

Advanced Level – Information and Communication Technology
2018 MCQ Past Paper

1. Consider the following three numbers in decimal, octal and hexadecimal notations, respectively.

A - 231_{10}
B - 347_8
C - $E7_{16}$

Which of the above is/are equivalent to 11100111_2 , in binary notation?

- (1) A only (2) B only (3) A and C only (4) B and C only (5) All A, B and C

2. What is the decimal equivalent to the binary 110101.11_2 ?

- (1) 53.00_{10} (2) 53.50_{10} (3) 53.75_{10} (4) 54.25_{10} (5) 54.75_{10}

1	1	0	1	0	1	. 1	1
32	16	8	4	2	1	0.5	0.25
$32+16+4+1 = 53$						$0.5+0.25 = 0.75$	

3. Which of the following describes the term ‘telecommuting’?

- (1) ability of an employee to perform duties conveniently from different geographical locations using modern technology

(2) having online meetings with people at different geographic locations
(3) using ICT for community services
(4) using web-based applications to retrieve information
(5) performing financial transactions online

Telecommuting is the practice of working from home, making use of the internet, email, and the telephone

4. Consider the following statements.

- A - Word size is the number of bits processed by the CPU of a computer in a single action (instance).
B - Data bus width and register width are directly related to word size of a computer.
C - Word size of modern general purpose computers is either 32 or 64 bits.

Which of the above statements is/are correct?

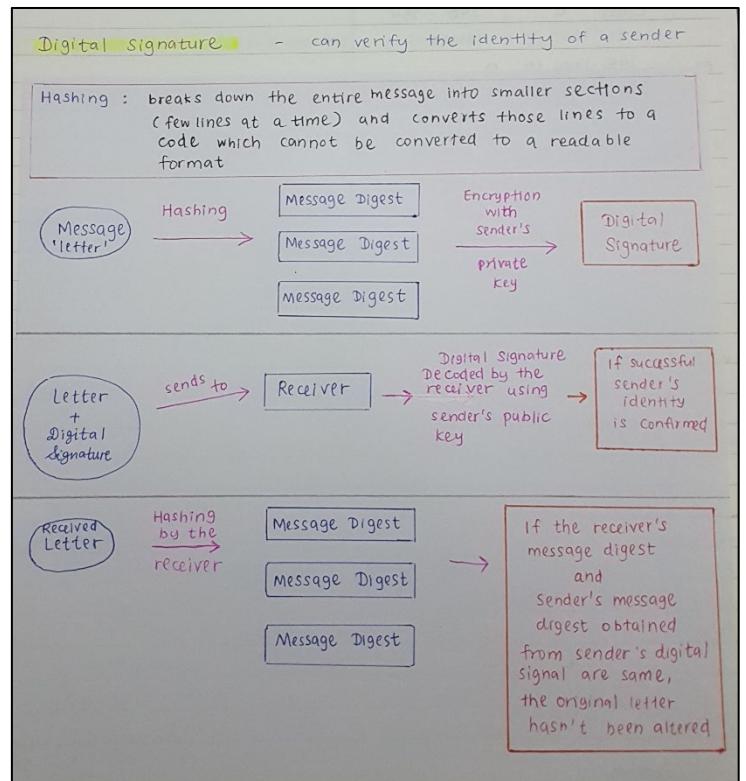
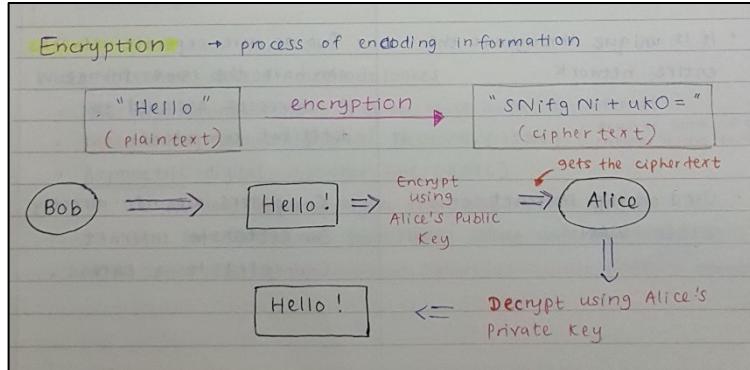
- (1) A only (2) B only (3) C only
(4) B and C only (5) All A, B and C

Word size refers to the amount of data a CPU’s internal data registers can hold and process at one time. Modern desktop computers have 64-bit words or 32-bit words.

5. Consider the following statements.

- A - In public key encryption systems each pair of communicating entities share a single key for encryption and decryption.
 - B - Phishing is a type of social engineering attack often used to steal user data such as user name and password.
 - C - Port scanning is a method which can be used by attackers to identify open ports or services on a network host.
 - D - Digital signatures can be used for email message authentication.

Which of the above statements are correct?



6. Consider the following statements.

- A - DHCP server in an IP network dynamically allocates IP addresses to network devices.
 - B - DNS server translates domain names to IP addresses.
 - C - FTP server caches the recently accessed web pages.

Which of the above statements is/are correct?

A – DHCP server	A network server which automatically provides and assigns IP addresses, default gateways and other network parameters to client devices.
B – DNS server	Responsible for translating domain names to numeric IP addresses leading them to the correct website
C – FTP server	Allows users to upload and download files

7. Consider the following statements.

- A - TCP is a connection oriented and a reliable protocol.
- B - UDP is a connectionless and an unreliable protocol.
- C - TCP and UDP are transport layer protocols.

Which of the above statements is/are correct?

- (1) A only
- (2) B only
- (3) A and B only
- (4) B and C only
- (5) All A, B and C

Transport layer protocols	
TCP	UDP
<u>3 way handshake</u> 1. SYN 2. SYN-ACK 3.ACK	Request → Response
Connection-oriented (Establish→Maintain→Close)	Connectionless
Guarantee delivery of data packets if possible	Do not guarantee
Retransmission of lost data packets is possible	Not possible
Reliable	Unreliable
Data packets arrive in order	Application layer manage order if needed to be ordered
Comparatively slower	Much faster, simpler, efficient
Checks the readiness of the receiver	Do not check
Extensive error checking (parity)	Basic error checking mechanisms
Does not support broadcasting	Does support broadcasting
E.g. Email, Web pages (HTTP); FTP	E.g. Live video streaming DNS, DHCP

8. In the OSI reference model, the network layer is responsible for communication.

Which of the following is suitable to fill the blank in the above statement?

- (1) node to node
- (2) source to destination
- (3) hop to hop
- (4) switch to router
- (5) process to process

Types of data deliveries

Node to node → Data link layer

Host to host → Network layer

- “*Host-to-host delivery*” refers to the process of delivering data or messages from one individual host (a computer or any networked device) to another host within a network. In the context of networking, a “host” is any device connected to a network that has a unique identifier, such as an IP address.

Process to process → Transport layer

9. Which of the following indicates the number of host bits and the number of IP addresses respectively in a class C network?

- (1) 8 and 256
 (4) 16 and 65536

- (2) 8 and 65536
 (5) 24 and 256

- (3) 16 and 256

Class	Range		Subnet mask	Net bits	Host bits	Number of IP addresses/ Hosts
A	0 – 127	For internetwork communication	255. 0. 0. 0	8 bits	24 bits	$2^{24} = 16,777,216$
B	128 – 191		255. 255. 0. 0	16 bits	16 bits	$2^{16} = 65,536$
C	192 – 223		255. 255. 255. 0	24 bits	8 bits	$2^8 = 256$
D	224 – 239	Reserved for multicasting				
E	240 – 254	Reserved for research and experiments				

10. To which of the following network classes does the IP address 192.248.254.1 belong?

- (1) A (2) B (3) C (4) D (5) E

Class	Range
A	0 – 127
B	128 – 191
C	192 – 223
D	224 – 239
E	240 – 254

11. In the OSI reference model, a protocol data unit of the network layer is referred to as a

Which of the following terms is suitable to fill the blank in the above statement?

- (1) frame (2) segment (3) window (4) message (5) packet

7 layers of OSI reference model (Bottom to Top)		
Layer	Explanation	Names for the data units at each layer
1 st layer – Physical layer	It provides a physical medium through which bits are transmitted	Bits
2 nd layer – Data link layer	It is used for error free transfer of data frames	Frames
3 rd layer – Network layer	It is responsible for moving the packets from source to destination	Packets / Datagrams
4 th layer - Transport layer	It provides reliable message delivery from process to process	Segments
5 th layer – Session layer	It is used to establish, manage and terminate the sessions	Data
6 th layer – Presentation layer	It is responsible for translation, compression and encryption	Data
7 th layer – Application layer	It provides the services to the user	Data

12. Which of the following correctly lists the given computer storage components in the **descending order of access speed**?

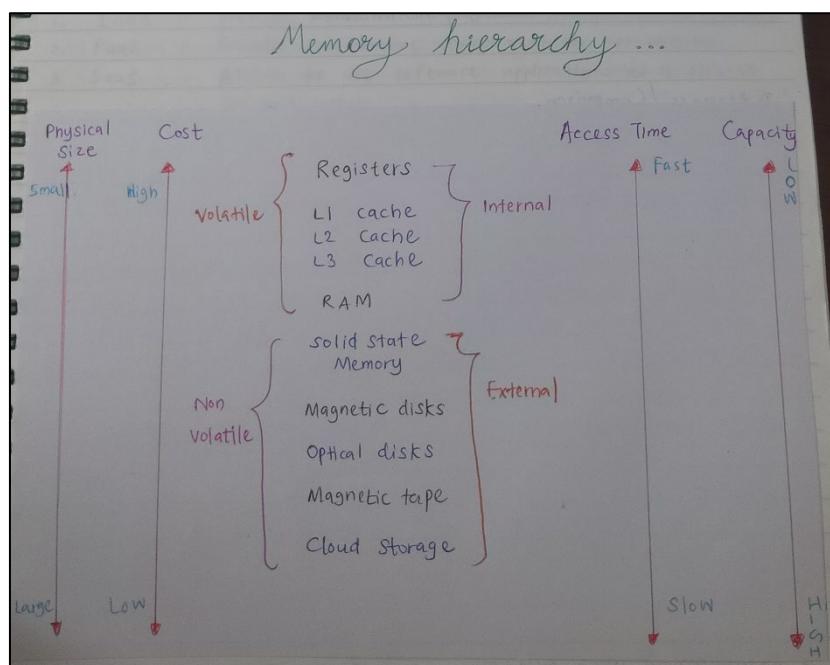
- (1) cache memory > main memory > magnetic disk > register
- (2) magnetic disk > main memory > cache memory > register
- (3) magnetic disk > main memory > register > cache memory
- (4) register > cache memory > main memory > magnetic disk
- (5) register > main memory > magnetic disk > cache memory

13. Consider the following computer memory types.

- A - CMOS memory
- B - cache memory
- C - flash memory
- D - hard disk
- E - RAM
- F - registers

Which of the above are *volatile* memory types?

- (1) A, C and D only
- (2) A, D and E only
- (3) B, E and F only
- (4) C, E and F only



A – CMOS	Non-volatile
B – Cache	Volatile
C – Flash	Non-volatile
D – Hard disk	Non-volatile
E – RAM	Volatile
F – Register	Volatile

Volatile → Maintains its data while the device is powered

Non-volatile → Does not lose content when power is lost

14. Consider the following statements regarding HTML.

- A - HTML frames are used to divide a browser window into multiple sections.
- B - The rows attribute of <frameset> tag defines the number of vertical frames in an HTML page.
- C - <frameset cols="100, 500, 100"> creates vertical frames with the specified number of millimetres.

Which of the above statement/s is/are correct?

- (1) A only
- (2) B only
- (3) A and B only
- (4) B and C only
- (5) All A, B and C

15. Consider the following HTML code with labels ① – ③ and the expected output.

HTML code	Expected output
<pre><html> <head> <title>Coffee Shop</title> </head> <body> <①> <②>Coffee</②> <③>black hot drink</③> <②>Milk</②> <③>white cold drink</③> </①> </body> </html></pre>	<p>Coffee black hot drink</p> <p>Milk white cold drink</p>

What is the correct order of tags for replacing the labels ①, ② and ③ ?

- (1) dt, dl, dd
- (2) dl, dt, dd
- (3) dd, dt, dl
- (4) dt, dd, dl
- (5) dl, dd, dt

dl → definition list

dt → definition title

dd → definition data

16. Consider the following HTML code for creating a table.

```
<html>
<head><style> table,th,td{border: 1px solid black} </style>
</head><body>
<table>
<tr><th> Name:</th> <td> Kamal </td> </tr>
<tr><th rowspan="2"> Telephone:</th> <td> 55577854 </td> </tr>
<tr><td> 55577855 </td> </tr>
</table>
</body>
</html>
```

Which of the following is the output generated by the above code?

<table border="1"><tr><td>Name:</td><td>Kamal</td></tr><tr><td>Telephone:</td><td>55577854</td></tr><tr><td>Telephone:</td><td>55577855</td></tr></table>	Name:	Kamal	Telephone:	55577854	Telephone:	55577855	<table border="1"><tr><td>Name:</td><td>Telephone:</td></tr><tr><td>Kamal</td><td>55577854</td></tr><tr><td></td><td>55577855</td></tr></table>	Name:	Telephone:	Kamal	55577854		55577855	<table border="1"><tr><td colspan="2">Name: Telephone:</td></tr><tr><td>Kamal</td><td>55577854</td></tr><tr><td></td><td>55577855</td></tr></table>	Name: Telephone:		Kamal	55577854		55577855	<table border="1"><tr><td>Name:</td><td>Kamal</td></tr><tr><td>Telephone:</td><td>55577854</td></tr><tr><td>Telephone:</td><td>55577855</td></tr></table>	Name:	Kamal	Telephone:	55577854	Telephone:	55577855	<table border="1"><tr><td>Name:</td><td>Kamal</td></tr><tr><td>Telephone:</td><td>55577854</td></tr><tr><td></td><td>55577855</td></tr></table>	Name:	Kamal	Telephone:	55577854		55577855
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(1)	(2)	(3)	(4)	(5)																														

17. Which of the following is the correct HTML statement for inserting an image?

- (1) ``
- (2) `image.gif`
- (3) ``
- (4) `<image src="image.gif" href="MyImage">`
- (5) ``

The `` tag has two required attributes:

- `src` - Specifies the path to the image
- `alt` - Specifies an alternate text for the image

Syntax

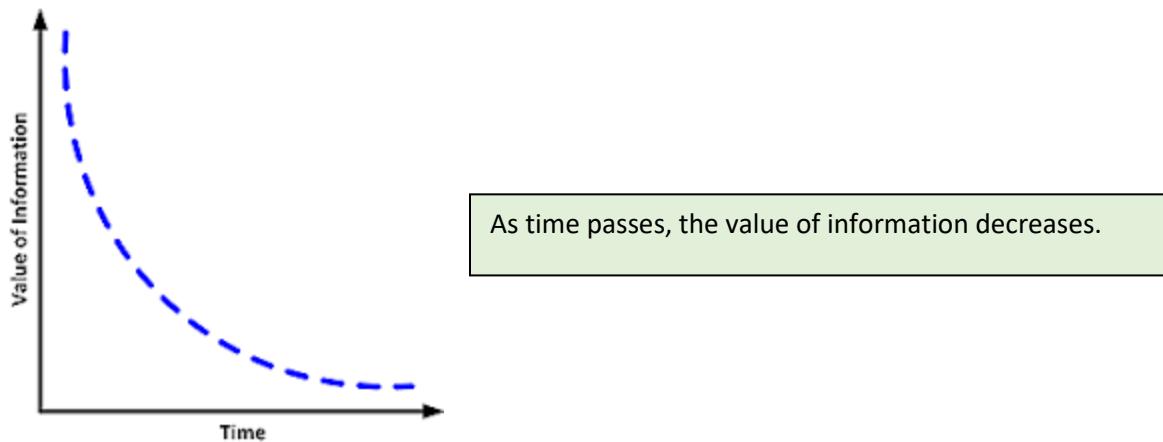
```

```

18. Consider the space voyage for landing a human being on the surface of the moon for the first time in 1969. The entire event was broadcast on the radio in Sri Lanka by several commentators based in Sri Lanka and the USA.

Which of the following events relates to the highest value of information?

- (1) counting down for the launching of the rocket that carried the space shuttle
- (2) the moment the space shuttle escaped from the gravitational field of the earth
- (3) the moment the space shuttle entered the moon's gravitational field
- (4) the moment the astronaut Neil Armstrong placed his first step on the surface of the moon
- (5) the moment the astronauts landed on the sea in their return voyage to earth



19. Consider the following statements related to the development of computers over time.

- A - Both processing speed and power consumption of computers have increased.
- B - Processing speed of a computer has increased while physical size of a computer has decreased.
- C - Both power consumption and the physical size of a computer have reduced.

Which of the above statements is/are correct?

- (1) A only
- (2) B only
- (3) A and B only
- (4) B and C only
- (5) All A, B and C

A	Incorrect	Processing speed increased while power consumption reduced
B	Correct	
C	Correct	

20. Consider the following statements.

- A - Providing the personal information of customers stored in a computer by a vehicle servicing centre to an insurance agent is, an issue related to the privacy of customers.
- B - Providing a copy of a single user licensed software to another party is a piracy issue related to the copyright owner of the software.
- C - Unauthorized access to another person's computer is both illegal and unethical.

Which of the above statements is/are valid?

- (1) A only
- (2) B only
- (3) A and B only
- (4) B and C only
- (5) All A, B and C

21. Consider the following Boolean expression.

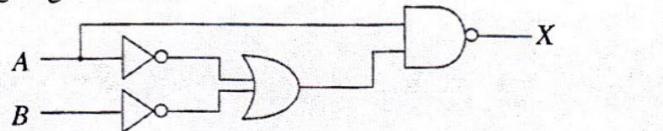
$$\overline{A + B \cdot \bar{C}}$$

Which of the following is/are equivalent to the above expression?

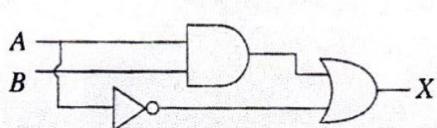
- I. $\bar{A} + \bar{B} \cdot C$
 - II. $\bar{A} \cdot B \cdot \bar{C}$
 - III. $\bar{A} \cdot \bar{B} + \bar{A} \cdot C$
- (1) I only
 - (2) II only
 - (3) III only
 - (4) I and II only
 - (5) II and III only

$$\begin{aligned} & \overline{A + B \cdot \bar{C}} \\ = & \boxed{\bar{A} \cdot \bar{B} \cdot \bar{C}} \quad \text{De Morgan's Law} \\ = & \bar{A} \cdot \bar{B} + \bar{C} \quad \text{De Morgan's Law} \\ = & \bar{A} \cdot \bar{B} + C \quad \text{Double complement Law} \\ = & \boxed{\bar{A} \cdot \bar{B} + \bar{A} \cdot C} \quad \text{Distributive Law} \end{aligned}$$

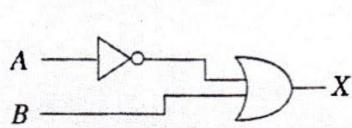
22. Consider the following logic circuit.



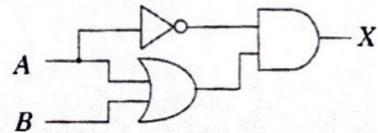
Which of the following circuit/s is/are equivalent to the above circuit?



I

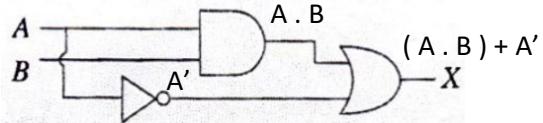
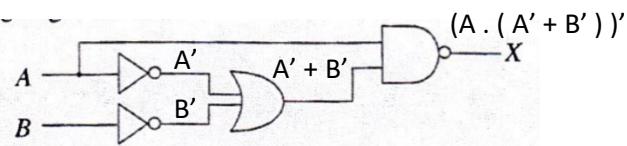


II

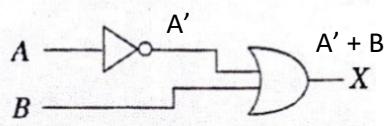


III

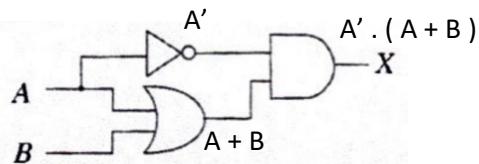
- (1) I only (2) II only (3) III only (4) I and II only (5) All I, II and III



I



II



III

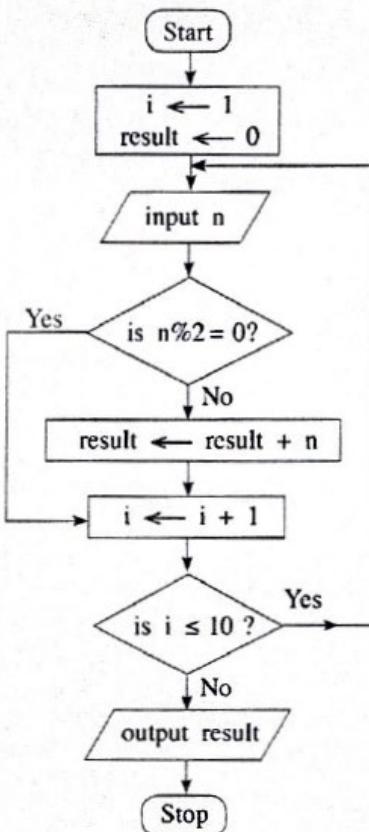
$$(A . (A' + B'))' \rightarrow A' + AB \rightarrow A' + A . A' + B$$

$$\text{I. } (A.B) + A' = A + A' . B + A' \rightarrow A' + B \text{ (Redundancy law)}$$

$$\text{II. } A' + B$$

$$\text{III. } A' . (A + B) = A'A + A'B$$

- Questions 23 - 25 are based on the flowchart below. (Note that $n\%2$ represents $n \bmod 2$.)



23. Which of the following is/are correct regarding the algorithm expressed by the above flowchart?

- A - It takes 10 inputs.
 B - It computes the sum of the even numbers in the input.
 C - To take 100 inputs, only modifying "is $i \leq 10$?" will be sufficient.

- (1) A only (2) B only (3) C only (4) A and B only (5) A and C only

A	Correct	Takes 10 inputs
B	Incorrect	Computes the sum of odd numbers in the input
C	Correct	As i can be considered as the count, modifying $i \leq 10$ will be sufficient

24. If the following were fed as inputs to the above algorithm, what will be the output?
 2, 8, 9, 3, 4, 10, 6, 5, 13, 19, 12, 7

- (1) 10 (2) 30 (3) 42 (4) 49 (5) 56

no of inputs	i	result	n	n%2=0	result=result + n	i = i + 1	i <= 10	result
1	1	0	2	2%2=0 (Yes)	-	2 = 1 + 1	2 <= 10 (Yes)	
2			8	8%2=0 (Yes)	-	3 = 2 + 1	3 <= 10 (Yes)	
3			9	9%2=0 (No)	9 = 0 + 9	4 = 3 + 1	4 <= 10 (Yes)	
4			3	3%2=0 (No)	12 = 9 + 3	5 = 4 + 1	5 <= 10 (Yes)	
5			4	4%2=0 (Yes)	-	6 = 5 + 1	6 <= 10 (Yes)	
6			10	10%2=0 (Yes)	-	7 = 6 + 1	7 <= 10 (Yes)	
7			6	6%2=0 (Yes)	-	8 = 7 + 1	8 <= 10 (Yes)	
8			5	5%2=0 (No)	17 = 12 + 5	9 = 8 + 1	9 <= 10 (Yes)	
9			13	13%2=0 (No)	30 = 17 + 13	10 = 9 + 1	10 <= 10 (Yes)	
10			19	19%2=0 (No)	49 = 30 + 19	11 = 10 + 1	11 <= 10 (No)	49
11			12	12%2=0				
12			7	7%2=0				

25. For any given input, outputs of which of the following Python programs will be the same as the output produced by the algorithm in the above flowchart?

I -
 $i = 1$
 $result = 0$
 $while (i <= 10):$
 $\quad n = int(input())$
 $\quad if (n \% 2 != 0):$
 $\quad \quad result += n$
 $\quad i = i + 1$
 $print result$

II -
 $result = 0$
 $for i in range(10):$
 $\quad n = int(input())$
 $\quad if (not(n \% 2 == 0)):$
 $\quad \quad result = result + n$
 $\quad print result$

III -
 $result = 0$
 $i = 1$
 $while True:$
 $\quad n = int(input())$
 $\quad if (not(n \% 2 == 0)):$
 $\quad \quad result = result + n$
 $\quad i = i + 1$
 $\quad if (i > 10):$
 $\quad \quad break$
 $\quad print result$

- (1) I only (2) II only (3) III only (4) I and II only (5) All I, II and III

26. Consider the following statements regarding databases.

- A - Candidate key is a column, or a set of columns that can uniquely identify a row in a table.
- B - Alternate key is any candidate key that has not been selected as the primary key.
- C - Primary key can have a NULL value.

Which of the above statements is/are correct?

- (1) A only
- (2) B only
- (3) A and B only
- (4) A and C only
- (5) All A, B and C

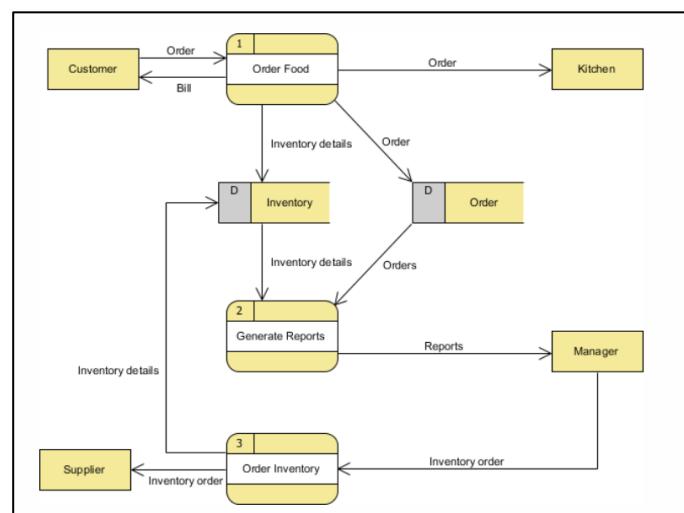
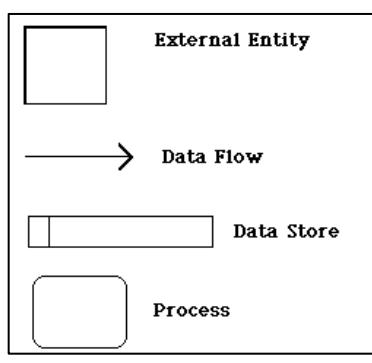
Primary Key	<ul style="list-style-type: none"> • Uniquely identify all table records , not null • A table can be created without the primary key
Foreign Key	<ul style="list-style-type: none"> • Link two tables together • Refers to the primary key of a different table • A foreign key can contain duplicate values
Alternate Key	<ul style="list-style-type: none"> • The key that has not been selected to be the primary key, but are candidate keys • If a table consists of only one candidate key then it becomes the primary key. Then there will be no alternate key
Compound Key	<ul style="list-style-type: none"> • A combination of two or more columns in a table that can be used to uniquely identify each row in the table (can be a primary key)
Candidate Key	<ul style="list-style-type: none"> • A column or set of columns in a table that can uniquely identify any record without referring to any other data (can be a primary key) • Each table may have one or more candidate keys but one primary key

27. Consider the following statements relevant to external entities of Data Flow Diagrams.

- A - An external entity can be a person, system or organization that has predefined behaviour.
- B - An external entity can be a source of input data for a process or/and a destination of the output of a process.
- C - External entities are always data stores.

Which of the above statement(s) is/are correct?

- (1) A only
- (2) B only
- (3) A and B only
- (4) B and C only
- (5) All A, B and C



28. Consider the following relational schema in a database.

Subject (*SubjectID*, *TermID*, *SubjectDescription*)

Here the *SubjectID*, *TermID*, and *SubjectDescription* are and *Subject* is

Which of the following are most suitable to fill the blanks, respectively?

- | | |
|--|--|
| <p>(1) <u>attributes, a relation</u></p> <p>(3) tuples (records), a relation</p> <p>(5) relations, a tuple</p> | <p>(2) relations, an attribute</p> <p>(4) tuples, an attribute</p> |
|--|--|

An attribute	Attributes are the describing characteristics or properties that define all items pertaining to a certain category applied to all cells of a column (Columns of a table are attributes)
A relation	In this example → a table
A tuple	A record / row. Represents a single instance of a relation, or table

29. Consider the following tasks.

- A - identifying the problems in the existing system
 - B - suggesting alternative solutions
 - C - prioritizing of the information system's requirements

Which of the above tasks is/are carried out during the preliminary investigations of systems development life cycle?

System Investigation → Preliminary Analysis + Feasibility Analysis

The main aim of preliminary analysis is to identify the problem. First, need for the new or the enhanced system is established. Only after the recognition of need, for the proposed system is done, then further analysis is possible.

30. Which of the following feasibility types is generally **not** carried out during the development of a system to be used only in-house?

- (1) economic feasibility (2) market feasibility (3) operational feasibility
(4) organizational feasibility (5) technical feasibility

Economic feasibility	Evaluating the effectiveness of candidate system by using cost/benefit analysis method	Considered for all systems
Market feasibility	Determines the depth and condition of a particular market and its ability to support a particular development	Not considered for a system which is developed uniquely for a particular party
Operational feasibility	The measure of how well a proposed system solves problems	Considered for all systems
Organizational feasibility	Aims to assess the skillfulness of management and sufficiency of resources to bring a product or idea to market	Considered for all systems
Technical feasibility	Focuses on the technical resources available to the organization	Considered for all systems

31. Consider the following statements related to e-business.

- A - *Brick-and-click* is a business model by which a company integrates both offline and online presence of the business.
- B - *Pure-brick* is a business model in which a company has only a physical presence.
- C - *Pure-click* business has the presence only on the Internet.

Which of the above statements is/are correct regarding e-business models?

- (1) A only
- (2) B only
- (3) C only
- (4) A and C only
- (5) All A, B and C

Types of business organizations	
1. Pure brick	Only physical
2. Brick and click	Both physical and online
3. Pure click	Only online

32. A smart home application that automates the controlling of lighting, temperature, entertainment systems, and appliances is an example for

- (1) evolutionary computing.
- (2) multi-agent systems.
- (3) nature inspired computing.
- (4) software agents.
- (5) ubiquitous computing.

(1) Evolutionary computing	Applies to a set of nature-inspired AI algorithms
(2) Multi-agent systems	Computerized systems composed of multiple interacting intelligent agents
(3) Nature inspired computing	A very new discipline that strives to develop new computing techniques through observing how naturally occurring phenomena behave to solve complex problems in various environmental situations
(4) Software agents	A computer program that performs various actions continuously and autonomously on behalf of an individual or an organization.
(5) Ubiquitous computing	A concept in software engineering, hardware engineering and computer science where computing is made to appear anytime and everywhere

33. Consider the following statements regarding artificial intelligence.

- A - Artificial intelligence systems can be used in email spam filters.
- B - Artificial intelligence systems are capable of analyzing uncertain information.
- C - An artificial intelligence system is a system for capturing, storing, processing, and displaying data related to positions on earth's surface.

Which of the above is/are correct?

- (1) A only
- (2) A and B only
- (3) A and C only
- (4) B and C only
- (5) All A, B and C

Artificial intelligence system

A field, which combines computer science and robust datasets, to enable problem-solving. It also encompasses sub-fields of machine learning and deep learning, which are frequently mentioned in conjunction with artificial intelligence

34. Consider the following statements regarding programming languages and program translation.

- A - A compiler translates a program one statement at a time.
- B - An assembler converts a program in an assembly language into machine code.
- C - An interpreter scans the entire program and translates it as a whole into machine code.

Which of the above statements is/are correct?

- (1) A only
- (2) B only
- (3) C only
- (4) A and C only
- (5) B and C only

Compiler	Interpreter	Assembler
Converts the whole source code in one session and reports all the errors afterwards	Converts the source code line by line and reports an error as soon as it is found	Translates assembly language to machine language

35. What is the value of the following Python expression?

$$(5^{**2}) // 3 ^ 4$$

- (1) 3
- (2) 5
- (3) 7
- (4) 12
- (5) 4096

$$\begin{aligned} & (5^{**2}) // 3^4 \\ &= 25 // 3^4 \\ &= 8^4 \\ &= 12 \end{aligned}$$

=====

$\begin{array}{r} 1000 \text{ (8)} \\ \text{xor} \\ 0100 \text{ (4)} \\ \hline 1100 \end{array}$

Python Operator Precedence	
()	
**	
*	/, %, //
+, -	
<<, >>	Left shift, Right shift
&	Bitwise AND
^	Bitwise XOR
	Bitwise OR
<, <=, >, >=, !=, ==	
not	
and	
or	

36. Consider the following statements.

- A - Disk defragmentation makes files that are fragmented in a disk, contiguous.
- B - Swapping is a memory management technique where the main memory contents which were not recently used are copied to disk to make the memory available for other processes.
- C - A File Allocation Table (FAT) is a table that an operating system maintains which provides a map of the clusters that a file has been stored in.

Which of the above is/are correct?

- (1) A only
- (2) A and B only
- (3) A and C only
- (4) B and C only
- (5) All A, B and C

Disk defragmentation	Rearranges fragmented data so the disks and drives can work more efficiently
Swapping	The process of bringing a process into memory and then temporarily copying it to the disc after it has run for a while
File Allocation Table	OS use it to manage hard drive files. This systems uses a table to track the clusters on a storage volume and how those clusters link together through associated directories and files

37. Through which of the following, will a device controller that controls a device deal with the operating system?

- (1) application software
- (2) assembler
- (3) compiler
- (4) device driver
- (5) utility software

(1) Application software	A computer software developed specifically to aid a user to perform any task
(2) Assembler	Translates assembly language to machine language
(3) Compiler	Converts the whole source code in one session and reports all the errors afterwards
(4) Device driver	A special kind of software program that controls a specific hardware device through the OS which is attached to a computer
(5) Utility software	Includes all systems and programs on a computer system that maintain its functionality

38. Consider the following statements relevant to the trends in modern information technology.

- A - In traditional computing, data is encoded into binary digits while in quantum computing data is represented in quantum bits or qubits.
- B - A wearable device capable of activity tracking that measures data such as the number of steps walked and heart rate is an example for a sensor network.
- C - A collection of nodes capable of environmental sensing, local computation, and communication with its peers or with other higher performance nodes is called a Geographic Information System.

Which of the above statements is/are correct?

- (1) A only
- (2) A and B only
- (3) A and C only
- (4) B and C only
- (5) All A, B and C

39. Consider the following statements regarding databases.

- A - For each attribute of a relation, there is a set of permitted values, called the *domain* of that attribute.
 - B - The tuples (records) of the relations are always in sorted order.
 - C - Database schema shows the organization of data as a blueprint of how the database is constructed.

Which of the above statements is/are correct?

Domain	In a relational database, the term "domain" typically refers to the set of allowable values for a specific attribute or column in a database table. In other words, it defines the data type and constraints for a particular column, specifying what kind of data can be stored in that column..
Tuple	A record / row. Represents a single instance of a relation, or table. Not sorted
Database schema	The logical and visual configuration of the entire relational database

- Consider the following relational schema consisting of text fields in answering questions 40 and 41.

Students (admission_number, surname_with_initials, house_number, street_name, village, postal_town, postal_code)

Assume that for a given *postal_town* only one *postal_code* exists.

40. Consider the following statements.

- A - *Students* relation is not normalised.
 - B - *Students* is a relation in First Normal Form (1NF) only.
 - C - In normalization terms, *Students* is a relation in Second Normal Form (2NF) and hence also in 1NF.

Which of the above statements is/are correct?

All

Zero Normal Form	Not yet normalized. Have repeating attributes (such as author1, author2, author3)
First Normal Form	Primary key is repeated but there is a composite primary key → partial dependency
Second Normal Form	Np partial dependencies. Has transitive dependencies → non-prime attribute/ column doesn't depend on the primary key but depends on another non-prime attribute
Third Normal Form	Fully functional dependencies

41. Which of the following is displayed as output if the query:

Select * from Students where postal_code ='10120' **and** house_number ='30A';
is executed?

- (1) postal_code of all records
- (2) postal_code and house_number of records having postal_code as '10120' and house_number as '30A'
- (3) postal_code and house_number of all records
- (4) all fields of records having postal_code as '10120' and house number as '30A'
- (5) all fields of all records

42. Consider the following statements relating to Entity Relationship (ER) modelling.

A - Cardinality specifies how many instances of an entity relates to one instance **of** another entity.
B - An entity is a 'thing' or 'object' in the real world that can be identified separately (distinguishable)
from all other objects.

C - Cardinality specifies primary key attributes of an entity.

Which of the above is/are correct?

- (1) A only
- (2) A and B only
- (3) A and C only
- (4) B and C only
- (5) All A, B and C

Cardinality → specifies how many instances of an entity relate to one instance of another entity

An entity → a table or attribute of a table in database

43. Consider the following statements regarding functional and non-functional requirements of a sales system.

- I - Reads barcodes of items purchased and produces the invoice
- II - Accepts user's request and responds in less than 1 second
- III - Processes a minimum of 1,000 transactions per second

Which of the following is the correct classification of requirements?

- (1) I, II and III all functional
- (2) I – functional, II and III – non-functional
- (3) II – functional, I and III – non-functional
- (4) I and III – functional, II – non-functional
- (5) I, II and III all non-functional

Functional requirements	Non-functional requirements
Requirements which are expected from the system	Requirements which describe how the system work / requirements which enhance the quality of the system
Essential	Nice to have
It is a must to have to fulfill what is expected from the system	It would be better to have to what is expected from the system

44. Consider the following software development lifecycle models.

- A - spiral
- B - waterfall
- C - Rapid Application Development (RAD)

Which of the above requires defining and finalizing requirements in the early phases of the lifecycle?

- (1) A only
- (2) B only
- (3) A and B only
- (4) A and C only
- (5) B and C only

Waterfall model

First process model to be introduced which is simple to understand and use

Requirements have to be well-known, clear and fixed

Project is short

Spiral model

Has four phases → Planning, Risk analysis, Engineering and Evaluation

Complex and unsure, unfixed user requirements (Change according to the user time to time)

Long term projects

RAD model (Rapid Application Development)

For systems which are needed in a short span of time

User will be involved all through the life cycle

Requirements are known but might change

Agile model

Prioritizes features, continuously gathers customer feedback and adjusts and remains flexible throughout the process

45. Consider the following statements regarding *Structured* and *Object Oriented* software development methodologies.

- A - Structured analysis and design represents systems as a hierarchy of functions.
- B - Structured design is a system of interacting objects.
- C - Object oriented methodology combines data and processes into individual entities.

Which of the above statements is/are correct?

- (1) A only
- (2) A and B only
- (3) A and C only
- (4) B and C only
- (5) All A, B and C

Structured software development methods are process-oriented, focusing primarily on modeling the processes, or actions that capture, store, manipulate, and distribute data as the data flow through a system. These methods separate data from processes.

Object oriented software development is a programming paradigm that uses objects, which are instances of classes, for organizing code.

46. What is the output of the following Python code segment if executed with 30 as input?

```
n = int(raw_input())
if (n < 40):
    result = 1
    if (n < 10):
        result = 2
    elif (n < 20):
        result = 3
    else:
        result = 4
else:
    result = 5
print result
```

- (1) 1
- (2) 2
- (3) 3
- (4) 4
- (5) 5

```
n = int(raw_input())
if (n < 40):
    result = 1
    if (n < 10): X
        result = 2
    elif (n < 20): X
        result = 3
    else:
        result = 4
else:
    result = 5
print result
```

n = 30
if (30<40):

If statements

All the if conditions in a python code will be checked. But elif will be checked only if the if conditions or elif conditions before it is false.

else will be executed if the if and elif statements before are false.

47. What is the output of the following Python code segment?

```
s = 0
for i in range(10):
    s = s + i
print s
```

(1) 0

(2) 10

(3) 45

(4) 55

(5) 100

s = 0	for i in range (10) <i>i=0, 10 is the stop → stops before 10</i>	s = s + i	print s
0	0	$0 = 0 + 0$	
	1	$1 = 0 + 1$	
	2	$3 = 1 + 2$	
	3	$6 = 3 + 3$	
	4	$10 = 6 + 4$	
	5	$15 = 10 + 5$	
	6	$21 = 15 + 6$	
	7	$28 = 21 + 7$	
	8	$36 = 28 + 8$	
	9	$45 = 36 + 9$	45

48. What is the output of the following Python code segment?

```
aList = [2,3,11,13,5,7]
s = 0
for i in range(len(aList)):
    if (aList[i] > 10):
        continue
    s = s + aList[i]
print s
```

(1) 0

(2) 5

(3) 16

(4) 17

(5) 41

s = 0	len(aList)	i in range(len(aList))	if (aList[i]>10)	continue	s = s + aList[i]	print s
0	6	0	2>10 (No)	-	$2 = 0 + 2$	
		1	3>10 (No)	-	$5 = 2 + 3$	
		2	11>10 (Yes)	Yes	-	
		3	13>10 (Yes)	Yes	-	
		4	5>7 (No)	-	$10 = 5 + 5$	
		5	7>10 (No)	-	$17 = 10 + 7$	17

49. Consider the following Python code segment with a blank line. (The line numbers on the left are shown for guidance only. They are not part of the code).

```
1 # Function definition starts
2 .....
3             s = arg1 + arg2
4             return s
5 # Function definition ends
6 total = sum(10,20)
7 print total
```

The above code should consist of a programmer defined function named 'sum'. Which of the following should be entered in the blank on line 2, so that the function 'sum' is correctly defined?

- (1) sum(arg1, arg2): (2) def sum(arg1, arg2):
(3) function sum(arg1, arg2): (4) def sum(arg1, arg2, s):
(5) def sum():

Example

This function expects 2 arguments, and gets 2 arguments:

```
def my_function(fname, lname):
    print(fname + " " + lname)

my_function("Emil", "Refsnes")
```

- 50.** Consider the following statements.

- A - BIOS is an example for application software.
 - B - A utility software is an example for firmware.
 - C - Spyware is an example for malware.

Which of the above is/are correct?

BIOS (Basic Input Output System)	The program a computer's microprocessor uses to start the computer system after it is powered on
Utility Software	Includes all systems and programs on a computer system that maintain its functionality
Firmware	A form of microcode or program embedded into hardware devices to help them operate effectively
Spyware	Malicious software that enters a user's computer, gathers data from the device and user, and sends it to a third parties without their consent.
Malware	Refers to any intrusive software developed by hackers to steal data and damage or destroy computers and computer systems ex:- viruses, worms, spyware, adware, trojan, ransomware