Advanced Level – Information and Communication Technology
2015 MCQ Past Paper

1. Charles Babbage is considered as the "father of the computer" by some people. That is because he
   (1) invented the mechanical calculator Pascaline.
   (2) invented the first re-programmable electronic computing machine.
   (3) took the leadership in building the first personal computer at IBM.
   (4) introduced the concept of "Input, Process and Output" that is used in modern computers, for the first time.
   (5) is the founder of the first electronic digital computer ENIAC (Electronic Numerical Integrator And Computer).

Pascaline	Pascaline was invented by Blaise Pascal in 1642
First re-programmable electronic computing machine	Charles Babbage was not alive in the electronic age
First personal computer at IBM	Charles Babbage was not alive in the electronic age
Input, Process and Output concept	Charles Babbage founded the Difference engine which was able to stamp its output after processing
Founder of ENIAC	John Mauchly and J. Presper Eckert designed the ENIAC

2. The first generation computers were based on
   (1) Very Large Scale Integration (VLSI) technology.
   (2) Large Scale Integration (LSI) technology.
   (3) Integrated Circuits (ICs).
   (4) Transistors.
   (5) Vacuum tubes.

(1) Mechanical technology	Mechanical age (1450 – 1840)
(2) Vacuum tube technology	First Generation (1940 – 1956)
(3) Transistor technology	Second Generation (1956 – 1963)
(4) Integrated Circuit (IC) technology	Third Generation (1964 – 1975)
(5) Very Large Scale Integrated (VLSI) Circuit technology	Fourth Generation (1976 – 1989)

3. The decimal number equivalent to 110110_2 is
   (1) 39.   (2) 48.   (3) 54.   (4) 55.   (5) 108.

4. Consider the following list rendered by a web browser:
   1. Pineapple
   2. Mango
   3. Banana

Which of the following HTML tags can be used to create the above list?

(1) <dd>　　　　(2) <dl>　　　　(3) 　　　　(4) 　　　　(5)

> As number format 1,2,3 is used in the list, we can say that this is an **ordered** list. If bullets such as circle, square, etc. are used, that means that list is an unordered list.

5. Random Access Memory (RAM) modules are often compared by their capacity, measured in ....
   and by their speed, measured in ....
   Most suitable words to fill the blanks of the above statements are respectively

(1) Kilobytes, Gigabytes　　　　　　　　(2) Gigabytes, Megabits per second
(3) Gigabytes, Megahertz　　　　　　　　(4) Megahertz, Kilohertz
(5) Gigabits, Megabits per second
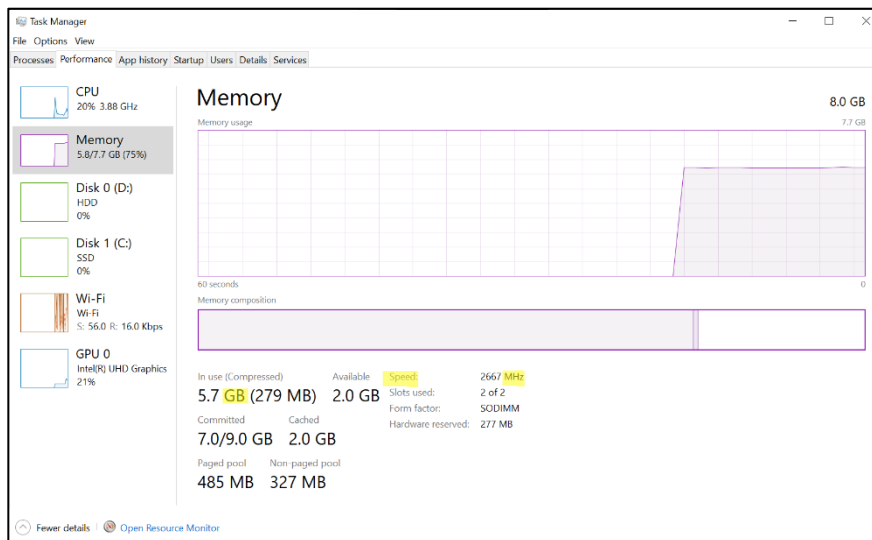
6. An application which requires more memory space than the maximum memory space available in the primary memory of a computer is ready for execution. Which of the followings is used by the operating system of that computer to satisfy this need?

(1) Random Access Memory (RAM)　　　　(2) Read Only Memory (ROM)
(3) Cache Memory　　　　　　　　　　　　(4) Virtual Memory
(5) Extended Memory

> Virtual Memory
>
> This technique allows the user to use the hard disk as extra RAM when the physical RAM runs out of space
>
> Virtual Memory = Physical Memory Size × 1.5
> 　　(12 GB)　　　　　　　(8 GB)

7. $48B_{16} + 00101011_2 =$
   (1) $4B6_{16}$ (2) 310_{16} . (3) 503_{16} (4) 513_{16} (5) 559_{16}

8. The feature in modern operating systems which allows the automatic installation of new hardware devices connected to a computer is commonly known as
   (1) Add/Remove Hardware.   (2) Easy Installer.   (3) Plug and Play.
   (4) Add Hardware Utility.   (5) Fetch and Store.

9. Which of the following is **not** a typical use of the Random Access Memory(RAM) of a personal computer?
   (1) Keeping data for processing.
   (2) Holding instructions for operations.
   (3) Providing storage for operating system.
   (4) Retaining information for output.
   (5) Keeping the BIOS program for boot-up.

Everything in RAM will be lost when the computer is turned off. Therefore, the boot program which is essential for the boot up process of a computer is not kept in the RAM. It's in the ROM

10. Consider the following statements about social networking sites:
    A - They are being used increasingly as a medium for election campaigns.
    B - A user's true identity is always guaranteed in a social networking site.
    C - They are absolutely necessary to maintain human relationships in the modern society.
    Which of the above statement(s) is/are correct?
    (1) A only   (2) B only   (3) C only   (4) A and B only   (5) A and C only

11. Consider the following combinatory circuit implemented using universal gates:
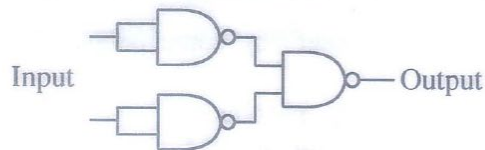
The above circuit is equivalent to a/an

(1) AND Gate.   (2) OR Gate.   (3) NAND Gate.   (4) NOR Gate.   (5) NOT Gate.
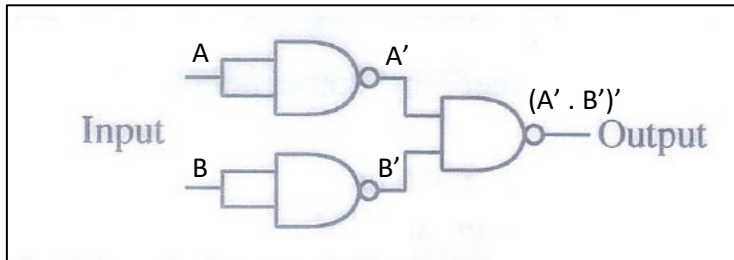
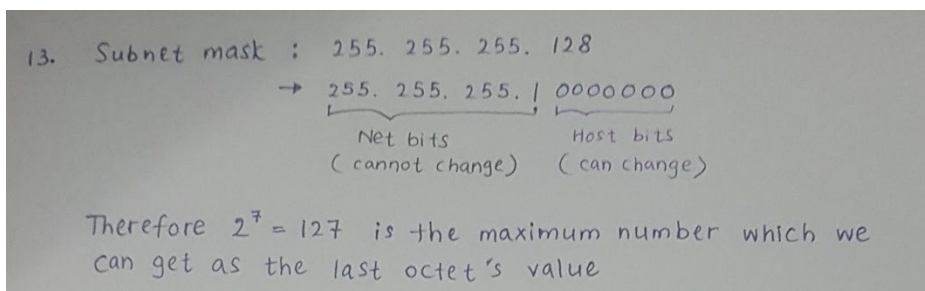| (A' . B')'	
A'' + B''	De Morgan's Law
A + B	Double Complement Law

12. .... is used for analog signal to digital signal conversion.
Which of the following is most appropriate to fill the blank in the above statement?

(1) Amplitude Modulation (AM)   (2) Frequency Modulation (FM)
(3) Pulse Code Modulation (PCM)   (4) Phase Modulation (PM)
(5) Time Division Modulation (TDM)

(1) Amplitude Modulation (AM)	Amplitude of the *carrier signal* varies according the amplitude of the *message signal*
(2) Frequency Modulation (FM)	Transmitting information over a carrier wave by varying its frequency in accordance with the amplitude of the message signal
(3) Pulse Code Modulation (PCM)	Converts the analog information into a binary sequence (1 and 0 – digital form) so that the computer can understand
(4) Phase Modulation	Transmits information over a carrier wave by varying its phase in accordance with the amplitude of the message
(5) Time Division Modulation (TDM)	Transmitting multiple signals over a single communication channel by dividing time into discrete slots and allocating each signal its own time slot for transmission

13. A computer in a network is configured with the IP address 192.248.16.91 and the subnet mask 255.255.255.128. Which of the following IP addresses **cannot** be assigned to a computer in the same network?
    (1) 192.248.16.161   (2) 192.248.16.78   (3) 192.248.16.110
    (4) 192.148.16.75   (5) 192.248.16.120

13. Subnet mask : 255. 255. 255. 128

→ 255. 255. 255. | 0000000

Net bits   Host bits
(cannot change)   (can change)

Therefore $2^7 = 127$ is the maximum number which we can get as the last octet's value

14. Some provinces in Sri Lanka currently issue revenue licenses for motor vehicles online. Which of the following is the correct business type for this service?
    (1) B2C   (2) B2B   (3) C2B   (4) B2E   (5) G2C

Types of e business transactions
B2B - Business makes a commercial transaction with another business online
B2C - Products or services are sold to the consumer by the business using Internet
C2C - One consumer sells a product or service to another consumer online
C2B - Consumer acts as the seller and the business is the buyer. Any transaction will made online
B2E - Allows companies to provide products or services to their employees online
G2C - Government provides products or services to the citizens online
B2G - Imply the relationship between a business the government. Transactions are made through internet
G2B - Government provides products or services to businesses through the internet

15. Consider the following HTML element:
    `<input    type = "text"    name = "firstname"    maxlength = "15" />`
    What is the effect of the attribute 'maxlength' on the functionality of the element above?
    (1) It sets the length of the textbox to 15 pixels.
    (2) It sets the length of the textbox to 15 characters.
    (3) It displays maximum of 15 characters in the textbox.
    (4) The display scrolls to the right after typing 15 characters.
   (5) It allows to type maximum of 15 characters into the textbox.

The `maxlength` attribute specifies the maximum number of characters allowed in the `<input>` element.

16. Consider the following HTML element:

    `<a href = "attributes.html" target = "_blank"> Attributes </a>`

    The value of the attribute 'target' in the above specifies that the linked document 'attributes.html' should be opened in

    (1) a new tab or window. (2) the same frame. (3) the parent frame.
    (4) the frame named "blank". (5) the full body of the current window.
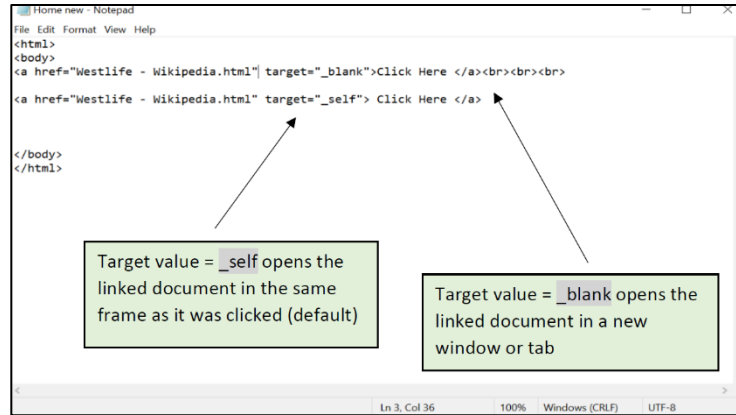
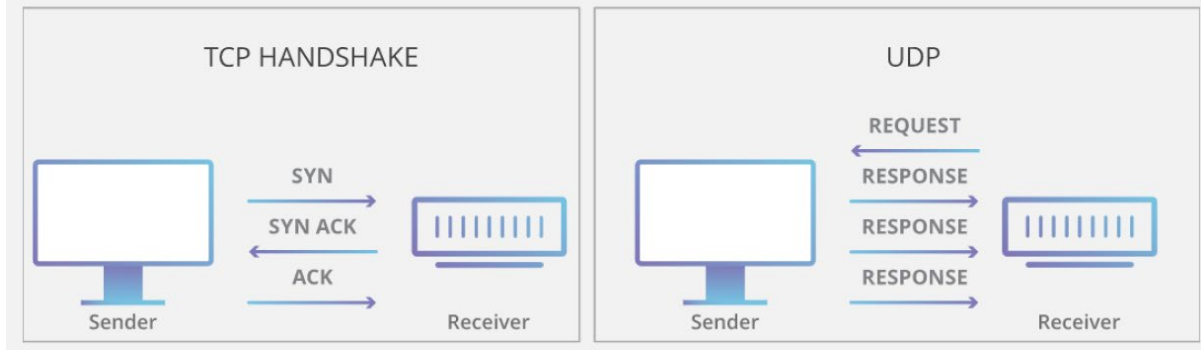17. What is the correct CSS rule to set the background colour of a web page to yellow?

    (1) body {body-color: "yellow";} (2) body {bgcolor: yellow;}
    (3) body {background-color: yellow;} (4) body {bgcolor = yellow}
    (5) body {background-color = yellow;}

18. Which of the following statements is correct with respect to the Transmission Control Protocol (TCP)?

    (1) TCP is a network layer protocol.
    (2) TCP guarantees that each byte sent is received at the receiver.
    (3) Only one application at a time can use TCP in a computer.
    (4) HTTP uses TCP.
    (5) TCP uses User Datagram Protocol (UDP) as the transport protocol.

Answer (1)	Incorrect	TCP is a transport layer protocol
Answer (2)	Correct	TCP is used for loading web page content, requires a handshake in which the receiver agrees to the communication before the data is sent.
Answer (3)	Incorrect	Multiple applications can use TCP simultaneously on a computer
Answer (4)	Incorrect	
Answer (5)	Incorrect	TCP and UDP are two different transport layer protocols, each with its own characteristics and use cases.

TCP vs UDP Communication

TCP HANDSHAKE	UDP

TCP HANDSHAKE

Sender → SYN → Receiver
Receiver → SYN ACK → Sender
Sender → ACK → Receiver

Sender — Receiver

UDP

REQUEST
RESPONSE
RESPONSE
RESPONSE

Sender — Receiver

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19. A LAN uses the subnet mask 255.255.240.0. How many different IP addresses can be assigned to devices in this LAN?

(1) 254   (2) 256   (3) 1024   (4) 2046   (5) 4094

19.   255. 255. 240. 0

Step 1 : Convert last two octets to binary

255. 255. 1111 0000. 0000 0000

Net   Host

— step 1 is performed to identify the net bits and host bits

Step 2 : Count the host bits → 12 bits

= 2^{12} = 4096 addresses are there in the network

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20. Which of the following statements is correct with respect to routing in the Internet?
(1) There can be at most one router in any given LAN.
(2) A router can have more than one network interface.
(3) Routing is a functionality of the Transport Layer.
(4) All routers function as HTTP proxies.
(5) The Internet does not need routing if all applications use TCP.

Answer (1)	Incorrect	There can be more than one router in a LAN
Answer (2)	Correct	Yes, routers commonly have more than one network interface. Routers are designed to connect different networks together, and having multiple network interfaces allows them to do so effectively.
Answer (3)	Incorrect	Routing is a functionality of Network layer
Answer (4)	Incorrect	Not all routers function as HTTP proxies
Answer (5)	Incorrect	Routing is essential for directing data packets to their intended destinations on the internet

21. Consider the following terms related to computer systems:

A - Malware   B - Hardware   C - Software   D - Liveware

Which of the above are basic components of a computer system?

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

(4) B and C only   (5) B, C and D only

22. In a public key encryption system, the private key of a person x is given by the function priv(x) and the public key is given by pub(x). Consider the following statements:
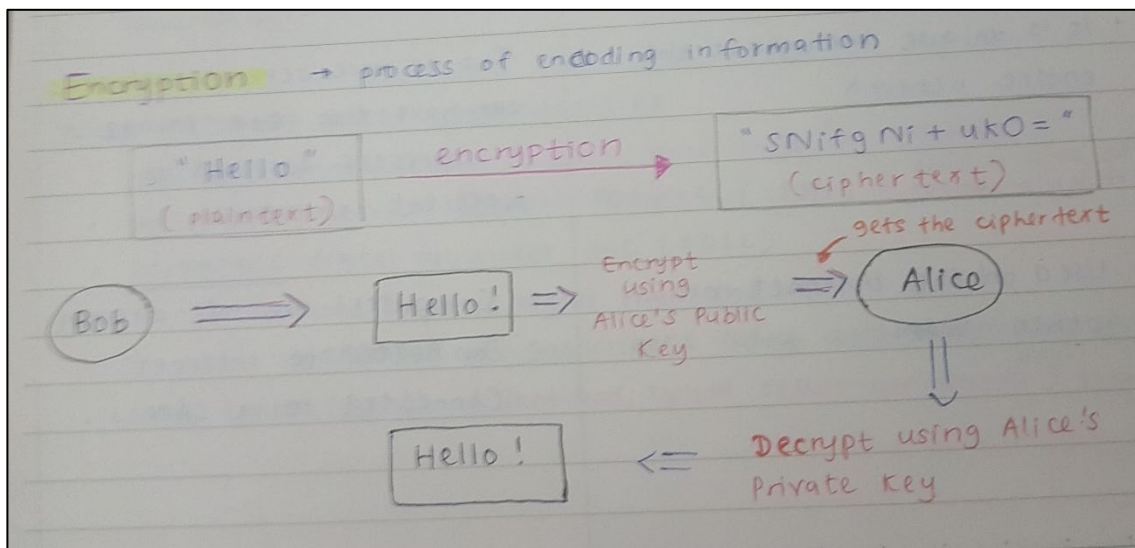
A - pub(x) is used to encrypt a message that can only be decrypted using priv(x).

B - pub(x) is used to sign a message to be sent to x.

C - A message encrypted using pub(x) can be decrypted using pub(x).

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

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

23. Consider the following statements regarding a server with the domain name www.bogus.lk:
    A - The server www.bogus.lk can be located anywhere in the world.
    B - www.bogus.lk must be a web server.
    C - The domain names www.bogus.lk and www.bogus.com can be resolved to the same IP address.
    Which of the above statement(s) is/are correct?
    (1) A only   (2) B only   (3) C only   (4) A and B only (5) A and C only

A	Correct	This web page is stored in a server and this server can be located anywhere in the world
B	Incorrect	Could be associated with various types of servers, not just web servers
C	Correct	This is possible to do

24. Consider the following statements about computer programming languages:
    A - The processor of a typical computer can understand and execute only the machine language of that processor.
    B - The processor of a typical computer can understand and execute any machine language of any processor.
    C - The processor of a typical computer can understand and execute any program in any assembly language.
    D - The processor of a typical computer can understand and execute any program in Python language.
    Which of the above statement(s) is/are correct?
    (1) A only   (2) A and B only (3) A and C only (4) B and C only (5) C and D only

Compiler	Converts the whole source code
Interpreter	Converts the source code line by line
Assembler	Translates assembly language to machine language

A	Correct	The processor of a computer can only understand and execute its machine language only
B	Incorrect	One computer cannot understand another processors' language
C	Incorrect	One computer cannot understand another processors' language
D	Incorrect	One computer cannot understand another processors' language

High Level Language	Assembly Language	Machine Language
Is being designed to make writing and reading codes easier for humans.	A low-level programming language designed to interface directly with computer hardware which consists of some human-readable commands.	Low-level language which consists of binary or hexadecimal instructions to which a computer can directly react.

High Level Language:
```
def Odd_Even(n):
    if(n%2!=1):
        print("The number is even")
    else:
        print("The number is odd")

Odd_Even(10)
Odd_Even(5)
```

Assembly Language:
```
section     .text
global      _start

_start:

    mov     edx,len
    mov     ecx,msg
    mov     ebx,1
    mov     eax,4
    int     0x80

    mov     eax,1
    int     0x80

section     .data

msg     db  'Hello, world!',0xa
len     equ $ - msg
```

Machine Language:
```
00000000 00000100 0000000000000000
01011110 00001100 11000010 0000000000000010
11101111 00010110 0000000000000101
11101111 10011110 0000000000001011
11111000 10101101 11011111 0000000000010010
01100010 11011111 0000000000010101
11101111 00000010 11111011 0000000000010111
11110100 10101101 11011111 0000000000011110
00000011 10100010 11011111 0000000000100001
11101111 00000010 11111011 0000000000100100
01111110 11110100 10101101
11111000 10101110 11000101 0000000000101011
00000110 10100010 11111011 0000000000110001
11101111 00000010 11111011 0000000000110100
01010000 11010100 0000000000111011
00000100 0000000000111101
```

25. Consider the following statements about the World Wide Web (WWW):
   A - It is a collection of interlinked, hypertext documents accessed via the Internet.
   B - It is a protocol for distributing information via computers connected to the Internet.
   C - It was invented by the World Wide Web Consortium (W3C).
   Which of the above statement(s) is/are correct?
   (1) A only   (2) B only   (3) C only   (4) A and B only (5) A and C only

A	Correct	A system of interlinked hypertext documents and multimedia content that is accessed via the internet using web browsers
B	Incorrect	Not a protocol but an URL
C	Incorrect	Tim Berners Lee is the founder of WWW

26. Consider the following statements on Dynamic Random Access Memory (DRAM) and Static Random Access Memory (SRAM):

A - Registers are made of DRAM
B - DRAM is faster than SRAM
C - DRAM is more dense than SRAM

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

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

DRAM	SRAM
High power consumption	Low power consumption
Simple structural complexity (capacitor + transistor per bit)	Complex structural complexity (4 – 6 transistors per bit)
Low cost	High cost
High memory capacity	Low memory capacity
Used for RAM	Used for Cache memory and Registers
Requires a memory refreshment circuit	

27. ABC Holdings is a manufacturing organization in Sri Lanka which has its head office in Japan. What is the most convenient method to conduct weekly progress review meetings between the local staff in Sri Lanka and the senior management team in Japan?

(1) Telephone calls   (2) Skype   (3) E-mail   (4) SMS   (5) YouTube

28. Consider the following statements:
    A - This algorithm takes only a single input.
    B - This algorithm does not have any repetition(loop).
    C - If the user inputs -1 for X, the algorithm will not terminate.
    D - When the user inputs 1 for X, the algorithm will not
        terminate till the user enters another value.
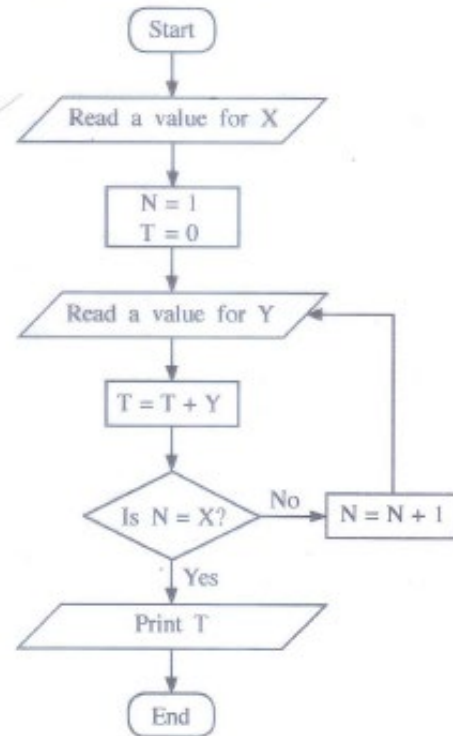   Which of the above statement(s) is/are correct?
    (1) A only   (2) A and B only (3) A and D only
    (4) B and C only (5) C and D only

29. The algorithm represented by the flowchart is considered as a
    poor algorithm because it does **not**
    (1) terminate for some input values.
    (2) contain finite number of steps.
    (3) specify the next step to be performed at least for a one
        step of the algorithm.
    (4) consist of a sequence of steps.
    (5) contain any variable type declarations.

30. The algorithm terminates
    (1) for input value 5.
    (2) when values 0,5,4 are given as input one after the other.
    (3) by printing the value 5 when it is given the input values
        2,5,4 one after the other.
    (4) by printing the value 4 when it is given the input values
        2,5,4 one after the other.
    (5) by printing the value 9 when it is given the input values
        2,5,4 one after the other.

Start

Read a value for X

N = 1
T = 0

Read a value for Y

T = T + Y

Is N = X? — No → N = N + 1

Yes

Print T

End

28.

A	False	X and Y are the inputs
B	False	There is a loop where the condition N=X is checked
C	True	N is a positive integer and therefore it will not be equal to X. After the incrementation the loop will keep running asking the user to enter y repeatedly
D	True	As there are two inputs

29. A program should always eliminate for some inputs. Otherwise it run infinite times

30.

	X	N	T	Y	T= T+Y	N= X	N= N+1	Print T
(2)	O	1	O	5	5 = 0+5	1 = 0 X	2 = 1+1	
				4	9 = 5+4	2 = 0 X	3 = 2+1	
(5)	2	1	O	5	5 = 0+5	1 = 2 X	2 = 1+1	
					9 = 5+4	2 = 2 ✓	—	9

31. Which of the following Python programs implements the behaviour of the flowchart?

(1)
```
x = int(input("Enter a value : "))
n = 1
t = 0
while n <= x:
    y = int(input("Enter the next value: "))
    t = t + y
    n = n + 1
print(t)
```

(2)
```
x = int(input("Enter a value : "))
n = 1
t = 0
while n <= x:
    y =int(input("Enter the next value: "))
    t = t + y
    n = n + 1
print(t)
```

(3)
```
x = int(input("Enter a value : "))
n =1
t = 0
iterate = True
while n != x:
    y = int(input("Enter the next value: "))
    t = t + y
    n = n + 1
print(t)
```

(4)
```
x = int(input("Enter a value : "))
n = 1
t = 0
while n != x:
    y =int(input("Enter the next value: "))
    t = t + y
    n = n + 1
print(t)
```

(5)
```
x = int(input("Enter a value : "))
n =1
t = 0
iterate = True
while iterate:
    y = int(input("Enter the next value: "))
    t = t + y
    if n == x:
        iterate = False
    else:
        n = n + 1
print(t)
```

32. Consider the following statement regarding an Automatic Teller Machine (ATM) of a bank:
    "System shall dispense cash in less than 10 seconds."
    Which of the following is correct with respect to the above statement?
    (1) This is an essential non-functional requirement.
    (2) This is a nice to have non-functional requirement.
    (3) This is an essential functional requirement.
    (4) This is a nice to have functional requirement.
    (5) This is not a requirement of the system.

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

33. Consider the following Data Flow Diagram:
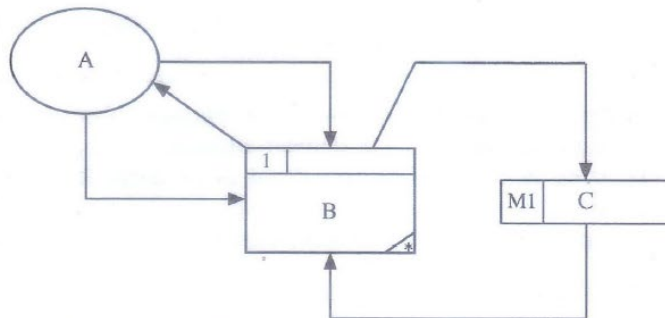
According to the Structured System Analysis and Design Methodology (SSADM), the components A, B and C in the above diagram represent ……………………… respectively.
    (1) an external entity, a process and a data flow
    (2) a process, an entity and a data store
    (3) a user, a process and a table in an electronic database
    (4) a user, a function and a table in an electronic database
    (5) an external entity, a process and a data store

| A	An external Entity	The external party of the system depending on what the system is
B	Process	This is where what we expect from the systems happens
C	Data Store	A system gets or stores data from these

34. Which of the following statements is correct with respect to openness and closeness of a system?
    (1) An Automatic Teller Machine of a bank should be a close system.
    (2) A general purpose computer can be considered as an open system.
    (3) Human blood circulatory system is an open system.
    (4) A mobile phone is a close system.
   (5) A solar power generation system is a close system.

Open System	Closed System
• Interacts with its environment through giving and receiving data/ information/ material/ energy	• All interaction and knowledge is transmitted within the closed system only
• Inputs are taken from the system environment and outputs are given to the environment as well	• Inputs are taken within the system boundary and outputs are given within the system boundary as well

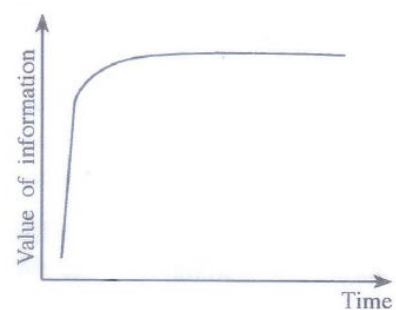|	
ATM of a Bank	An open system
A general purpose computer	An open system
Human blood circulatory system	A closed system
A mobile phone	An open system
A solar power generation system	An open system

35. Which of the following graphs illustrates the Golden rule of information?
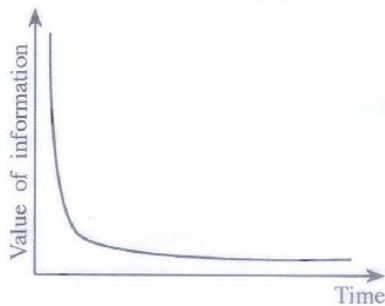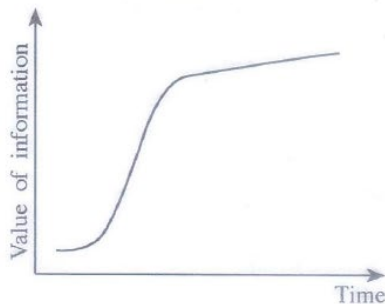

(1)
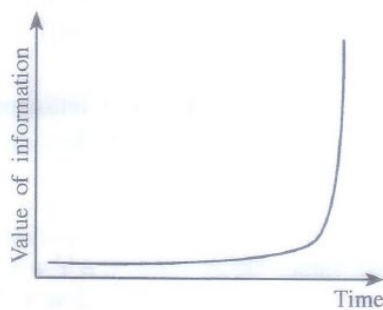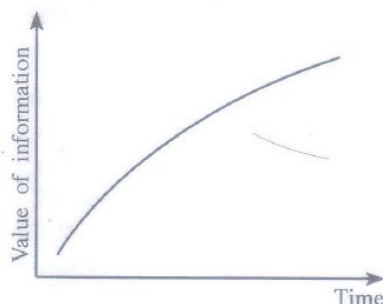
(2)

(3)

(4)

(5)

Golden Rule of information → Value of information degrades over time

- Consider the following relations to answer questions from **36** to **38**.

  programmer (programmerId, programmerName, gender, NIC, mobilePhoneNumber, degree, universityName)
  client(clientId, clientName, address, telephoneNumber)
  project(projectId, projectName, clientId, startDate, endDate, cost)
  workFor(programmerId, projectId, startDate, endDate)

36. Consider the following statements:
   A - A programmer works for at most one project at any given time.
   B - A programmer is assigned to a single client at any given time.
   C - One client can have more than one project.

   Which of the above statement(s) is/are **always** correct?
   (1) A only   (2) B only   (3) C only   (4) A and B only   (5) B and C only

A	Incorrect	A programmer can work on more than one project at any given time
B	Incorrect	A programmer is being assigned to several clients at any given time
C	Correct	One client can request more than one projects to be done

37. **Which of the following is correct with respect to attributes of the relations?**
   (1) Attributes gender, NIC and mobilePhoneNumber are candidate keys of programmer relation.
   (2) Attribute startDate is a derived attribute.
   (3) Attribute NIC can be considered as an alternate key for the programmer relation.
   (4) Attribute startDate is a foreign key for the workFor relation.
   (5) Each record in the workFor relation can be uniquely identified by using projectId.

Primary Key	• Uniquely identify all table records , not null • A table **can** be created without the primary key
Foreign Key	• Link two tables together • Refers to the primary key of a different table • A foreign key can contain duplicate values
Alternate Key	• 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	• 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	• 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

38. Which of the following is correct?
    (1) All relations are in 3rd normal form.
    (2) All relations except the programmer are in the 3rd normal form.
    (3) All relations except the client are in the 3rd normal form.
    (4) All relations except the project are in the 3rd normal form.
    (5) All relations except the workFor are in the 3rd normal form.

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

39. Consider the following database constraints:
    A - Primary key
    B - Data type
    C - Foreign key
    Which of the above constraint/s does/do **not** allow users to duplicate data in a database table?
    (1) A only   (2) B only   (3) A and B only (4) A and C only (5) B and C only

Domain Integrity Constraint	Definition of a valid set of values for an attribute
Entity Integrity Constraint / Primary Key Constraint	Uniquely identifies each record in a database table
Referential Intergrity/ Foreign key integrity constraint	Is used to maintain the consistency among rows between the two tables

- Consider the following four relational database tables to answer questions **40** and **41**.

item table

item	product
T001	Laptop
T002	TV
T003	Camera

supplier table

supplier	name
S001	BeLap Company Ltd.
S002	DigiTV trading company

itemSupplier table

item	supplier
T001	S001
T002	S001
T002	S002

delivery table

item	supplier	batch	quantity	date
T001	S001	B01	450	1.5.2015
T002	S001	AB1	45	1.5.2015
T001	S001	B02	500	2.5.2015
T001	S002	C01	75	5.5.2015

40. Which of the following actions is taken by a database management system when the SQL statement "delete from item" is executed?

    (1) It will ask the user to select records for deletion.
    (2) It may delete all the records from the 'item' table.
    (3) It will drop the 'item' table.
    (4) It will not delete any record from the 'item' table.
    (5) The SQL statement will not be executed since it has errors.

Data Definition Language (DDL)	Data Manipulation Language (DML)
CREATE	SELECT
ALTER	INSERT
DROP	UPDATE
RENAME	DELETE

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- CREATE – to create objects in the database
- ALTER – alters the structure of the database
- DROP – delete objects from the database
- RENAME – rename an object

- SELECT – retrieve data from a database
- INSERT – insert data into a table
- UPDATE – updates existing data within a table
- DELETE – delete all records from a database table

41. Which of the following is correct with respect to the above tables?

    (1) All the tables are in third normal form.
    (2) Normalization has been applied to these tables.
    (3) Integrity constraints are correctly applied to these tables.
    (4) There is no evidence to say that integrity constraints are properly applied.
    (5) Normalization and integrity constraints are properly applied.

42. What is the two's complement representation of 6_{10}?

(1) 11111010   (2) 00000110   (3) 11111001   (4) 01011111   (5) 00000101

> In two's complement positive numbers are not inverted and add 1 after converting into 8 bit binary format.

43. A file of 1 MB has been successfully sent from the machine X to machine Y in a network over a TCP connection. It has been observed that the 10th byte of the file has passed through the router R. Consider the following statements regarding this communication:

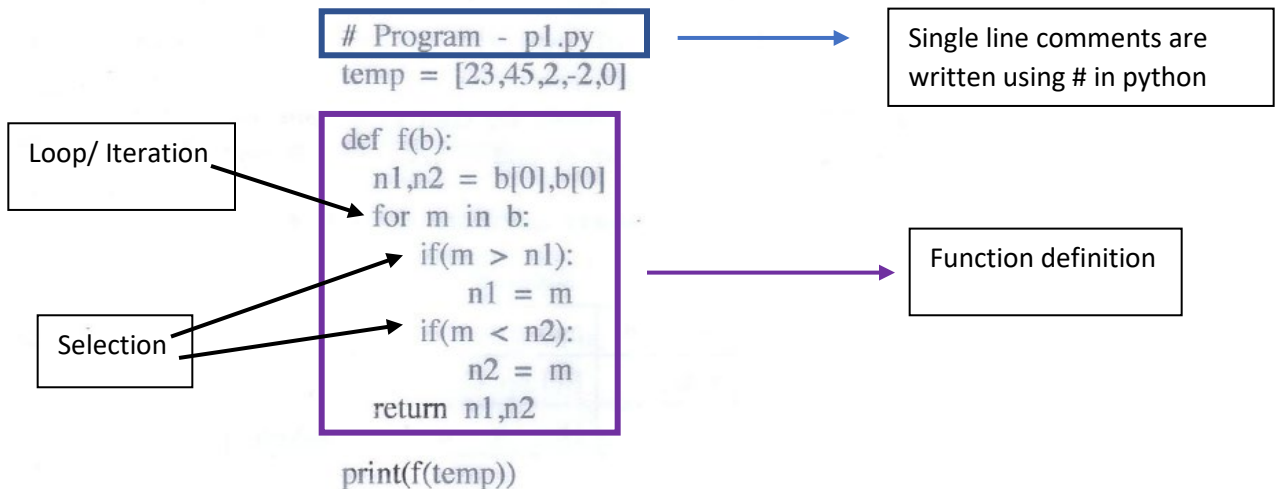A - The $10,000^{th}$ byte must have gone through the router R after the 10th byte.
B - The $10,000^{th}$ byte must have gone through the same path from X to Y as the 10th byte.
C - The $10,000^{th}$ byte may or may not have gone through the router R.

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

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

● Questions from **44** to **47** are based on the following Python program.

```
# Program - p1.py
temp = [23,45,2,-2,0]

def f(b):
    n1,n2 = b[0],b[0]
    for m in b:
        if(m > n1):
            n1 = m
        if(m < n2):
            n2 = m
    return n1,n2

print(f(temp))
```

Single line comments are written using # in python

Loop/ Iteration

Selection

Function definition

44. Consider the following statements about this Python code:

         A - It contains a comment.
         B - It contains a definition of a function.
         C - It does **not** contain any selections.
         D - It does **not** contain any iterations.

Which of the above statements are correct?

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

45. What is the data type of the variable **temp** in this Python code?
    (1) Integer   (2) Float   (3) Boolean   (4) Tuple   (5) List

> Lists are defined inside square brackets []

46. What is the return data type of the function named "**f**"?
    (1) Integer   (2) Float   (3) Boolean   (4) Tuple   (5) List

47. Which of the following value/s is/are in the output of the above program?
    (1) 23 and 45   (2) 45 and -2   (3) -2 and 0   (4) 0   (5) 23

48. Consider the following Python program:

```
temp = [23,45,2,-2,0]
print(temp[::2])
```

What is the output of the above program?
    (1) [23,45]   (2) [-2,0]   (3) [23,2,0]   (4) [2,-2,0]   (5) [23,45,2,-2,0]

	23	45	2	-2	0
Index	0	1	2	3	4

> print (temp[::2]) → This will print values from index 0 to index 2 (including 2nd index)

49. Which of the following is **incorrect** about software agents?
   (1) They exhibit some degree of autonomy.
   (2) They are a subset of reactive systems.
   (3) They are proactive in terms of their ability to exhibit goal-directed behaviour.
   (4) Electronic commerce is one of the key application areas of them.
   (5) They are always cooperative in a multi-agent environment.

Characteristics of a Software Agent

- Autonomy - should be able to perform problem-solving tasks without the direct intervention of humans or other agents

- Social Ability – should be able to interact, with other software agents and humans in order to complete their tasks

- Responsiveness/ Reactiveness - should perceive their environment (which may be the physical world, a user, a collection of agents, the INTERNET, etc.) and respond in a timely fashion to changes which occur in it. (Time period they have to respond isn't restricted)

- Proactiveness - should not simply act in response to their environment, they should be able to exhibit opportunistic, goal-directed behavior and take the initiative where appropriate.

- Learn Ability - should be able to learn through experiences

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50. Which of the following is/are examples for artificial intelligence techniques?
   A - Neural Networks
   B - Genetic Algorithms
   C - Ubiquitous Computing
   (1) A only   (2) B only   (3) A and B only   (4) A and C only   (5) B and C only

A – Neural Networks	A method in AI that teaches computers to process data in a way that is inspired by the human brain
B – Genetic Algorithms	A method for solving both constrained and unconstrained optimization problems that is based on natural selection, the process that drives biological evolution
C – Ubiquitous Computing	A concept in software engineering, hardware engineering and computer science where computing is made to appear anytime and everywhere