$\text{So, } F = \frac{1}{4\pi\varepsilon}\frac{Q^2}{r^2}$$

$$\varepsilon = \frac{Q^2}{4\pi r^2 F}$$

$$\because C = \frac{Q}{V}$$

$$V = \frac{W}{Q}$$

$$\text{So, } C = \frac{Q^2}{W}$$

$$Q^2 = CW$$

$$\varepsilon = \frac{CW}{4\pi r^2 F} \qquad [W = \text{work}]$$

$$= \frac{F\times Nm}{m^2\times N}$$

$$\boxed{\varepsilon = \frac{F}{m}\ Farad/meter}$$

73. (d)

Given that

$$f = 100\ kHz = 100\times 10^3\ Hz$$

$$C = 0.01\ \mu F = 0.01\times 10^{-6} F$$

$$X_C = \frac{1}{2\pi fC}$$

$$= \frac{1}{2\times 3.14\times 100\times 10^3\times 0.01\times 10^{-6}}$$

$$\boxed{X_C = 159.23\Omega}$$

74. (c)

Given that,

Coefficient of coupling (k) = 0.5

Equivalent inductance on same polarity (L_{eq}) = 1.9 H

Equivalent inductance on opposite polarity (L_{eq}) = 0.7 H

On same polarity

$$L_{eq}(same) = L_1 + L_2 + 2M$$

$$L_1 + L_2 + 2M = 1.9\ H \qquad ...(i)$$

On opposite polarity

$$L_{eq}(opposite) = L_1 + L_2 - 2M$$

$$L_1 + L_2 - 2M = 0.7\ H \qquad ...(ii)$$

Adding equations (i) and (ii)

$$2L_1 + 2L_2 = 2.6\ H$$

$$L_1 + L_2 = 1.3\ H$$

$\therefore$ $0.9 + 0.4 = 1.3$ H

$\therefore$ $L_1 = 0.9H, \qquad L_2 = 0.4H$

75. (a)

Watt-hour meter is a measuring device which can evaluate and records the electrical power passing through a circuit in a certain time.

By implementing the watt - hour meter, we can know how much amount of electrical energy is used by a consumer or a residence or an electrically powered device or a business.

76. (d)

Relationship between magnetic field intensity (H) and magnetic flux density (B)–

$$\boxed{B = \mu_0\mu_r H} \text{ and } H = \frac{NI}{\ell}$$

Where- B → Magnetic flux density

μ_0 → Permeability in free space

μ_r → Relative permeability

H → Magnetic field intensity.

77. (b)

Electric field intensity, $(E) = \frac{\lambda}{2\pi\varepsilon_0 .r}$

Where, λ = Charge density

r = Distance

ε_0 = Permittivity

Given,

$\lambda = 1$ C/m & r = 1 m.

$$E = \frac{1}{2\pi\varepsilon_0 \times 1}$$

$$E = \frac{1}{2\pi\varepsilon_0}$$

78. (a)

The electric field intensity at a point is the force experienced by unit of positive charge placed at that point. Electric field intensity is a vector quantity. A hollow sphere of charge does not produce an electric field at interior point because net charge density is zero in interior point.

79. (c)

The direction of induced emf in a conductor can be determined by Fleming's right hand rule. Fleming's right hand rule states, that if we arrange our thumb, forefinger and middle finger of the right-hand perpendicular to each other then the thumb point towards the direction of the motion of the conductor relative to the magnetic field, the fore finger point toward the magnetic field and the middle finger point toward the direction of the induced current

80. (a)

Constantan:- It is a copper and nickel alloy used in the production of thermocouples and thermocouple extension wire as well as precision resistor and two temperature resistance heating application.

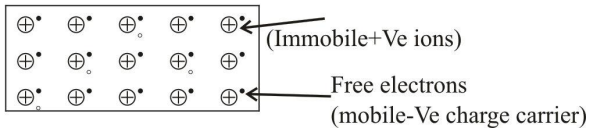
Constantan = Cu (60%) + Ni (40%)

81. (d)

Bakelite is an example of a thermosetting Polymer. A thermosetting plastic is a Polymer that hard irreversibly when heated. It is a rigid type of plastic that is highly resistant to heat after it has cured during the compression molding process. Thermosetting Plastic are generally strong than thermo plastic material.

82. (c)

Stable positive ions in N-type semiconductor.



In an N-type semiconductor, the number of free electrons is more than the number of holes for this reason in N-type semiconductor free electrons are called majority charge carriers and holes are called minority charge carriers.

83. (d)

LED are light emitting diodes which are semiconductors that convert electrical energy into the light energy. The colour of the emitted light depends on the type of semiconductor material depending on which LEDs can be classified into three wavelengths: ultraviolet, visible and infrared.

84. (b)

Transistor biasing configuration works best at relatively low power supply voltage.

When the transistor is biased, DC voltage is applied in it, DC current start flowing in it, whose value can be determined by drawing DC load line on the output characteristics of the transistor. Before using the transistor as an amplifier, its DC biasing is done. Hence transistor biasing configuration work best on DC voltage or low power voltage supply.

85. (b)

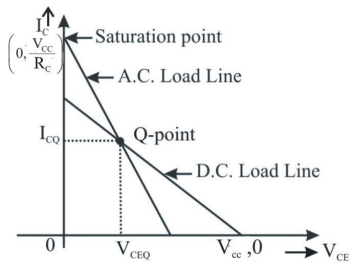
Enhancement mode MOSFET is generally a type of transistor. Enhancement can be operated only in enhancement mode (increase in V_{GS} leads to increase in I_d) or it gets enhanced. Therefore the MOSFET device can be classified as enhancement type is called MOSFET.

86. (a)

A clipper circuit is also known as limiter circuit. The clipper circuit is made using diodes which is used to remove the applied part of the signal without removing the remaining part from the signal.

87. (c)

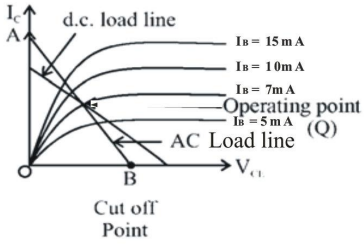
In a single stage amplifier D.C and A.C load lines intersect each other at the Q-point.



Q-point is also called quiescent point or operating point.

88. (d)

The ac load line of a transistor circuit is steeper than its dc load line but intersect each other at point Q. Slope of AC load line is greater than slope of DC load line.



$$\text{Slope} = \frac{-1}{R_{ac}}$$

89. (d)

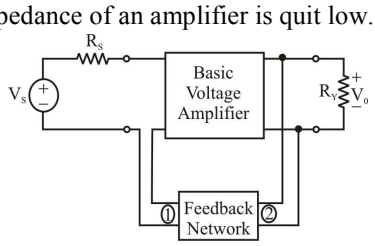
Most commonly used feedback arrangement in cascaded amplifier is voltage series feedback system.

Cascaded amplifier is also known as multistage amplifier.

Advantages of Voltage series feedback-

- High input impedance
- Low output impedance
- Less noise
- Less distortions

Output impedance of an amplifier is quit low.



90. (d)

Given,

$A_d = 100,\ A_c = 0.01$

$$\boxed{CMRR = \frac{A_{DM}}{A_{CM}}}$$

$$= \frac{100}{0.01}$$

$$CMRR = 10^4$$

$$CMRR(dB) = 20 \log_{10} (CMRR)$$

$$CMRR(dB) = 20 \log_{10}(10)^4$$

$$\boxed{CMRR\,(dB) = 80dB}$$

91. (c)

Buck-boost converter is a type of DC to DC converter, In which the magnitude of the output voltage can be greater or less than the magnitude of the input voltage.

92. (c)

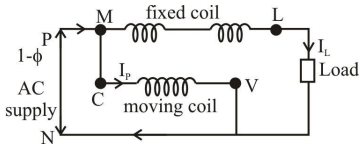
$$\text{Current sensitivity (S)} \propto \frac{1}{I_{fSD}}$$

$$\text{Sensitivity} = \frac{\text{Ohm}}{\text{Volt}} = \frac{1}{\text{Volt/ohm}}$$

$$\boxed{\text{Sensitivity} = \frac{1}{\text{ampere}}}$$

93. (c)

Electrodynamometer is a transfer type instrument where magnetic field in which coil move is provided by two fixed coils.



94. (c)

Electrostatic-type instruments are primarily used as voltmeters.

- These instruments are mainly used to measure high voltages.
- Deflecting torque, $T_d = \frac{1}{2} V^2 \frac{dC}{d\theta}$

$$\boxed{\theta = \frac{1}{2K} V^2 \frac{dC}{d\theta}}$$

- Scale is non-uniform due to square law response.
- These instruments are mounted vertically and uses fluid friction damping.
- It is used on both ac and dc voltage only.
- Power consumption is less.

95. (a)

Two wattmeter method of power measurement is suitable for both balanced and unbalanced load.

$\Rightarrow$ For n-phase, n-wire balanced or unbalanced system is required (n-1) wattmeter.

96. (a)

When a conductor is stretched or compressed due to the change in it's length and diameter it's resistance change the property of the conducting material is called "Piezo resistive effect".

$$G_f = \frac{\Delta R / R}{\Delta L / L}$$

consider a wire having a length of L and diameter D, when a tensile force acts on its length and diameter changes by ΔL and ΔD.

97. (d)

(39) = 00100111 in 8 bit binary

1's complement of (00100111) = 11011000

2' s complement of (11011000) = 11011001

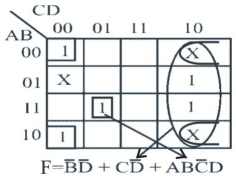
Hence, 2's complement of –39 is = 11011001

98. (b)

Function,

$$F(A, B, C, D) = \sum (0,6,8, 13, 14)$$

$$d(A, B, C, D) = \sum (2, 4, 10)$$



99. (b)

- Gate is a combinational circuit.
- JK- FF is a sequential circuit.
- Counter is a sequential circuit.
- MSJK Flip-flop does not suffer from race-around

100. (a)

The duty cycle for repetitive waveform is defined as the ratio of ON time to total time.

$$\boxed{\text{Duty cycle} = \frac{T_{ON}}{T_{ON} + T_{OFF}} = \frac{T_{ON}}{T_{Total}}}$$

PRACTICE SET - 5

1. **Name the centre in India which is used for launching satellites.**
(a) North Eastern Space Applications Centre (NESAC)
(b) Barren Island
(c) ISTRAC ground station
(d) Wheeler Island

2. **With which of following sports is Black Pearl associated?**
(a) Soccer (b) Golf
(c) Snooker (d) Horse Racing

3. **Kalbelia folk songs and dances belong to which Indian state?**
(a) Madhya Pradesh (b) Rajasthan
(c) Maharashtra (d) Himachal Pradesh

4. **Which physician came to India and served in the Bengal Medical service from 1794 to 1815 and also undertook pioneering survey explorations in several diverse regions of India.**
(a) Francis Buchanan (b) Sir William Jones
(c) William Bentinck (d) Warren Hastings

5. **Which of the following is depicted on the Indian 200-rupee note?**
(a) Red Fort (b) Ellora Caves
(c) Mangalyaan (d) Sanchi Stupa

6. **Who among the following has the power to grant pardons under Article 161 of the Constitution of India?**
(a) Prime Minister (b) Chief Justice of India
(c) President (d) Governor

7. **Of the given options, which is the saltiest sea in the world ?**
(a) Celebes Sea (b) Black Sea
(c) Baltic Sea (d) Red Sea

8. **Identify the world's second longest glacier located outside the polar region in Nubra Valley?**
(a) Baltaro (b) Siachen
(c) Hispar (d) Batura

9. **Who was also known as Rabia-ud-Daurani?**
(a) Nur Jahan
(b) Dilras Banu Begum
(c) Jagat Gosain
(d) Asmat Begum

10. **The Non-Cooperation Movement was adopted at the Congress session in December 1920 at:**
(a) Nagpur (b) Surat
(c) Aurangabad (d) Nasik

11. **Select the option that is related to the fifth term in the same way as the second term is related to the first term and fourth term related to the third term.**
SUGAR : 11 :: PILOT : 12 :: HOTEL : ?
(a) 15 (b) 12
(c) 10 (d) 19

12. **Starting from point S, Mahesh walked 25 meters towards South. He turned to his left and walked 50 meters. He again turned to his left and walked 25 meters. He again turned to his left and walked 60 meters and reached point T. How far and in which direction is Mahesh from point S?**
(a) 10 m, East (b) 10 m, West
(c) 25 m, West (d) 25 m, North

13. **By which of the following options, using the given symbols in the same order balance the given equation ?**
65, 5, 25 = 190
(a) +, × (b) ×, –
(c) ×, + (d) ÷, ×

14. **Statement:**
It's better to pay cooks than paying doctors.
Conclusion:
I. **Cook can expect better pay for making delicious food.**
II. **Those who visits hotels regularly do not need to go to the doctors.**
III. **It is better to keep healthy than going to the hospital.**
IV. **Chefs are paid less than doctors.**
(a) Only conclusion II follows.
(b) Only conclusion I follows.
(c) Only conclusion IV follows.
(d) Only conclusion III follows.

15. **Consider the given statement and decide which of the given assumptions is/are implicit in the statement.**
Statement :
On his second visit, the doctor changed the prescription
Assumptions
I. **The patient did not show improvement with the earlier prescription**
II. **The patient did not take the earlier prescription seriously**
(a) Both assumptions I and II are implicit
(b) Only assumption I is implicit
(c) Only assumption II is implicit
(d) None of the assumptions is implicit

16. **Which of the following statements is correct?**
    1. **The angle between two tangents to a circle may be 0°**
    2. **If a transversal intersects two line such that a pair of alternate interior angles is equal, then the two lines are parallel.**
    3. **The tangents at the end points of a diameter of a circle are perpendicular.**

    (a) Only 1
    (b) Both 1 and 2, but not 3
    (c) Only 3
    (d) Only 2

17. **Arrange the given words in alphabetical order**
    A. mild **B. moderate**
    C. severe **D. profound**
    (a) A, C, B, D (b) A, D, B, C
    (c) A, B, C, D (d) A, B, D, C

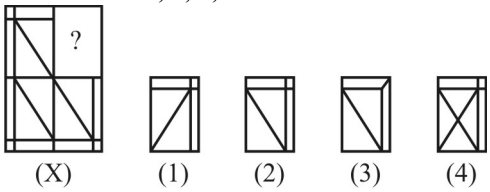
18. **Heart is related to 'Cardiology' in the same way as kidney is related to_____**
    (a) Nuclear Medicine (b) Nephrology
    (c) Neurology (d) Rheumatology

19. **In a certain code language, 'COUSIN' is written as 'UOISNC' and 'AUNTY' is written as 'UAYTN' How will 'UNCLE' be written in that language?**
    (a) CNELU (b) CNEUL
    (c) UENLC (d) UNELC

20. **Four letter-clusters have been given, out of which three are alike in some manner and one is different. Select the one that is different.**
    (a) DBI (b) HFM
    (c) SQX (d) JGO

21. **Select the letter-cluster from among the given options that can replace the question (?) in the following series.**
    GSI, ITD, KUY, MVT, OWO. ?
    (a) JXM (b) JYM
    (c) QXJ (d) QYK

22. **Complete the Figure X from the given alternatives 1, 2, 3, 4**



    (X) (1) (2) (3) (4)
    (a) 1 (b) 2
    (c) 3 (d) 4

23. **Facing South, X turns 225° clockwise and then 90° anti-clockwise. What direction is X facing now?**
    (a) South-West (b) North-East
    (c) North-West (d) South-East

24. **Pointing to a photograph, sumit said, "The man in the picture is the father-in-law of my mother-in law" How is the man in the picture related to sumit's wife.**
    (a) Father (b) Grand Father
    (c) Husband's Father (d) Grand Father

25. **If '+' means division,'÷' means subtraction, '–' means multiplication, and '×' means addition, then what is the value of the given expression?**
    175 –10 + 2 × 165 ÷ 25 + 5 = ?
    (a) 1015 (b) 1025
    (c) 1035 (d) 1045

26. **Which of the following universities designed and built the first electronic computer (ENIAC)?**
    (a) University of Harvard
    (b) University of Pennsylvania
    (c) University of Standford
    (d) University of Oxford

27. **In the context of computer, trackball is a/an _____ device.**
    (a) Output (b) Storage
    (c) Input (d) Processing

28. **A mouse, trackball and joystick are examples of**
    (a) pointing devices
    (b) pen input devices
    (c) data collection devices
    (d) multimedia devices

29. **Example of Input device is**
    (a) Headphones (b) Projector
    (c) Soundcard (d) Webcam

30. **Static RAM (SRAM) is faster than Dynamic RAM (DRAM) because .....**
    (a) SRAM uses capacitors
    (b) SRAM is costlier
    (c) SRAM does not require refreshing
    (d) SRAM is cheaper

31. **Identify whether the given statements are true or false.**
    (i) Both, DRAM and cache memory have the same access speed.
    (ii) Both, SRAM and DRAM can be used as main memory in a computer system.
    (a) (i)-False (ii)-True
    (b) (i)-True (ii)-True
    (c) (i)-True (ii)-False
    (d) (i)-False (ii)-False

32. **Based on their data persistence property, identify the odd one out from the following options.**
    (a) SRAM (b) EEPROM
    (c) EPROM (d) PROM

33. Information Technology can be defined as–
(a) Computers + Connectivity
(b) Computers + Network
(c) Hardware + Software
(d) Connectivity + Hardware

34. Servers are computers that provide resources which are connected to a…
(a) Client (b) Network
(c) Super Computer (d) Mainframe

35. A device that provides functionality for other programs or devices that called client.
(a) Intranet (b) Dongle
(c) Thermostat (d) Server

36. Which of the following texts is an example of subscript in MS-Word?
(a) X = 12 (b) X = 10 + Y
(c) H_2O (d) $X^2 + Y^2$

37. Which of the following keyboard shortcuts is used to go to the File tab in MS-Word 2010?
(a) Alt + N (b) Alt + F
(c) Alt + H (d) Alt + G

38. Which of the following statement(s) is/are true about page setup in MS Word 2007?
(i) The value of margin is normally 2.54 cm in each direction.
(ii) The size of A4 paper is 21 cm × 29.7 cm.
(a) Only (i) (b) Only (ii)
(c) Neither (i) nor (ii) (d) Both (i) and (ii)

39. Which of the following is true with respect to Local Area Network?
(a) LAN can be operated only on client/ server technology
(b) It connects devices that are in a single limited area
(c) It is a combination of devices connected in different countries
(d) WAN cannot connect multiple LANs simultaneously

40. Which of the following layer is not available in five - layered internet architecture?
(a) Transport (b) Data Link
(c) Session (d) Application

41. In the context of Internet, what is the full form of ARPANET?
(a) Advanced Research Planning Agency Network
(b) Automatic Research Projects Agency Network
(c) Advanced Remedial Projects Agency Network
(d) Advanced Research Projects Agency Network

42. Which of the following is a type of browser window that opens without any user request while browsing the internet?
(a) Pop-up (b) Pull-up
(c) Plugins (d) Add-ons

43. Which of the following is not the main part of a search engine?
(a) Search algorithm (b) Search index
(c) Crawler (d) Kernel

44. Which of the following options is generally used to store the contact information of the people you contact frequently by web mail?
(a) Public profile
(b) Private profile
(c) Online calendar
(d) Online address book

45. Identify whether the following statements are true or false.
i) A microcontroller is a programmable digital processor.
ii) A microprocessor is defined as a multipurpose, programmable logic device that has the capability to read binary instructions from memory; that accepts binary data as input and then, processes that data.
iii) A microcontroller uses an internal controlling bus.
(a) i-False, ii-True, iii-False
(b) i-False, ii-True, iii-True
(c) i-True, ii-False, iii-True
(d) i-True, ii-True, iii-True

46. $3^{71}+3^{72}+3^{73}+3^{74}+3^{75}$ is divisible by:
(a) 8 (b) 5
(c) 11 (d) 7

47. Using BODMAS, simplify the following.
$\frac{7}{9}\times\frac{21}{5}\times 25(65^2-55^2)$
(a) 42000 (b) 86000
(c) 98000 (d) 84000

48. Arrange the following fractions in descending order.
5/6, 3/7, 8/9, 3/14
(a) 8/9, 5/6, 3/7, 3/14 (b) 8/9, 3/14, 3/7, 5/6
(c) 5/6, 8/9, 3/7, 3/14 (d) 3/7, 8/9, 5/6, 3/14

49. What is the fraction which, when subracted from $\frac{1}{2}$, gives $\frac{2}{3}$?
(a) $\frac{1}{3}$ (b) $-\frac{1}{3}$
(c) $-\frac{1}{6}$ (d) $\frac{1}{6}$

50. **Find the second term in a sequence of numbers that leaves that remainders 1, 2 and 7 when divided by 2, 3 and 8 respectively.**
(a) 37 (b) 38
(c) 48 (d) 47

51. **If the ratio of two numbers is 5 : 7, and their HCF is 8, then their LCM is :**
(a) 480 (b) 580
(c) 380 (d) 280

52. **If A : B = 3 : 4 and B : C = 6 : 5, then A : (A + C) = ?**
(a) 9:11 (b) 9:10
(c) 9:19 (d) 6:7

53. **The ratio of the number of boys to the girls in a school is 3 : 2. If 20% of the boys and 25% of the girls are scholarship holders, find the percentage of those who are NOT scholarship holders.**
(a) 78% (b) 87%
(c) 68% (d) 86%

54. **Three small triangles are so formed from the three corners of a large triangle in such a way that each side of the small triangle is equal to $\frac{2}{5}$ times of the corresponding side of the large triangle. What is the ratio between the total areas of the three small triangles and the remaining area of the large triangle?**
(a) 12 : 13 (b) 1 : 5
(c) 12 : 25 (d) 4 : 25

55. **Arjun alone can do a work in 12 days and Bheem alone can do the same work in 15 days with the help of Chetan, they together complete that work in 5 days. How many days will Chetan alone take to do that work ?**
(a) 20 days (b) 24 days
(c) 15 days (d) 16 days

56. **A man at 6:30 am starts walking and wants to travel 30 km. His initial speed is 6 km/h and after traveling 3/5 of distance he reduced his speed to 2 km/h. He will finish his journey:**
(a) 11.00 am (b) 12.30 pm
(c) 11.30 pm (d) 12.00 pm

57. **If a sum of ₹2,000 amounts to ₹2,360 in 3 years at a certain rate of simple interest per annum, then will the same sum amount to in 5 years, if the rate of simple interest per annum remains the same?**
(a) ₹ 2,605 (b) ₹ 2,650
(c) ₹ 2,600 (d) ₹ 2,500

58. **40% of the goods are sold at 2% loss while the rest of the goods are sold at 4% profit. If there is a total profit of ₹ 250, then the cost price of goods sold is:**
(a) ₹ 5,625 (b) ₹ 6,525
(c) ₹ 9,000 (d) ₹ 15,625

59. **If x + y = 8 product of x and y is, 15 then find the value of $x^4 + y^4$:**
(a) 606 (b) 806
(c) 906 (d) 706

60. **Find the value of** $2-\frac{\sin^2\alpha}{1-\cos\alpha}+\frac{1-\cos\alpha}{\sin\alpha}-\frac{\sin\alpha}{1+\cos\alpha}$
(a) 1 – sin α (b) 1 – cos α
(c) 1 + sin α (d) 1 + cos α

61. **If an observation 70 is removed from the data 60, 68, 70, 72, 74, 76, 78, 80, then the median is increased by:**
(a) 0.5 (b) 1.5
(c) 2 (d) 1

62. **Find the value of** $\sqrt{4.2436}$
(a) 2.14 (b) 2.16
(c) 2.04 (d) 2.06

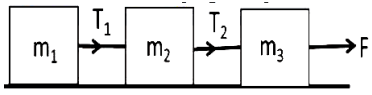
63. **Rajan was married 8 years ago. Then he was 5/6 of his present age. At the time of his marriage, his sister was 10 years younger than him. What is the present age of sister?**
(a) 38 (b) 32
(c) 26 (d) 40

64. **Pipe A can fill a cistern in 6 hours and B can fill it in 30 hours. Both pipes were turned on but there was a leakage in the bottom of the cistern. So, the cistern took 30 minutes more to fill. The time that the leakage will take to empty the full cistern is :**
(a) 54 hours (b) 65 hours
(c) 60 hours (d) 55 hours

65. **If 10% of *x* = 15% of y, then what will be the value of x : y ?**
(a) 2 : 3 (b) 2 : 1
(c) 3 : 2 (d) 1 : 2

66. **S.I. Unit of universal gravitational constant is**
(a) Nkg^2/m^2 (b) kg^2/Nm^2
(c) Nm^2/kg^2 (d) N^2m^2/kg^2

67. **Three blocks of masses m_1 , m_2 and m_3 are connected by mass less strings as shown in figure on a frictionless table.**



They are pulled with a force F = 40 N. If m_1 = 10 kg, m_2 = 6 kg and m_3 = 4 kg then tensions T_2 will be
(a) 20 N (b) 40 N
(c) 10 N (d) 32 N

68. **A bullet travels 90 m in 0.2 seconds. Find its speed in km/hr.**

(a) 162 (b) 1620
(c) 125 (d) 1250

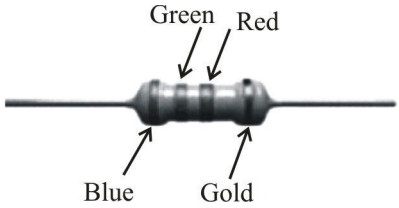
69. If 1,200 J of work is done in pushing a trolley by 20 m, what was the force (in N) employed?
(a) 30 (b) 90
(c) 120 (d) 60

70. _____° Celsius = 167°Fahrenheite
(a) 348 (b) 103
(c) 198 (d) 75

71. The terms 'ferrite beads' and 'toroidal cores' are related to _____.
(a) Decoupled capacitors
(b) Inductors
(c) Ganged capacitors
(d) Coupled capacitors

72. What is the SI unit of pressure :
(a) Dyne (b) Newton
(c) Pascal (d) Joule

73. Calculate the resistance of the given resistor.

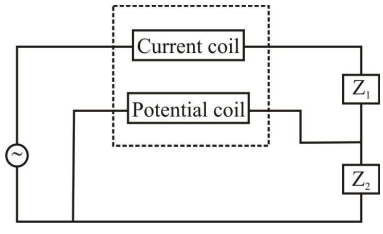


(a) 65×10^{-2} Ω– 5 percent
(b) 65×10^{2} Ω ± 5 percent
(c) 65×10^{-2} Ω
(d) 65×10^{-2} Ω + 5 percent

74. The given properties define which magnetic circuit measure?
1. Opposes the production of magnetic flux in a magnetic circuit
2. It is denoted by S.
3. Its unit is AT/Wb or 1/Henry of H^{-1}

(a) Conductance (b) Magnetic flux
(c) Permeance (d) Reluctance

75. With reference to the given figure, if a wattmeter current coil is connected to series impedance Z_1 and Z_2 potential coil connected across Z_2, then the wattmeter shows:



(a) Power consumed by Z_1 and Z_2
(b) Power consumed by Z_1
(c) Power consumed by Z_2
(d) wrong connection

76. Which type of electromagnetic wave has highest frequency?
(a) Gamma-rays (b) X-rays
(c) Ultraviolet (d) Microwaves

77. Electric field intensity at any point is equal to :
(a) Potential gradient at that point
(b) Potential at that point
(c) Potential difference at that point
(d) Work done at that point

78. Ampere's law relates
(a) Electric field and Charge
(b) Electric field and Current
(c) Magnetic field and Current
(d) Magnetic field and Charge

79. Electric field is a
(a) Scalar quantity
(b) Vector quantity
(c) Both scalar quantity & vector quantity
(d) None of these

80. Metal film resistors are made by depositing a very thin layer of metal on–
(a) Metal rod (b) Bakelite sheet
(c) Ceramic rod (d) Metal sheet

81. Materials in which large number of free electrons are available in outermost orbit are called :
(a) Semiconductors
(b) Conductors
(c) Insulators
(d) Magnetic materials

82. The following property of semiconductors cannot be determined from Hall effect:
(a) Semiconductor is n-type or p-type
(b) The carrier concentration
(c) The mobility of semiconductor
(d) The atomic concentration of semiconductor

83. Hot-carrier diode or surface-barrier diode are different names of the _____.
(a) Varactor diode
(b) Tunnel diode
(c) Schottky-barrier diode
(d) Gunn diode

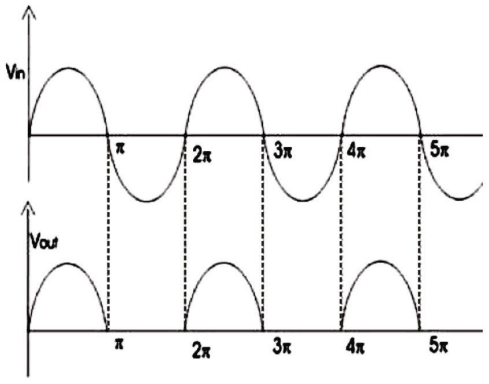
84. Group-I lists four different semiconductor devices. Match each device in Group-I with corresponding properties in Group-II

Group-I		Group-II	
P	BJT	**1**	Population Inversion
Q	MOSFET	**2**	Pinch-off voltage
R	LASER	**3**	Early effect
S	JFET	**4**	Flat band voltage

(a) P-3, Q-1, R-4 and S-2
(b) P-1, Q-4, R-3 and S-2
(c) P-3, Q-4, R-1 and S-2
(d) P-3, Q-2, R-1 and S-4

85. MOSFET is ..... controlled device-
(a) Voltage
(b) Current
(c) Voltage and current both
(d) Can not be controlled

86. Identify the given waveform.



(a) Negative half wave rectifier
(b) Positive half wave rectifier
(c) Dual wave rectifier
(d) Full wave rectifier

87. If biasing is not done in an amplifier circuit, it results in
(a) Decrease in the base current
(b) Excessive collector bias
(c) Unfaithful amplification
(d) High power loss

88. The bandwidth of an *RF* tuned amplifier is depend on
(a) Q-factor of the tuned output circuit
(b) Q-factor of the tuned input circuit
(c) Quiescent operating point
(d) Q-factors of output and input circuits as well as the quiescent operating point

89. Cascade control contains:
(a) One feedback and one feedforward
(b) Two feedforward
(c) Two feedback
(d) None of the above

90. In differentiator, feedback element is-
(a) Capacitor (b) Resistor
(c) Zener diode (d) Voltage divider

91. What voltage regulation does an ideal regulated power supply have?
(a) 0% (b) 100%
(c) 50% (d) 10%

92. The detector that minimizes the error probability is called as
(a) Minimum likelihood detector
(b) Maximum likelihood detector
(c) Mean likelihood detector
(d) Random likelihood detector

93. Identify the name of instrument shown in figure.

(a) Noise dosimeter (b) Flux meter
(c) FFT analyser (d) Sound enclosures

94. For the measurement of high resistances, following methods are used:
1. Loss of Charge Method
2. Direct Deflection Method
3. Substitution Method
Which of the following is/are correct?
(a) 1 and 2 (b) 2 and 3
(c) 1 and 3 (d) Only 1

95. The phenomenon of creeping occurs in
(a) Ammeter
(b) Voltmeter
(c) Energy meter
(d) None of the above

96. Seismic transducer is used for the measurement of-
(a) Linear velocity (b) Angular velocity
(c) Acceleration (d) Pressure

97. Parity bits are used for the purpose of _____in digital systems
(a) Power monitoring
(b) Error detection
(c) Symmetry Generation
(d) Time Stamping data

98. De Morgan's law states
(a) $\overline{X+Y}=\overline{X}.\overline{Y}$ (b) $\overline{X.Y}=\overline{X}+\overline{Y}$
(c) Both (d) None of these

99. Which of the following circuits can be used as a parallel to serial converter?
(a) Digital counter (b) Decoder
(c) Multiplexer (d) De-multiplexer

100. The fan out of a 7400 NAND gate is
(a) 2 TTL (b) 5 TTL
(c) 8 TTL (d) 10 TTL

SOLUTION : PRACTICE SET- 5

ANSWER KEY

1. (d)	11. (c)	21. (c)	31. (a)	41. (d)	51. (d)	61. (d)	71. (b)	81. (b)	91. (a)
2. (a)	12. (b)	22. (b)	32. (a)	42. (a)	52. (c)	62. (d)	72. (c)	82. (d)	92. (b)
3. (b)	13. (a)	23. (c)	33. (d)	43. (d)	53. (a)	63. (a)	73. (b)	83. (c)	93. (a)
4. (a)	14. (d)	24. (d)	34. (b)	44. (d)	54. (a)	64. (d)	74. (d)	84. (c)	94. (a)
5. (d)	15. (b)	25. (c)	35.(d)	45. (d)	55. (a)	65. (c)	75. (c)	85. (a)	95. (c)
6. (d)	16. (b)	26. (b)	36. (c)	46. (c)	56. (b)	66. (c)	76. (a)	86. (b)	96. (c)
7. (d)	17. (d)	27. (c)	37. (b)	47. (c)	57. (c)	67. (d)	77. (a)	87. (c)	97. (b)
8.(b)	18. (b)	28. (c)	38. (d)	48. (a)	58. (d)	68. (b)	78. (c)	88. (a)	98. (c)
9. (b)	19. (c)	29. (d)	39. (b)	49. (c)	59. (d)	69. (d)	79. (b)	89. (c)	99. (c)
10. (a)	20. (d)	30. (c)	40. (c)	50. (d)	60. (b)	70. (d)	80. (b)	90. (b)	100. (d)

SOLUTION

1. (d)
The Integrated Test Range missile testing facility is located on Dr Abdul Kalam Island, formerly known as wheeler Island, an island off the coast of Odisha. Missiles like Agni, Prithvi, Brahmos, Astra, Nirbhay etc are tested here.

2. (a)
Brazilian Footballer Pele is also known as 'Black Pearl' he was part of the Brazillian national teams that won three World Cup Championships (1958, 1962, 1970).

3. (b)
Kalbelia folk dance and song belong to the state of Rajasthan.The costume of Kalbelia dance is Lehenga, Odhani, or Angarkha. This dance is performed by both men and women. Kalbelia folk songs and dances of Rajasthan are in the 'Representative List of the Intangible Cultural Heritage of Humanity'. Kalbelia folk songs and dances of Rajasthan" were recognized by UNESCO as an Intangible Cultural Heritage.

4. (a)
Francis Buchanan (also known as Hamilton) undertook pioneering survey explorations in several diverse regions of the Indian subcontinent during his 20 years career as a surgeon naturalist with the British East India Company.

5. (d)

Rupee Note	Depicted figure
200	Sanchi Stupa
500	Red Fort
2000	Mangalyaan
20	Ellora Caves
50	Stone chariot of Hampi
100	Rani ki Vav
10	Konark Sun temple

6. (d)
Article 161 grants power of Governor to "grant pardons, reprieves, respites or remissions of punishment or to suspend, remit or commute the sentence." any person convicted of any offence against any law relating to a matter to which the executive power of the state extends.

7. (d)
All the oceans and seas have salty water. However, the Dead Sea is considered to be the saltiest of all of them. In the given option the Red Sea is the saltiest water body.

Sea Salinity
Black Sea→ 1.3 – 2.3%
Baltic Sea→ 1.0%
Red Sea→ 3.6 – 4%

8.(b)
Siachen is the world's second longest glacier located outside the polar region in Nubra Valley.

Baltaro Glacier - One of the longest glaciers outside the polar regions located in Gilgit Baltistan region of Pakistan
Hisper Glacier - It is also located in Gilgit-Baltistan region of Pakistan
Batura Glacier - Gilgit-Baltistan, Pakistan

9. (b)
The original name of Rabia-ud-Daurani was Dilras Banu Begum. She was the first wife of Aurangzeb. Aurangzeb commissioned the tomb of Rabia-ud-Daurani in 1660 in Aurangabad, which is called as the second Taj Mahal. It is also known as 'Bibi Ka Maqbara'. It was actually built by his eldest son Prince Azam Shah in memory of his mother. It was built in 1678 AD.

10. (a)

The Non-Cooperation Movement was adopted at Nagpur Session of the Congress in 1920. The Non-Cooperation Movement was launched in 1920 by M.K. Gandhi. The Congress passed a resolution in favour of Non-Cooperation Movement and defined Swaraj as its ultimate aim. Gandhi ji withdrew the Non-Cooperation Movement after the Chauri-Chaura incident.

11. (c)

Just as,

Note:- $\dfrac{(\text{Alphabetical order of letters})}{6}$

$$\begin{matrix} S & U & G & A & R \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 19 & 21 & 7 & 1 & 18 \end{matrix} : 11 = \frac{19+21+7+1+18}{6} = 11$$

and,

$$\begin{matrix} P & I & L & O & T \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 16 & 9 & 12 & 15 & 20 \end{matrix} : 12 = \frac{16+9+12+15+20}{6} = 12$$

Same as,

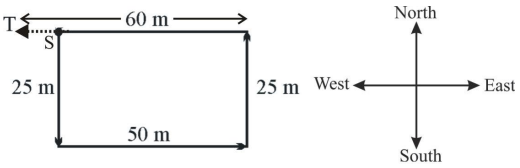
$$\begin{matrix} H & O & T & E & L \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ (8 & +15 & +20 & +5 & +12) \end{matrix} : \boxed{10}$$

$$\frac{}{6}$$

Hence, ? = 10

12. (b)

According to the question,



Distance b/w S and T = 60 – 50 = 10 m

Direction of S respect to T = West.

13. (a)

Given,

65, 5, 25 = 190

From option (a), (+, ×),

Putting the symbol in equation

65 + 5 ×25 = 190

65 + 125 = 190

190 = 190

L.H.S. = R.H.S.

14. (d)

The meaning of the sentences of the given statement, if we pay money to consume good food then it could be better than paying to the doctor. Hence, it is clear that conclusion III satisfies the statement.

15. (b)

The patient did not show improvement in the earlier prescription. So the doctor changed the prescription. Hence, only assumption I is implicit in the statement.

16. (b)

Hence, it is clear that statement 1 and 2 both are correct but statement 3 is not correct.

17. (d)

mild → moderate → profound → severe

A B D C

18. (b)

Just as, the heart is studied under cardiology, same as the kidney is studied under Nephrology.

19. (c)

Just as,

COUSIN = UOISNC

And,

AUNTY = UAYTN

Same as

UNCLE = UENLC

Note- In the given code first vowel then the consonant are coded in descending order on the basis of their place number.

20. (d)

From options-

(a) $D \xrightarrow{-2} B \xrightarrow{+7} I$

(b) $H \xrightarrow{-2} F \xrightarrow{+7} M$

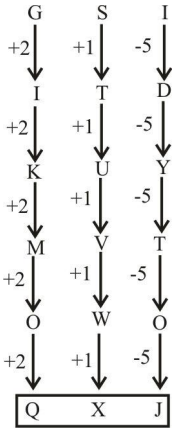
(c) $S \xrightarrow{-2} Q \xrightarrow{+7} X$

(d) $J \xrightarrow{-3} G \xrightarrow{+8} O$ (different)

Hence, option (d) is odd one.

21. (c)

The given series is as follows-



Hence, It is clear that option (c) is correct.

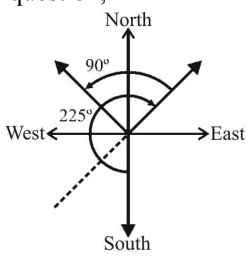
22. (b)

According to the question, answer figure (2) will complete the question figure.

Hence, option (b) is correct.

23. (c)

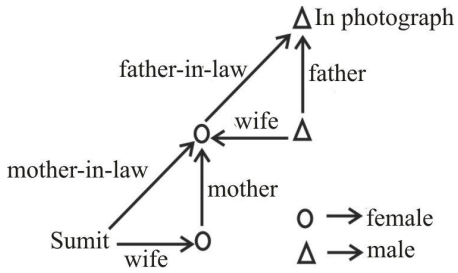
According to the question,



Hence, X is facing North-West.

24. (d)

According to the question blood relation diagram is follows as:



Hence, it is clear from blood relation diagram that the man in the picture is the grand father of Sumit's wife.

25. (c)

Given,

$$175 - 10 + 2 \times 165 \div 25 + 5 = ?$$

$+ \rightarrow \div$

$\div \rightarrow -$

$- \rightarrow \times$

$\times \rightarrow +$

On changing the sign,

$= 175 \times 10 \div 2 + 165 - 25 \div 5$

$= 175 \times 5 + 165 - 5$

$= 875 + 165 - 5$

$= 1040 - 5$

$= 1035$

26.(b)

ENIAC was built the first electronic computer formally dedicated at the University of Pennsylvania on February 15, 1946.

27. (c)

Devices through which we give instructions to the computer are called as input devices.

Example- Keyboard, Mouse, Touch pad, Joystick, Trackball etc.

28. (c)

Mouse is a small hand held pointing device that basically control the two-dimensional movement of the cursor of the display screen pointing devices are the input devices that are generally used for moving the cursor to a particular location to point an object on the screen.

Some of the commonly used pointing devices are: Mouse, trackball, Light pen, Joystick, Touch screen.

A pointing device is a human interface device that allows a user to input spatial data to a computer.

29. (d)

Input devices are electromechanical devices that are used to enter data to a computer or other devices for storing and further processing. Example of input devices are Mouse, Keyboard, Webcam, Scanner etc.

30. (c)

SRAM (Static-RAM) is faster than DRAM (Dynamic-RAM) and commonly used as cache memory in computers. Need to refresh it again and again. Hence it is much faster than DRAM.

31. (a)

(i) The access speed of both DRAM and cache memory is not same. The access speed of cache memory is faster than DRAM. Hence statement (i) is wrong.

(ii) In computer system SRAM and DRAM both can be used as main memory. Hence statement (ii) correct.

32. (a)

SRAM is type of RAM but EPROM, EEPROM and PROM are types of ROM. RAM is volatile memory but ROM is non-volatile memory.

33. (d)

Information technology can be defined in term of connectivity and hardware. Information technology on computer passed information system. Information technology has become an integral part of commerce and trade in the present times.

34. (b)

Server is a computer program or computer machine that provides various services to each computer connected to the network. The purpose of a server is to share data or hardware and software resources among its users.

35.(d)

A Server is a computer program or device that provides a service to another computer program and its user, also known as the client.

36. (c)

A superscript or subscript in Word is a number, shape, symbol, or indicator that is smaller than the normal line of type and is set it slightly above (superscript) or below (subscript).

Ex- $X^2 + Y^2$, H_2O

37. (b)

In MS Word 2010, the Alt+F shortcut key is used to go to the File tab. The File menu has options to manage Microsoft Word files. Alt + F shortcut key is used to open the file menu. 'Key tips' are displayed on the file menu page options.

38. (d)

The default A4 paper size in MS Word 2007 page setup is 21 × 29.7 cm or 8.27 × 11.69 inches, and the typical margin value is 2.54 cm. Page Setup can change the structure and layout of the pages in the document.

39. (b)

LAN is the short form of Local Area Network. It connects devices which are available in a single or limited area with the help of LAN.

LAN can share data at speeds ranging from 10 Mbps to 1000 Mbps. Data transmission speed is higher in LAN network because the range of LAN network is limited to a fixed area.

40. (c)

TCP/IP has five different layers those are followings -

→ Application Layer

→ Transport Layer

→ Internet Layer

→ Data Link Layer

→ Physical Layer

Therefore, session layer does not come under five layer internet architecture.

41. (d)

In the context of internet full form of ARPANET is Advanced Research Projects Agency Network.

42. (a)

Pop - up is a type of browser window, which opens without any user request while browsing the Internet. It is also used to show advertisements on the Internet we can turn on or off pop-up windows in our browser as per our choice.

43. (d)

Search engine is a web based application that helps the user to find information on the World Wide Web. Its main parts are search algorithm, search index and crawler while kernel is a part of operating system.

44. (d)

Address book feature of a mail program allows the users to store information about the people when they communicate regularly by sending e-mails.

45. (d)

All statements are true because a microprocessor is defined as a programmable, multipurpose, logic device that has the reading capability of binary instructions from memory and I/O component externally in a microprocessor for processing. In this system, a microcontroller also known as a programmable digital processor, uses an internal controlling bus.

46. (c)

$$3^{71}+3^{72}+3^{73}+3^{74}+3^{75}$$

$$= 3^{71}\left(3^0+3^1+3^2+3^3+3^4\right)$$

$$= 3^{71}\left(1+3+9+27+81\right)$$

$$= 3^{71}\times 121$$

$$= 3^{71}\times 11^2$$

Hence, given series will be divisible by 11.

47. (c)

Given expression,

$$\frac{7}{9}\times\frac{21}{5}\times 25\left(65^2-55^2\right)$$

$$= \frac{49\times 5}{3}\left[(65+55)(65-55)\right]$$

$$= \frac{49\times 5}{3}\times 120\times 10$$

$$= 49\times 5\times 40\times 10$$

$$= 98000$$

48. (a)

$$\frac{5}{6}=0.83,\quad \frac{3}{7}=0.42,\quad \frac{8}{9}=0.88,\quad \frac{3}{14}=0.21$$

Hence, the descending order of the fractions is $\frac{8}{9},\frac{5}{6},\frac{3}{7},\frac{3}{14}$.

49. (c)

Let the fraction be $\frac{x}{y}$.

According to the problem,

$$\frac{1}{2}-\frac{x}{y}=\frac{2}{3}\Rightarrow\frac{x}{y}=\frac{1}{2}-\frac{2}{3}$$

$$\frac{x}{y}=\frac{-1}{6}$$

50. (d)

LCM of number 2, 3 and 8 = 24

Required number = 24K–1

$(\because 2-1=1,3-2=1,8-7=1)$

(On putting K = 2)

$$= 24\times 2-1 = 47$$

51. (d)

Let the two numbers are 5x and 7x respectively.

Given-

HCF = 8

I[st] Number = 5 × 8 = 40
II[nd] Number = 7 × 8 = 56
By formula - I[st] Number × II[nd] Number = HCF × LCM
40 × 56 = 8 × LCM
LCM = 40 × 7
= 280

52. (c)

A : B : C
3 4
6 5
18 : 24 : 20
9 : 12 : 10

Hence, $\frac{A}{A+C}=\frac{9}{9+10}=\frac{9}{19}$

53. (a)

Let the number of boys in school = 3x
And number of girls = 2x
Total number of students in school = 5x
Number of students who hold scholarship

$=3x\times\frac{20}{100}+2x\times\frac{25}{100}$

$=\frac{110x}{100}=\frac{11x}{10}$

Number of students who don't hold scholarship

$=5x-\frac{11x}{10}$

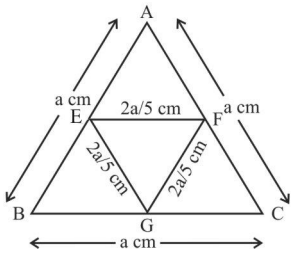
$=\frac{39x}{10}$

$\text{Required percentage}=\frac{\frac{39x}{10}}{5x}\times100$

$=\frac{39x\times100}{10\times5x}$

= 78%

54. (a)



Area of equilateral triangle ABC $=\frac{\sqrt{3}}{4}a^2$ cm

Area of small equilateral $\Delta AEF, \Delta BEG$ and ΔCFG

$=\frac{\sqrt{3}}{4}\left\{\left(\frac{2a}{5}\right)^2+\left(\frac{2a}{5}\right)^2+\left(\frac{2a}{5}\right)^2\right\}$

$=\frac{3\sqrt{3}}{4}\times\frac{4a^2}{25}=\frac{3\sqrt{3}}{25}a^2$ cm

$\frac{\text{Area of }\Delta ABC}{\text{Area of three small triangles}}=\frac{\sqrt{3}/4a^2}{3\sqrt{3}/25a^2}$

$\frac{\text{Area of }\Delta ABC}{\text{Area of three small triangles}}-1=\frac{25}{12}-1$

$\frac{\text{Area of }\Delta ABC-\text{Area of three small triangles}}{\text{Area of three small triangles}}$

$=\frac{25-12}{12}$

$=\frac{\text{Area of remaining triangle}}{\text{Area of three small triangles}}=\frac{13}{12}$

$=\frac{\text{Area of three small triangles}}{\text{Area of remaining triangle}}=\frac{12}{13}$

55. (a)

According to the question,

One day work of Arjun $=\frac{1}{12}$ part

One day work of Bheem $=\frac{1}{15}$ part

Let, one day work of Chetan $=\frac{1}{x}$ part

One day work of all three $=\frac{1}{12}+\frac{1}{15}+\frac{1}{x}$

$\frac{1}{5}=\frac{5+4}{60}+\frac{1}{x}$

$\frac{1}{x}=\frac{1}{5}-\frac{9}{60}$

$\frac{12-9}{60}=\frac{1}{x}$

$\frac{1}{x}=\frac{3}{60}=\frac{1}{20}$

So time taken by Chetan to finish the work alone = 20 days

56. (b)

Total distance = 30 km.
Distance traveled at a speed of 6 Km./hr.

$=\frac{3}{5}$ of total distance

$=30\times\frac{3}{5}$

= 6 × 3
= 18 km

By 2 Km./hr. reduction in speed (6 – 2) = 4 Km./hr.
Hence the last 12 km distance will run at a speed of 4 Km./hr.
Hence time taken to cover the entire distance of 30 km

$=\frac{18}{6}+\frac{12}{4}$ = 3 + 3 = 6 hours

Total time taken by man to finish journey = 6 : 30 + 6 hours

= 12:30 pm

57. (c)

$A = ₹\ 2360$

$P = ₹\ 2000$

$t = 3$ years

$$A = P\left(1+\frac{rt}{100}\right)$$

$$2360 = 2000\left(1+\frac{3r}{100}\right)$$

$$\Rightarrow \quad \frac{2360}{2000}-1=\frac{3r}{100}$$

$$\Rightarrow \quad \frac{360}{2000}=\frac{3r}{100}$$

$$\boxed{r = 6\%}$$

For 5 years

$$A = 2000\left(1+\frac{5\times 6}{100}\right)$$

$$= 2000\times\frac{130}{100} = ₹2600$$

58. (d)

Let the cost price of total goods = 100x

According to the question,

$$\text{Total selling price} = \frac{40x\times(100-2)}{100}+\frac{60x(100+4)}{100}$$

$$\Rightarrow \quad \frac{40x\times 98+60x\times 104}{100}=\frac{3920x+6240x}{100}$$

$$\Rightarrow \quad \frac{10160x}{100}=101.6x$$

Profit = 101.6x – 100x = 1.6x

1.6x = 250

$$x = \frac{250}{1.6}$$

$$\text{Now the cost price of goods} = \frac{250}{1.6}\times 100 = ₹\ 15625$$

59. (d)

Given,

$x + y = 8$ .....(i)

$xy = 15$ .....(ii)

From the eq. (i)

$(x + y)^2 = 8^2$

$x^2 + y^2 + 2xy = 64$

$x^2 + y^2 + 2 \times 15 = 64 \qquad \{\because xy = 15\}$

$(x^2 + y^2) = 34$

$(x^2 + y^2)^2 = (34)^2$

$x^4 + y^4 + 2x^2y^2 = 1156$

$x^4 + y^4 = 1156 - 2 \times (15)^2$

$x^4 + y^4 = 706$

60. (b)

Given

$$2-\frac{\sin^2\alpha}{1-\cos\alpha}+\frac{1-\cos\alpha}{\sin\alpha}-\frac{\sin\alpha}{1+\cos\alpha}$$

$$=2-\left[\frac{\left(1-\cos^2\alpha\right)}{1-\cos\alpha}\right]+\frac{(1-\cos\alpha)(1+\cos\alpha)-\sin^2\alpha}{\sin\alpha(1+\cos\alpha)}$$

$$= 2-(1+\cos\alpha)+\frac{\left(1-\cos^2\alpha\right)-\sin^2\alpha}{\sin\alpha(1+\cos\alpha)}$$

$$= 2-1-\cos\alpha+\frac{\sin^2\alpha-\sin^2\alpha}{\sin\alpha(1+\cos\alpha)}$$

$$= 1-\cos\alpha+0$$

$$= 1-\cos\alpha$$

61. (d)

Given observations– 60, 68, 70, 72, 74, 76, 78, 80

Number of term = 8 (even)

$$\text{Median} = \frac{\left(\frac{n}{2}\right)^{th}\text{term}+\left(\frac{n}{2}+1\right)^{th}\text{term}}{2}$$

$$= \frac{\left(\frac{8}{2}\right)^{th}\text{term}+\left(\frac{8}{2}+1\right)^{th}\text{term}}{2}$$

$$= \frac{4^{th}\text{ term}+5^{th}\text{ term}}{2}$$

$$= \frac{72+74}{2}$$

$$= \frac{146}{2}$$

Median = 73

Number of term on removing 70 = 7 (odd)

$$\therefore \quad \text{Median} = \frac{n+1}{2}\text{ th term}$$

$$= \frac{7+1}{2} = 4^{th}\text{ term}$$

$$= 74$$

Then, Increased median = 74 – 73

= 1

62. (d)

$\sqrt{4.2436}$ = Square root of 4.2436

	206
2	42436
+2	4
406	×2436
6	2436
	××××

$$\sqrt{4.2436} = \sqrt{\frac{42436}{10000}} = \frac{206}{100} = 2.06$$

63. (a)

Let the present age of Rajan = x years

Then present age of sister = (x – 10) years

According to the question,

$$x - 8 = \frac{5}{6}x$$

$$x - \frac{5}{6}x = 8$$

$$\frac{x}{6} = 8$$

x = 48 years

Therefore, present age of sister = 48 – 10 = 38 years

64. (d)

Part filled by pipe A in 1 hour $= \frac{1}{6}$

Part filled by pipe B in 1 hour

In intially stage, time taken by both pipe to fill the tank in 1 hour.

$$= \frac{1}{6} + \frac{1}{30} = \frac{5+1}{30} = \frac{6}{30} = \frac{1}{5}$$

Due to leakage let the time taken in x hours to empty the tank.

According to the question,

$$\frac{1}{6} + \frac{1}{30} - \frac{1}{x} = \frac{1}{5 + \left(\frac{30}{60}\right)}$$

$$\Rightarrow \quad \frac{5+1}{30} - \frac{1}{x} = \frac{1}{5 + \frac{1}{2}}$$

$$\Rightarrow \quad \frac{6}{30} - \frac{1}{x} = \frac{2}{11}$$

$$\Rightarrow \quad \frac{1}{x} = \frac{6}{30} - \frac{2}{11}$$

$$\Rightarrow \quad \frac{1}{x} = \frac{66 - 60}{30 \times 11}$$

$$\Rightarrow \quad \frac{1}{x} = \frac{6}{30 \times 11}$$

$$\Rightarrow \quad \frac{1}{x} = \frac{1}{5 \times 11}$$

$$\frac{1}{x} = \frac{1}{55}$$

So, x = 55 hours

65. (c)

$$x \times \frac{10}{100} = y \times \frac{15}{100}$$

$$10x = 15y$$

$$\frac{x}{y} = \frac{15}{10}$$

$$\frac{x}{y} = \frac{3}{2}$$

or x : y = 3 : 2

66. (c)

As per universal law of gravitations,

$$F = \frac{GMm}{d^2}$$

$$G = \frac{Fd^2}{Mm}$$

Where,

The SI units of Gravitational force = Newton (N)

The SI unit of Distance = Meter (m)

The SI units of Masses (M, m) = kg

Therefore, The SI unit of G = Nm^2kg^{-2} or $\frac{Nm^2}{Kg^2}$

67. (d)

Given,

F = 40N

$m_1 = 10$ kg, $m_2 = 6$ kg, $m_3 = 4$ kg

We know that,

F = ma

Total mass of the system

$m = m_1 + m_2 + m_3$

$= 10 + 6 + 4$

$= 20$ kg

Then,

Total acceleration of the system

$40 = 20 \times a \Rightarrow \boxed{a = 2m/s^2}$

Now,

Tension T_2 will be,

$T_2 = (m_1 + m_2)\, a = (10+6) \times 2$

$T_2 = 16 \times 2$

$\Rightarrow \quad \boxed{T_2 = 32N}$

68. (b)

$$\text{Speed of bullet} = \frac{\text{distance}}{\text{time}}$$

$$= \frac{90}{0.2} \times \frac{18}{5}$$

= 1620km/hr

69. (d)

Given,

Work (w) = 1200 J

Displacement (d) = 20 m

Force (F) = ?

Work = Force × displacement

$\Rightarrow$ $1200 = F \times 20$

$\Rightarrow$ $F = \frac{1200}{20}$

So, $F = 60$ N

70. (d)

We know that, $°C = \frac{5}{9}(F - 32)$

$C = \frac{5}{9}(167 - 32)$

$= \frac{5}{9} \times 135$

$C = 75°$

71. (b)

A ferrite beads is a type of choke that suppresses high-frequency electronic noise in electronic circuits. While toroidal cores are small MnZn based soft ferrite cores.

Both (ferrite beads and toroidal cores) are related to inductors.

72. (c)

SI unit of pressure is Pascal

$$\text{Pressure} = \frac{\text{Force}}{\text{Area}} = \frac{N}{m^2} = \frac{Kg}{m.sec^2}$$

Dimension of pressure $\rightarrow [ML^{-1}T^{-2}]$

73. (b)

In resistor 4 colour strips

Ist strip –Blue , Value – 6

IInd strip – Green , Value – 5

IIIrd strip – Red, Multiplier –10^2

IVth strip – Gold, tolerance – ± 5%

Formula - $\boxed{R = AB \times 10^C \pm \text{Tolerance}}$

Resistance of resistor = $(65 \times 10^2 \pm 5\%)\ \Omega$

Colour	Ist band	IInd band	IIIrd band	IVth band Tolerance
Black	0	0	$10^0\Omega$	
Brown	1	1	$10^1\Omega$	±1%
Red	2	2	$10^2\Omega$	±2%
Orange	3	3	$10^3\Omega$	
Yellow	4	4	$10^4\Omega$	
Green	5	5	$10^5\Omega$	±0.5%
Blue	6	6	$10^6\Omega$	±0.25%
Violet	7	7	$10^7\Omega$	±0.10%
Grey	8	8	$10^8\Omega$	±0.05%
White	9	9	$10^9\Omega$	
Gold			$10^{-1}\Omega$	±5%
Silver			$10^{-2}\Omega$	±10%

74. (d)

We know that-

Magneto motive force or MMF = ϕ.S

Where,

$\phi \rightarrow$ Flux

S $\rightarrow$ Reluctance

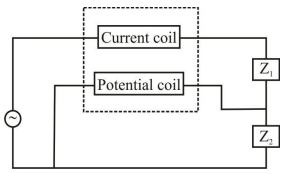
$\therefore$ $S = \frac{MMF}{\phi} = \frac{AT}{wb}$

The reluctance (S) opposes the flux production in a magnetic circuit.

$$S = \frac{\ell}{\mu a} = \frac{m}{H/m \times m^2} = \frac{1}{H} = H^{-1}$$

The unit of reluctance is H^{-1}

75. (c)

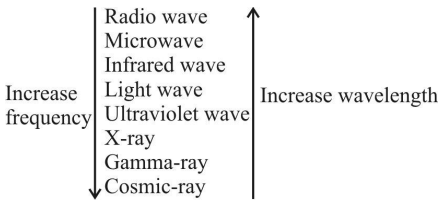


- The potential coil is connected across Z_2.
- It reads the voltage across Z_2 only.
- So, wattmeter reads only power consumed by Z_2.

76. (a)

Gamma-rays of electromagnetic wave has highest frequency.

The different wave present in the electromagnetic spectrum (in the order of increasing frequency) are as follows.



77. (a)

Electric field intensity at any point is equal to potential gradient at that point.

The potential gradient at a point in an electric field is the rate of change of potential with respect to distance, while the rate of change of this potential is considered at that point in the direction of the electric force.

78. (c)

Ampere's law relates to magnetic field and current.

$$\left[\oint \vec{H}.d\vec{\ell} = I_{enclosed}\right]$$

79. (b)

Electric field is a vector quantity because it has both magnitude and direction. The electric field is a ratio of electric force and charge. The charge is a scalar quantity but the electric force is a vector quantity and therefore the electric field has magnitude and direction both.

$$\left[\vec{E} = \frac{\vec{F}}{Q}\right]$$

80. (b)

Metal film resistors are made by depositing a very thin layer of metal on Bakelite Sheet.

81. (b)

The large number of free electrons are available in outermost orbit are called conductor.

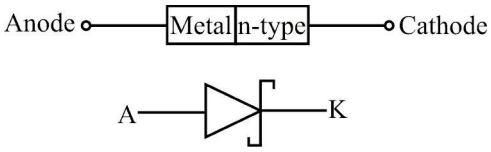
Example- Cu, Ag, Al etc.

82. (d)

The atomic concentration of semiconductor can not be determined by hall effect. While the type of semiconductors (P type or N-type) can be determined by hall effect and the carrier concentration and mobility of the semiconductor can also be determined. The information of a substance is also obtained from the hall effect. whether the substance is metal, semiconductor or an insulator.

83. (c)

The Schottky diode also known as Schottky barrier diode or hot-carrier diode, is a semiconductor diode formed by the junction of a semiconductor with a metal



84. (c)

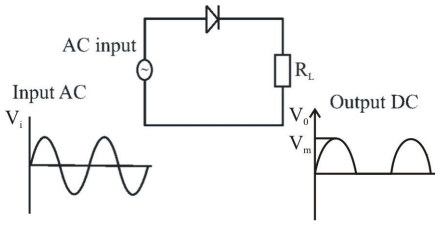
- BJT — Early effect
- Mosfet —Flat band voltage.
- Laser — Population inversion.
- JFET — Pinch-off voltage.

85. (a)

MOSFET is a voltage controlled current source device. The drain current (I_D) is controlled by the gate voltage. There are two types of MOSFET enhancement and depletion.

86. (b)

Positive Half wave Rectifier:- Half wave rectifies a positive half cycle of AC input. It remains turn off in the negative half cycle.



87. (c)

If biasing is not done in the amplifier circuit, it results in unfaithful amplification, because the Q-point will not be fixed, that is, the Q-point will be either in saturation or will go into cut-off.

88. (a)

The bandwidth of an RF tuned amplifier is depend on Q-factor of the tuned input circuit.

$$BW = \frac{f_r}{Q}$$

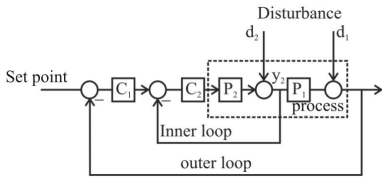
Where, f_r = Frequency of tuned amplifier

BW = Bandwidth

Q = Quality factor

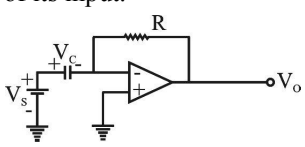
89. (c)

The cascade control scheme consists of two nested loops. The inner loop contains the secondary controller and the outer loop contains the primary controller. Cascade controllers are used to reject a plant fault before it spreads.



90. (b)

In differentiator feedback element is resistor. A differentiator circuit produces an output proportional to the derivative of its input.



$$V_O = -RC\frac{dV_s}{dt}$$

- It is called the high pass filter.

91. (a)

Voltage regulation- The change in the value of the regulated output voltage when load current is changed from no load to full load (or in other words to change the load current from zero to maximum rated value) to the change in the value of regulated output voltage is called voltage regulation.

$$\% \text{ Voltage regulation} = \frac{V_{NL} - V_{FL}}{V_{FL}} \times 100$$

In ideal condition $V_{NL} = V_{FL}$

$$\% \text{ Voltage regulation} = \frac{V_{NL} - V_{NL}}{V_{FL}} \times 100 \quad = 0\%$$

- The ideal voltage regulation is 0%.

It should be as low as possible for proper operation of electrical equipment.

92. (b)

The detector that minimizes the error probability is called as maximum likelihood detector.

93. (a)

Identified name of instrument shown in figure is noise dosimeter.

Noise dosimeter - Noise dosimeter is an instrument for measuring noise pollution. There is a microphone in it, which checks the noise pollution of any city and records the noise of the city. The level of noise pollution is displayed on the screen of the device.

94. (a)

For the measurement of high resistance -

- Loss of charge method.
- Megger
- Direct deflection method
- Mega ohm bridge

Classification of resistance -

1. Low resistance - $R \leq 1\Omega$
2. Medium resistance - $1\ \Omega < R < 100\ k\Omega$
3. High resistance - $R > 100\ k\Omega$

- Low resistance standard are four terminal type.
- Medium resistance standard are two terminal type.
- High resistance standard are three terminal type.

Low resistance method -

- Kelvin's double bridge method
- Potentiometer method
- Voltmeter-Ammeter method

Medium resistance -

1. Substitution method
2. Wheatstone bridge method
3. Ammeter-Voltmeter method
4. Ohmmeter

95. (c)

The phenomenon of creeping occurs in energy meter. Creeping in energy meter is the phenomenon in which the aluminium disc rotates continuously when only the voltage is supplied to the pressure coil and no current flows through the current coil.

Prevention of creeping -

$\Rightarrow$ The creeping is avoided by drilling the hole in the disc. The holes should be diametrically opposite to each other.

96. (c)

Seismic transducer is used for the measurement of acceleration.

- Seismic transducer may be used is displacement mode.
- Seismic transducer used for measuring the vibration of ground. It is also called as accelerometer.

$$\omega_n = \sqrt{\frac{k}{m}}$$

97. (b)

Parity bits are used for the purpose of error detection in digital systems.

Parity bit is the simplest and frequently used method for detecting an error. In this method we have to join a parity bit to the end of the data structure.

There are two techniques used in parity bit are-

- Simple parity check.
- Two dimensional parity check.

98. (c)

There are two theorems of Demorgan -

Demorgan's first theorem- According to this theorem, the complement of a sum is equal to the product of the individual complements of the quantities used in it.

i.e.

$$\overline{A + B + C + ... + N} = \overline{A}.\overline{B}.\overline{C}.....\overline{N}$$

Demorgan's second theorem - According to this theorem, the complement of a product is equal to the sum of the separate complements of the quantities.

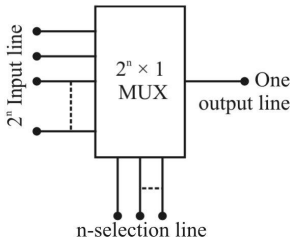
i.e.

$$\overline{A.B.C.....N} = \overline{A} + \overline{B} + \overline{C} + ... + \overline{N}$$

99. (c)

Multiplexer circuit can be used as a parallel to series converter.

- It is also called data selector Circuit.
- It is also called Many to One Circuit.
- Multiplexer is also called universal logic converter.



100. (d)

The fan-out of a 7400 NAND gate is 10 TTL. TTL logic family maximum fan-out = 10

7400 class ICs-

7400	–	quad 2 input NAND gate
7402	–	quad 2 input NOR gate
7404	–	hex inverter
7408	–	quad 2 input AND gate
7432	–	quad 2 input OR gate
7486	–	quad 2 input XOR gate