1073

Code : 20CS11T

Register Number | | | | | | | | | |

I Semester Diploma Examination, June/July-2023

FUNDAMENTALS OF COMPUTER

Time : 3 Hours] **[Max. Marks : 100**

Instructions : (1) Answer **one** full question from each section.

(2) One full question carries **20** marks.

SECTION – I

1. (a) Define Number System. Explain types of number systems with example. **10**

(b) Convert the following : **4**

(i) Binary to Decimal : 11011_2

(ii) Decimal to Octal : 425_{10}

(c) Write binary equivalent ASCII code for the given word **6**

(i) CAR

ASCII code for 'A' is 65 in decimal, 'a' is 97 in decimal.

2. (a) Define Logic gates. Explain universal gates with logic symbol, expressions and truth table. **10**

(b) (i) Find 1's complement of 111011_2

(ii) Find 2's complement of 110011_2 **4**

(c) Convert the given decimal number 123_{10} to BCD and Excess-3 code. **6**

SECTION – II

3. (a) State and prove De-Morgan's theorem using truth table. **10**

(b) Explain the working of full adder with logic diagram and truth table. **10**

4. (a) Explain with a neat circuit and truth table the working of Decimal-to-BCD encoder. 10

(b) Explain the functioning of 4 : 1 multiplexer with a logic circuit and truth table. 10

SECTION – III

5. (a) Define Flip Flop. List the types of flip flops. Describe the working of SR Flip flop with a diagram. 10

(b) Define shift register. Construct 4-bit SISO shift register with a block diagram. 10

6. (a) Classify computer based on purposes. List any 4 applications of computer. 10

(b) Explain the working of laser printer with diagram. 10

SECTION – IV

7. (a) Define Computer Network. Explain categories of network. 10

(b) Explain the functional units of computer with a neat diagram. 10

8. (a) Write a note on : 10

(i) Primary Memory

(ii) Cache Memory

(b) Define Operating System. Explain any two types of Operating System. 10

SECTION – V

9. (a) Write an algorithm to find the area of a triangle. 10

(b) Define flowchart. Write the notations/symbols used in flowchart. 10

10. (a) Define Variable. Specify the rules for naming a variable. 10

(b) Draw a flowchart to find whether a given number is even or odd. 10

I Semester Diploma Examination, June/July-2023

Fundamentals of Computers- 20CS11T

Scheme of Valuation

Q.No	Rubrics		Total
	Section-1		
1(a)	Definition + 4 Types with Example	2M + (2M*4)	10M
(b)	(i) Binary to Decimal Conversion +(ii) Decimal to Octal Conversion	2M + 2M	4M
(c)	Binary Equivalent for individual character	(2M*3)	6M
2(a)	Definition + Logical Symbol + Expression + Truth Table	2M+(1M*2)+(1M*2)+(2M*2)	10M
(b)	(i)1's Complement + (ii) 2's Complement	2M + 2M	4M
(c)	BCD Conversion + Excess-3 Conversion	3M + 3M	6M
	Section -2		
3(a)	2 De-Morgan's Theorems(Statement + Expression + TT)	(1M*2)+(1M*2)+(3M*2)	10M
(b)	Statement with Block diagram+ Logic Diagram+ TT + Expression	2M + 2M + 4M + 2M	10M
4(a)	Statement with Block diagram+ TT+ Circuit diagram	3M + 4M + 3M	10M
(b)	Logical Symbol+ TT+ Expression + Logic Circuit	2M + 3M + 2M + 3M	10M
	Section-3		
5(a)	Definition + Types + SRFF(Statement+ Circuit Dig + TT)	2M +2M + (2M+ 2M + 2M)	10M
(b)	Definition + SISO Explanation + Block Diagram	2M + 4M + 4M	10M
6(a)	2 purpose of Computer + Any 4 Applications	(3M*2) + 4M	10M
(b)	Explanation + Diagram	5M +5M	10M
	Section-4		
7(a)	Definition + 4 Categories of Network	2M + (2M*4)	10M
(b)	Explanation + Diagram	6M + 4M	10M
8(a)	(i)Primary Memory + (ii) Cache Memory	5M + 5M	10M
(b)	Definition + 2 types of OS	2M + (4M*2)	10M
	Section-5		
9(a)	Input + Logic + Output	3M + 4M + 3M	10M
(b)	Definition + Notations with Description	2M + 8M	10M
10(a)	Definition + Rules	3M + 7M	10M
(b)	Input + Process + Output	3M + 4M +3M	10M

I Semester Diploma Examination, June/July-2023

Fundamentals of Computers- 20CS11T

Answer Script

SECTION-1

1a. Define Number system. Explain types of number systems with example. -10M

- The technique to represent the symbol with numbers is called Number System
- A Number system is defined as set of values used to represent the quantity.

Binary Number System:

- The binary number system is a base-2 system, using only two symbols: 0 and 1.
- It is commonly used in computer science and digital electronics because computers use binary logic to represent and process data. Each digit in a binary number is called a bit.
- **For example**, the binary number 1010 represents 1 eight, 0 fours, 1 two, and 0 ones, which is equivalent to the decimal number 10.

Decimal Number System:

- The decimal number system is the most familiar and widely used number system.
- It is a base-10 system, meaning it uses ten symbols (0-9) to represent numbers. Each digit's value is determined by its position or place value.
- **For example**, in the decimal number system, the number 425 represents 4 hundreds, 2 tens, and 5 units.

Octal Number System:

- The octal number system is a base-8 system that uses the digits 0 to 7.
- It is often used in computer programming and represents groups of three bits in binary. Octal numbers are typically preceded by a 0 prefix to distinguish them from decimal numbers.
- **For example**, the octal number 425 represents 4 eights squared, 2 eights, and 5 units, which is equivalent to the decimal number 277.

Hexadecimal Number System:

- The hexadecimal number system is a base-16 system that uses the digits 0 to 9 and the letters A to F to represent values from 0 to 15.
- It is commonly used in computer programming, especially for representing memory addresses and colors. Each digit in a hexadecimal number is called a digit.
- **For example**, the hexadecimal number 2A represents 2 sixteens and 10 units, which is equivalent to the decimal number 42.

1b. Convert the following **-4M**

i. **Binary to Decimal:11011_2**
ii. **Decimal to octal:425_{10}**

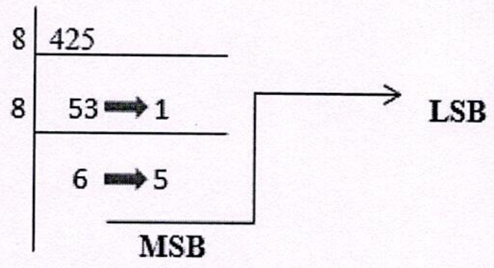
(i) Convert the given binary number 11011 to decimal

Binary weights → $2^4\ \ 2^3\ 2^2\ 2^1\ 2^0$

Binary number → 1 1 0 1 1

$$= 1*2^4 + 1*2^3 + 0*2^2 + 1*2^1 + 1*2^0$$
$$= 1*16 + 1*8 + 0*4 + 1*2 + 1*1$$
$$= 16 + 8 + 2 + 1$$
$$= 27$$

(ii) Convert the decimal number $(425)_{10}$ to an octal number equivalent.



=651

Therefore $\boxed{(425)_{10} \rightarrow (651)_8}$

i.e., 651 is the equivalent octal number of the given decimal number 425.

1c. Write binary equivalent ASCII code for the given words. **-6M**

i. **CAR**

ASCII code for 'A' is 65 in decimal, 'a' is 97 in decimal.

C	A	R
67	65	82
1000011	1000001	1010010

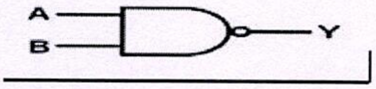
2a. What is a logic gate? Explain universal gates with logic symbol, expressions and truth table. **-10M**

Logic Gate are the electronic circuits in digital form. They can operate at two distinct states. They are made out active electronic components viz. Diodes and Transistors and passive electronic components viz Resistors and Capacitors. These two states are approximated as Logic High or TRUE or a '1' state and Logic Low or FALSE or a '0' state. It performs specific functions like Arithmetic & logical operation & Logic Functions.

The NAND gates and NOR gates are termed as Universal Logic Gates

- The NAND gate is a combination of AND and NOT gate that is intended to generate complemented (inverted) output of AND gate function.

Logic Symbol:



Boolean Expression = $Y = \overline{A.B}$

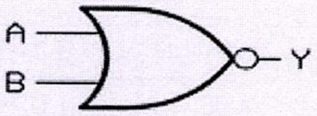
Truth Table:

Inputs		Output
A	B	$Y=\overline{AB}$
0	0	1
0	1	1
1	0	1
1	1	0

1=High
0=LOW

- The NOR gate is a combination of OR and NOR gate that is intended to deliver complemented (inverted) output of OR gate function.

Logic Symbol:



Boolean Expression: $Y = \overline{A + B}$

Truth Table:

Inputs		Output
A	B	Y=A+B
0	0	1
0	1	0
1	0	0
1	1	0

2b. **-4M**

i. Find 1's complement of 111011_2

ii. Find 2's complement of 110011_2

(i).111011_2

Given Binary number is → 1 1 1 0 1 1

↓ ↓ ↓ ↓ ↓ ↓

1's complement is → 0 0 0 1 0 0

(ii).110011_2

Given Binary number is → 1 1 0 0 1 1

↓ ↓ ↓ ↓ ↓ ↓

1's complement is → 0 0 1 1 0 0

Add a 1 to LSB + 1

0 0 1 1 0 1→2's complement

2c. Convert the given decimal number 123_{10} to BCD and excess-3 code. **-6M**

i. **Convert 123_{10} to BCD.**

1 **2** **8**

↓ ↓ ↓

(01 0010 1000) BCD

ii. **Get the Excess -3 code for the decimal number 128_{10}.**

1 **2** **8**

+ **3** **3** **3**

4 5 11

↓ ↓ ↓

0100 0101 1011

SECTION-2

3a. State and prove De-Morgan's theorem using truth table **-10M**

1. **De Morgan's First Theorem**

   Its states that "the complement of a product of variables is equal to the sum of complements of the variables".

➢ The Boolean equation of the First theorem for 2 variables A and B can be expressed as:

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

Truth Table:

A	B	A.B	$\overline{A.B}$	$\overline{A}$	$\overline{B}$	$\overline{A} + \overline{B}$
0	0	0	1	1	1	1
0	1	0	1	1	0	1
1	0	0	1	0	1	1
1	1	1	0	0	0	0

2.De Morgan's Second Theorem

It states that – "The complement of a sum of variables is equal to the product of the Complements of the variable".

➢ The Boolean equation of the second theorem for 2 variables A and B can be expressed as:

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

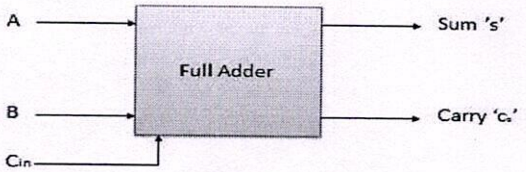
Truth Table:

A	B	A+B	$\overline{A+B}$	$\overline{A}$	$\overline{B}$	$\overline{A.B}$
0	0	0	1	1	1	1
0	1	1	0	1	0	0
1	0	1	0	0	1	0
1	1	1	0	0	0	0

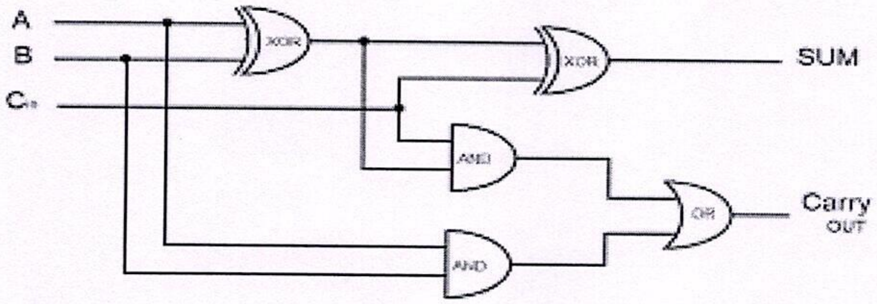
3b. Explain the working of full adder with logic diagram and truth table. -10M

A full adder is a combinational circuit that accepts two input binary digits (bits) and an input carry bit. It generates a sum output bit and an output carry bit.

Block Diagram:



Logic Diagram:



Truth Table:

A	B	C	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

Expression:

SUM = $A \oplus B \oplus$ **C**
CARRY=AB+BC=AC

From the knowledge of Half adder sum of two input bits A and B is the exclusive-OR operation of A and B. Now the input carry bit C is to be added to A & B. In other words C must be exclusive-ORed with A and B for the complete full adder operation i.e., $A\oplus B\oplus C$ is the equation that generates Sum and Carry.

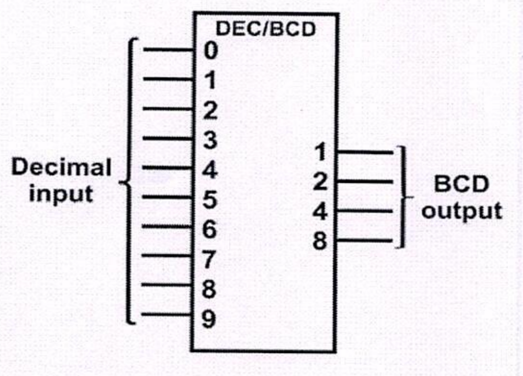
4a. Explain with a neat circuit and truth table the working of Decimal-to-BCD encoder.

-10M

The decimal to BCD encoder is also called as 10 – line – to – 4 – line Encoder.

Since this type encoder consist of 10 inputs for 10 decimal digits and 4 – outputs that suggest BCD code. The logic symbol for a decimal – to – BCD encoder is shown as below:

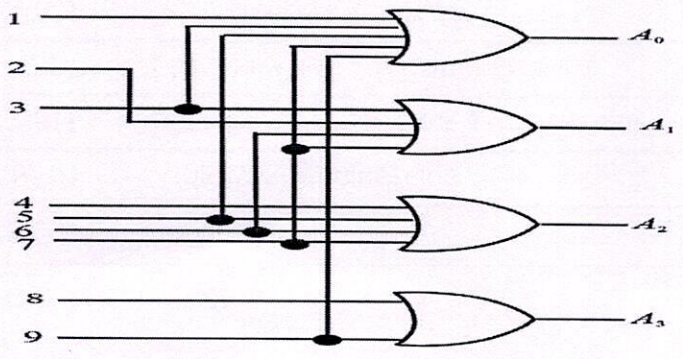
Block Diagram:



The following table depict the relationship between the decimal digits inputs and the 8421 BCD code output.

Decimal	BCD Code			
Digit	A_3	A_2	A_1	A_0
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

The basic logic diagram of a decimal – to – BCD encoder is:



- A 0-digit input is not shown here because the BCD outputs are all LOW when there are no HIGH inputs.
- When a HIGH input is activated on one of the decimal digit inputs lines, the corresponding output levels occurs on the 4 BCD lines output ($A_3A_2A_1A_0$).

4b. Explain the functioning of 4:1 multiplexer with a logic circuit and truth table.

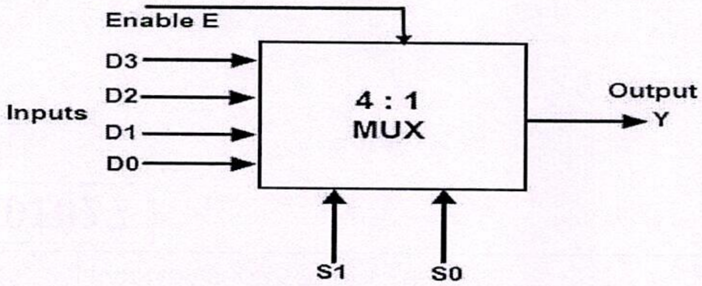
-10M

- A 4:1 Mux is a multiplexer circuit having 4 – input data lines and one – output line with two numbers of data – select control lines.
- With 2 – control bits for data select (2^2) -one-of-4 data inputs can be selected at each time. According, the logic symbol for 4 – input multiplexer (MUX) and the corresponding truth table is illustrated in the figure below:

Data Select/ Control Inputs		**Input Selected**
S_1	S_0	**Y =**
0	0	**D_0**
0	1	**D_1**
1	0	**D_2**
1	1	**D_3**

Truth Table for Data Selection: 1 – of – 4

Logic Symbol for 4:1 multiplexer:



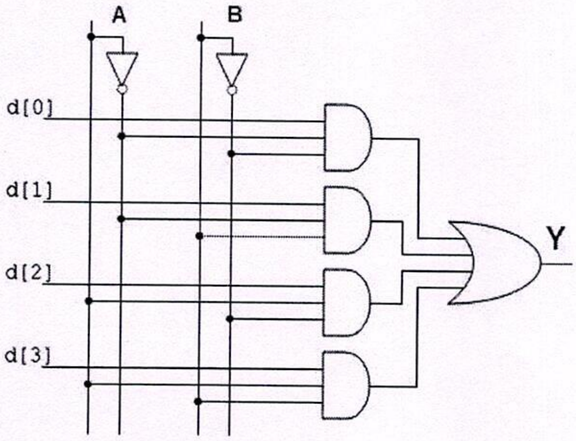
- The logic expression for the 4:1 multiplexer output can be derived in terms of data input and data select/control input and is given as:

$$Y=D_0\overline{S_1}\,\overline{S_0}+D_1\overline{S_1}S_0+D_2S_1\overline{S_0}+D_3S_1S_0$$

- The data output $Y=D_0$ if and only if $S_1 = 0, S_0 = 0$
  i.e. $Y=D_0\overline{S_1}\,\overline{S_0}$
- The data output $Y=D_1$ if and only if $S_1 = 0, S_0 = 1$
  i.e., $Y=D_1\overline{S_1}\,S_0$
- The data output $Y=D_2$ if and only if $S_1 = 1, S_0 = 0$
  i.e., $Y=D_2S_1\,\overline{S_0}$
- The data output $Y=D_3$ if and only if $S_1 = 1, S_0 = 1$

  i.e., $Y=D_3S_1S_0$

Logic Diagram for 4:1 multiplexer:



- ➢ Thus Data input can be selected from any one of 4 – input lines D_0,D_1,D_2 and D_3 this multiplexer circuit is also termed as Data Selector.

SECTION-3

5a Define Flip Flop. List the types of Flip Flop. Describe the working of JK Flip Flop with a diagram. **-10M**

- ➢ Flip Flops is a sequential circuit. It is also called as Bistable Circuit/Device
- ➢ The flip – flops are used for the storage purpose.
- ➢ A flip – flops has two states set & reset.
- ➢ Each flip – flops can store one bit of information either 0 or 1 so it is called as Bistable.
- ➢ It can be generated as Q & $\overline{Q}$

➢ **Types of Flip Flops:**

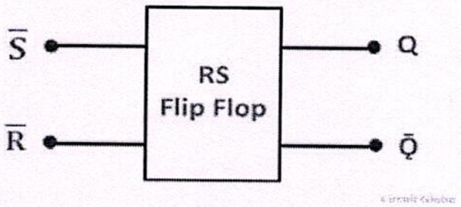
- ➢ RS Flip Flop
- ➢ JK Flip Flop
- ➢ Master – slave JK flip flop
- ➢ D – Flip Flop
- ➢ T – Flip Flop

S R Flip Flops

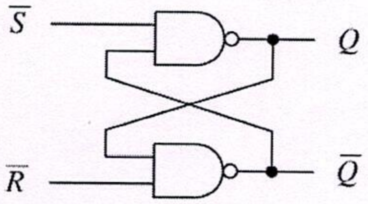
- The working concept Viz 1-bit storage nature of Flip-Flops can be better understood by considering an **S-R (Set-Reset) Latch**.
- A latch is similar to Flip-flop but without clock signal input. Latch is a type of bistable logic device. It can in either of its two states: SET (1) or RESET (0). For which latch make use of a sort of feedback arrangement to retain or store the previous state. Here the outputs are connected back to the opposite inputs.
- Let's consider an example of an Asynchronous Flip-flop i.e., an

R-S Flip-Flop called **S-R Latch using NAND gates.**

Block Diagram:



S-R Latch using NAND gates:



Truth Table:

INPUTS		OUTPUTS		REMARKS
S	R	Q	$\overline{Q}$	
0	0	1	1	Invalid (Not allowed)
0	1	0	1	Latch result
1	0	1	0	Latch set
1	1	NC	NC	NC-NO change Latch remains in its present state

How S-R Latch works and stores 1-bit

- From the figure as above and truth table-it is observed that the latch can exist in one of its two stable states. [SET (1) and RESET (0))
- Therefore a latch is said to store 1-bit of information and can be used as a 1-bit storage (memory) cell.

- Accordingly, the necessary data can be entered into this memory cell via the input terminals S and R.
- Thus a latch can be SET i.e., a '1' can be stored into this cell by applying S=1 and R=0. For which Q=1 and $\overline{Q}$ = 0
- Similarly a latch can be RESET i.e., a '0' can be stored into this cell by applying S=0 and R=1. For which Q=0 and $\overline{Q}$=1.
- Please note that $\overline{Q}$ and Q outputs must always be complementary to each other.
- When the input condition is S=0 and R=0, it results Q=Q=1 which is Invalid or Forbidden.
- Therefore the input condition S=0 and R=0 should not be allowed, for the latch as input.
- Suppose the input condition is S-1 and R=1, it will not result into changes. Thus previous state of storage will remain as its present state i.e., either Q=0 and $\overline{Q}$=1 or Q=1 and $\overline{Q}$=0 (Q= NC $\overline{Q}$-NC
NC = No change).

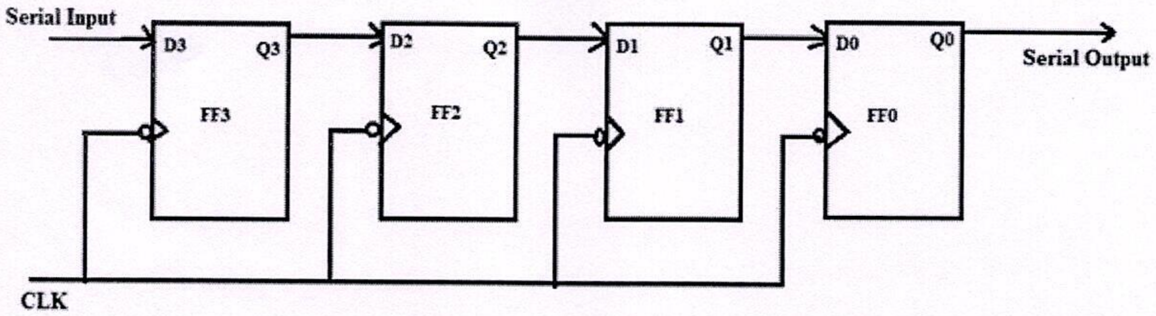
5b. Define Shift Register. Construct 4 – bit SISO shift Register with a block diagram. -10M

- A Shift register is a Digital logic circuit used to perform 2 basic functions
  i. Data storage
  ii. Data movement
- The shift register consists of two or more flip flops used to store & shift data.
- A register is basically a memory device or also called as memory chip.
- A shift register is a type of Sequential Circuit it is used to store & transfer the data in the binary form.
- A shift registers contain group of flip flops where each can store one bit of binary information at a time.
- The data is shifted towards left to right by applying the clock.

<u>SISO (serial in serial out):</u>

- In SISO the data is stored serially and it is been output in serial.
- In SISO all the flip flops are Delay(D) flip flops
- The SISO generates the stored bits of information at the output bit by bit at each clock pulse in the serial out passion.
- The serial In/serial-out shift register accepts data bits ‘0’ or ‘1’ serially bit – by – bit at each subsequent clock pulse input but one – bit at a time on a single line.

4-bit SISO Block Diagram:



6a. Classify computer based on purpose. List any 4 applications of computer.

-10M

Computers can be used for general purpose or for specific applications.

General purpose computers

- A general purpose computer is designed to perform a variety of tasks.
- These computers can store different programs according to tasks those are to be performed. Such computers are versatile.
- However, they are low in speed and efficiency.
- These machines can be used for scientific, business purposes, in schools as well as in homes.

Specific purpose computers

- A specific purpose computer is designed to perform a single specific task.
- A specific program required to perform the specific task is stored in machine.
- These computers are high in speed and efficiency.
- However they are not versatile. Generally, these computers are used for airline reservations, air traffic control, satellite tracking etc.

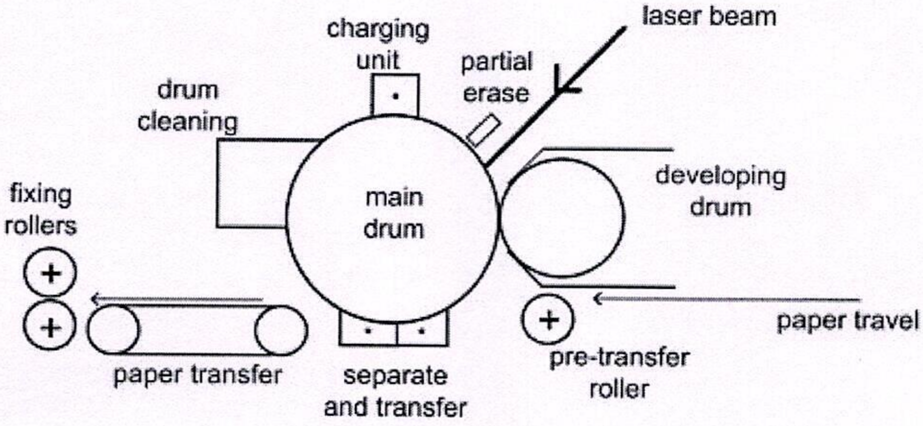
Applications of computer (Any 4)

- Science
- Education
- Medicine and Health care
- Engineering/Architecture/Manufacturing
- Entertainment
- Business Application
- Publishing
- Banking
- Automated Teller Machines (ATM)
- Communication
- Networking
- Music
- Petroleum industry

6b. Explain the working of laser printer with diagram. **-10M**

- The line, dot matrix, and ink-jet printers need a head movement on a ribbon to print characters.
- This mechanical movement is relatively slow due to the high inertia of mechanical elements. In laser printers these mechanical movements are avoided.
- In these printers, an electronically controlled laser beam traces out the desired character to be printed on a photoconductive drum.
- The exposed areas of the drum gets charged, which attracts an oppositely charged ink from the ink toner on to the exposed areas.
- This image is then transferred to the paper when it comes in contact with the drum with pressure applied by the pressure roller. The charge on the drum decides the darkness of the print. When charge is more, more ink is attracted and we get a dark print.

Diagram:



SECTION 4

7a. Define computer network. Explain categories of network **-10M**

A computer network is a collection of interconnected computers and other devices that communicate and share resources with one another. These networks can be set up in various configurations, enabling data exchange, file sharing, and communication among the connected devices

Categories of Computer Networks:

1. **Local Area Network (LAN):** A LAN is a network that spans a limited geographical area, typically within a single building, office, or campus. LANs are commonly used to connect computers, printers, servers, and other devices within a home or an organization. Ethernet and Wi-Fi are popular technologies used to establish LAN connections.

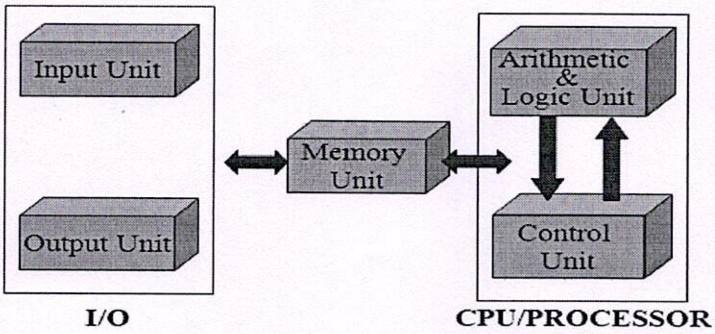
2. **Wide Area Network (WAN):** WANs cover larger geographical areas, connecting devices over long distances. These networks can span across cities, states, countries, or even continents. The internet itself is the most prominent example of a WAN, which interconnects countless smaller networks globally, enabling communication and data transfer on a massive scale.

3. **Metropolitan Area Network (MAN):** A MAN is an intermediate-sized network that covers a larger area than a LAN but smaller than a WAN. Typically`11, MANs connect multiple LANs within a city or metropolitan area. They are often used by D878 service providers to deliver high-speed internet access to a large number of users in a specific region.

4. **Personal Area Network (PAN):** A PAN is the smallest type of network, connecting devices within an individual's workspace or personal space. Bluetooth is a popular technology used for PAN connections, linking devices like smartphones, laptops, wireless headphones, and smartwatches.

7b. Explain the functional units of computer with a neat diagram. -10M

Diagram:



Explanation:

Input Unit: Computer accepts encoded information through input unit. The standard input device is a keyboard. Whenever a key is pressed, keyboard controller sends the code to CPU/Memory. Examples include Mouse, Joystick, Tracker ball, Light pen, Digitizer, Scanner etc.

Output Unit : The output unit consists of output devices that are attached with the computer. It converts the binary data coming from CPU to human understandable form. The common output devices are monitor, printer, plotter etc.

Arithmetic and Logic Unit (ALU) : The ALU, as its name suggests performs mathematical calculations and takes logical decisions. Arithmetic calculations include addition, subtraction, multiplication and division

Control Unit: The Control unit coordinates and controls the data flow in and out of CPU and also controls all the operations of ALU, memory registers and also input/output units. It is also responsible for carrying out all the instructions stored in the program. It decodes the fetched instruction, interprets it and sends control signals to input/output devices until the required operation is done properly by ALU and memory.

Memory Unit: Memory unit stores the program instructions (Code), data and results of computations etc. Memory unit is classified as:

- Primary /Main Memory
- Secondary /Auxiliary Memory

Primary memory is a semiconductor memory that provides access at high speed. Run time program instructions and operands are stored in the main memory. RAM is termed as Read/Write memory or user memory that holds run time program instruction and data. While primary storage is essential, it is volatile in nature and expensive. Additional requirement of memory could be supplied as auxiliary memory at cheaper cost. Secondary memories are non volatile in nature.

8a. Write a note on (i)Primary memory (ii) Cache memory **-10M**

(i) Primary Memory:

- Primary memory is a semiconductor memory that provides access at high speed.
- Run time program instructions and operands are stored in the main memory
- For instance ROM-BIOS Chip and DIMM Strips - the memory modules of RAM flavours viz., SDRAM, RDRAM, DDRRAM, EDORAM and so on....
- RAM as primary memory provide scratch pad or work area for temporary storage and retrieval of Runtime program instructions + data + intermediate results.
- Costlier memory but provide Faster access to processor.
- ROM Chips are Non-volatile where as RAM is volatile.
- Volatile Memory i.e., contents will be last in case of power- failures or computer is switched off.

(ii) **Cache Memory:**

- Cache memory is a small, high-speed memory component used to store frequently accessed data and instructions. It is positioned between the CPU (central processing unit) and the main memory (RAM) to reduce the average time taken to access data and instructions by providing faster access than the main memory.
- The primary purpose of cache memory is to bridge the speed gap between the CPU and the main memory. By storing frequently accessed data closer to the CPU, cache memory can significantly reduce the latency associated with accessing data from the main memory. This helps improve overall system performance and efficiency.
- Cache memory operates on the principle of locality, which suggests that programs tend to access data and instructions in localized or nearby memory locations. It

utilizes a hierarchy of cache levels, typically referred to as L1, L2, and L3 caches, with L1 being the closest and fastest cache to the CPU.

8b. Explain operating system. Explain any 2 types of operating system - 10M

Operating System lies in the category of system software. It basically manages all the resources of the computer. An operating system acts as an interface between the software and different parts of the computer or the computer hardware. The operating system is designed in such a way that it can manage the overall resources and operations of the computer.

An Operating System (OS) is a collection of software that manages computer hardware resources and provides common services for computer programs.

Types of operating system are: (Any 2)

1. **Batch Operating System:**
   In a batch processing environment, jobs or programs are grouped together and presented to the computer system in a batch. The system executes them one after another in a batch. All the data required to be processed by a particular program and hence for that batch of programs are gathered over a period of time and submitted together at once along with a batch of programs. Data processing is carried out collectively on the overall data collected in a specific time period.
2. **Multi Tasking OS:**
   This OS permits execution of two or more tasks (events) at a time by way of time sharing, resource sharing and multiprocessing by processors. With Multi-tasking Operating System, the processor is empowered to switch rapidly among different processes (task) in a given computer system.The Multi-tasking OS extract work from single processor by taking advantages of different states of execution of processes or tasks.
3. **Time Sharing OS:**
   Since the single processor's time is divided into individual time slices and allocated to different tasks. This division of time is also known as Time-sharing. The processor switches among different tasks by allocating them a requisite amount of time for completion/execution of the specified task. Time Sharing concept is a logical extension of Multiprogramming. It also refers to Multi tasking.
4. **Multi-Processing OS:**
   Multiprocessing means having more then one processor operating on the same memory but executing separate processes simultaneously In a multiprocessing system multiple processors are employed to execute more than one activity at a time. In other words, whenever massive data processing is a to be carried out at regular intervals. multiprocessor system can be used to achieve high speed data processing.

5. **Real Time OS:**
   A real time OS may be embedded one, that is built in to the control and operational circuitry of the device that monitors a Real time system/ Embedded System.Accordingly, a real-time OS is used for real time systems when rigid time requirements have been placed on the operation of a processor or the flow of data.
   Examples : Medical imaging systems, Weather Monitoring and Forecast- Ing System
6. **Distributed OS:**
   In distributed computing environment - multiple processors spread over geographically apart, serve multiple real-time applications and multiple end-user's requirements. Accordingly. the data processing jobs are distributed among good number of centralised but geographically distant apart processor's (processing Elements-PEs).DOS-allows and/or enable processors to communicate with each other through various communication links.
7. **Network OS:**
   Network Operating System runs on a network server computer to which workstations or nodes are connected. The NOS enables the Network Server in a conventional LAN (Local Area Network) to manage user accounts/groups, sharing of data files and applications.The NOS is intended to provide the service of shared files and printer (single) sharing accesses among two or more computers connected as notes/terminals or workstations with a server computer in a Network typically in a LAN environment.
8. **Mobile OS:**
   Mobile Operating System (OS) as the name itself indicates, s for operating hand held cell phones, tiny electronic gadgets like smartphones, Digital Tabs or Notepads [PDAs] or Touch pads. These mobile OS softwares are proprietary (company ownership) in nature and are light and smart to run utility softwares, application softwares, mobile apps (applications) etc., on cel (mobile) phones of companies of different make. Mobile OS of different make and versions vary and become popular by extending good number of utility services to an average end user.

SECTION 5

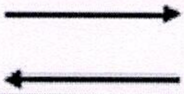
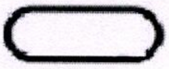
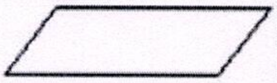
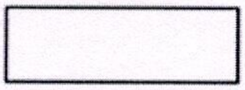
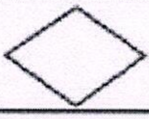
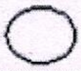
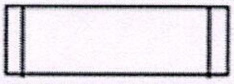
9a. Write an algorithm to find the area of a triangle. **-10M**

```
Algorithm1:
Step-1: Start.
Step-2: Input base and height of triangle in variable b & h.
Step-3: Calculate area = 1/2×b×h.
Step-4: Print value of area.
Step-5: Stop.
```

9b. Define flowchart. Write the notations/symbols used in flowchart **-10M**

A flowchart is a graphical representation of a process or workflow that uses various symbols and arrows to illustrate the sequence of steps or decisions involved. It provides a visual way to understand and communicate complex processes, allowing for easier analysis and improvement.

Notations:

Symbol	Symbol Name	Description
	Flow Lines	Used to connect symbols
	Terminal	Used to start, pause or halt in the program logic
	Input/output	Represents the information entering or leaving the system
	Processing	Represents arithmetic and logical instructions
	Decision	Represents a decision to be made
	Connector	Used to Join different flow lines
	Sub function	used to call function

10a. Define variable. Specify the rules for naming a variable -10M

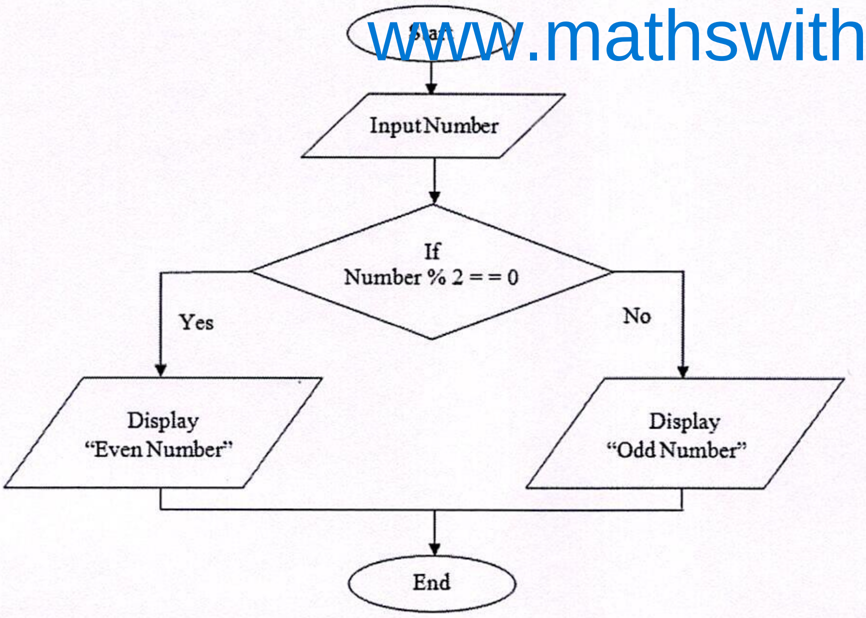
Variable is a symbolic name or identifier that represents a value stored in memory. It acts as a container to store data of different types, such as numbers, characters, or objects, which can be manipulated and referenced within the program.

The rules for naming a variable are :

1. **Valid characters**: Variables can contain letters (both uppercase and lowercase), digits (0-9), and underscores (_). Typically, the first character cannot be a digit.
2. **Case sensitivity**: Most programming languages are case-sensitive, meaning that uppercase and lowercase letters are treated as different characters. For example, "myVariable" and "myvariable" would be considered two separate variables.

3. **Length**: Variable names are usually limited in length, which depends on the programming language. Commonly, they can be up to a certain number of characters long (e.g., 255 characters).
4. **Reserved keywords**: You cannot use language-specific reserved keywords as variable names since they have predefined meanings in the programming language. For example, "int," "if," "for," etc., are often reserved.
5. **No special characters**: Special characters such as spaces, punctuation marks, and mathematical symbols are not allowed in variable names. However, the underscore (_) is commonly used to separate words within a variable name (e.g., my_variable).
6. **Numbers in names**: While most programming languages allow numbers in variable names, they are usually not allowed as the first character. For example, "myVariable123" is usually acceptable, but "123myVariable" is not.
7. **Meaningful names**: It is good practice to choose descriptive and meaningful names for variables to make the code more readable and maintainable.

10b. Draw a flowchart to find weather a given number is even or odd. -10M



****************************END**********************************

Certified that the model answer prepared by me for the code no. 20CS11T are from prescribed textbook and model answers and scheme of valuation prepared by me is correct

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