**I Semester Diploma (MAKEUP) Examination November-2022**
**20CS11T- FUNDAMENTALS OF COMPUTER**

**SCHEME OF VALUATION**

| Q.No | Rubrics | | Total |
|---|---|---|---|
| | **SECTION I** | | |
| 1(a) | Definition + List + Characteristics/Examples (of any 3 | 2 + 2 + (2 * 3) | 10 |
| (b) | Stepwise Conversion | 2 * 3 | 06 |
| (c) | A brief note on ASCII code | --- | 04 |
| 2(a) | List + Logic symbol + Expression + Truth table | 1 + 3(1+1+1) | 10 |
| (b) | Logic symbol + Truth table | 2 + 8 | 10 |
| | **SECTION II** | | |
| 3(a) | Statement + Proof | 1 + 3 | 04 |
| (b) | Multiplexer & Demultiplexer (Differentiating features -any 3) | 3 * 2 | 06 |
| (c) | Diagram + Explanation | 4 + 6 | 10 |
| 4(a) | Explanation + Block Diagram + Truth table +Boolean Expression + Circuit | 2 + 2 +2 + 2 + 2 | 10 |
| (b) | Explanation + Block diagram + Truth table + Expression + Circuit | 2 + 1 + 2 + 3 + 2 | 10 |
| | **SECTION III** | | |
| 5(a) | Diagram + Explanation | 4 + 6 | 10 |
| (b) | Classification + One valid point on each classification | 3 + 1 * 2 | 05 |
| (c) | Any five I/O devices | 1 * 5 | 05 |
| 6(a) | Definition + List + Explanation of each category | 2 + 2 + (2 * 3) | 10 |
| (b) | List any 5 methods | 5 * 1 | 05 |
| (c) | Classification + Applications (any two) | 2 + (2 * 1.5) | 05 |
| | **SECTION IV** | | |
| 7(a) | Diagram + Explanation | 4 + 4 | 08 |
| (b) | List 6 methods | 6 * 1 | 06 |
| (c) | Explanation of two threats | 2 * 3 | 06 |
| 8(a) | Any four valid differences | 4 * 1.5 | 06 |
| (b) | List any 5 commercial OS – desktop/laptop & mobile | 5 * 1 | 05 |
| (c) | Diagram or suitable Explanation | --- | 06 |
| (d) | List any three topologies | 3 * 1 | 03 |
| | **SECTION V** | | |
| 9(a) | Explanation of any 5 valid points for each (i) & (ii) | 5 + 5 | 10 |
| (b) | Definition + Rules | 1 + 4 | 05 |
| (c) | FC convention + Input + Process + Output | 2 + 1 + 1 + 1 | 05 |
| 10(a) | Five generations (any two points of each generation) | 5 * 2 | 10 |
| (b) | Input + Logic + Output | 3 + 4 + 3 | 10 |

**I Semester Diploma (MAKEUP) Examination November-2022**
**20CS11T- FUNDAMENTALS OF COMPUTER**
**MODEL ANSWERS**

**1. (a). Explain different types of number systems. 10**

The technique to represent and work with numbers is called as **number system**.
Four common types of number system are
1) Binary **number system** (Base- 2)
2) Octal **number system** (Base-8)
3) Decimal **number system** (Base- 10)
4) Hexadecimal **number system** (Base- 16)

**Characteristics of binary number system:**

- The binary number system is base 2 systems where only digits 0 & 1 are used.
- All digital computers use this number system.
- Therefore, the data entered computer is converted into its binary equivalent.
- Ex: - 01, 11, 10,110 etc.
- Binary number system is a **positional value system**.
- This means that each binary digit has its own value or weight expressed as a power of 2.

**Characteristics of octal number system:**

- It is also called as base 8 number system
- Uses eight digits from 0 to 7 (0,1,2,3,4,5,6,7).
- Octal number system is a positional value system.
- This means that each digit has its own value or weight expressed as a power of 8.

**Characteristics of Decimal number system:**

- It is a base 10 number system.
- It has 10 digits. They are 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.
- Each position in a decimal number represents specific power of the base 10.
- Example: -452
- Decimal Number System is easily readable, used by humans.
- So, we use this number system in our day-to-day life.
- Decimal number system is a positional value system.

**Characteristics of Hexadecimal number system:**

- It is a base 16 number system
- It has a total of 16 digits, numbers from 0-9 and letters from A-F.
- They are 0, 1 , 2 , 3 , 4 , 5 , 6 , 7, 8 , 9 , A , B , C , D , E , F.
- The letters represent A = 10. B = 11, C = 12, D = 13, E = 14, F = 15
- It is used to represent Computer memory addresses.
- It is also helpful to describe colors on web pages.
- Hexadecimal number system is a positional value system. This means that each digit has its own value or weight expressed as a power of 16.

(b) **Convert the Following** **06**

**(i) $111000_{(2)}$ to ( ) $_{(10)}$**

$=1*2^5 + 1*2^4 + 1*2^3 + 0*2^2 + 0*2^1 + 0*2^0$

$=1*32 + 1*16 + 1*8 + 0 + 0 + 0$

$=32 + 16 + 8$

**$111000_{(2)} = 56_{(10)}$**

**(ii) $425_{(10)}$ TO ( )$_{(2)}$**

| | | |
|---|---|---|
| 2 | 425 | |
| 2 | 212 | - 1 |
| 2 | 106 | - 0 |
| 2 | 53 | - 0 |
| 2 | 26 | - 1 |
| 2 | 13 | - 0 |
| 2 | 6 | - 1 |
| 2 | 3 | - 0 |
| | 1 | - 1 |

**$425_{(10)} = 110101001_{(2)}$**

**(iii) $147_{(8)}$ to ( )$_{(2)}$**

| Octal Number | 1 | 4 | 7 |
|---|---|---|---|
| Binary Number | 001 | 100 | 111 |

**$147_{(8)} = 1100111_{(2)}$**

(c) **ASCII Code** **4**

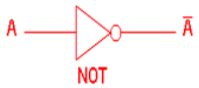
- Stands for American Standard Code for Information Interchange.
- It is a most common format used in computers
- ASCII is of 2 types – ASCII -7 & ASCII-8 (Extended ASCII)
- ASCII-7 uses 7 bits.
- Therefore, it can represent up to 27 alphanumeric characters & symbols.
- ASCII-8 uses 8 bits.
- Therefore, it can represent up to 28 alphanumeric characters & symbols.
- It is compatible with modern coding schemes like UNICODE

**2. (a) List and Explain basic gates with logic symbol, expressions, and truth table.** **10**

**Basic gates are NOT, AND, and OR Gates**

1. **NOT gate:** The NOT gate is an electronic circuit that produces an inverted version of the input at its output. It is also known as an **inverter**.
   If the input variable is **A**, then the inverted output is $\overline{A}$.

**Logic Symbol**




**Truth Table**

| NOT gate | |
|---|---|
| A | $\bar{A}$ |
| 0 | 1 |
| 1 | 0 |

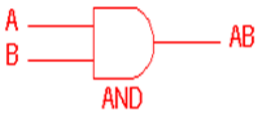
Expression

**Y=A,**

**Y= $\bar{A}$.**

2. **AND gate:** The AND gate is an electronic circuit having **two** or **more input**s and only **one output.** It performs logical multiplication.
   The output of an AND gate is **High (1)** when all the inputs are **High (1)**.
   When one of the inputs is **Low (0)**, the output is **Low (0)**.
   A dot (.) is used to show the AND operation i.e. **A.B** or **AB**.

**Logic Symbol**




**Truth Table**

| 2 Input AND gate | | |
|---|---|---|
| A | B | A.B |
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

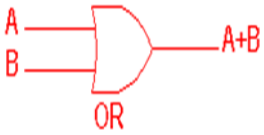
**Expression**

Y=AB

3. **OR gate**

The OR gate is an electronic circuit having **two** or **more input** and only **one output.** It performs logical addition. A **plus (+)** is used to show the OR operation.
When one of the inputs is **High (1)**, output is always **High (1)**.
Output is **Low (0)** when all the inputs are **Low (0)**.

**Logic Symbol**




**Truth Table**

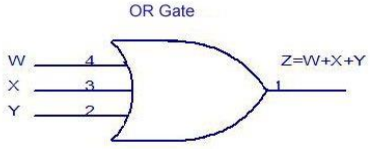
| 2 Input OR gate | | |
|---|---|---|
| A | B | A+B |
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

**Expression**

Y=A+B

**(b) Develop truth table for 3 inputs OR gate.** **10**

3 Input OR Gate




TRUTH TABLE

| INPUTS | | | OUTPUT |
|---|---|---|---|
| W | X | Y | Z |
| 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 1 |
| 1 | 1 | 1 | 1 |

**Truth table of 3-input OR gate**

The truth table can be expanded for any number of inputs; but regardless of the number of inputs, the output is *high* when any one or more of the inputs are *high*.

## SECTION-II

**3. (a) State and prove De Morgan's theorem.** **04**

De-Morgan's Theorem-1

$\overline{A.B} = \overline{A} + \overline{B}$

NAND = Bubbled OR

- The left-hand side (LHS) of this theorem represents a NAND gate with inputs A and B, whereas the right-hand side (RHS) of the theorem represents an OR gate with inverted inputs.
- This OR gate is called as Bubbled OR.

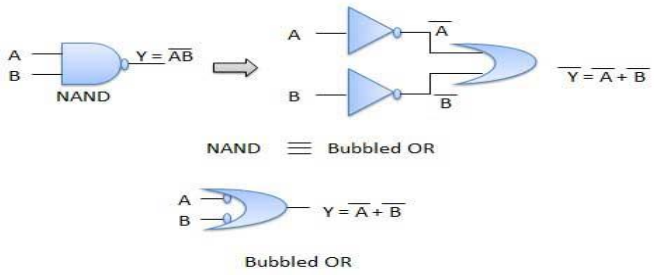



Table showing verification of the De Morgan's first theorem –

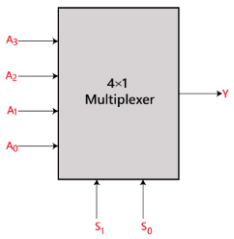
| A | B | $\overline{AB}$ | $\overline{A}$ | $\overline{B}$ | $\overline{A} + \overline{B}$ |
|---|---|---|---|---|---|
| 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 1 |
| 1 | 0 | 1 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 0 |

(b) **Differentiate multiplexer and Demultiplexer.** **06**

| Multiplexer | De-multiplexer |
|---|---|
| Multiplexer processes the digital information from various sources into a single source. | De-multiplexer receives digital information from a single source and converts it into several sources |
| It is known as Data Selector | It is known as Data Distributor |
| Multiplexer is a digital switch | De-multiplexer is a digital circuit |
| It follows combinational logic type | It also follows combinational logic type |
| It has n data input | It has single data input |
| It has a single data output | It has n data outputs |
| It works on many to one operational principle | It works on one-to-many operational principle |
| In time division Multiplexing, multiplexer is used at the transmitter end | In time division Multiplexing, de-multiplexer is used at the receiver end |

**(c) Explain 4:1 multiplexer.** **10**

In the 4×1 multiplexer, there is a total of four inputs, i.e., $A_0$, $A_1$, $A_2$, and $A_3$, 2 selection lines, i.e., $S_0$ and $S_1$ and single output, i.e., Y. Based on the combination of inputs that are present at the selection lines $S^0$ and $S_1$, one of these 4 inputs are connected to the output. The block diagram and the truth table of the 4×1 multiplexer is given below.

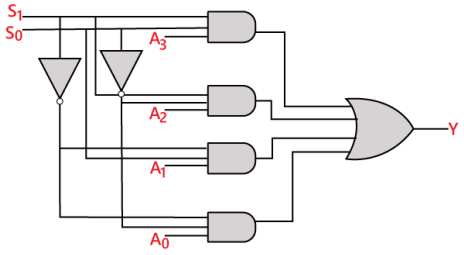



| INPUTS | | Output |
|---|---|---|
| $S_1$ | $S_0$ | Y |
| 0 | 0 | $A_0$ |
| 0 | 1 | $A_1$ |
| 1 | 0 | $A_2$ |
| 1 | 1 | $A_3$ |

The logical expression of the term Y is as follows:

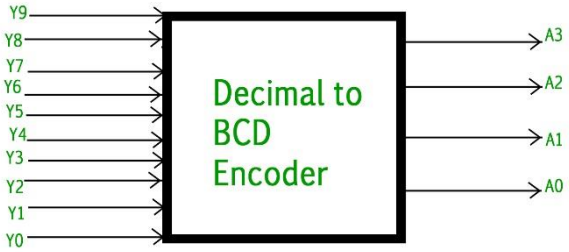
$Y=S_1' S_0' A_0+S_1' S_0 A_1+S_1 S_0' A_2+S_1 S_0 A_3$

Logic circuit of the above expression is given below:




**4.(a) Implement decimal to BCD encoder.** **10**

The decimal to binary encoder usually consists of 10 input lines and 4 output lines. Each input line corresponds to each decimal digit and 4 outputs correspond to the BCD code. This encoder accepts the decoded decimal data as an input and encodes it to the BCD output which is available on the output lines. The figure below shows the logic symbol of decimal to BCD encoder:




The truth table for decimal to BCD encoder is as follows:

| INPUTS | | | | | | | | | | OUTPUTS | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Y9 | Y8 | Y7 | Y6 | Y5 | Y4 | Y3 | Y2 | Y1 | Y0 | A3 | A2 | A1 | A0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |

Logical expression for A3, A2, A1 and A0 :

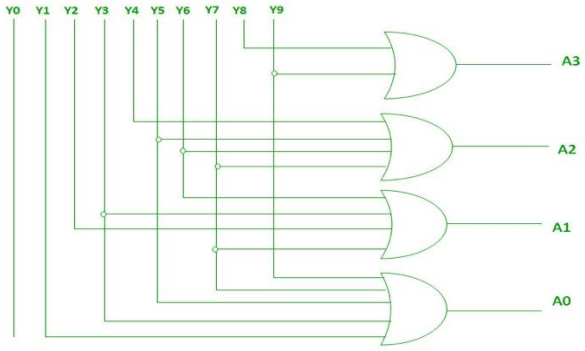
A3 = Y9 + Y8

A2 = Y7 + Y6 + Y5 +Y4

A1 = Y7 + Y6 + Y3 +Y2

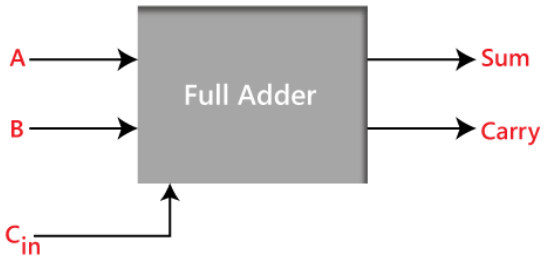
A0 = Y9 + Y7 +Y5 +Y3 + Y1

The above two Boolean functions can be implemented using OR gates :

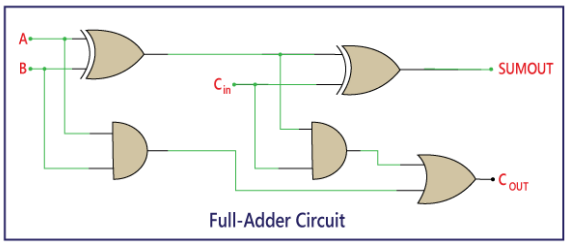



**(b) Design full adder circuit with truth table.** **10**

Full Adder is a combinational circuit that performs the addition of three bits (two significant bits and previous carry). It consists of three inputs and two outputs, two inputs are the bits to be added, the third input represents the carry form the previous position. The full adder is usually a component in a cascade of adders, which add 8, 16 etc binary numbers.




| Inputs | | | Outputs | |
|---|---|---|---|---|
| A | B | $C_{in}$ | Sum | Carry |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 |
| 0 | 1 | 1 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 1 |




Sum= $(A \oplus B) \oplus C_{in}$

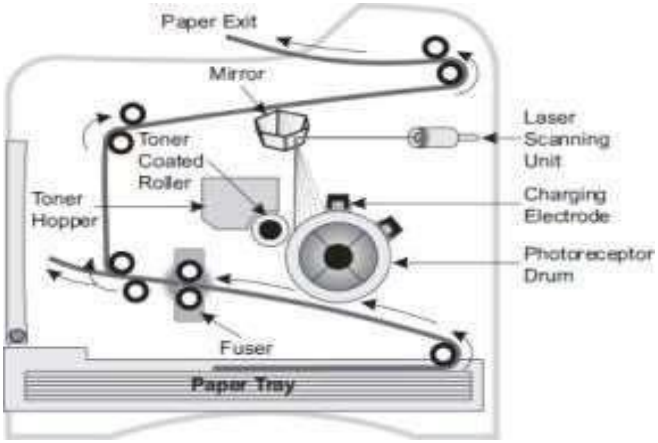
Carry=A.B + $(A \oplus B)$

## SECTION III

**5. a. Explain the working of a Laser Printer with a neat diagram.** **10**

- A laser printer provides the highest quality text and images for personal computers today.
- It is a very fast printer, which operates on the same principle as that of a photocopy machine.

- Most laser printers can print text and graphics with a very high-quality resolution.




- The core component of a laser printing system is the photoreceptor drum.
- A rotating mirror inside the printer causes the beam of a laser to sweep across the photoconductive drum.
- Initially, the beam of laser charges the photoconductive drum positively.
- When the charged photoconductor is exposed to an optical image through a beam of light to discharge, a latent or invisible image is formed.
- At the point where the laser strikes the surface of the drum, it creates a dot of positive charge.
- These After this, the printer coats the drum with a container, which contains a black powder called toner. This toner is negatively charged, and so it clings to the positive areas of the drum surface.
- When the powder pattern gets fixed, the drum is rotated, and the paper is fed into the drum surface via a pressure roller.
- This pressure roller transfers the black toner onto the paper.
- Since the paper is moving at the same speed as the drum, the paper picks up the image pattern precisely.
- Finally, the printer passes the paper through the fuser, a pair of heated rollers.
- As the paper passes through these rollers, the loose toner powder gets melted and fuses with the fibers in the paper.
- The paper is then brought out of the printer.

**5.b. Classify Computers according to purpose.** **05**

According to purpose, computers are either general purpose or specific purpose.

- **General purpose computers** are designed to perform a range of tasks. They can store numerous programs, but lack in speed and efficiency.
- General Purpose Computer have the capability of dealing with variety of different problems and can act in response to programs created to meet different needs.
- A general-purpose computer is one that can store different programs of instruction and thus to perform a variety of operations.

- **Specific purpose computers** are designed to handle a specific problem or to perform a specific task. A set of instructions is built into the machine.
- Special Purpose Computer is designed to perform one specific task. The program of instructions is built into, or permanently stored in the machine. Specialization results in the given task being performed very quickly and efficiently.
- Most special purpose computers have the capability of performing just one task. They are frequently referred to us "dedicated", because of their limitations to the specific task at hand

**5. c. List various input and output devices.** **05**

**INPUT DEVICES**:

- Barcode reader
- Digital camera
- Joystick
- Keyboard
- Cameras
- Microphone
- Mouse (pointing device)
- Scanner
- Webcam
- Touchpad

**OUTPUT DEVICES**:

- LCD Projection Panels
- Monitor
- Printers
- Plotters
- Projector
- Headphone
- Speaker
- Visual Display Unit

**6 a. Define Computer network. List and explain its categories?** **10**

A computer network is a collection of computing devices that relate to each other for the purpose of information and resource sharing among a wide variety of users.

OR

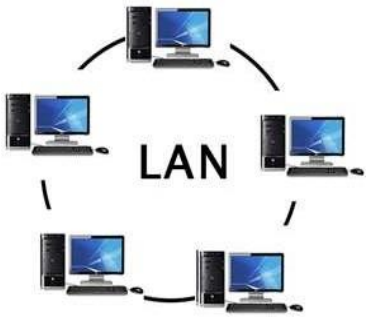
A computer network is an interconnection of two or more computers that are able to exchange information.

A computer network can be categorized by their size. A **computer network** is mainly of **three** Categories/types:

- LAN (Local Area Network)
- MAN (Metropolitan Area Network)
- WAN (Wide Area Network)

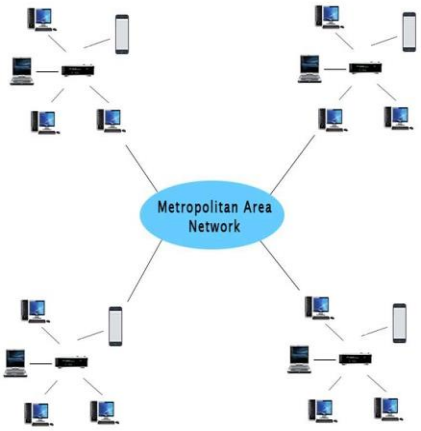
❖ **LAN (Local Area Network)**

- Local Area Network is a group of computers connected to each other in a small area such as building, office.
- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and ethernet cables.
- The data is transferred at an extremely faster ratein Local Area Network.
- Local Area Network provides higher security.



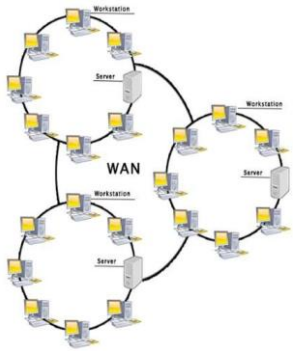

❖ **MAN (Metropolitan Area Network)**

- A metropolitan area network is a network thatcovers a larger geographic area by interconnecting a different LAN to form alarger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.
- The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN, OC-3, ADSL, etc.
- It has a higher range than Local Area Network (LAN).




❖ **WAN (Wide Area Network)**

- A Wide Area Network is a network that extends over a large geographical area such as states or countries.
- A Wide Area Network is quite bigger network than the LAN.
- A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fiber optic cable orsatellite links.
- The internet is one of the biggest WAN in the world.
- A Wide Area Network is widely used in the field of Business, government, and education.




**b. What are the various methods of data processing? 05**

Collection, manipulation, and processing collected data for the required use is known as data processing.

**Methods of Data Processing**

- **Single user programming**: It is usually done by a single person for his personal use.
- **Multiple programming**: This technique provides facility to store and execute more thanone program in the Central Processing Unit (CPU) simultaneously.
- **Real-time processing**: This technique facilitates the user to have direct contact with the computer system. This technique eases data processing.
- **On-line processing**: This technique facilitates the entry and execution of data directly; so, it does not store or accumulate first and then process.
- **Time sharing processing**: This is another form of online data processing that facilitates several users to share the resources of an online computer system. This technique is adopted when results are needed swiftly.
- **Distributed processing**: This is a specialized data processing technique in which various computers (which are located remotely) remain interconnected with a single host computer making a network of computer.

**6. c. Classify Counters. List any 2 applications of Counters. 05**

Counter is a sequential circuit. A digital circuit which is used for a counting pulses is knowncounter.

**Counters are classified into two categories**

1. Asynchronous counter
2. Synchronous counter

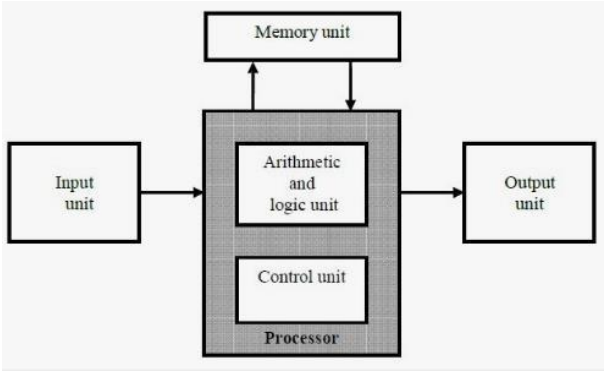
**Applications of counter:** Counters are used in

- Frequency counters
- Digital clocks
- Analog to digital convertors.
- Time measurement
- A to D converter
- Frequency divider circuits
- Digital triangular wave generator.
- Program Counters

**SECTION IV**

**7 a. Explain the functional units of computer with neat diagram. 08**

**Various Functional units of computer are**:




i. **Input Unit:** Data or Instructions to a computer is input using any Input device. Commonly used input devices are Keyboard, Mouse, Joystick, scanner etc.

ii. **Central Processing Unit (CPU):** CPU- also known as brain of computer, is constituted of Arithmetic andLogic Unit (ALU) and Control Unit (CU).

**ALU** is responsible for performing all the Arithmetic like addition, subtraction etc and Logical operations like AND, OR etc. The intermediate results are stored on temporary storage called the registers.

**CU** controls and coordinates all the processes being executed on the computer. It generates thetiming signal responsible to which all the processes are synchronized.

iii. **Memory Unit**: Memory unit store the programs and the data on which the instructions of programsoperate. Instructions are fetched from memory, executed on CPU and result is stored back to memory.

iv. **Output Unit**: This unit renders the output to the users. Commonly used output devices are Monitor,Printer, Speaker etc.

**7b. What are the various data processing methods. 6m**

Methods of data processing: Collection, manipulation, and processing collected data for the required use is known as data processing. It is a technique normally performed by a computer; the process includes retrieving,transforming, or classification of information.

Methods of Data Processing

- Single user programming
- Multiple programming
- Real-time processing
- On-line processing
- Time sharing processing
- Distributed processing

**7c. Explain any 2 cyber security threats.**

Cyber Security threats (**any two**):

i. Phishing attacks – Users may be trapped into fake sites that look similar to genuine sites. Cybercriminals may convince / force users to provide sensitive data like banking details, password etc.

ii. Use of unsecure protocols. Ex: HTTP instead of HTTPS for secure communications

iii. Ransomware attack – User's sensitive data is encrypted. But it will be decryptedonly

after paying money to attacker

iv. Online File editing sites may misuse our uploaded data. When we upload our filessay our images or videos, they may be misused by them without user's consent.

v. User may be prompted to download Malwares, virus, Trojans etc through attractive/catchy links

Drive in downloads – where without user's notice virus, spyware may get installed on user'scomputer

vi. Denial of service attack – Here user may be denied of service he requested becauseof flooding of requests by botnet

vii. Honey traps

**(Any other appropriate answers, may be awarded marks)**

**OR**

**8a. Differentiate between BIOS and UEFI. 6**

Differences (**any 4**) - **(4*1.5=6m)**

| **BIOS** | **UEFI** |
|---|---|
| BIOS refers to Basic Input/Output system | UEFI refers to Unified Extensible Firmware Interface |
| It works on 16bit mode | Supports 32bit and 64bit mode |
| Uses MBR (Master boot record) to save information about hard drive | Uses GPT (GUID Partition Table) to save information about hard drive |
| BIOS doesn't support GUI | UEFI supports GUI |
| Hard disk drive is limited to maximum size of 2TB | Hard disk Drive may of size larger than 2TB |
| Require more boot time than UEFI | Booting takes less time than in BIOS |
| Less secure | More secure than BIOS |

**8b. List the different OS available in market and which OS is used in desktop, laptops and mobiles. 5m**

**Desktop and Laptop Operating System list:**

1. **Microsoft Windows 2. Linux 3. MacOS 4. Unix etc**

**Mobile OS list:**

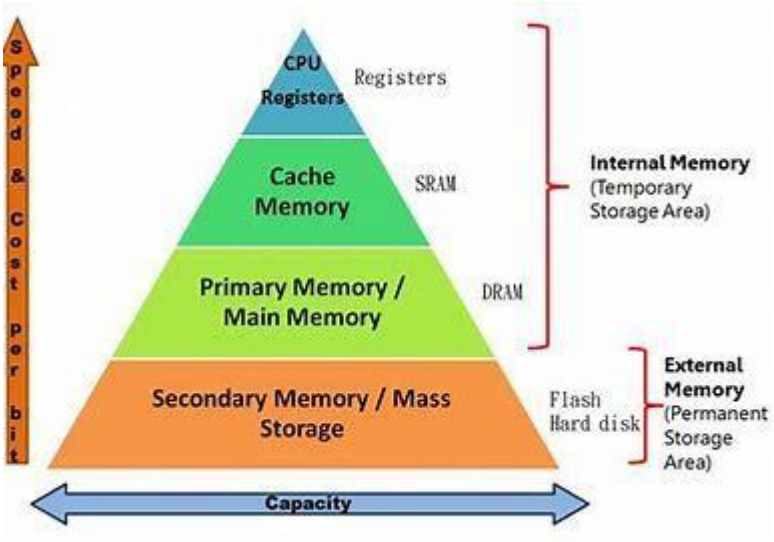
1. **Android 2. Blackberry OS 3. iOS 4. Bada etc**

**8C. Show or explain hierarchical arrangement of computer memory in terms of speed, size and cost. 06**

**(**Hierarchical arrangement diagram award full marks or Explanation award full marks)

A memory unit is an essential component in any computer for storing programs and data. Typically, a memory unit can be of two categories:

1. **Main (primary) Memory**: The memory unit that establishes direct communication with the CPU. The main memory is often referred to as RAM (Random Access Memory).
2. **Auxiliary (secondary) Memory**: The memory units that provide backup storage are called **Auxiliary Memory**. For Example, magnetic disks and magnetic tapes are the most used auxiliary memories.




MEMORY HIERARCHY

### Registers

- It consists of a small amount of fast storage, although some registers have specific hardwarefunctions, and may be read-only or write-only.

### Cache Memory

- The data or contents frequently used by CPU are stored in the cache
- So, the processor can easily access that data in a shorter time.
- Whenever the CPU requires access required data, it first checks into the cache memory, If thedata is found in the cache memory, it is read.
- Example: L1 cache, L2 cache, L3 cache.

### Main Memory

- The main memory is also called as **primary memory**
- It is a fast memory used to store runtime programs and data.
- It uses semiconductor integrated circuits. Example: RAM (Random Access Memory)

**SECTION – V**

**9.a Explain the following.** **10**

i. **Stored program concept.**
ii. **BIOS**

**Answer:**

**i. Stored program concept:**

- **Stored-program concept** is designed by Hungarian mathematician John Von Neumann.
- The von Neumann architecture is a design model for a stored-program digital computer that uses a processing unit and a single separate storage structure to hold both instructions and data.
- A stored-program digital computer is one that keeps its programmed instructions, as well as its data, in read-write, random access memory (RAM).
- We store programs and data in a slow-to access storage medium (such as a hard disk) and work on them in a fast-access, volatile storage medium (RAM).
- The idea behind stored-program concept was to design a computer that includes an instruction set architecture and can store in memory a set of instructions (a program) that details the computation.
- A stored-program design also lets programs modify themselves while running
- An instruction set is a list of all the instructions, and all their variations, that a processor can execute.

  Instructions include:

  i. Arithmetic such as add and subtract
  ii. Logic instructions such as and, or, and not
  iii. Data instructions such as move, input, output, load, and store.
  iv. Control flow instructions such as goto, if ... goto, call, and return

**ii. BIOS: -**

- BIOS, which stands for ***Basic Input Output System***, is software stored on asmall memory chip on the motherboard.
- When BIOS boots up a computer, it first determines whether all the necessary attachments are in place and operational.
- BIOS is responsible for the POST (Power-on Self-Test) and therefore makes itthe very first software to run when a computer is started.
- The BIOS firmware is non-volatile, meaning that its settings are saved and recoverable even after power has been removed from the device.
- It tests the hardware of the computer before loading the OS. Bootstrap loader.It locates the OS.

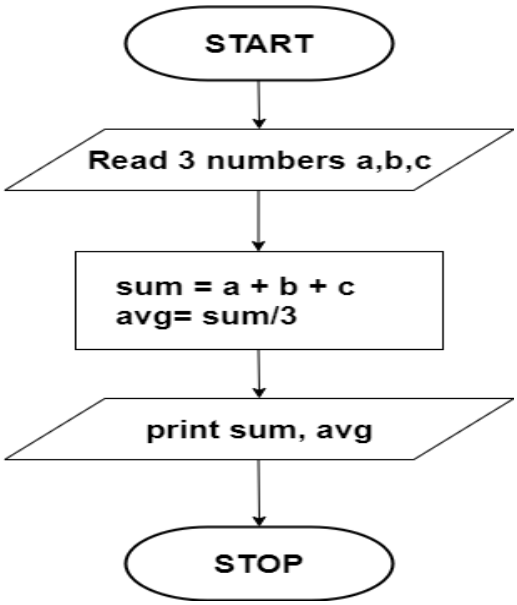
**b. Define variable. Mention the rules for naming variables. 05**

**Answer:** Variable is a named location in a memory where a program can manipulate the data. This location is used to hold the value of the variable.

**Rules for naming variable:**

1. Variable name must begin with letter or underscore and can be followed by digits.
2. Variables are case sensitive.
3. They can be constructed with digits, letters.
4. No special symbols are allowed other than underscore.
5. sum, height, _value are some examples for variable name.

**b. Draw a flowchart to find sum and average of 3 numbers.**
**Input + Process + Output = 1 + 3 + 1 = 5M**




**10.a. Explain the different generations of Programming languages (Any 2 points each) 10**

**First Generation Programming Language (1GL): Machine Language.**

- A first-generation programming language (1GL) is a machine-level programming language.
- A first generation (programming) language (1GL) is a grouping of programming languages that are machine level languages used to program first-generation computers.
- The instructions in 1GL are made of binary numbers, represented by 1s and 0s. This makes the language suitable for the understanding of the machine but far more difficult to interpret and learn by the human programmer.
- The main advantage of programming in 1GL is that the code can run very fast and very

efficiently, precisely because the instructions are executed directly by the central processing unit (CPU).

- One of the main disadvantages of programming in a low level language is that when an error occurs, the code is not as easy to fix.

**Second Generation Programming Language (2GL): Assembly Language.**

- The Second-generation programming language (2GL) is a Assembly-level programming language.
- Assembly language allows programmer to interact directly with the hardware.

- It uses mnemonic code to each machine language instruction to make it easier to remember or write.
- Assembly language program must be translated into machine code by a separateprogram called assembler.
- Assembly Language programs are easy to understand and use when compared tomachine language program and are less error prone.
- Assembly Language programs are machine dependent.

**Third Generation Programming Language (3GL): High-Level Language.**

- A third-generation programming language (3GL) is a high- level computer programming language that tends to be more machine-independent and programmer-friendly than the machine code of the first-generation and assembly languages of the second-generation.
- 3GLs are much more machine-independent and more programmer-friendly.
- 3GLs are more abstract than previous generations of languages.
- Most 3GLs support structured programming. Many support object-oriented programming.
- The main advantage of high-level languages over low-level languages is that they are easier to read, write, and maintain.
- Programs written in a high-level language must be translated into machine language by a compiler or directly into behavior by an interpreter and hence require compilation or interpretation.

**Fourth Generation Programming Language (4GL):**

- A fourth-generation programming language (4GL) is an advancement upon third-generation programming languages (3GL).
- Each of the programming language generations aims to make the language more programmer-friendly, powerful, and versatile.
- Fourth generation languages are non-procedural, the computer is instructed what itmust do rather than how to do.
- Fourth generation languages comprise minimum number of syntax rules.

- Languages claimed to be 4GL may include support for database management, report generation, mathematical optimization, GUI development, or web development.

**Fifth Generation Programming Language (5GL): Very High-level Languages.**

- Fifth generation is actually a future concept.
- They are just the conceptual view of what might be the future of programminglanguages.
- These languages will be able to process natural languages.
- the computer would be able to accept, interpret and execute instructions in the nativeof natural language of the end users.
- The users will be free from learning any programming language to communicate withthe computers.
- The programmers may simply type the instruction or simply tell the computer via microphone what it needs to do.
- Fifth generation programming languages are used in artificial intelligence research.

**10.b. A user enters the input, write an algorithm to check whether it is a character or a number. 10**

Every printable and non-printable symbol is treated as a character and has an ASCII value.

**Input:** Any character / number: 5

**Output:** 5 is a number.

**Step 1:** Begin / Start

**Step 2:** Read any input value and store in variable **ch.**

**Step 3:** Check if **ch** is greater than '**0**' and less than '**9**'.

**a.** if **TRUE**, print **"Entered input is a number".**

**b.** if **FALSE**, print **"Entered input is a character".**

**Step 4:** End / Stop.

**Board Members**

**Sd/-**