Advanced Level – Information and Communication Technology
2022(2023) MCQ Past Paper

1. Which of the following statements is/are correct?

A – *Firmware* is a computer program that is usually embedded in the volatile memory of a computer.

B – A *printer driver* is an example for an application software.

C – *Linux* is an example for a system software.

(1) A only (2) B only (3) C only

(4) A and B only (5) B and C only

Firmware	Firmware is a specialized software embedded in electronic devices' hardware that provides low-level control for the device's specific functions
Application Software	A type of computer program that performs a specific personal, educational, and business function.
System software	A program designed to run a computer's hardware and applications and manage its resource, such as its memory, processors and devices

A – Not in volatile memory

B – Device driver

C – An OS is considered as a system software

2. Which of the following require(s) *real-time* processing?

A – generating monthly electricity bills of customers

B – updating the bank account balance of a customer when she/he withdraws money from an ATM

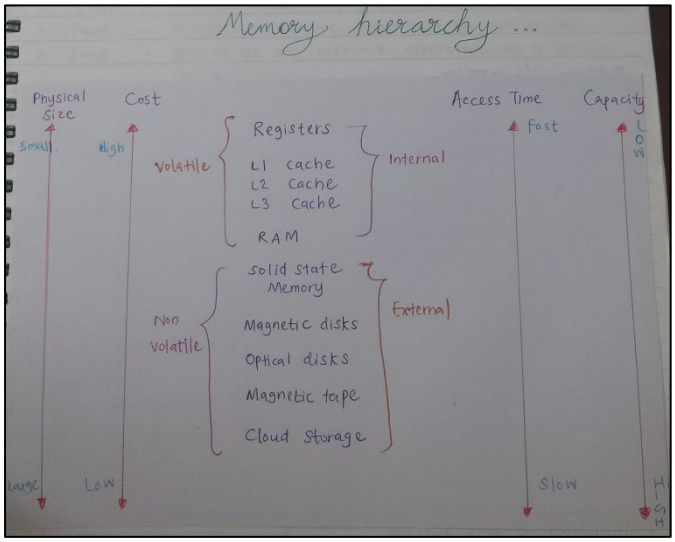
C – updating the stock balance in a store upon successful completion of each transaction

(1) A only (2) B only (3) C only

(4) A and B only (5) B and C only

Real-time processing refers to the immediate and continuous execution of data or tasks as they occur, without noticeable delay, ensuring rapid response and timely output.

3. Which of the following lists a computer memory hierarchy in the **descending order** of access speed?
   (1) hard disk, registers, L2 cache, L1 cache, main memory
   (2) main memory, L1 cache, registers, L2 cache, hard disk
   (3) registers, main memory, hard disk, L1 cache, L2 cache
   (4) registers, L1 cache, L2 cache, main memory, hard disk
   (5) L1 cache, L2 cache, registers, main memory, hard disk



4. Which of the following gives the correct results of bit-wise AND and bit-wise OR operations between the two binary numbers 01010100_2 and 11101001_2 respectively?
   (1) 01000000_2, 11111101_2
   (2) 00000010_2, 10111001_2
   (3) 10111101_2, 11001010_2
   (4) 11000000_2, 00101100_2
   (5) 11111101_2, 01010011_2

01010100	01010100
AND 11101001	OR 11101001
01000000	11111101

5. What is the correct binary equivalent of decimal 12.75_{10}?

(1) 1011.01_2 (2) 1011.11_2 (3) 1100.00_2 (4) 1100.11_2 (5) 1100.01_2

Step 1: Convert decimal 12 to binary → 1100

Step 2: Convert decimal fraction 0.75 to binary

Power in Binary	2^3	2^2	2^1	2^0	2^{-1}	2^{-2}
Equivalent	8	4	2	1	0.5	0.25
	1	1	0	0	1	1

6. What is the correct 2's complement binary representation of decimal -41_{10} using 8-bits?

(1) 00101001 (2) 01010110 (3) 10101001 (4) 11010110 (5) 11010111

Step 1: Convert positive 41 to binary → 0010 1001

Step 2: Invert all bits and add 1 to the least significant bit

1101 0110 + 1 → 1101 0111

7. The address of an instruction was shown as **10f9** in hexadecimal. What is that address in decimal?

(1) 25 (2) 1249 (3) 4345 (4) 10159 (5) 16249

8. A particular command can be used to output a text file in its binary format.

Assume a file contains the following text:

0 Waste!

Referring the **Important notes** (i) and (ii) given below, select the correct output that will result when the said command is run on that file.

(1) 00110000 00100000 01010111 01100001 01110011 01110100 01100101 00001010
(2) 00110000 01010111 01100001 01110011 01110100 01100101 00100001 00001010
(3) 00110000 00100000 01010111 01100001 01110011 01110100 01100101 00100001 00001010
(4) 00110000 00100000 01110111 01100001 01110011 01110100 01100101 00100001 00001010
(5) 00110000 00100000 01010111 01100001 01110011 01110100 01100101 00100000 00001010

Important notes:

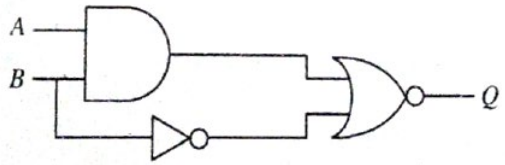
(i) The file ends with a LINE FEED character.

(ii) Some selected rows from the 7-bit ASCII table are given below:

Character	Binary
(LINE FEED)	0001010
(SPACE)	0100000
!	0100001
0	0110000
W	1010111

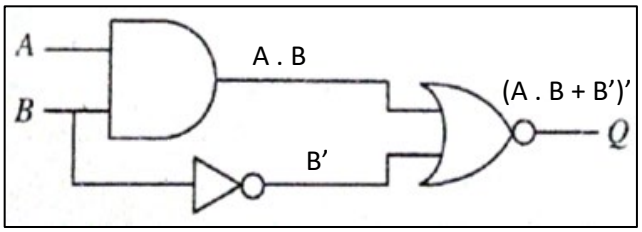
Character	Binary
a	1100001
e	1100101
s	1110011
t	1110100
w	1110111

9. Consider the following logic circuit:



When B=1, what would **definitely** be the output at Q?

(1) A (2) $\overline{A}$ (3) B (4) $\overline{B}$ (5) 0



(A . B + B')'	
(A.B)' . B''	De Morgan's Law
(A.B)'. B	Double Complement Law
A'+B' . B	De Morgan's Law
A'B + BB'	Distribute Law
A'B + 0	Inverse Law
A'B	Identity Law

10. Simplified Boolean expressions help to obtain simpler circuits.
Which of the following is a simplified form of $X + \bar{X}Y$?

(1) X (2) Y (3) XY (4) $\bar{X}Y$ (5) $X + Y$

X + X' Y ➔ X + Y (Redundancy Law)

11. Consider the following truth table:

A	B	C	Z
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	1
1	1	0	0
1	1	1	0

What is the correct Karnaugh map for the above truth table?

(1)

A \ BC	00	01	10	11
0	0	0	1	1
1	1	1	0	0

(2)

A \ BC	00	01	11	10
0	0	0	1	1
1	1	1	0	0

(3)

A \ BC	00	10	01	11
0	0	1	0	1
1	1	0	1	0

(4)

A \ BC	00	10	11	01
0	0	1	1	0
1	1	0	0	1

(5)

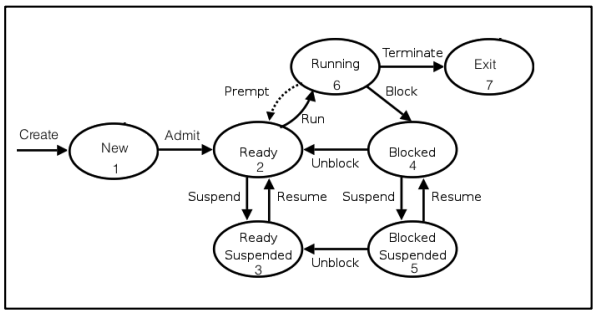
A \ BC	00	11	10	01
0	0	1	1	0
1	1	0	0	1

A	B	C	AB	AB+C	SOP
0	0	0	0	0	
0	0	1	0	0	
0	1	0	0	1	A'BC'
0	1	1	0	1	A'BC
1	0	0	0	1	AB'C'
1	0	1	0	1	AB'C
1	1	0	1	0	
1	1	1	1	0	

A \ BC	00	01	11	10
0	0	0	1	1
1	1	1	0	0

12. A program in execution in a computer is called a *process*. Such a process transits between several states during its lifetime. Which of the following correctly represents a possible state transition sequence of a process?

(1) New → Ready → Running → Waiting → Ready → Running → Terminated
(2) New → Ready → Waiting → Running → Waiting → Running → Terminated
(3) New → Running → Ready → Waiting → Running → Ready → Terminated
(4) New → Running → Waiting → Ready → Waiting → Running → Terminated
(5) New → Waiting → Running → Ready → Running → Ready → Terminated



13. Which of the following is **not** a task of a computer operating system?

(1) selecting a memory *frame* for a *page* of a process
(2) maintaining a list of free memory *frames*
(3) maintaining a *page table* for each process
(4) monitoring the usage of binary files on a hard disk
(5) swapping processes between main memory and hard disk

Tasks of an operating system

1. Memory Management → Keeps track of the primary memory
2. Process Management → Allocates and deallocates the CPU to processes
3. Device Management → Keeps track of all the devices
4. File Management → Allocates and deallocates resources
5. Security → Prevents unauthorized access to programs and data
6. Error-detecting → Production of error messages and error detecting methods

14. The *block size* of a disk is 4KB. A portion of its File Allocation Table (FAT) at a particular time is shown below. The portion shown indicates the blocks of the *average.py* file as well.

FAT

200	202
201	200
202	-1
203	201
204	205

Notes: I. The last block of a file is indicated by -1.

II. The *directory entry* of a file contains the block number of the first block of the file.

Which of the following gives the *directory entry* for the *average.py* file and the disk space allocated for the average.py file respectively?

(1) 200, 12KB (2) 200, 16KB (3) 200, 20KB (4) 203, 16KB (5) 203, 20KB

- The directory entry is 203 because the lowest value is in that block.
- As each block is 4KB and there are 4 blocks including the last block, the disk space allocated for the file will be (4*4) 16KB.

15. Which of the following are *Transport Layer* protocols of the TCP/IP stack?

A – Transmission Control Protocol (TCP)
B – User Datagram Protocol (UDP)
C – File Transfer Protocol (FTP)
D – Internet Protocol (IP)

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

Host-to-Host layer (TCP,UDP)

- process to process delivery
- end to end connection between hosts
- multiplexing and demultiplexing
- error detection and correction
- flow control

16. Which of the following statements is/are correct about MAC and IPv4 addresses?

A – MAC addresses are 32 bits in length and are used in the network layer.
B – MAC addresses are 48 bits in length and are used in the datalink layer.
C – IPv4 addresses are 32 bits in length and are used in the network layer.

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

MAC address	A MAC (Media Access Control) address is a hardware address associated with network interface cards. The standard MAC address has a bit length of 48 bits and is typically associated with the data link layer (Layer 2) of the OSI model.
IPv4 address	IPv4 (Internet Protocol version 4) addresses have a bit length of 32 bits. IPv4 operates at the network layer (Layer 3) of the OSI model.

17. Which of the following is/are correct regarding a *firewall*?

A – It can monitor and filter outgoing traffic from an internal network.
B – It protects a network from unauthorized accesses.
C – It can be a hardware, a software or a combination of both.

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

A firewall is a network security device that monitors and controls incoming and outgoing network traffic based on predetermined security rules. The primary functions of a firewall include:

1. **Packet Filtering**: Examining packets of data and allowing or blocking them based on predefined rules.

2. **Stateful Inspection**: Tracking the state of active connections and making decisions based on the context of the traffic.

3. **Proxying**: Acting as an intermediary between a user and the internet, forwarding requests and responses to enhance security and privacy.

4. **Network Address Translation (NAT)** : Modifying network address information in packet headers while in transit to hide internal IP addresses.

5. **Logging and Monitoring**: Keeping records of network activity, which aids in identifying and analyzing security events.

6. **Virtual Private Network (VPN) Support**: Facilitating secure communication over the internet by implementing VPN protocols.

7. **Access Control**: Enforcing policies to control which devices and applications are allowed to communicate with the network.

8. **Intrusion Detection and Prevention**: Identifying and blocking or alerting on potential security threats or attacks.

9. **Content Filtering**: Blocking or allowing data based on content types, such as websites, applications, or specific keywords.

Firewalls are a crucial component of network security, providing a barrier between a trusted internal network and untrusted external networks, helping to prevent unauthorized access and protect against various cyber threats.

18. An organization with the assigned IP address block 193.1.1.0/24 needs to define **eight** subnets. Each subnet should provide for more than 25 IP addresses. Which of the following correctly lists the number of bits needed to identify the given network, the total number of bits needed to identify the subnets, and the number of bits needed to assign unique IP addresses for this requirement, respectively?

(1) 24, 3, 5 (2) 24, 5, 3 (3) 24, 27, 5 (4) 27, 3, 5 (5) 27, 30, 2

19. Which of the following statements is correct regarding network topologies?

(1) In *bus topology*, a central network hub is used to connect all nodes.
(2) In *star topology*, a linear cable is used to connect all nodes.
(3) In *ring topology*, messages are sent only clockwise.
(4) In *ring topology*, each node is directly connected only to two of its neighbors.
(5) In *mesh topology*, each node is always connected to one other node only.

1. Ring Topology

- Each device is connected to two other devices on either side via an RJ-45 cable or coaxial cable
- Data flows in one direction

2. Bus Topology

- All devices in the network are connected by one central RJ-45 network cable or coaxial cable
- Suitable for a smaller network
- Data packets can be lost

3. Star Topology

- Every host is connected to a central hub
- Reliable as other device's failure does not affect others
- But without the hub/switch the network fails

4. Mesh Topology

- All the computers are interconnected to every other

20. Consider the seven layer OSI reference model and match each of the given layers labeled from P to S to the corresponding responsibility of it labeled from 1 to 4.

Layer
P – Application layer
Q – Physical layer
R – Transport layer
S – Network layer

Responsibility
1 – binary transmission over the communication medium
2 – route determination
3 – user services that include file transfer, remote access etc.
4 – data delivery from process to process

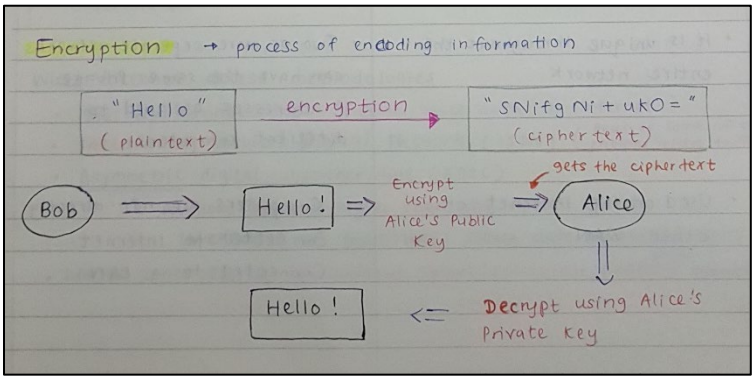
(1) P – 1, Q – 3, R – 2, S – 4
(2) P – 2, Q – 4, R – 3, S – 1
(3) P – 3, Q – 1, R – 2, S – 4
(4) P – 3, Q – 1, R – 4, S – 2
(5) P – 4, Q – 2, R – 1, S – 3

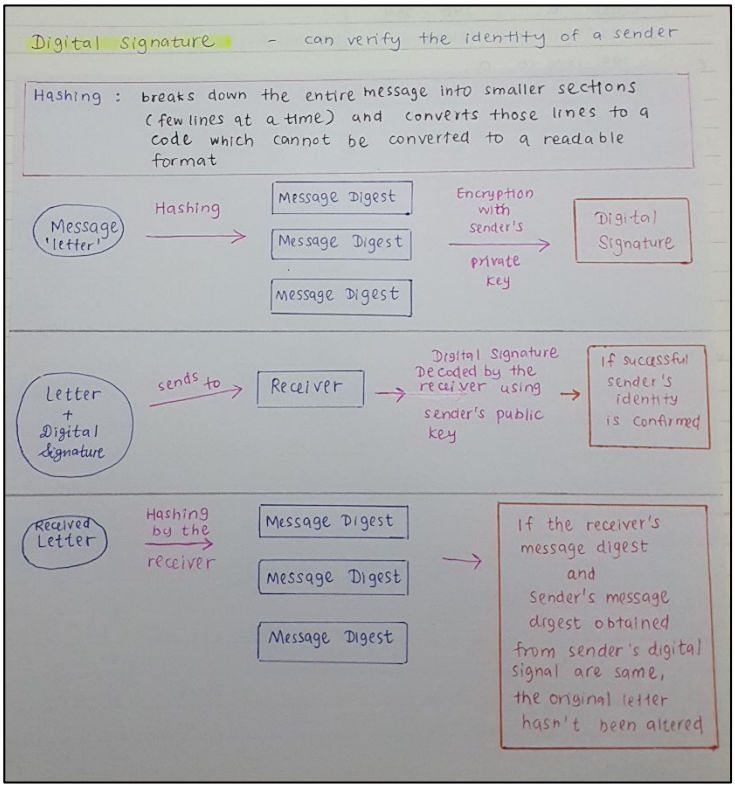
7 layers of OSI reference model (Bottom to Top)		
Layer	Explanation	Names for the data units at each layer
1st layer – Physical layer	It provides a physical medium through which bits are transmitted	Bits
2nd layer – Data link layer	It is used for error free transfer of data frames	Frames
3rd layer –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

21. Which of the following statements is/are correct?

A – A *digital signature* ensures the authenticity of a message.
B – In *asymmetric key encryption*, different keys are used for encryption and decryption.
C – The encryption process transforms plaintext to ciphertext.

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





Asymmetric encryption	The sender and recipient use two different keys

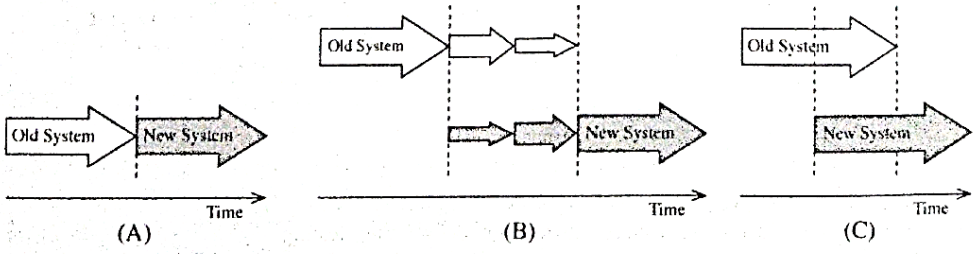
22. Match each of the given data communication protocols labelled from P to T to the corresponding descriptions labelled from 1 to 5.

Protocol	Description
P – Hyper Text Transfer Protocol (HTTP)	1 – provides directory lookup service for given web addresses and URLs
Q – Transmission Control Protocol (TCP)	2 – provides a very reliable data transfer service
R – Domain Name System (DNS) Protocol	3 – used in the world wide web
S – Internet Protocol (IP)	4 – provides a connection-less transport service
T – User Datagram Protocol (UDP)	5 – handles unique addressing of hosts in the Internet

(1) P – 2, Q – 4, R – 1, S – 5, T – 3
(2) P – 2, Q – 5, R – 4, S – 1, T – 3
(3) P – 3, Q – 2, R – 1, S – 5, T – 4
(4) P – 3, Q – 4, R – 5, S – 1, T – 2
(5) P – 4, Q – 2, R – 3, S – 1, T – 5

DNS	Translates human-readable domain names into IP addresses, facilitating the resolution of internet hostnames to their corresponding numerical IP addresses.
HTTP	An application layer protocol designed to transfer information between networked devices and runs on top of other layers of the network protocol stack
IP	A set of rules that govern how data is sent and received over computer networks, facilitating communication between devices on the Internet by assigning unique numerical addresses to each device.
TCP	A communications standard that enables application programs and computing devices to exchange messages over a network
UDP	A communication protocol for time-sensitive applications like gaming, playing videos or Domain Name System (DNS) lookups

23. The following diagrams labelled (A), (B) and (C) illustrate three software deployment types.



Which of the following correctly represents (A), (B) and (C) deployment types respectively?

(1) Direct, Phased and Parallel
(2) Direct, Pilot and Parallel
(3) Parallel, Phased and Direct
(4) Parallel, Pilot and Phased
(5) Phased, Direct and Pilot

Direct	Old system is discontinued and the new system will be used from that point onwards
Phase	Parts of the new system are implemented one by one over the time
Parallel	Old and new systems are used at the same time
Pilot	Entire system is used in one location

24. Consider the information system types in List A and the descriptive examples in List B. Identify the most suitable matching between the items in lists A and B.

List A	List B
A1 – Decision Support System (DSS)	B1 – a system that allows to update, create, and manage the details in a news website
A2 – Content Management System (CMS)	B2 – a system that handles electronic fund transfers
A3 – Transaction Processing System (TPS)	B3 – a system that combines data and analytical tools for sales forecasting based on historical data

(1) A1 – B1, A2 – B2, A3 – B3
(2) A1 – B2, A2 – B1, A3 – B3
(3) A1 – B2, A2 – B3, A3 – B1
(4) A1 – B3, A2 – B1, A3 – B2
(5) A1 – B3, A2 – B2, A3 – B1

Decision Support System (DSS)	An interactive computer-based tool that helps individuals and organizations make informed decisions by providing data analysis, modeling, and information retrieval capabilities.
Content Management System (CMS)	A software application that enables users to create, manage, and modify digital content on a website without requiring specialized technical knowledge.
Transaction Processing System (TPS)	An information processing system for business transactions involving the collection, modification and retrieval of all transaction data

25. Which of the following statements is/are correct regarding System Development Life Cycle (SDLC) models?

A – In the *agile* model, small portions of systematically developed working software are delivered to the client frequently.

B – Late changes in the requirements can be easily accomodated in the *waterfall* model.

C – *Prototyping* model can be practiced without client interactions.

(1) A only (2) B only (3) C only

(4) A and B only (5) A and C only

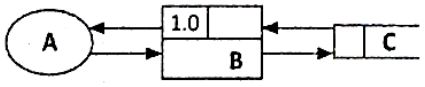
Waterfall model • First process model to be introduced which is simple to understand and use • Requirements have to be well-known, clear and fixed • Project is short
Spiral model • Has four phases → Planning, Risk analysis, Engineering and Evaluation • Complex and unsure, unfixed user requirements (Change according to the user time to time) • Long term projects
RAD model (Rapid Application Development) • For systems which are needed in 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
Prototyping model • A system development method in which a prototype is built, tested and then reworked as necessary until an acceptable outcome is achieved from which the complete system or product can be developed. The client will always be involved in this model.

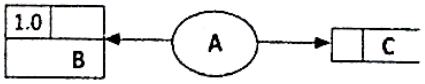
26. *Non-functional requirements* specify quality attributes of a system. Which of the following is an example for a *non-functional requirement*?

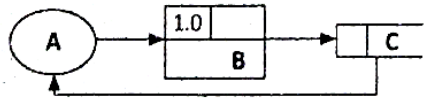
(1) the email system should allow users to attach files
(2) each page of the website must load within 4 seconds
(3) administrator of the E-commerce website should be able to view a list of customers
(4) a user of the online banking system should be able to view the last transactions
(5) the ATM machine should allow users to print a receipt

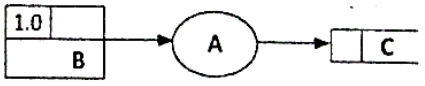
Functional requirements	Non-functional requirements
Requirements which are **expected** from the system	Requirements which describe how the system work / requirements which enhance the quality of the system
Essential	Nice to have
It is a **must to have** to fulfill what is expected from the system	It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

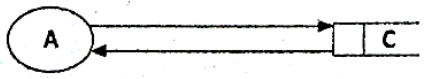
27. Which of the following Data Flow Diagrams (DFDs) is correct with respect to the rules of data flow modelling? (Note: A – an external entity, B – a process, C – a data store)

(1)


(2)


(3)


(4)


(5)


DFD Designing Rules

1. Each process should have at least one input and an output
2. Each data store should have at least one data flow in and one data flow out
3. Data stored in a system must go through a process
4. All the processes in a DFD go to another process or a data store.
5. Data can flow directly between → Two external entities, An external entity and a process, Two processes, A process and a data store
6. A direct data flow can NOT exist between → An external entity and a data store, Two data stores
7. Processes and data stores must NOT → Originate data, Be dead ends

28. Which of the following statements is correct regarding *software testing*?
(1) Integration testing is usually carried out before unit testing.
(2) Black-box testing techniques are usually used in acceptance testing.
(3) White box testing examines the behaviour of a software based only on the inputs to a system
(4) Unit testing examines the entire system's functionality as a whole.
(5) System testing is usually carried out after the user acceptance testing.

Software Testing Types

1. Unit Testing (Individual units are tested)
   - Using white or black box testing
   - Before integration testing
   - Done by the developers

2. Integrated Testing
   - Individual units are combined and tested as a group
   - Using white or black testing
   - Done by a specific tester or test team

3. System Testing
   - Using black box testing
   - Done by a team that is independent of the development team in order to measure the quality of the system unbiased

4. Acceptance Testing
   - Performed by the end user or the client to verify/ accept the system

29. Consider the following relational schema:

Student (StudentId, StudentName, Address, Gender, DateOfBirth)

Study (StudentId, SubjectId, Grade)

Subject (SubjectId, SubjectName)

Which of the following is the most suitable *Entity Relationship (ER)* diagram to correctly represent the relationship between **Student** and **Subject** entities?

Note: In the ER diagrams, the entities are drawn without attributes.

(1) 

(2) 

(3) 

(4) 

(5) 

As one student study more than one subject and one subject can be taught to many students, relationship here is many to many

- The tables which are partially extracted from a database used in an information system developed for a shop are shown below. Answer the questions from **30** to **32** using those tables.

Customer

CusId	Fname	Lname	Location
C001	Saman	Perera	Dehiwala
C002	Kalum	Gamage	Galle
C003	Shiromi	Silva	Galle
C004	Kalum	Perera	Kandy

Product

ProdId	Name
PR001	Refrigerator
PB401	Blender
PM025	Mobile Phone
PP009	Inkjet Printer

Order

OrderId	CusId	OrderDate	SellerId
A001	C002	2022-07-14	S001
A002	C003	2022-07-14	S001
A003	C002	2022-07-18	S002
A004	C004	2022-07-20	S002

Order_Product

OrderId	ProdId
A003	PR001
A001	PR001
A002	PB401
A003	PM025
A004	PP009

30. Which of the following shows the most suitable *primary keys* for **Order** and **Order_Product** relations?

(1) **Order**: CusId, **Order_Product**: OrderId
(2) **Order**: OrderId, **Order_Product**: OrderId
(3) **Order**: OrderId, **Order_Product**: OrderId + ProdId
(4) **Order**: CusId + SellerId, **Order_Product**: ProdId
(5) **Order**: OrderId + CusId, **Order_Product**: OrderId

31. What will be the output after executing the following SQL statement?

```
SELECT Customer.Fname, Customer.Lname, Order.OrderId
FROM Customer INNER JOIN Order ON Customer.CusId = Order.CusId
WHERE Customer.Location="Galle";
```

(1)

Fname	Lname	OrderId
Kalum	Gamage	A001
Kalum	Gamage	A003
Shiromi	Silva	A002

(2)

Fname	Lname	OrderId
Kalum	Gamage	A004
Kalum	Perera	A001
Kalum	Gamage	A003
Shiromi	Silva	A002

(3)

Fname	Lname	OrderId
Kalum	Gamage	A001
Kalum	Perera	A003
Shiromi	Silva	A002

(4)

Lname	Fname	OrderId
Gamage	Kalum	A001
Gamage	Kalum	A003
Silva	Shiromi	A002

(5)

Fname	Lname	OrderId
Kalum	Gamage	A001
Shiromi	Silva	A002

32. Which of the following is correct regarding the **Order** relation?

(1) CusId attribute uniquely identifies each tuple in the relation.
(2) The relation is in First Normal Form (1NF).
(3) The relation is in Second Normal Form (2NF).
(4) Orders of each customer are handled by a unique salesperson.
(5) The relation consists of a composite primary key.

33. Which of the following statements is/are correct regarding the *normalization* concept?

A – In first normal form, atomic attributes are **removed** from a relation.
B – In second normal form, partial dependency of attributes on the primary key are **removed**.
C – In third normal form, transitive dependency of attributes are **removed**.

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

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

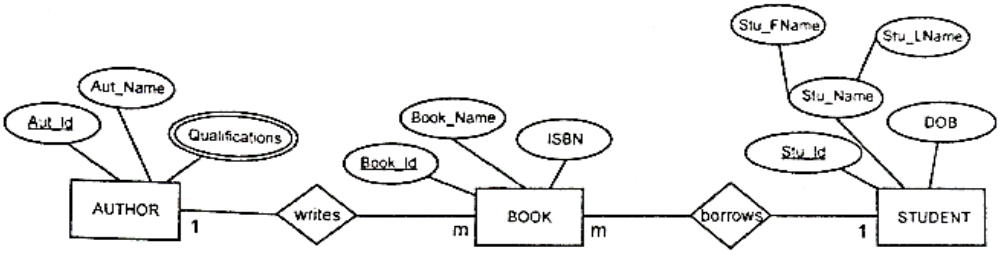
34. Which of the following statements is/are correct regarding *Entity Relationship (ER) modelling*?

A – A weak entity is dependent on another entity.
B – A derived attribute is represented as an attribute in a relation.
C – An entity can contain a multi-value attribute and a composite attribute at the same time.

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

A weak entity	If a primary key of another entity is used to uniquely identify records a table, that entity is a weak entity
A derived attribute	As the name suggests is the one that can be derived or calculated with the help of other attributes present themselves. Example: The age can be derived from Date of Birth
An entity	A thing, place, person or object that is independent of another

35. The following ER diagram represents a scenario of students borrowing books from a library. Which of the following gives the most suitable relation list for the given ER diagram?



(1) BOOK (Book_Id, Book_Name, ISBN, Stu_Id, Aut_Id)
STUDENT (Stu_Id, Stu_FName, Stu_LName, DOB)
AUTHOR (Aut_Id, Aut_Name)
AUTHOR_QUALIFICATION (Aut_Id, Qualifications)

(2) BOOK (Book_Id, Book_Name, ISBN)
STUDENT (Stu_Id, Stu_FName, Stu_LName, DOB)
AUTHOR (Aut_Id, Aut_Name)
AUTHOR_QUALIFICATION (Aut_Id, Qualifications)

(3) BOOK (Book_Id, Book_Name, ISBN, Stu_Id, Aut_Id)
STUDENT (Stu_Id, Stu_FName, Stu_LName, DOB)
AUTHOR (Aut_Id, Aut_Name, Qualifications)

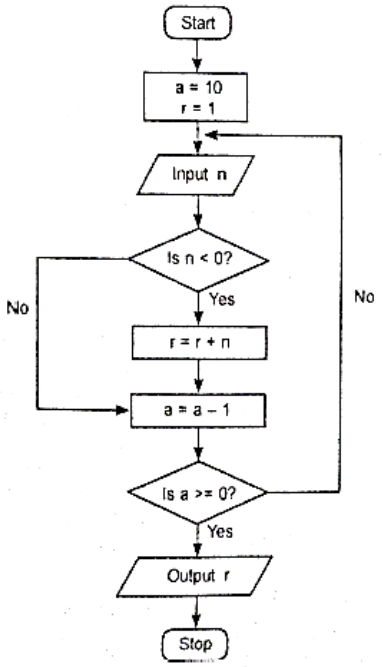
(4) BOOK (Book_Id, Book_Name, ISBN, Stu_Id, Aut_Id)
STUDENT (Stu_Id, Stu_Name, DOB)
AUTHOR (Aut_Id, Aut_Name)
AUTHOR_QUALIFICATION (Aut_Id, Qualifications)

(5) BOOK (Book_Id, Book_Name, ISBN, Stu_Id, Aut_Id)
STUDENT (Stu_Id, Stu_Name, DOB)
AUTHOR (Aut_Id, Aut_Name)
AUTHOR_QUALIFICATION (Aut_Id, Qualifications)
BORROW (Aut_Id, Book_Id)
WRITE (Aut_Id, Book_Id)

36. Which of the following statements is/are correct about the algorithm expressed by the given flowchart?

A – An input is taken from the user only once.
B – The output of the algorithm is always 9.
C – The algorithm outputs the summation of all the numbers entered.

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



37. What would be the output of the following Python code if the input was 25?

```
x = int(input())
x = (x % (x – 21)) **3
print(x)
```

(1) 0 (2) 1 (3) 3 (4) 12 (5) 25

```
( 25 % ( 25 – 21 ) ) * * 3
25 % 4 * * 3
1 * * 3
1
```

38. What would be the output of the following Python code?

```
def fun(para1, para2):
    x=foo(para2, para1)
    return x

def foo(para3, para4):
    return para3 – para4

result=fun(2, 4)
print("Result is " + str(result))
```

(1) Result is 0
(2) Result is 2
(3) Result is –2
(4) Result is (2, 4)
(5) Result is +2

What would be the output of the following Python code?

```
def fun(para1, para2):
    x=foo(para2, para1)
    return x

def foo(para3, para4):
    return para3 – para4

result=fun(2, 4)
print("Result is " + str(result))
```

2 4 4, 2 4 2 4-2 = 2 2

39. What would be the output of the following Python code?

```
def foo(name, age=18, address="Kandy"):
    print(name, address, age)

foo("Nimal", 25, "Colombo")
```

(1) Nimal Colombo 25
(2) Nimal, Colombo, 25
(3) Nimal, Kandy, 18
(4) Nimal Kandy 18
(5) Nimal 18 Kandy

40. What would be the output of the following Python code?

```
numbers=[10, 20, 30, 40, 50]
numbers.pop(1)
numbers.append(60)
numbers.pop(2)
print(numbers)
```

(1) [10, 50, 60]
(2) [10, 20, 40, 60]
(3) [10, 30, 50, 60]
(4) [20, 30, 40, 50]
(5) [20, 30, 50, 60]

```
numbers=[10, 20, 30, 40, 50]
numbers.pop(1)
numbers.append(60)
numbers.pop(2)
print(numbers)
```

After removing value in 1st index ➔ [10,30,40,50]
After appending the value to the end ➔ [10,30,40,50,60]
After removing value in 2nd index ➔ [10,30,50,60]
[10,30,50,60]

41. What would be the output of the following Python code?

```
val = 9
for i in range(5):
    for j in range(2, 3, 1):
        val += 1
        if (val % 2) == 0:
            continue
            val += 2
        else:
            val += 2
print(val)
```

(1) 18
(2) 24
(3) 29
(4) 38
(5) 39

42. Which of the following is/are correct regarding Python functions?

A – A Python function can return a data structure that contains multiple values.
B – A Python function can be used without passing any parameters to it.
C – Parameters can be passed to a python function by value or by reference.

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

A function is a block of code which only runs when it is called.

You can pass data, known as parameters, into a function.

A function can return data as a result.

43. Which of the following HTML tags can be used to change the appearance of a word in a text?

(1) <i>, , <li>,
(2) <b>, <i>, , <h1>
(3) <b>, , <sup>,
(4) <i>, <u>,
, <sup>
(5) <u>, <i>, <ol>, <b>

<b> = bold
<i> italic
 = emphasized text
<h1> = heading 1
 = list
<sup> = superscript
<u> = underline

 = break line
 = ordered list

44. What would be the output of the following HTML code segment?

```
<dl>
    <dt> Vegetable </dt>
      <dd> Potato </dd>
    <dt> Fruit </dt>
      <dd>  Orange </dd>
</dl>
```

(1)
- Vegetable
  - Potato
- Fruit
  - Orange

(2)
Vegetable
Potato
Fruit
Orange

(3)
- Vegetable
  Potato
- Fruit
  Orange

(4)
1. Vegetable
   Potato
2. Fruit
   Orange

(5)
- Vegetable
  - Potato
- Fruit
  - Orange

dl → definition list

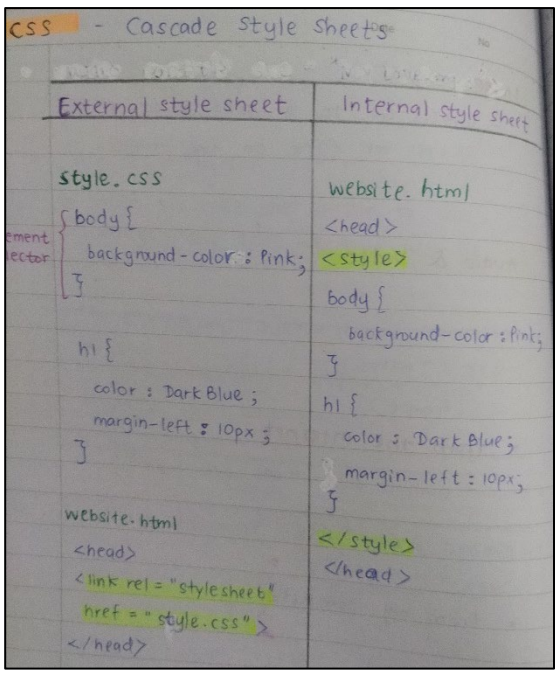
dt → definition title

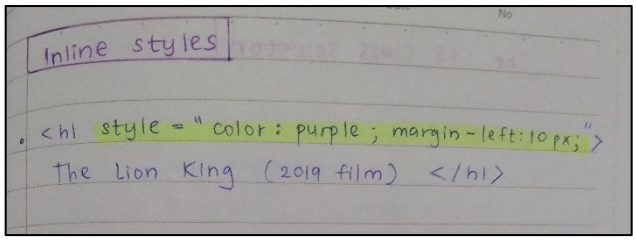
dd → definition data

45. Which of the following statements is/are correct regarding HTML and CSS?

A – CSS can be used to describe how HTML elements are to be displayed on screen.
B – External CSS can be used to define the style for many HTML pages.
C – Inline CSS can be used to apply a style to a single HTML element.

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





46. Which of the following HTML code line can be used to create a hyperlink to the website of the National Institute of Education? (The URL of the website is http://nie.lk)

(1) National Institute of Education
(2) National Institute of Education
(3) National Institute of Education
(4) <a href = "http://nie.lk"National Institute of Education>
(5) <a src = http://nie.lkNational Institute of Education>

This example shows how to create a link to W3Schools.com:

```
<a href="https://www.w3schools.com/">Visit W3Schools.com!</a>
```

47. Which of the following could be used to create an array in PHP?

A - $city[ ] = array("Colombo");
B - city[ ] = "Colombo";
C - $city = array("Colombo");

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

Example

```
<?php
$cars = array("Volvo", "BMW", "Toyota");
echo "I like " . $cars[0] . ", " . $cars[1] . " and " . $cars[2] . ".";
?>
```

48. Given below is a partially completed PHP script used to connect to a database named **Employees** using MySQLi (procedural method). Which option is most suitable to fill in the blank spaces Ⓐ, Ⓑ and Ⓒ respectively?

```
<?php
    $servername = "127.0.0.1";
    $username = "username";
    $password = "password";
    $conn = mysqli_connect($servername, $username, $password);
    if (!$conn) {
        die("Connection failed: " . mysqli_connect_error());
    }
    $sql = "CREATE DATABASE _____Ⓐ____";
    if (mysqli_query(___Ⓑ__, Ⓒ___) {
        echo "Database created successfully";
    } else {
        echo "Error creating database: " . mysqli_error($conn);
    }
    mysqli_close($conn)
?>
```

(1) $sql, $conn, $Employees
(2) $conn, $sql, Employees
(3) $Employees, $conn, $sql
(4) Employees, $conn, $sql
(5) Employees, $sql, $conn

A → Database name

49. Which of the following statements is/are correct?

A – Quantum computing could be an alternative to overcome the limitations of the existing microprocessors.

B – Natural phenomena such as the behaviour of ant colonies could be used to develop new computing models to solve complex problems.

C – An inference engine of an expert system utilizes the facts in a knowledge base to support decision making.

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

- Quantum computing is a multidisciplinary field comprising aspects of computer science, physics, and mathematics that utilizes quantum mechanics to solve complex problems faster than on classical computers.

- Inference engine is one of the basic components of an expert system that carries out reasoning whereby the expert system reaches a solution. It matches the rules provided in the rule base with the facts contained in the database. The part of a decision support system that performs the reasoning function

50. Which of the following statements is/are correct?

A – E-Commerce encourages to minimize physical interactions between buyers and sellers.

B – The main purpose of sending a One Time Password (OTP) to a credit card holder's mobile phone during an online payment is to identify the current location of the card owner.

C – Bitcoin is a leading virtual currency.

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