Advanced Level – Information and Communication Technology
2017 MCQ Past Paper

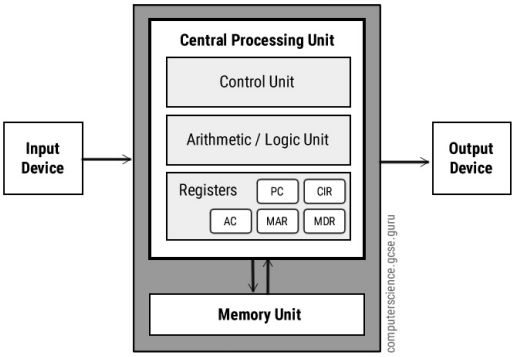
1. Who proposed the stored program concept first?

(1) Lady Ada Augusta (2) Charles Babbage (3) Howard Aiken
(4) Blaise Pascal (5) Von Neumann

(1) Lady Ada Augusta	First programmer who wrote the program for Analytical Engine
(2) Charles Babbage	Father of computing
(3) Howard Aiken	Founded Mark 1 calculator
(4) Blaise Pascal	Pascaline was invented by Blaise Pascal in 1642
(5) Von Neumann	Proposed the stored program concept

2. Which of the following components is generally seen outside the Central Processing Unit (CPU) of a computer?

(1) RAM (2) Control Unit (3) ALU
(4) General purpose registers (5) L1 cache memory



Cache Level	Location
Level 1	Inside the CPU
Level 2	Inside the CPU/ CPU housing/ motherboard
Level 3	CPU housing/ Motherboard

3. What is the two's complement representation of 45, if an integer is represented by 8 bits?

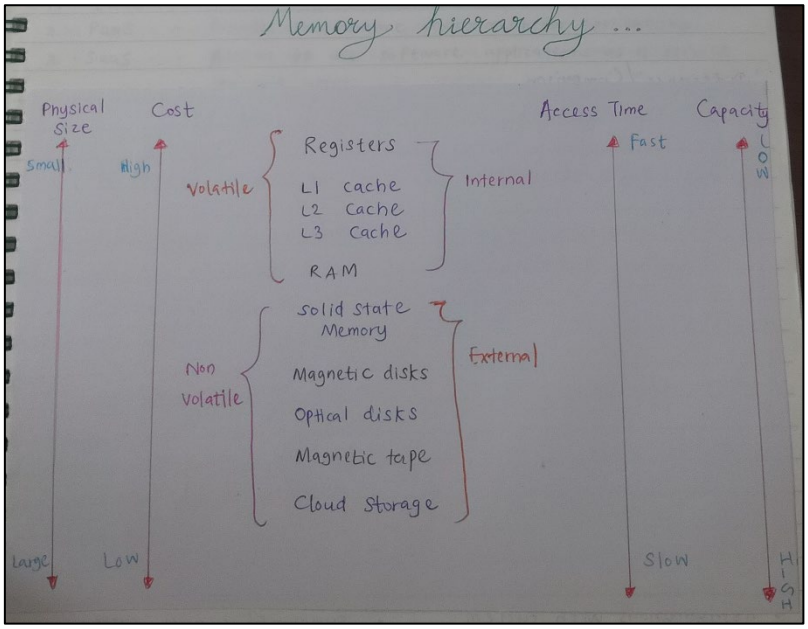
(1) 11010011 (2) 10110011 (3) 11001101 (4) 00101111 (5) 00101101

When representing a positive number in two's complement, we just have to convert the decimal number to binary and represent by 8 bits.

When representing a negative number in two's complement, we have to first convert the decimal number to binary and then invert all the bits. Lastly we have to add 1 to the least significant bit.

4. Which of the followings is another name for web publishing?
(1) Offline publishing (2) Desktop publishing (3) Media publishing
(4) Online publishing (5) Self publishing

5. Which of the following secondary storage devices is generally considered to provide the fastest access to data?
(1) Compact Disc (2) Digital Versatile Disc (3) Internal hard disk
(4) Magnetic tape (5) Floppy disk



6. Which of the followings is usually used to boot-up personal computers?
(1) Firmware (2) Malware (3) Adware (4) Ransomware (5) Liveware

(1) Firmware	A form of microcode or program embedded into hardware devices to help them operate effectively
(2) Malware	A file or code, typically delivered over a network that infects, explores, steals or conducts virtually any behavior an attacker wants.
(3) Adware	A type of malicious software that secretly installs itself on your device and displays unwanted advertisements and pop-ups.
(4) Ransomware	A type of malicious software designed to block access to a computer system until a sum of money is paid.
(5) Live ware	Used to describe people that are responsible for working on the computer

7. Which of the followings is a main use of Complementary Metal-Oxide Semiconductor (CMOS) memory of a personal computer?
(1) Keeping inputs for processing
(2) Holding instructions for operations
(3) Providing space for loading operating system
(4) Retaining information for output
(5) Keeping Basic Input Output System settings for the booting procedure

CMOS memory stores important system settings and configurations such as the date and time, boot order, hardware settings, and password information.

8. The execution of a series of non-interactive jobs on a personal computer with relative to the user is known as
(1) multitasking.
(2) multiuser processing.
(3) multiprocessing.
(4) batch processing.
(5) online processing.

All

(1) multitasking	A mechanism which allows several programs to run at the same time on a uniprocessor
(2) multiuser processing	This technique allows multiple users to access
(3) multiprocessing	The utilization of two or more CPUs in a single computer system
(4) batch processing	Transactions are allowed to pile up in a stack of documents and are entered into the computer system in a batch.
(5) online processing	The ongoing entry of transactions into a computer system in real time. (The opposite of batch processing)

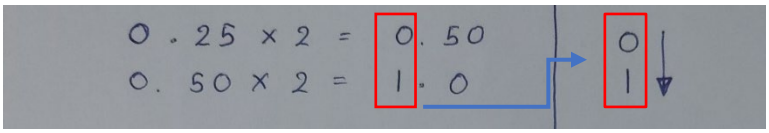
9. Which of the following numbers is equivalent to the binary number 101111_2?
(1) 57_8 (2) 57_{16} (3) 57_{10} (4) 59_{16} (5) $5F_{16}$

10. $5D_{16} + 10111_2 =$
(1) 73_8 (2) 75_{16} (3) 116_8 (4) 163_8 (5) 164_8

11. What is the binary representation of 9.25_{10}?
(1) 1110011101 (2) 00001001.01 (3) 0000100101 (4) 1000100101 (5) 10001001.01

Step 1: Convert 9 to binary → 0000 1001

Step 2: Convert 0.25 to binary → .01



12. A ..... on motherboard is used to expand the functionality of a computer. Which of the followings is the most appropriate to fill in the blank in the above statement?
(1) Bus (2) Clock (3) RAM (4) Slot (5) ROM

13. Consider the following HTML code:

```
<html>
    <head>
        <title>Countries</title>
    </head>
    <body>
        <p><!-- <h1> Sri Lanka </h1> --></p>
    </body>
</html>
```

Which of the followings correctly describes the display, when the above code is rendered?
(1) The text "Country" appears on the title bar and the text "Sri Lanka" appears as a header.
(2) The text "Sri Lanka" appears on the title bar and the text "Country" appears as a header.
(3) The text "Country" appears on the title bar.
(4) The text "<!--<h1> Sri Lanka </h1>-->" appears on the title bar.
(5) The text "<!--<h1> Sri Lanka </h1>-->" appears in the body of the web page.

All

14. Consider the "Submit" button of an HTML form given below:

Which of the following tags/elements correctly implements the intended function of the above "Submit" button?

(1) <input type = "submit" value = "Submit">
(2) <input type = "button" value = "Submit">
(3) <button type = "button" >Submit</ button>
(4) <button type = "submit"></ button>
(5) <button type = "submit" value = "Submit"></ button>

Example

A form with a submit button:

```
<form action="/action_page.php">
  <label for="fname">First name:</label><br>
  <input type="text" id="fname" name="fname" value="John"><br>
  <label for="lname">Last name:</label><br>
  <input type="text" id="lname" name="lname" value="Doe"><br><br>
  <input type="submit" value="Submit">
</form>
```

15. Which of the following CSS rules renders the image in the file "school.png" as the background of a web page?

(1) body { background = "school.png"; }
(2) body { background: url ("school.png"); }
(3) body { background-image = "school.png"; }
(4) body { background-image: "school.png"; }
(5) body { background-image: url ("school.png"); }

Example

Set the background image for a page:

```
body {
  background-image: url("paper.gif");
}
```

16. In electronic mail systems, the protocol used by mail clients to retrieve messages from the mail server is

(1) Simple Mail Transfer Protocol (SMTP).
(2) File Transfer Protocol (FTP).
(3) Internet Control Message Protocol (ICMP).
(4) Internet Message Access Protocol (IMAP).
(5) Telnet.

(1) Simple Mail Transfer Protocol (SMTP)	Used for electronic mail transmission (use TCP)
(2) File Transfer Protocol (FTP)	Used for the transfer of files from one host to another over a TCP-based network such as the Internet
(3) Internet Control Message Protocol (ICMP)	Used by network devices to diagnose network communication issues
(4) Internet Message Access Protocol (IMAP)	Used by email clients to retrieve email messages from a mail server over a TCP/IP connection
(5) Telnet	Provides a command line interface for communication with a remote device or server

17. The transport layer protocol User Datagram Protocol (UDP) can be used for
(1) reliable communication. (2) guaranteed delivery.
(3) connection oriented communication. (4) ordered delivery.
(5) exchanging state information among routers.

TCP	UDP
Connected	Connectionless
State Memory	Stateless
Byte Stream	Packet/Datagram
Ordered Data Delivery	No Sequence Guarantee
Reliable	Lossy
Error Free	Error Packets Discarded
Handshake	No Handshake
Flow Control	No Flow Control
Relatively Slow	Relatively Fast
Point to Point	Supports Multicast
Security: SSL/TLS	Security: DTLS

18. Which of the following statements regarding MAC addresses is correct?
(1) Every network device has a unique MAC address.
(2) Every network host has a unique MAC address.
(3) Every network interface has a unique MAC address.
(4) It is assigned for a device at the time of installation.
(5) It is used for routing.

MAC address (Physical address/ BIA/ Networking hardware address)

Identifies a device to another device on the same local network. (unique) A mac address in a network is a unique identifier assigned to a network interface controller (NIC) for communication within the local network.

19. The first and the last IP addresses of a subnet are 192.192.48.0 and 192.192.63.255 respectively. Which of the followings is the subnet mask of this subnet?
(1) 255.255.255.0 (2) 255.255.192.0 (3) 255.255.255.192
(4) 255.255.240.0 (5) 255.240.0.0

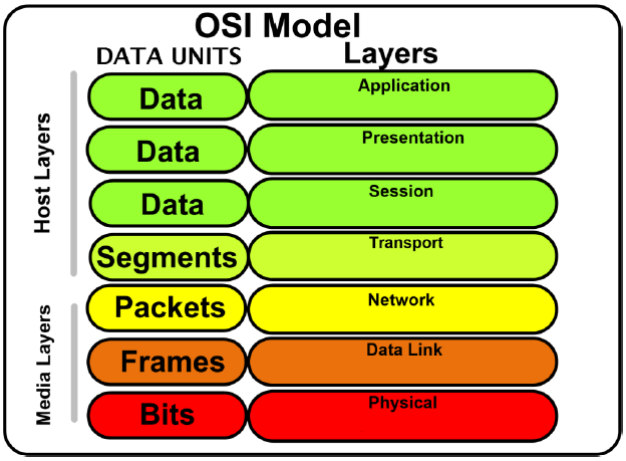
When considering the two IP addresses we can see that these belong to class C. Then, also we can see that the first two octets are same as well. What we have to do is convert 48 and 63 to binary. Then we'll get 0011 0000 and 0011 1111 respectively. As you can see the first four bits of third octet are the same as well in both. So, finally we can see that the last 12 bits are the host bits. That means we have (32-12) 20 net bits. Convert the 1111 0000 as 3rd octet to binary and we get 240. The last octet will be 0

20. 172.16.48.200/24 is a

(1) host address in a class B network.
(2) network address of a class C network.
(3) host address in 172.16.48.0/24 subnet.
(4) network address of a subnet with 255 hosts.
(5) host address with 8 network bits.

21. In TCP/IP computer networks, Transport Protocol Data Unit (TPDU) is referred to as a

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



22. Which of the following statements best describes a nice to have non-functional requirement of an Automated Teller Machine (ATM)?

(1) System shall facilitate users to withdraw money.
(2) System should let users to deposit money.
(3) System shall use 256-bit encryption for all communications.
(4) System should provide users a touch screen interface.
(5) System shall dispense money within 5 seconds.

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

23. The following symbol, appeared in a Data Flow Diagram (DFD) of a Sales Information System, represents a ..... containing payment details.

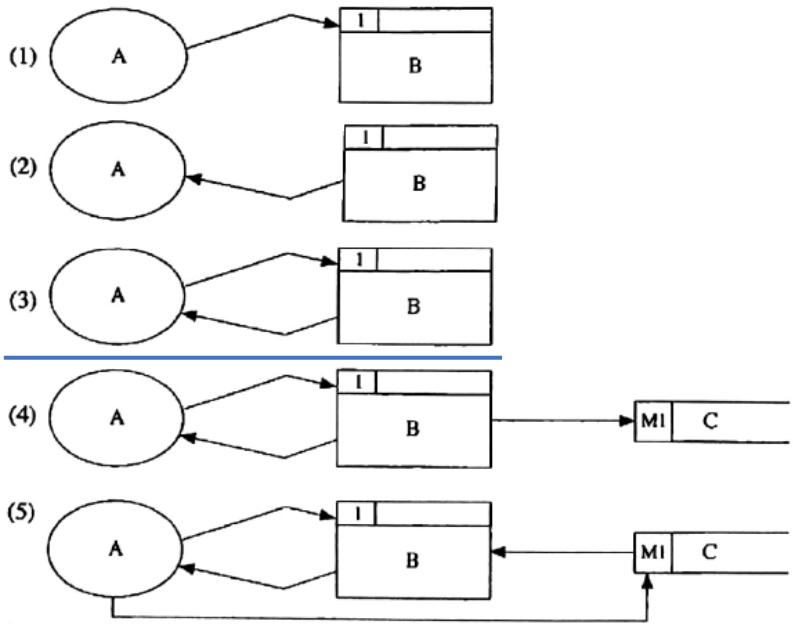
T1(M)	Payment

Which of the followings is most appropriate to fill in the blank in the above statement?

(1) file tray
(2) cardboard file
(3) file cabinet
(4) data file in a hard disk
(5) temporary data file in a hard disk

'T' for temporary
'M' for manual

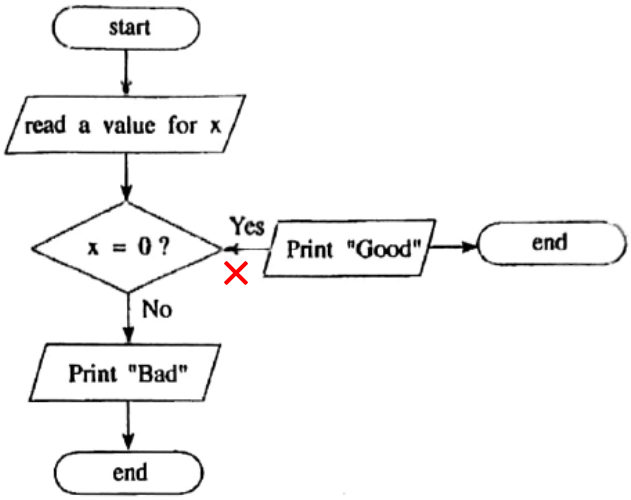
24. Which of the following dataflow diagrams is correct with respect to the rules of dataflow modelling?



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

25. Consider the following flow chart:



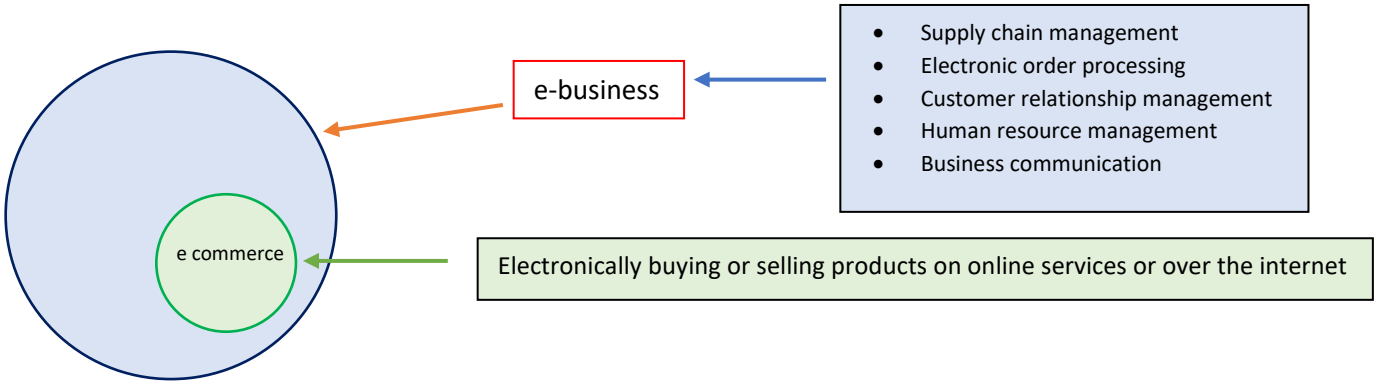
What is the error with the above flow chart?

(1) It has two end symbols.
(2) Print is not a valid keyword.
(3) It has no process box.
(4) It has two print symbols.
(5) A flow direction is not correct.

(1) A flowchart can only have one start but more ends
(2) Print is a valid keyword where we use to display our output
(3) A flowchart may/ may not have a process box
(4) We can display our outputs more than one times

26. Which of the following statements is true about e-business?

(1) It is a business process which conducts partially on online.
(2) It consists of front-end and back-end online processes.
(3) All 'brick vendors' conduct their business on online.
(4) Any e-commerce application is an e-business application.
(5) Any e-business application is an e-commerce application.



27. Students in a school are given tablet computers to improve their studies. Which of the followings is the most appropriate activity to achieve this objective?

(1) Downloading computerized study material
(2) Watching entertainment videos
(3) Instant messaging among friends
(4) Blog writing
(5) Playing computer games

28. Which of the following statements is true about Artificial Intelligence?

(1) Inference Engine in an Expert System completely mimics human decision making process.
(2) Knowledge Base in an Expert System consists only the primary knowledge of an expert.
(3) Expert systems are always implemented by using Genetic Algorithms.
(4) Genetic Algorithms provide only one solution to a given problem.
(5) Genetic Algorithm evolves a solution for a given problem over a number of iterations.

Expert System	Inference Engine + Knowledge Base
Inference Engine	A component of an AI system that is responsible for drawing conclusions from a set of data
Knowledge Base	An organized collection of facts about the system's domain
Genetic Algorithm	A method for solving both constrained and unconstrained optimization problems based on a natural selection process that mimics biological evolution. Will repeat the steps until a solution is found.

29. Which of the following statements is true about algorithms?

(1) A set of steps used to solve a problem is called an algorithm.
(2) A sequence of activities used to solve a problem is called an algorithm.
(3) To solve any problem, there can be at most one algorithm.
(4) An algorithm can contain an infinite number of steps.
(5) An algorithm does not need to terminate within a finite time.

An algorithm is a set of commands that must be followed sequentially for a computer to perform calculations or other problem-solving operations.

30. Requirements of a system can be classified as Mandatory (Essential), Desirable (Optional), Functional and Non-functional.

"ATM of a bank shall not allow more than three attempts to enter a user's secret number incorrectly"

Which of the followings correctly classifies the above requirement?

(1) Mandatory, Functional
(2) Mandatory, Non-functional
(3) Desirable, Functional
(4) Desirable, Non-functional
(5) Mandatory or Desirable, 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 (Mandatory)	Nice to have (Desirable/ Optional)
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

- Consider the following relation to answer questions **31** and **32**:

Student (index_no, national_id_no, name, date_of_birth, gender, blood_group)
where index_no is a unique attribute and the name attribute fully depends on the index_no attribute.

31. Which of the following statements is correct with respect to the normal form of the above relation?

(1) It is in the zero normal form.
(2) It is in the first normal form.
(3) It is in the second normal form.
(4) It is in the third normal form.
(5) Its normal form cannot be decided.

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

32. Which of the followings can be a candidate key of the above relation?
(1) national_id_no (2) name (3) date_of_birth (4) gender (5) blood_group

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

- Consider the following relations to answer questions **33** to **36**:

book (book_no, title, publisher, edition)
author (author_id, name, email_address)
bookAuthor (book_no, author_id)
where book_no and author_id are unique attributes in the relations book and author respectively.

33. Which of the following statements is correct with respect to the relation bookAuthor?
(1) book_no is the primary key. (2) author_id is the primary key.
(3) Any single attribute can be a candidate key. (4) author_id is a candidate key.
(5) book_no is a part of the primary key.

book_no and author_id are primary keys of book and author respectively. Therefore, in bookAuthor table we have to have both book_no and author_id as the primary key to uniquely identify a record.

34. Which of the following Entity Relationship (ER) diagrams correctly represents the relationship between the entities represented by the above relations?

(1) 

(2) 

(3) 

(4) 

(5) 

35. Assume that above relations are converted into tables in a relational database. The following SQL query is executed on the database:

```
SELECT * FROM bookAuthor
```

Which of the following statements is correct regarding the output of the above SQL query?

(1) It cannot be an empty table.
(2) title column is in it.
(3) name column is in it.
(4) All the tables book, author and bookAuthor are used to produce the output.
(5) All records in the bookAuthor table are in the output.

36. Consider the following statements regarding the Data Definition Language (DDL) used to create the table bookAuthor while maintaining data integrity:

A - It has a primary key constraint.
B - It has a foreign key constraint.
C - It has a domain constraint.

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) All A, B and C

Domain Integrity Constraint	Definition of a valid set of values of an attribute Example→ Age INT, Name VARCHAR (300) NOT NULL
Entity Integrity Constraint / Primary Key Constraint	Uniquely identifies each record in a database table. Cannot be NULL
Referential Integrity Constraint / Foreign Key Integrity Constraint	Is specified between two tables and is being used to maintain consistency among rows between the two tables

37. Which of the following organs is a part of a closed system of the human body?
(1) Eye (2) Ear (3) Heart (4) Kidney (5) Lung

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

38. Which of the following statements is correct?
(1) Application software load applications into the main memory.
(2) The programs stored in ROM are known as system software.
(3) System software support data communication between peripheral devices.
(4) Utility software is generally stored in ROM.
(5) Utility software are incorporated in washing machines.

Answer(1)	Incorrect	Task of the OS
Answer(2)	Incorrect	Firmware
Answer(3)	Correct	
Answer(4)	Incorrect	Utility software is typically stored on the computer's storage devices such as hard drives, solid-state drives or other types of secondary storage
Answer(5)	Incorrect	These have control systems that may include embedded systems or microcontrollers

39. Consider the following data input devices:
A - On screen keyboard (virtual keyboard)
B - Bar code reader
C - Magnetic card reader
Which of the above devices can be used to input data more efficiently?
(1) A only (2) B only (3) C only (4) A and B only (5) B and C only

On screen keyboard is indeed an input device. But as data is manually input, the entered may not be accurate sometimes.

40. Consider the following statements regarding CSS used in HTML:

A - One style sheet can define the rendering of HTML elements in multiple documents.
B - No additional download is needed to import style sheets.
C - The HTML document must include a <link> tag.
D - The style attribute is required in the relevant element.

Which of the above statements are correct when using External Style Sheets?

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

A	Correct	An external style sheet can be used in multiple documents
B	Incorrect	
C	Correct	To use an external style sheet, have to include <link> in html document
D	Incorrect	The 'style' attribute is not required in HTML elements. In HTML, the style attribute is optional and is used to apply inline styles to a specific element. Inline styles are CSS styles that are directly applied to the individual HTML tags.

41. Which of the following statements about Python data types/expressions is correct?

(1) String is a mutable data type.
(2) List is an immutable data type.
(3) [1, 2, 3] is a tuple.
(4) The expression [1, 2, 3] [1] will produce [2] when executed.
(5) The type of {'a':1, 1:(1, 2)} is a Dictionary.

Mutable data types	Immutable data types
Code can be edited after defining • List • Dictionary	Code cannot be edited after defining • Tuple • String • Set

Examples for..

String → x = "Book" Inside double quotations

Tuple → x = ((5,9),[5,8],"Hi") Inside brackets (Inside a tuple, there can be other tuples, lists and strings)

List → x = [1,2, "Hello"] Inside square brackets

Set → x = {1,2, "Hello", (1,2)} Inside curly brackets

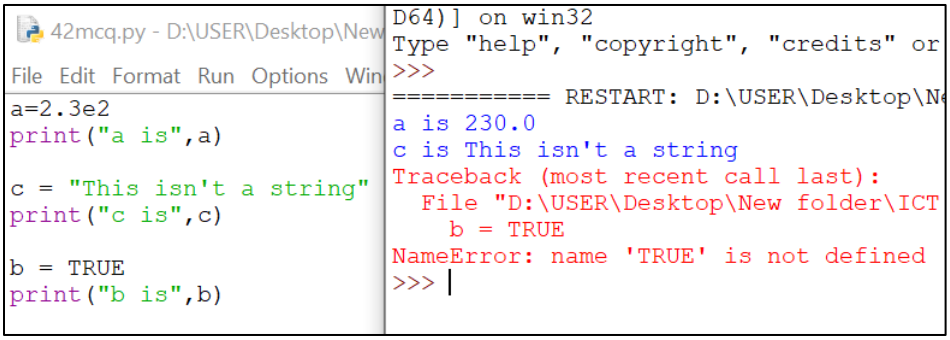
Dictionary → x = {Key: value } → x = {book: "SH", school: "Anula" }

42. Consider the following values:

A - 2.3e2
B - TRUE
C - "This isn't a string"
D - ''

Which of the above values are valid in Python?

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



43. Consider the following Python statement:

temp = [1, 2, 3, 4, 5, 6] [2::2]

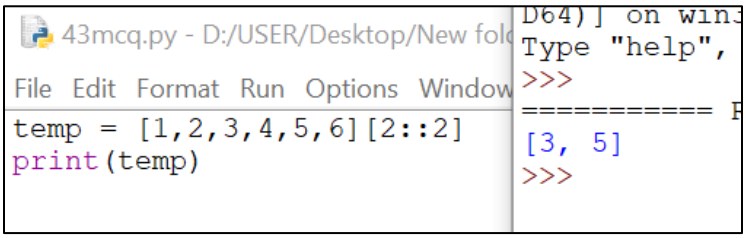
Which of the followings is the value of the variable temp after executing the above statement?

(1) 2, 4, 6 (2) 3, 5 (3) [2, 3] (4) [3, 5] (5) [2, 4, 6]

temp = [1, 2, 3, 4, 5, 6] [2::2] [start index: end index: step]

Start from 2nd index

print elements in 'temp' list by incrementing step by 2

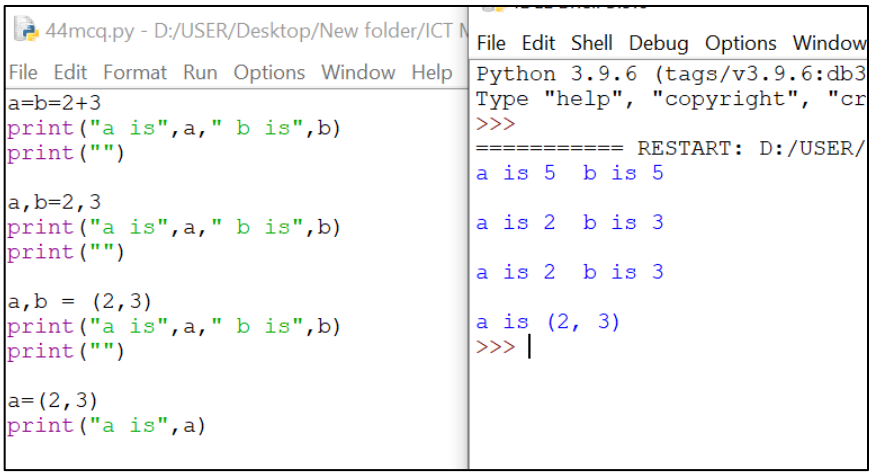


44. Consider the following statements:

A - a = b = 2 + 3
B - a, b = 2, 3
C - a, b = (2, 3)
D - a = (2, 3)

Which of the above are valid assignment statements in Python?

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

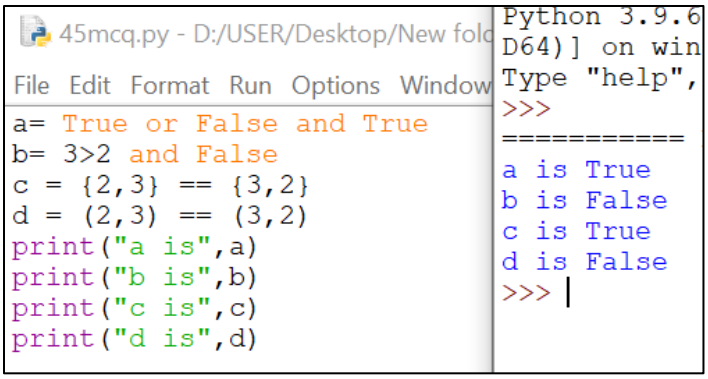


45. Consider the following Python expressions:

A - True or False and True
B - 3 > 2 and False
C - {2, 3} == {3, 2}
D - (2, 3) == (3, 2)

Which of the above expressions would result in the Boolean value True?

(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



46. The content of two files with names "in.csv" and "out.csv" are shown in the figures "Fig. 1" and "Fig. 2" respectively.

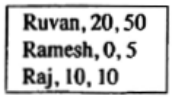


Fig. 1: in.csv

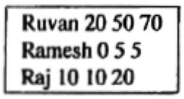


Fig. 2: out.csv

Which of the following Python programs can be used to transform the data in "in.csv" to the content of the file "out.csv"?

(1)

```
f1=open("in.csv", "r")
f2=open("out.csv", "r")
for line in f1:
    items=line.strip().split(",")
    tot=int(items[1])+int(items[2])
    print(items[0], items[1], items[2], tot, file = f2)
f1.close()
f2.close()
```

(2)

```
f1=open("in.csv", "r")
f2=open("out.csv", "w")
for line in f1:
    items=line.strip()
    tot=int(items[1])+int(items[2])
    print(items[0], items[1], items[2], tot)
f1.close()
f2.close()
```

(3)

```
f1=open("in.csv", "r")
f2=open("out.csv", "w")
for line in f1:
    items=line.strip().split(",")
    tot=int(items[1])+int(items[2])
    print(items[0], items[1], items[2], tot, file = f2)
f1.close()
f2.close()
```

(4)

```
f1=open("in.csv", "r")
f2=open("out.csv", "w")
for line in f1:
    items=line.strip().split(",")
    tot=items[1]+items[2]
    print(items[0], items[1], items[2], tot, file = f2)
f1.close()
f2.close()
```

(5)

```
f1=open("in.csv", "r")
f2=open("out.csv", "w")
for line in f1:
    items=line.strip().split(",")
    tot=int(items[1])+int(items[2])
    print(items[0], items[1], items[2], tot, file = f1)
f1.close()
f2.close()
```

47. Consider the following statements on using NAND, NOR gates over NOT, AND, OR gates when constructing logic circuits:

A - They make logic circuit design simpler.

B - They help to construct logic circuits that consume less electricity.

C - They make logic circuit construction more economical.

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) B and C only

NAND,NOR → derived gates/universal gates, NOT, AND, OR → basic combinational gates

Statement A	Incorrect	A logic circuit design is much simpler when using derived gates
Statement B	Correct	
Statement C	Correct	

48. Which of the following functions gives the sum of all elements in any list of integers?

(1)
```
def f(x):
    s = x[0]
    for i in range (0, len(x)):
        s=s+i
    return s
```

(2)
```
def f(x):
    s = x[0]
    for i in range (1, len(x)):
        s=s+i
    return s
```

(3)
```
def f(x):
    s = 0
    for i in x:
        s=s+i
    return s
```

(4)
```
def f(x):
    s = 0
    for i in x:
        s=s+ x[i]
    return s
```

(5)
```
def f(x):
    s = 0
    i = 0
    while i < len(x):
        s=s+ x[i]
    return s
```

49. Consider the following system implementation methods:

A - Direct
B - Pilot
C - Parallel

Which of the above method(s) is/are generally used to implement a home security system?

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

A – Direct	Old system is discontinued and the new system will be used from that point onwards
B – Phase	Parts of the new system are implemented one by one over the time
C – Parallel	Old and new systems are used at the same time
It is risky to directly implement a new system for systems such as home security systems in case of a failure of the new system. Therefore, it is recommended to use both old and new systems parallelly until the new system is stable and reliable. But if you trust the new system, you may implement that as well.	

50. Consider the following clauses:

A - can response to relevant environment changes
B - always acts according to well-defined user instructions
C - performs only pre-defined set of tasks
D - can make decisions under incomplete information

Which of the above can be considered as properties of software agent system?

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

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
- All the agents doesn't have a user interface