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11th COMPUTER SCIENCE

VOLUME-I

STUDY MATERIAL

CHAPTER 1 - 8 COMPLETE NOTES

[Book Back Evaluation & Extra Q/A]

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E-Materials

- ✓ **Download the QR code scanner from the google play store / apple app store into your smart phone.**
- ✓ **Open the QR code scanner application.**
- ✓ **Once the scanner button in the application is clicked, camera opens and then bring it closer to the QR code in the textbook.**
- ✓ **Once the camera detects the QR code, a URL appears in the screen. Click the URL and go to the content page.**

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GOVERNMENT PUBLIC EXAM QUESTION PATTEN MARK ALLOTMENT:

I. Theory Exam = 70 Marks

PART-I	ONE MARKS (CHOOSE)	15 X 1=15
PART-II	TWO MARKS	6 X 2 = 12
PART-III	THREE MARKS	6 X 3 = 18
PART-IV	FIVE MARKS	5 X 5 = 25
	TOTAL	**= 70 Marks**

II. Practical Exam = 30 Marks

Total Marks = 100 (70+30)

CHAPTER – 1
INTRODUCTION TO COMPUTER

SECTION – A

I. Choose the correct answer:

1. First generation computers used
   (a) Vacuum tubes (b) Transistors (c) Integrated circuits (d) Microprocessors
2. Name the volatile memory
   (a) ROM (b) PROM **(c) RAM** (d) EPROM
3. Identify the output device
   (a) Keyboard (b) Memory **(c) Monitor** (d) Mouse
4. Identify the input device
   (a) Printer **(b) Mouse** (c) Plotter (d) Projector
5. …… Output device is used for printing building plan, flex board, etc.
   (a) Thermal printer **(b) Plotter** (c) Dot matrix (d) inkjet printer
6. In ATM machines, which one of the following is used to
   (a) Touch Screen (b) speaker (c) Monitor (d) Printer
7. When a system restarts …… ….. which type of booting is used.
   (a) Warm booting (b) Cold booting (c) Touch boot (d) Real boot.
8. Expand POST
   (a) Post on self Test (b) Power on Software Test **c) Power On Self Test** (d) Power on Self Text
9. Which one of the following is the main memory?
   (a) ROM **(b) RAM** (c) Flash drive (d) Hard disk
10. Which generation of computer used IC's?
    (a) First (b) Second **(c) Third** (d) Fourth

SECTION-B

Short Answers:

1. What is a Computer?

- A **computer** is an electronic device that manipulates information, or data. It has the ability to store, retrieve, and process data.
- Computer works faster than human being and given the values more accuracy and reliable.

2. Distinguish between Data and Information.

Data:	Information:
Data is defined as an unprocessed collection of raw facts, suitable for communication, interpretation or processing.	Information is a collection of facts from which conclusions may be drawn.
Example: 134, 16, 'Kavitha', 'C'	**Example:** Kavitha is 16 years old.

3. What are the component of the computer?

1. Input Unit
2. Central Processing Unit (Control Unit, Arithmetic Logic Unit, Memory Unit)
3. Output Unit

4. Write the functions of Arithmetic and Logic Unit

- The ALU is a part of the CPU where various computing functions are performed on data.
- The ALU performs arithmetic operations such as addition, subtraction, multiplication, division and logical operations.
- The result of an operation is stored in internal memory of CPU.
- The logical operations of ALU promote the decision-making ability of a computer.

5. Write the functions of control unit.

The control unit controls the flow of data between the CPU, memory and I/O devices.

It also controls the entire operation of a computer.

6. What is the function of memory?

The Memory Unit is of two types. which are primary memory and secondary memory. The primary memory is used to temporarily store the programs and data when the instructions are ready to execute. The secondary memory is used to store the data permanently.

7. Differentiate Input and Output unit.

Input Unit	Output Unit
Input unit is used to feed any form of data to the computer, which can be stored in the memory unit for further processing. **Example: Keyboard, mouse, etc.**	An Output Unit is any hardware component that conveys information to users in an understandable form. **Example: Monitor, Printer etc.**

8. Distinguish between Primary memory and Secondary Memory.

Primary memory	Secondary Memory
The **Primary Memory** is volatile, that is, the content is lost when the power supply is switched off.	The **Secondary memory** is non volatile, that is, the content is available even after the power supply is switched off.
The Random Access Memory (RAM) is example of a main memory.	Hard disk, CD-ROM and DVD ROM are examples of secondary memory.

SECTION - C

Explain in detail:

1. What are the Characteristics of Computer?

- Computer is the powerful machine.
- It can perform large number of tasks.
- The main capacities of computer are work length, speed accuracy, diligence, versatility memory and automation and lots of more tasks.

2. Write the applications of computer.

The various applications of computers in today's are:

1. Business
2. Education
3. Marketing
4. Banking
5. Insurance
6. Communication
7. Health Care
8. Military
9. Engineering Design

3. What is input device? Give two examples.

Input device is used to feed any form of data to the computer, which can be stored in the memory unit for further processing.

Example: Keyboard, mouse, Scanner, Fingerprint scanner, Track Ball, Retinal Scanner, Light pen etc.

4. Name any three output devices.

Monitor, Printer, Plotter, Speaker, Multimedia Projectors are the output devices.

5. Differentiate optical and Laser Mouse.

Optical Mouse Laser Mouse	Laser Mouse
Measures the motion and acceleration of Pointer. It uses light source instead of ball to judge the motion of the pointer. Optical mouse has three buttons. Optical mouse is less sensitive towards surface.	Measures the motion and acceleration of pointer. Laser Mouse uses Laser Light. Laser mouse has three buttons Laser Mouse is highly sensitive and able to work on any hard surface.

6. Write short note on impact printer.

These printers print with striking of hammers or pins on ribbon. These printers can print on multi-part (using carbon papers) by using mechanical pressure.

Example: Dot Matrix printers and Line matrix printers are impact printers.

7. Write the characteristics of sixth generation.

- In the Sixth Generation, computers could be defined as the era of intelligent computers, based on Artificial Neural Networks.
- One of the most dramatic changes in the sixth generation will be the explosive growth of Wide Area Networking.
- Natural Language Processing (NLP) is a component of Artificial Intelligence (AI).
- It provides the ability to develop the computer program to understand human language.

8. Write the significant features of Monitor.

Monitor is the most commonly used output device to display the information.

- Pictures on a monitor are formed with picture elements called PIXELS.
- Monitors may either be Monochrome which display text or images in Black and White or can be color, which display results in multiple colors.
- There are many types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes).
- The monitor works with the VGA (Video Graphics Array) card.
- The video graphics card helps the keyboard to communicate with the screen.
- It acts as an interface between the computer and display monitor.
- Usually the recent motherboards incorporate built-in video card.

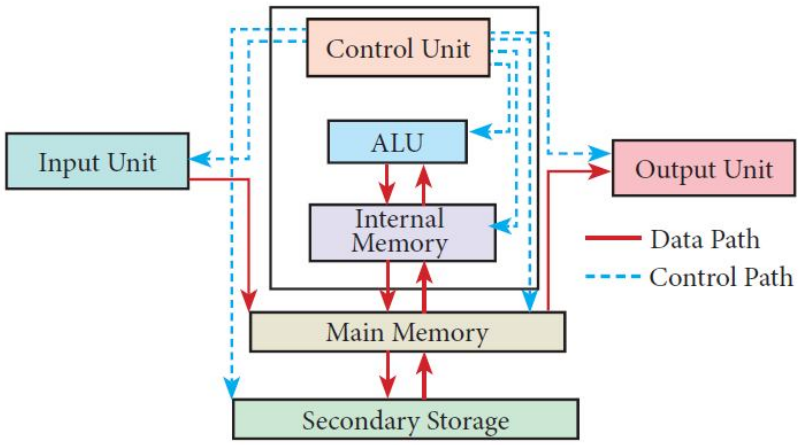
SECTION - D

Explain in detail:

1. EXPLAIN THE VARIOUS COMPONENTS OF A COMPUTER INPUT UNIT.

Input unit is used to feed any form of data to the computer, which can be stored in the memory unit for further processing.

Example: Keyboard, Mouse, etc.



Central Processing Unit:

- CPU is the major component which interprets and executes software instructions.
- It also controls the operation of all other components such as memory, input and output units.
- It accepts binary data as input, process the data according to the instructions and provide the result as output.
- The CPU has three components which are Control unit, Arithmetic and logic unit (ALU) and Memory unit.

Arithmetic and Logic Unit:

- The ALU is a part of the CPU where various computing functions are performed on data.
- The ALU performs arithmetic operations such as addition, subtraction, multiplication, division and logical operations.
- The result of an operation is stored in internal memory of CPU.
- The logical operations of ALU promote the decision-making ability of a computer.

Control Unit:

- The control unit controls the flow of data between the CPU, memory and I/O devices.
- It also controls the entire operation of a computer.

Output Unit:

- An Output Unit is any hardware component that conveys information to users in an understandable form.

Example: Monitor, Printer etc.

Memory Unit:

- The Memory Unit is of two types which are primary memory and secondary memory.
- The primary memory is used to temporarily store the programs and data.
- The secondary memory is used to store the data permanently.
- The Primary Memory is volatile, the Random Access Memory (RAM) is an example of a main memory.
- The Secondary memory is non volatile, hard disk, CDROM and DVD ROM are examples of secondary memory.

2. LIST OUT THE TYPES OF GENERATION IN COMPUTER

1. First generation -1942- 1955(VACCUM TUBES)
2. Second generation -1955-1964 (TRANSISTERS)
3. Third generation -1964-1975 (INTEGRATED CIRCUIT)
4. Fourth generation -1975-1980 (MICROPROCESSOR)
5. Fifth generation -1980 to till date (ULTRA LARGE SCALE INTEGRATION)
6. Sixth generation - in future.

Generation & Period	Main Component used	Merits/Demerits
First Generation 1942-1955	Vacuum tubes	• Big in size • Consumed more power • Malfunction due to overheat • Machine Language was used
Second Generation 1955-1964	Transistors	• Smaller compared to First Generation • Generated Less Heat • Consumed less power compared to first generation • Punched cards were used • First operating system was developed - Batch Processing and Multiprogramming Operating System • Machine language as well as Assembly language was used.
Third Generation 1964-1975	Integrated Circuits (IC)	• Computers were smaller, faster and more reliable • Consumed less power • High Level Languages were used
Fourth Generation 1975-1980	Microprocessor Very Large Scale Integrated Circuits (VLSI)	• Smaller and Faster • Microcomputer series such as IBM and APPLE were developed • Portable Computers were introduced.
Fifth Generation 1980 - till date	Ultra Large Scale Integration (ULSI)	• Parallel and Distributed computing • Computers have become smarter, faster and smaller • Development of robotics • Natural Language Processing • Development of Voice Recognition Software
Sixth Generation In future	• Parallel and Distributed computing • Computers have become smarter, faster and smaller • Development of robotics • Natural Language Processing • Development of Voice Recognition Software	

3. EXPLAIN THE VARIOUS INPUT DEVICES.

(1) Keyboard:

• Keyboard (wired / wireless, virtual) is the most common input device used today.

• The individual keys for letters, numbers and special characters are collectively known as character keys.

• There are different set of keys available in the keyboard such as character keys, modifier keys, system and GUI keys, enter and editing keys, function keys, navigation keys, numeric keypad and lock-keys.

(2) Mouse:

• Mouse (wired/wireless) is a pointing device used to control the movement of the cursor on the display screen.

• It can be used to select icons, menus, command buttons some mouse actions are move, click, double click, right click, drag and drop.

(3) Scanner:

• Scanners are used to enter the information directly into the computer's memory.

• The scanner converts any type of printed or written information including photographs into a digital format, which can be manipulated by the computer.

(4)Fingerprint Scanner:

• Finger print Scanner is a fingerprint recognition device used for computer security, that uses biometric technology.

• Fingerprint Reader / Scanner is a very safe and convenient device for security instead of using passwords, which is vulnerable to fraud and is hard to remember.

(5) Track Ball:

• Track ball is similar to the upside- down design of the mouse.

• The user moves the ball directly, while the device itself remains stationary.

• The user spins the ball in various directions to navigate the screen movements.

(6) Retinal Scanner:

This performs a retinal scan which is a biometric technique that uses unique patterns on a person's retinal blood vessels.

(7) Light Pen:

• A light pen is a pointing device shaped like a pen and is connected to a monitor.

• The tip of the light pen contains a light-sensitive element which detects the light from the screen helps the computer to identify the location of the pen on the screen.

• Light pens have the advantage of 'drawing' directly onto the screen, but this becomes hard to use, and is also not accurate.

(8) Optical Character Reader:

• It is a device which detects characters printed or written on a paper with OCR, User can scan a page from a book.

• The Computer will recognize the characters in the page as letters and punctuation marks and stores.

• The Scanned document can be edited using a word processor.

(9) Bar Code / QR Code Reader:

- A Bar code is a pattern printed in lines of different thickness.
- The Bar code reader scans the information on the bar codes transmits to the Computer for further processing.
- The system gives fast and error free entry of information into the computer.

QR (Quick response) Code: The QR code is the two dimension bar code which can be read by a camera and processed to interpreter the image.

(10) Voice Input Systems:

- Microphone serves as a voice Input device.
- It captures the voice data and sends it to the Computer.

4. EXPLAIN OUTPUT DEVICES.

(1) Monitor:

- Monitor is the most commonly used output device to display the information. Pictures on a monitor are formed with picture elements called PIXELS.
- Monitors may either be Monochrome which display text or images in Black and White or can be color, which display results in multiple colors.
- There are many types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes).
- The monitor works with the VGA (Video Graphics Array) card.
- The video graphics card helps the keyboard to communicate with the screen.
- It acts as an interface between the computer and display monitor.

(2) Plotter:

- Plotter is an output device that is used to produce graphical output on papers.
- It uses single color or multi color pens to draw pictures.

(3) Printers:

- Printers are used to print the information on papers.
- Printers are divided into *two main categories:*

A. Impact Printers
B. Non Impact printers

A. Impact Printers:

• These printers print with striking of hammers or pins on ribbon.
• These printers can print on multi-part (using carbon papers) by using mechanical pressure.
• **Dot Matrix** printers and **Line matrix** printers are impact printers.
• A Dot matrix printer that prints using a fixed number of pins or wires.
• Each dot is produced by a tiny metal rod, also called a “wire” or “pin”, which works by the power of a tiny electromagnet or solenoid, • It generally prints one line of text at a time.
• Te printing speed of these printers varies from **30 to 1550 CPS (Character Per Second).**
• Line matrix printers use a fixed print head for printing.
• It builds up a line of text by printing lines of dots.
• Line printers are capable of printing much more than 1000 Lines Per Minute.

B. Non-Impact Printers

• These printers do not use striking mechanism for printing.
• They use electrostatic or laser technology.
• Quality and speed of these printers are better than Impact printers.
• **Laser printers** and **Inkjet printers** are non-impact printers.

Laser Printers:

• Laser printers mostly work with technology used by photocopiers.
• It makes a laser beam scan back and forth across a drum inside the printer, it can produce very good quality of graphic images.
• One of the characteristics of laser printer is their resolution – how many Dots per inch(DPI).
• The available resolution range around 1200 dpi.
• It can print 100 pages per minute(PPM).

Inkjet Printers:

• Inkjet Printers use colour cartridges which combined Magenta, Yellow and Cyan inks to create color tones.
• A black cartridge is also used for monochrome output.
• Inkjet printers work by spraying ionized ink at a sheet of paper.
• The speed of Inkjet printers generally range from 1-20 PPM (Page Per Minute).
• They use the technology of firing ink by heating an Inkjet printer can spread millions of dots of ink at the paper every single second.

4. Speakers:

• Speakers produce voice output (audio).
• Using speaker along with speech synthesize software, the computer can provide voice output. This has become very common in places like airlines, schools, banks, railway stations, etc..

5. Multimedia Projectors:

• Multimedia projectors are used to produce computer output on a big screen.
• These are used to display presentations in meeting halls or in classrooms.

EXTRA 1-MARKS

1. _____ Example of First Generation Computer.
   a. IBM 1401 b. VLSI c. IBM 360 Series **d. ENIAC**
2. _____ Languages used in Third generation Computer.
   a. Machine Level b. Object Code **c. High Level** d. Assembly Level
3. _____ is defined as an unprocessed collection.
   a. Datum **b. Data** c. Process d. Project
4. The CPU has _____ components in Computer.
   a. 2 b. 4 **c. 3** d. 5
5. _____ Device is used to insert the Alpha-Numeric data into Computer.
   a. Mouse b. Printer c. Monitor **d. Keyboard**
6. _____ memory is a Volatile.
   a. **Primary** b. PROM c. Secondary d. ROM
7. The _____ converts any type of printed or written information including photographs into a digital format.
   a. Monitor **b. Scanner** c. Printer d. Digital Camera
8. A _____ is a device for signaling by hand, by way of pressing one or more switches.
   a. Keyboard b. Printer **c. Keyer** d. Touch Screen

9. Pictures on a monitor are formed with picture elements called _____.
a. Points b. Dots c. inches **d. Pixels**

10. A _____ printer that prints using a fixed number of pins or wires.
a. Laser b. Ink Jet c. Plotter **d. Dot-matrix**

11. _____ are used to produce computer output on a big screen.
a. Monitors b. Touch Screen c. Plotter **d. Multimedia Projector**

12. An _____ is a basic software that makes the computer to work.
a. Ms-Office b. Ms-Paint **c. Operation System** d. Note Pad

13. Booting process has _____ Types.
a. 3 **b. 2** c. 5 d. 1

14. _____ is the physical component of a computer.
a. Software b. Application **c. Hardware** d. Power

15. "An act of Calculating" means _____.
a. **Computing** b. Arithmetic c. numbers d. calculations

16. _____ is the first known calculating machine counting.
a. **Analytical Engine** b. Abacus c. Calculator d. Computer

17. The first generation computers were used between _____.
a. 1940 – 1955 b. 1941 – 1956 **c. 1942 – 1955** d. 1941- 1955

18. The first generation computers used _____ for memory.
a. Magnetic circuitry **b. Magnetic drums** c. Magnetic tubes d. Magnetic buses

19. Transistors were made smaller in size and placed on _____ chips.
a. Integrated **b. Silicon** c. Magnetic d. Circuit

20. The primary memory is _____ in nature.
a. Peripheral **b. Volatile** c. Non- Volatile d. Main memory

21. The second generation computers were used between _____.
a. **1954 – 1964** b. 1951 – 1966 c. 1950 – 1956 d. 1961- 1965

22. The third generation computers were used between _____.
a. 1964 – 1975 b. 1961 – 1971 c. 1960 – 1975 **d. 1964- 1975**

23. The fourth generation computers were used between _____.
a. **1975 – 1980** b. 1971 – 1981 c. 1970 – 1975 d. 1974- 1985

24. ____ is the major component which interprets and executes software instructions.
a. Input unit b. Output unit c. Memory **d. CPU**

25. In _____ Mouse uses Laser Light
a. Optical b. Mechanical **c. Laser** d. Air

26. _____ types of Printer in the categories.
a. 3 **b. 2** c. 4 d.1

27. Laser printer print _____ pages per minutes.
a. 100 b.150 c. 80 d. 120

28. Line printers are capable of printing much more than _____ Lines Per Minute.
a. 1500 **b. 1000** c. 500 d. 800

29. _____is the physical component of a computer.
a. **Hardware** b. Software c. Application d. Picture

30. The speed of Inkjet printers generally range from _____ Page Per Minute.
a. 1-10 b. 1-15 c. 15-20 **d.1-20**

31. _____ serves as a voice Input device.
a. Speakers b. Scanner c. Printer **d. Microphone**

32. _____ is the set of programs or instructions.
a. Hardware **b. Software** c. Application d. Picture

33. The computer mouse as we know it today was invented and developed by _____.
a. **Douglas Engelbart** b. Douglas Lee c. Charles Babbage d. Napier

34. Third generation computers, used_____
a. Vacuum Tube b. Transistor **c. Integrated Circuit** d. Micro Processor

35. When the system starts from initial state _____
a. Computing **b. Cold Booting** c. Warm Booting d. BIOS

36. When the system restarts or when Reset button is pressed, we call it _____.

a. Computing b. Cold Booting **c. Warm Booting** d. BIOS

37. The _____ is the combination of hardware and software.
a. Calculator **b. Computer** c. ALU d. CPU

38. CPU interprets and executes software instructions.
a. **CPU** b. ALU c. monitor d. mouse

39. _____ Printers use colour cartridges.
a. Laser b. Dot Matrix c. Thermal **d. Inkjet**

40. _____ is used to feed any form of data to the computer.
a. Output Unit b. Processing c. Memory Unit **d. Input Unit**

EXTRA 2 & 3 MARKS

1. Define data processing?

This conversion of data into information is called data processing.

2. What is hardware?

Hardware is the physical component of a computer like motherboard, memory devices, monitor, keyboard etc.

3. What is software?

Software is the set of programs or instructions. Both hardware and software together make the computer system to function.

4. List out the types of memory?

The Memory Unit is of two types which are

- Primary memory
- Secondary memory.

5. Define printer. And its types?

Printers are used to print the information on papers.

- Impact Printers
- Non Impact printers

6. Define booting

If these devices are ready, then the **BIOS** *(Basic Input Output System)* gets executed. This process is called **Booting.**

7. What is cold booting?

- When the system starts from initial state i.e. it is switched on, we call it cold booting or Hard Booting.
- When the user presses the Power button, the instructions are read from the ROM to initiate the booting process.

8. What is warm booting? (3m)

- When the system restarts or when reset button is pressed, we call it Warm Booting or Soft Booting.
- The system does not start from initial state and so all diagnostic tests need not be carried out in this case.
- There are chances of data loss and system damage as the data might not have been stored properly.

****

CHAPTER - 2
NUMBER SYSTEM

I CHOOSE THE BEST ANSWER

Part - I

1. Which refers to the number of bits processed by a computer's CPU?
   A) Byte B) Nibble **C) Word length** D) Bit
2. How many bytes does 1 Kilo Byte contain?
   A) 1000 B) 8 C) 4 **D) 1024**
3. Expansion for ASCII
   A) American School Code for Information Interchange
   B) American Standard Code for Information Interchange
   C) All Standard Code for Information Interchange
   D) American Society Code for Information Interchange
4. 2^50 is referred as
   A) Kilo B) Tera **C) Peta** D) Zetta
5. How many characters can be handled in Binary Coded Decimal System?
   A) 64 B) 255 C) 256 D) 128
6. For 11012 what is the Hexadecimal equivalent?
   A) F B) E **C) D** D) B
7. What is the 1's complement of 00100110?
   A) 00100110 **B) 11011001** C) 11010001 D) 00101001
8. Which amongst this is not an Octal number?
   A) 645 B) 234 **C) 876** D) 123

Part - II

1. Which is a basic electronic circuit which operates on one or more signals?
   (A) Boolean algebra **(B) Gate** (C) Fundamental gates (D) Derived gates
2. Which gate is called as the logical inverter?
   (A) AND (B) OR **(C) NOT** (D) XNOR
3. A + A = ?
   (A) A (B) O (C) 1 (D) A
4. NOR is a combination of ?
   (A) NOT(OR) (B)NOT(AND) (C) NOT(NOT) (D) NOT(NOR)
5. NAND is called as …… Gate
   (A) Fundamental Gate **(B) Derived Gate** (C) Logical Gate (D) Electronic gate

II VERY SHORT ANSWERS

Part - I

1. Define data

- The term data comes from the word **datum**, which means a raw fact.
- The data is a fact about people, places or some objects.

2. Write the 1's complement procedure.

- **This is for negative numbers only i.e. the number whose MSB is 1**
- Step 1: Convert given Decimal number into Binary
- Step 2: Check if the binary number contains 8 bits, if less add 0 at the left most bit, to make it as 8 bits.
- Step 3: Invert all bits (i.e. Change 1 as 0 and 0 as 1)

Example:

- Find 1's complement for (-24)10

Given Number	Binary Number	1's Compliment
$(-24)_{10}$	00011000	11100111

3. Convert $(46)_{10}$ into Binary number

46 / 2 = 23 =0 ↑ MSB
23 / 2 = 11= 1
11 / 2 = 5 = 1
5 / 2 = 2 = 1
2 / 2 = 1 = 0
LSB

$(46)_{10} = (101110)_2$

4. We cannot find 1's complement for $(28)_{10}$. State reason.

$(28)_{10}$ is positive number.

1's Complement represent signed numbers (Negative numbers) only. So, $(28)_{10}$ cannot find 1's complement.

5. List the encoding systems for characters in memory.

1. BCD – Binary Coded Decimal
2. EBCDIC – Extended Binary Coded Decimal Interchange Code
3. ASCII – American Standard Code for Information Interchange
4. Unicode
5. ISCII - Indian Standard Code for Information Interchange

Part-II

1. What is Boolean Algebra?

- Boolean algebra is a mathematical discipline that is used for designing digital circuits in a digital computer.
- It describes the relation between inputs and outputs of a digital circuit.

Ex: X=A+B

2. Write a short note on NAND Gate.

- The NAND gate operates an AND gate followed by a NOT gate.
- It acts in the manner of the logical operation "AND" followed by inversion. The output is "false" if both inputs are "true", otherwise, the output is "true".

The truth table for NAND gate is

Input		Output
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

3. Draw the truth table for XOR gate.

Input		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

4. Write the associative laws?

A + (B + C) = (A + B) + C
A . (B . C) = (A . B) . C

5. What are derived gates?

NAND, NOR, XOR and **XNOR**

III SHORT ANSWERS

Part - I

1. What is radix of a number system? Give example

A numbering system is a way of representing numbers. Each number system is uniquely identified by its **base value** or **radix**. Radix or base is the count of number of digits in each number system. Radix or base is the general idea behind positional numbering system.

2. Write note on binary number system.

- There are only **TWO DIGITS** in the Binary system, namely, **0 and 1.**
- The numbers in the binary system are represented to the base 2 and the positional multipliers are the powers of 2.
- The left most bit in the binary number is called as the **M**ost **S**ignificant **B**it (MSB) and it has the largest positional weight.
- The right most bit is the **L**east **S**ignificant **B**it (LSB) and has the smallest positional weight.

3. Convert $(150)_{10}$ into Binary, then convert that Binary number to Octal.

$(150)_{10} = (\ ?\ )_2$

150 / 2 = 75 = 0 → MSB
75 / 2 = 37 = 1
37 / 2 = 18 = 1
18 / 2 = 9 = 0
9 / 2 = 4 = 1
4 / 2 = 2 = 0
2 / 2 = 1 = 0
LSB

$(150)_{10} = (10010110)_2$

$(10010110)_2 = (\ ?\ )_8$

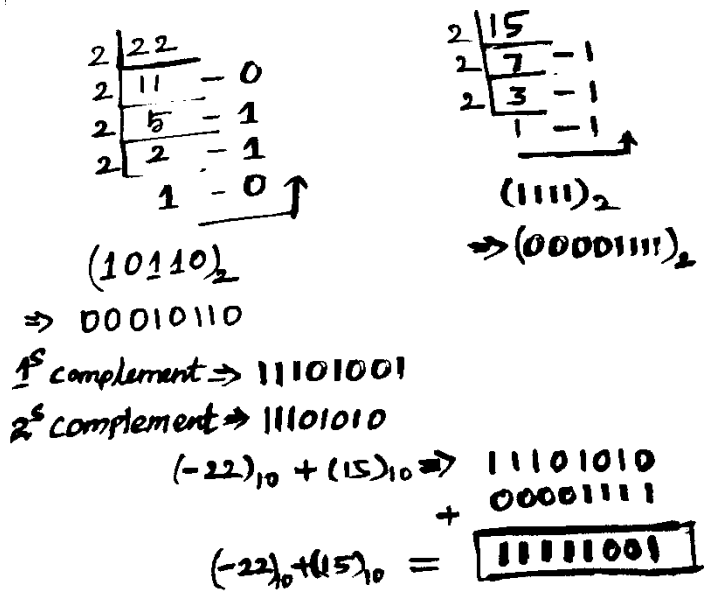
$= 010\ 010\ 110$
$= 2\ \ 2\ \ 6$

$(10010110)_2 = (226)_8$

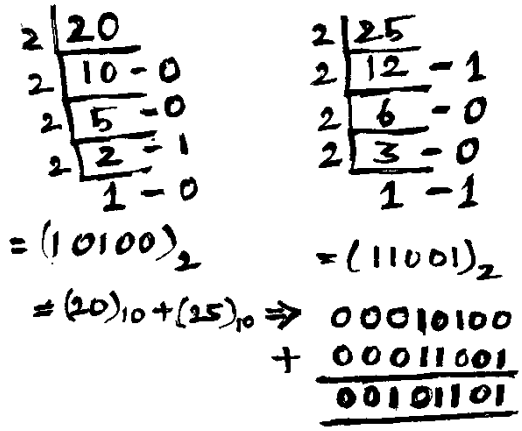
4. Write short note on ISCII.

- ISCII is the system of handling the character of Indian local languages.
- This as a 8-bit coding system.
- Therefore it can handle 256 (28) characters.
- This system is formulated by the department of Electronics in India in the year 1986- 88 and recognized by Bureau of Indian Standards (BIS).

5. Add a) $-22_{10}+15_{10}$



b) $20_{10}+25_{10}$



Part - II

1. Write the truth table of fundamental gates.

Logical Gates	Truth Table		
AND	A	B	AB
	0	0	0
	0	1	0
	1	0	0
	1	1	1
OR	A	B	A + B
	0	0	0
	0	1	1
	1	0	1
	1	1	1
NOT	A		$\overline{A}$
	0		1
	1		0

2. Write a short note on XNOR gate.

The XNOR (exclusive - NOR) gate is a combination XOR gate followed by an inverter. Its output is "true" if the inputs are the same, and "false" if the inputs are different. In simple words, the output is 1 if the input are the same, otherwise the output is 0.

The truth table for XNOR Gate is

Input		Output
A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

3. Reason out why the NAND an NOR are called universal gates?

NAND and NOR gates are called Universal gates, because the fundamental logic gates can be realized through them.

4. Give the truth table of XOR gate.

Input		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

5. Write the De Morgan's law

De Morgan's

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

$$\overline{(A \cdot B)} = \overline{A} + \overline{B}$$

IV DETAIL ANSWERS

Part - I

1. a) Write the procedure to convert fractional Decimal to Binary

The method of **repeated multiplication by 2** has to be used to convert such kind of decimal fractions.

The steps involved in the method of **repeated multiplication by 2**:

Step 1: Multiply the decimal fraction by 2 and note the integer part. The integer part is either 0 or 1.

Step 2: Discard the integer part of the previous product. Multiply the fractional part of the previous product by 2. Repeat Step 1 until the same fraction repeats or terminates (0).

Step 3: The resulting integer part forms a sequence of 0s and 1s that become the binary equivalent of decimal fraction.

Step 4: The final answer is to be written from first integer part obtained till the last integer part obtained.

	Integer part	
$0.2 \times 2 = 0.4$	0	(first integer part obtained)
$0.4 \times 2 = 0.8$	0	
$0.8 \times 2 = 1.6$	1	
$0.6 \times 2 = 1.2$	1	
$0.2 \times 2 = 0.4$	0	(last integer part obtained)

Write the integer parts from top to bottom to obtain the equivalent fractional binary number.

Hence,

$(0.2)_{10} = (0.00110011\ldots)_2 = (0.00110011)_2$

b. Convert $(98.46)_{10}$ to Binary

1. Integer part

2	98	
2	49	0
2	24	1
2	12	0
2	6	0
2	3	0
	1	1

2. Fractional part

$0.46 \times 2 = 0.92 = 0$

$0.92 \times 2 = 1.84 = 1$

$0.84 \times 2 = 1.68 = 1$

$0.68 \times 2 = 1.36 = 1$

$0.36 \times 2 = 0.72 = 0$

$0.72 \times 2 = 1.44 = 1$

$$98.46_{10} = (1100010.01110$$

2. Find 1's Complement and 2's Complement for the following Decimal number

a) -98

2	98	
2	49	– 0
2	24	– 1
2	12	– 0
2	6	– 0
2	3	– 0
	1	– 1

$= 98_{10} = 1100010$

8 bit format of 98_{10}	=	01100010
1's complement	=	10011101
Add 1 bit	=	+1
2's complement	=	10011110

b) -135

2	135	
2	67	– 1
2	33	– 1
2	16	– 1
2	8	– 0
2	4	– 0
2	2	– 0
	1	– 0

$135_{10} = 10000111$

1's complement	=	01111000
Add 1 bit	=	+1
2's complement	=	01111001

3. a) Add $1101010_2 + 101101_2$

```
  1101010
+  101101
---------
 10010111
```

b) Subtract $1101011_2 - 111010_2$

```
  1101011
-  111010
---------
   110001
```


Part - II

1. Explain the fundamental gates with expression and truth table.

A gate is a basic electronic circuit which operates on one or more signals to produce an output signal. There are three fundamental gates namely AND, OR and NOT.

i. AND Gate:

The AND gate can have two or more input signals and produce an output signal.

In boolean algebra the multiplication sign stands for the AND operation.

C = A . B

Symbol	Truth Table		
	A	B	AB
	0	0	0
	0	1	0
	1	0	0
	1	1	1

ii. OR Gate:

The OR gate gets its name from its behavior like the logical inclusive "OR".

We use the + sign to denote the OR function.

C = A + B

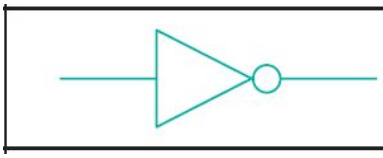
A	B	A + B
0	0	0
0	1	1
1	0	1
1	1	1

iii. NOT Gate:

The NOT gate, called a logical inverter, has only one input. It reverses the logical state. In other words the output C is always the complement of the input.

In boolean algerbra, the overbar stands for NOT operation.

C = NOT A



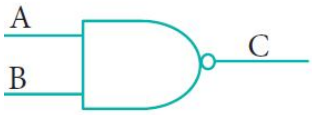
A	$\overline{A}$
0	1
1	0

2. How AND and OR can be realized using NAND and NOR gate.

NAND Gate:

The NAND gate operates an AND gate followed by a NOT gate. It acts in the manner of the logical operation "AND" followed by inversion. The output is "false" if both inputs are "true", otherwise, the output is "true".

symbol of NAND gate is



The output of the NAND gate is

$C = (\overline{A \cdot B})$

The truth table for NAND gate is

Input		Output
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

NOR Gate:

The NOR gate circuit is an OR gate followed by an inverter. Its output is "true" if both inputs are "false" Otherwise, the output is "false".

The output of NOR gate is

$C = (\overline{A + B})$

Read this as "C equals NOT of A OR B" or "C equals the complement of A OR B".

Input		Output
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

3. Explain the Derived gates with expression and truth table.

NAND, NOR, XOR and **XNOR** are derived gates which are derived from the fundamental gates.

1. NAND Gate:

The NAND gate operates an AND gate followed by a NOT gate. It acts in the manner of the logical operation "AND" followed by inversion. The output is "false" if both inputs are "true", otherwise, the output is "true".

The output of the NAND gate is

$$C = \overline{(A \cdot B)}$$

The logical sy

The truth table for NAND gate is

Input		Output
A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

2. NOR Gate:

The NOR gate circuit is an OR gate followed by an inverter. Its output is "true" if both inputs are "false" Otherwise, the output is "false".

The output of NOR gate is

$$C = \overline{(A + B)}$$

Read this as "C equals NOT of A OR B" or "C equals the complement of A OR B".

Input		Output
A	B	C
0	0	1
0	1	0
1	0	0
1	1	0

3. XOR Gate

The XOR (exclusive - OR) gate acts in the same way as the logical "either/or." The output is "true" if either, but not both, of the inputs are "true". The output is "false" if both inputs are "false" or if both inputs are "true."

In boolean algebra. exclusive - OR operator $\oplus$ or "encircled plus".

Hence $C = A \oplus B$

The logical symbol of XOR gate is

Input		Output
A	B	C
0	0	0
0	1	1
1	0	1
1	1	0

4. XNOR Gate

The XNOR (exclusive - NOR) gate is a combination XOR gate followed by an inverter.

The logical symbol is

The truth table for XNOR Gate is

Input		Output
A	B	C
0	0	1
0	1	0
1	0	0
1	1	1

EXTRA QUESTIONS:

ONE MARK:

1. The term data comes from the word **datum** which means a raw fact
2. The **data** is a fact about people, places or some objects.
3. Computer handles data in the form of '0'(Zero) and '1' (One).
4. A **bit** is the short form of **Binary digit** which can be '0' or '1'.
5. Bit is the basic unit of data in computers.
6. A **nibble** is a collection of 4 bits
7. A collection of 8 bits is called **Byte**
8. A **byte** is considered as the basic unit of measuring the memory size in the Computer
9. **Word length** refers to the number of bits processed by a Computer's CPU
10. **Computer memory** (Main Memory and Secondary Storage)is normally represented in terms of KiloByte (KB) or MegaByte (MB).
11. In decimal system, **1 Kilo represents 1000**
12. In binary system, 1 KiloByte represents **1024 bytes**
13. Yotta =2^80, Zetta=2^70, Exa=2^60, Peta=2^50,Tera=2^40,Giga=2^30 Mega=2^20,Kilo=2^10
14. **Bytes** are used to represent characters in a text
15. ASCII stands for **American Standard Code for Information Interchange**
16. The ASCII value for (blank space) is **32**
17. ASCII value of numeric 0 is **48**
18. ASCII values for lower case alphabets is from **97 to 122**
19. ASCII values for the upper case alphabets is **65 to 90**
20. A **numbering system** is a way of representing numbers
21. The most commonly used numbering system in real life is **Decimal number system**
22. Each number system is uniquely identified by its **base value** or **radix**
23. **Radix or base** is the count of number of digits in each number system
24. In the **positional number system**, each decimal digit is weighted relative to its position in the number
25. The numbers in the binary system are represented to the base **2**
26. The left most bit in the binary number is called as the **M**ost **S**ignificant **B**it
27. The right most bit is the **L**east **S**ignificant **B**it
28. Octal number system uses **8** digits
29. A hexadecimal number is represented using base **16**
30. Which number system is used to represent data in a more compact manner – **Hexadecimal Number system**
31. To convert Decimal to Binary "**Repeated Division by 2**" method can be used.
32. To convert Decimal to Octal, "**Repeated Division by 8**" method can be used.

33. To convert Decimal to Hexadecimal, "**Repeated division by 16**" method can be used

34. The method of **repeated multiplication by 2** has to be used to convert Decimal Fraction to Binary Fraction

35. Computers can handle both **positive** (unsigned) and **negative** (signed) numbers.

36. The simplest method to represent negative binary numbers is called **Signed Magnitude**

37. In signed magnitude method, the left most bit is Most Significant Bit (MSB), is called **sign bit or parity bit**

38. In signed binary representation, the left most bit is considered as **sign bit**

39. 1's Complement representation is an easier approach to represent **signed numbers**

40. BCD – **B**inary **C**oded **D**ecimal

41. EBCDIC – **E**xtended **B**inary **C**oded **D**ecimal **I**nterchange **C**ode

42. ASCII – **A**merican **S**tandard **C**ode for **I**nformation **I**nterchange

43. ISCII - **I**ndian **S**tandard **C**ode for **I**nformation **I**nterchange

44. BCD can handle **64 characters**.

45. Most popular encoding system recognized by United States - **ASCII**

46. ASCII can handle **128 characters**.

47. The new edition (version) ASCII -8 can handle **256 characters**

48. The ASCII code equivalent to the uppercase letter 'A' is **65**

49. EBCDIC coding system is formulated by **I**nternational **B**usiness **M**achine(IBM)

50. EBCDIC can handle **256 characters**.

51. Indian Standard Code for Information Interchange is a 8-bit coding system

52. **ISCII** was formulated in the year **1986-88** and recognized by **B**ureau of **I**ndian **S**tandards (BIS)

53. **English** and **European** Languages alone can be handled by ASCII

54. Unicode was generated to handle all the coding system of Universal languages

55. **Unicode** is a 16 bit code and can handle **65536 characters**

56. Unicode scheme is denoted by **hexadecimal numbers**

TWO MARK & THREE MARKS

1. Define Binary Digit

A **bit** is the short form of **Binary digit** which can be '0' or '1'. It is the basic unit of data in computers

2. Define Word length

Word length refers to the number of bits processed by a Computer's CPU.
For example, a word length can have 8 bits, 16 bits, 32 bits and 64 bits

3. What is meant by Number System?

- A numbering system is a way of Representing Numbers.
- The most commonly used numbering system in real life is Decimal number system.
- Other number systems are Binary, Octal, and Hexadecimal Number System.
- Each number system is uniquely identified by its **base value** or **radix**.
- Radix or base is the count of number of digits in each number system.

4. Write a note on Decimal Number system

- It consists of 0,1,2,3,4,5,6,7,8,9(10 digits).
- It is the oldest and most popular number system
- This means that each digit in the number is multiplied by 10 raised to a power corresponding to that digit's position

E.g

$(123)_{10} = 1x10^2 + 2x10^1 + 3x10^0$
$= 100 + 20 + 3$
$= (123)_{10}$

5. Convert Binary number $(1101)_2$ into Decimal Number

$$(1101)_2 = 1\times2^3 + 1\times2^2 + 0\times2^1 + 1\times2^0$$
$$= 8 + 4 + 0 + 1$$
$$= (13)_{10}$$

6. Write a note on octal number system

- Octal number system uses digits 0,1,2,3,4,5,6 and 7 (8 digits).
- Each octal digit has its own positional value or weight as a power of 8.

Eg. Convert octal number into decimal equivalent

$$(547)_8 = 5\times8^2 + 4\times8^1 + 7\times8^0$$
$$= 5\times64 + 4\times8 + 7\times1$$
$$= 320 + 32 + 7$$
$$= (359)_{10}$$

7. Write a note on Hexadecimal number system

- A hexadecimal number is represented using base 16.
- This system is used to represent data in a more compact manner.
- Since 16 symbols are used, 0 to F, the notation is called hexadecimal.
- The first 10 symbols are the same as in the decimal system, 0 to 9 and the remaining 6 symbols are taken from the first 6 letters of the alphabet sequence, A to F, where A represents 10, B is 11, C is 12, D is 13, E is 14 and F is 15.

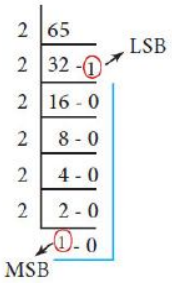
E.g Convert Hexadecimal number into decimal number

$$(25)_{16} = 2\times16^1 + 5\times16^0$$
$$= 32+5$$
$$= (37)_{10}$$

8. How to convert Decimal number into Binary number?

- To convert Decimal to Binary "**Repeated Division by 2**" method can be used.
- Any Decimal number divided by 2 will leave a remainder of 0 or 1.
- Repeated division by 2 will leave a sequence of 0s and 1s that become the binary equivalent of the decimal number.
- The process is repeated until the quotient becomes 0 or 1.
- When the quotient is '0' or '1', it is the final remainder value.
- Write the final answer starting from final remainder value obtained to the first remainder value obtained

E.g Convert Decimal number $(65)_{10}$ to Binary number

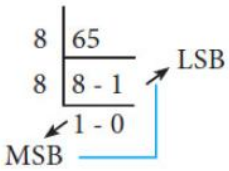


Ans : $(65)_{10} = (1000001)_2$

9. How will you convert Decimal number to octal number?

- To convert Decimal to Octal, "**Repeated Division by 8**" method can be used.
- We have to divide the given number by 8.

E.g Convert $(65)_{10}$ into its equivalent Octal number

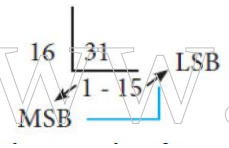


Ans: $(65)_{10} = (101)_8$

10. How will you convert Decimal to Hexadecimal number?

- To convert Decimal to Hexadecimal, "**Repeated division by 16**" method can be used.
- We have to divide the given number by 16.

E.g Convert $(31)_{10}$ into its equivalent hexadecimal number.



Ans : $(31)_{10} = (1F)_{16}$

11. Write the procedure for converting Decimal Fraction into Binary?

The method of **repeated multiplication by 2** has to be used

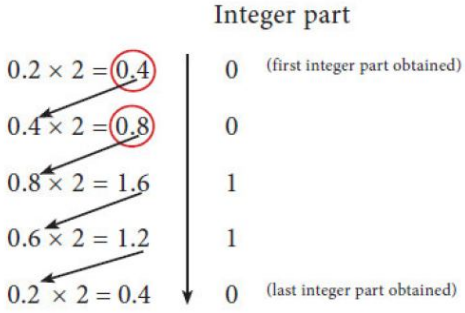
Step 1: Multiply the decimal fraction by 2 and note the integer part.
The integer part is either 0 or 1.

Step 2: Discard the integer part of the previous product. Multiply the fractional part of the previous product by 2. Repeat Step 1 until the same fraction repeats or terminates (0).

Step 3: The resulting integer part forms a sequence of 0s and 1s that become the binary equivalent of decimal fraction.

Step 4: The final answer is to be written from first integer part obtained till the last integer part obtained.

Eg Convert $(0.2)_{10}$ to (?)$_2$



Ans : $(0.2)_{10} = (0.00110011)_2$

12. Write the procedure for converting Binary to Decimal number

Step 1: Write down the Binary digits and list the powers of 2 from right to left(Positional Notation)
Step 2: For each positional notation written for the digit, now write the equivalent weight.
Step 3: Multiply each digit with its corresponding weight
Step 4: Add all the values.
Step 5: Add the final values.

E.g Convert **$(111011)_2$** into its equivalent decimal number

Weight	32	16	8	4	2	1
Positional Notation	2^5	2^4	2^3	2^2	2^1	2^0
Given number	1	1	1	0	1	1

$32+16+8+0+2+1 = (59)_{10}$ **Ans :** $(111011)_2 = (59)_{10}$

13. How will you Binary number into Octal number?

Step 1: Group the given binary number into 3 bits from right to left.
Step 2: Add preceding 0 to make a group of 3 bits if the left most group has less than 3 bits.
Step 3: Find the Octal equivalent for each group.

E.g Convert **$(11010110)_2$** into octal equivalent number

$$\underbrace{011}_{3}\quad\underbrace{010}_{2}\quad\underbrace{110}_{6}$$
$$(11010110)_2 = (326)_8$$

14. How will you convert Binary to Hexadecimal number?

Step 1: Group the given number into 4 bits from right to left.
Step 2: Add preceding 0's to make a group of 4 bits if the left most group has less than 4 bits.
Step 3: Find the Hexadecimal equivalent of each group.

Eg: Convert **$(1111010110)_2$** into Hexadecimal number

$$\underbrace{0011}_{3}\quad\underbrace{1101}_{D}\quad\underbrace{0110}_{6}$$
$$(1111010110)_2 = (3D6)_{16}$$

15. Write the procedure for converting Binary fraction into decimal fraction.

Step 1: Convert integral part of Binary to Decimal equivalent using positional notation method
Step 2: To convert the fractional part of binary to its decimal equivalent.
Step 2.1: Write down the Binary digits in the fractional part
Step 2.2: For all the digits write powers of 2 from left to right starting from **2-1, 2-2, 2-3 ..... 2-n**, now write the equivalent weight.
Step 2.3: Multiply each digit with its corresponding weight
Step 2.4: Add all the values which you obtained in Step 2.3
Step 3: To get final answer write the integral part (after conversion), followed by a decimal point(.) and the answer arrived at Step 2.4

E.g : Convert the given Binary number **$(11.011)_2$** into its decimal Equivalent

Integer part : 1 1

$1 \times 2_0 = 1$
$1 \times 2_1 = 2$

3

Fractional part: . 0 1 1

$1 \times 2^{-3} = 0.125$
$1 \times 2^{-2} = 0.25$
$1 \times 2^{-1} = 0.5$

0.875

Ans: **$(11 . 011)2 = (3. 875)_{10}$**

16. How will you convert Octal number into Decimal number?

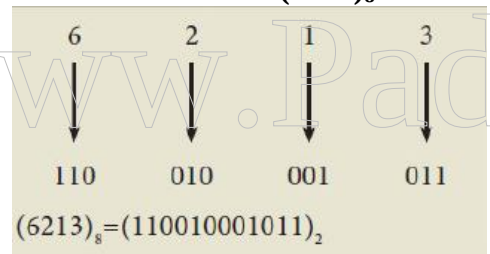
- Write down the Octal digits and list the powers of 8 from right to left(Positional Notation)
- For each positional notation of the digit write the equivalent weight.
- Multiply each digit with its corresponding weight Add all the values

E.g : Convert **$(1265)_8$** to equivalent Decimal number

Weight	512	64	8	1
Positional Notation	8^3	8^2	8^1	8^0
Given number	1	2	6	5

$(1265)_8 = 512 \times 1 + 64 \times 2 + 8 \times 6 + 1 \times 5$
$= 512 + 128 + 48 + 5$
$(1265)_8 = (693)_{10}$

17. Convert Octal number $(6213)_8$ to Binary number?



$(6213)_8 = (110010001011)_2$

18. Convert Hexadecimal into Decimal number

- Write down the Hexadecimal digits and list the powers of 16 from right to left(Positional Notation)
- For each positional notation written for the digit, now write the equivalent weight.
- Multiply each digit with its corresponding weight Add all the values to get one final value.

E.g: Convert Hexadecimal **$(25F)_{16}$** into its equivalent Decimal number

Weight	256	16	1
Positional Notation	16^2	16^1	16^0
Given number	2	5	F(15)

$(25F)_{16} = 2 \times 256 + 5 \times 16 + 15 \times 1$
$= 512 + 80 + 15$
$(25F)_{16} = (607)_{10}$

19. Write a note on Sign Magnitude representation.

- The value of the whole numbers can be determined by the sign used before it.
- If the number has '+' sign or no sign it will be considered as positive.
- If the number has '-' sign it will be considered as negative.

E.g +50 or 50 is a positive number
-50 is a negative number

- In signed binary representation, the left most bit is considered as sign bit.
- If this bit is 0, it is a positive number
- if it 1, it is a negative number.
- Therefore a signed binary number has 8 bits, only 7 bits used for storing values (magnitude) and the 1 bit is used for sign.

20. Write about 2's complement representation

- Invert all the bits in the binary sequence (i.e., change every 0 to1 and every 1 to 0 ie.,1's complement)
- Add 1 to the result to the Least Significant Bit (LSB).

Example:

2's Complement represent of $(-24)_{10}$

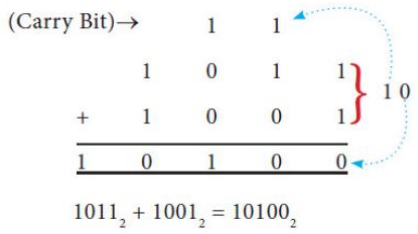
Binary equivalent of +24:	11000
8bit format:	00011000
1's complement:	11100111
Add 1 to LSB:	+1
2's complement of -24:	**11101000**

21. Binary addition:

Rules for Binary Addition:

A	B	SUM (A + B)	Carry
0	0	0	-
0	1	1	-
1	0	1	-
1	1	0	1

Add: $1011_2 + 1001_2$



22. Perform Binary addition for the following: $23_{10} + 12_{10}$

Step 1: Convert 23 and 12 into binary form

23_{10}

2's power	16	8	4	2	1
Binary Number	1	0	1	1	1

$23_{10} = 00010111_2$

12_{10}

2's power	8	4	2	1
Binary Number	1	1	0	0

$12_{10} = 00001100_2$

Step 2: Binary addition of 23 and 12:

Carry Bit →			1	1			
$23_{10} = 0$	0	0	1	0	1	1	1
$12_{10} = 0$	0	0	0	1	1	0	0
$35_{10} = 0$	**0**	**1**	**0**	**0**	**0**	**1**	**1**

23. Binary Subtraction

Rules for Binary Subtraction:

A	B	Difference (A-B)	Borrow
0	0	0	0
1	0	1	0
1	1	0	0
0	1	1	1

Example: Subtract 10010102 – 101002

```
1 0 0 1 0 1 0
  1 0 1 0 0
-------------
  1 1 0 1 1 0
-------------
```

24. Perform binary addition for the following: (-21)10 + (5)10

Step 1: Change -21 and 5 into binary form

21_{10}

2's power	16	8	4	2	1
Binary Number	1	0	1	0	1

$21_{10} = 00010101_2$

5_{10}

2's power	4	2	1
Binary Number	1	0	1

$5_{10} = 00000101_2$

Step 2:

21_{10}	0	0	0	1	0	1	0	1
1's Compliment	1	1	1	0	1	0	1	0
2's Compliment	1	1	1	0	1	0	1	1

Step 3:

Binary Addition of -21 and 5 :

Carry bit				1	1	1	1	
-21_{10}	1	1	1	0	1	0	1	1
5_{10}	0	0	0	0	0	1	0	1
-16_{10} (Result)	1	1	1	1	0	0	0	0

25. Write a note on ASCII

- This is the most popular encoding system recognized by United States.
- This encoding system can handle English characters only.
- This can handle 27 bit which means 128 characters.
- In this system, each character has individual number.
- The new edition (version) ASCII -8, has 28 bits and can handle 256 characters
- They are represented from 0 to 255 unique numbers.
- The ASCII code equivalent to the uppercase letter 'A' is 65.
- The binary representation of ASCII (7 bit) value is 1000001.
- Also 01000001 in ASCII-8 bit.

26. Write a note on EBCDIC

- This is similar to ASCII Code with 8 bit representation.
- This coding system is formulated by International Business Machine (IBM).
- The coding system can handle 256 characters.

27. Write a note on Unicode

- This coding system is used in most of the modern computers.
- The popular coding scheme after ASCII is Unicode.
- ASCII can represent only 256 characters.
- Therefore English and European Languages alone can be handled by the Unicode was generated to handle all the coding system of Universal languages.
- This is 16 bit code and can handle 65536 characters.
- Unicode scheme is denoted by hexadecimal numbers.

1. Convert Hexadecimal $(8BC)_{16}$ into Binary number

8	B	C
↓	↓	↓
1000	1011	1100

$(8BC)_{16} = (100010111100)_2$

****

CHAPTER - 3

COMPUTER ORGANIZATION

Part – I

Choose the correct answer

1. Which of the following is sadi to be the brain of a computer?
   (a) Input devices (b) Output devices **(c) Memory device** (d) Microprocessor
2. Which of the following is not the part of a microprocessor unit?
   (a) ALU (b) Control unit **(c) Cache memory** (d) register
3. How many bits constitute a word?
   (a) 8 (b) 16 (c) 32 **(d) determined by the processor used.**
4. Which of the following device identifies the location when address is placed in the memory address register?
   (a) Locator (b) encoder **(c) decoder** (d) multiplexer
5. Which of the following is a CISC processor?
   (a) Intel P6 (b) AMD K6 **(c) Pentium III** (d) Pentium IV
6. Which is the fastest memory?
   (a) Hard disk (b) Main memory **(c) Cache memory** (d) Blue-Ray dist
7. How many memory locations are identified by a processor with 8 bits address bus at a time?
   (a) 28 **(b) 1024** (c) 256 (d) 8000
8. What is the capacity of 12cm diameter DVD with single sided and single layer?
   (a) 4.7 GB (b) 5.5 GB (c) 7.8GB (d) 2.2 GB
9. What is the smallest size of data represented in a CD?
   (a) blocks (b) sectors **(c) pits** (d) tracks
10. Display devices are connected to the computer through.
    (a) USB port (b) Ps/2 port (c) SCSI port **(d) VGA connector**

Part – II

(1) What are the parameters which influence the characteristics of a microprocessor?

a) Clock speed
b) Instruction set
c) Word size

(2) What is an instruction?

A command which is given to a computer to perform an operation on data is called an **instruction.**

(3) What is a program counter?

The Program Counter (PC) is a special register in the CPU which always keeps the address of the next instruction to be executed.

(4) What is HDMI?

High-Definition Multimedia Interface is an audio/video interface transfers the uncompressed video and audio data from a video controller, to a compatible computer monitor, LCD projector, digital television etc.

(5) Which source is used to erase the content of a EPROM?

EPROM retains its contents until it is exposed to ultraviolet light. The ultraviolet light clears its contents, making it possible to reprogram the memory.

Part – III

(1) Differentiate Computer Organization from Computer Architecture.

- Computer organization deals with the hardware components of a computer system.
- Computer architecture deals with the engineering considerations involved in designing a computer.

(2) Classify the microprocessor based on the size of the data.

- 8-bit microprocessor
- 16-bit microprocessor
- 32-bit microprocessor
- 64-bit microprocessor

(3) Write down the classifications of microprocessors based on the instruction set.

1. RISC stands for Reduced Instruction Set Computers.
2. Complex Instruction Set Computers (CISC)

(4) Differentiate PROM and EPROM.

PROM:

- Programmable read only memory is also a non-volatile memory on which data can be written only once.
- PROM is non-volatile
- PROM is manufactured as a blank memory, whereas a ROM is Programmed during the manufacturing process itself.
- PROM programmer or a PROM burner is used to write data to a PROM chip.
- The process of programming a PROM is called burning the PROM.

EPROM:

- Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM,
- The content can be erased using ultraviolet rays.
- An EPROM differs from a PROM, PROM can be written only once and cannot be erased.
- EPROMs are used widely in personal computers because they enable the manufacturer to change the contents of the PROM to replace with updated versions or erase the contents before the computer is delivered.

(5) Write down the interfaces and ports available in a computer.

- Serial Port
- Parallel Port
- USB Ports
- USB 3.0
- VGA Connector
- Audio Plugs
- PS/2 Port
- SCSI Port
- High Definition Multimedia Interface (HDMI)

(6) Differentiate CD and DVD

CD	DVD
A CD or CD-ROM is made from 1.2 millimeters thick, polycarbonate plastic material. A thin layer of aluminum or gold is applied to the surface. CD data is represented as tiny indentations known as "pits", The areas between pits are known as "lands". The capacity of an ordinary CDROM is 700MB.	A DVD (Digital Versatile Disc or Digital Video Disc) is an optical disc DVDs are often used to store movies at a better quality. DVDs are read with a laser. The disc can have one or two sides, and one or two layers of data per side; Capable of storing up to 4.7 GB of data.

(7) How will you differentiate a flash memory and an EEPROM?

Flash memory devices:

- Flash memory is an electronic (solid-state) non-volatile computer storage medium that can be electrically erased and reprogrammed.
- Flash memories can be used in personal computers, Personal Digital Assistants (PDA), digital audio players, digital cameras and mobile phones.
- Flash memory offers fast access times.
- The time taken to read or write a character in memory is called access time.
- Examples for Flash memories are pen drives, memory cards etc.

EEPROM:

- Electrically Erasable Programmable Read Only Memory can be erased by exposing it to an electrical charge.
- EEPROM is non-volatile.
- EEPROM is slower in performance.

Part – IV

(1) Explain the characteristics of a microprocessor.

A Microprocessor's performance depends on the following characteristics:

a) Clock speed
b) Instruction set
c) Word size

a) Clock Speed

Every microprocessor has an **internal clock** that regulates the speed at which it executes instructions. The speed at which the microprocessor executes instructions is called the **clock speed**. Clock speed is measured in MHz (Mega Hertz) or in GHz (Giga Hertz).

b) Instruction Set

A command which is given to a computer to perform an operation on data is called an **instruction**. Basic set of machine level instructions that a microprocessor is designed to execute is called as an **instruction set**. This instruction set carries out the following types of operations:

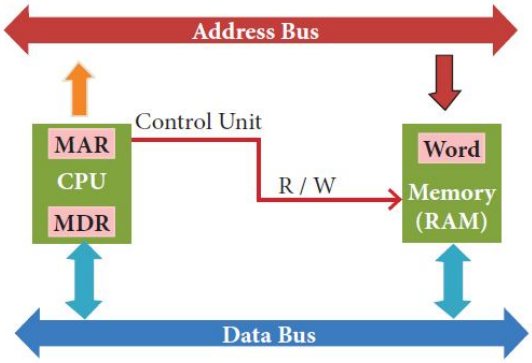
• Data transfer
• Arithmetic operations
• Logical operations
• Control flow
• Input/output

c) Word Size

The number of bits that can be processed by a processor in a single instruction is called its word size. **Word size** determines the amount of RAM that can be accessed by a microprocessor at one time and the total number of pins on the microprocessor. Total number of input and output pins in turn determines the architecture of the microprocessor.

(2) How the read and write operations are performed by a processor? Explain.

The Central Processing Unit (CPU) has a Memory Data Register (MDR) and a Memory Address Register (MAR).



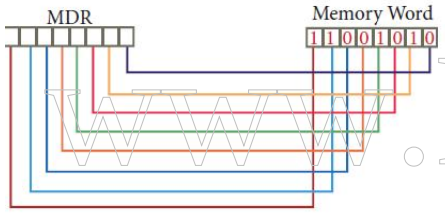
The Memory Data Register (MDR) keeps the data which is transferred between the Memory and the CPU. The program Counter (PC) is a special register in the CPU which always keeps the address of the next instruction to be executed.

A bus is a collection of wires used for communication between the internal components of a computer. The address bus is used to point a memory location.

A decoder, a digital circuit is used to point to the specific memory location where the **word** can be located.

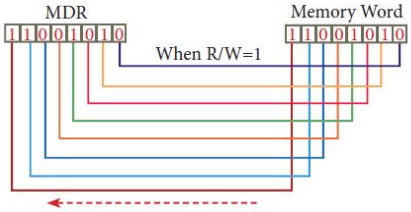
The read operation fetches data from memory and transfers to MDR. A single control line performs two operations like Read/Write using 1or 0.

Also, the write operation transfers data from the MDR to memory.



The data bus has eight parallel wires to transfer data either from MDR to word or word to MDR based on the control(Read or write). This control line is labeled as R/W , which becomes 1 means READ operation and 0 means WRITE operation. Figure shows the content of MDR and the word before the READ operation. Also, Figure shows the content of MDR and the word after the READ operation.

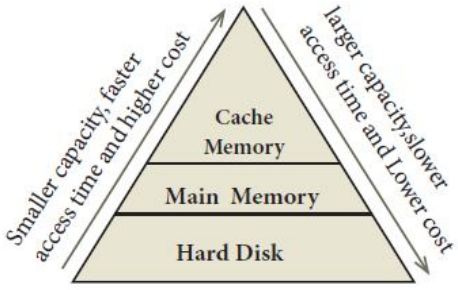
The read operation transfers the data(bits) from word to Memory Data Register. The write operation transfers the data(bits) from Memory Data Register to word.



(3) Arrange the memory devices in ascending order based on the access time.

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in the computer, where data and instructions are stored. There are two types of accessing methods to access (read or write) the memory.

They are sequential access and random access. In sequential access, the memory is accessed in an orderly manner from starting to end. But, in random access, any byte of memory can be accessed directly without navigating through previous bytes. Different memory devices are arranged according to the capacity, speed and cost as shown in Figure.



(4) Explain the types of ROM.

- Read only memory refers to special memory in a computer with prerecorded data at manufacturing time which cannot be modified.
- The stored programs that start the computer and perform diagnostics are available in ROMs.
- ROM stores critical programs such as the program that boots the computer.
- Once the data has been written onto a ROM chip, it cannot be modified or removed and can only be read.
- ROM retains its contents even when the computer is turned off.
- ROM is called as a non-volatile memory.

PROM:

- Programmable read only memory is also a non-volatile memory on which data can be written only once.
- PROM is non-volatile
- PROM is manufactured as a blank memory, whereas a ROM is programmed during the manufacturing process itself.
- PROM programmer or a PROM burner is used to write data to a PROM chip.
- The process of programming a PROM is called burning the PROM.

EPROM:

- Erasable Programmable Read Only Memory is a special type of memory which serves as a PROM.
- The content can be erased using ultraviolet rays.
- An EPROM differs from a PROM, PROM can be written only once and cannot be erased.
- EPROMs are used widely in personal computers because they enable the manufacturer to change the contents of the PROM to replace with updated versions or erase the contents before the computer is delivered.

EEPROM:

- Electrically Erasable Programmable Read Only Memory can be erased by exposing it to an electrical charge.
- EEPROM is non-volatile.
- EEPROM is slower in performance.

EXTRA ONE MARK QUESTIONS:

1. **Computer organization** deals with the hardware components of a computer System
2. **Computer organization** is concerned with how the various components of computer hardware operate.
3. **Computer organization** deals with how they are interconnected to implement an architectural specification
4. **Computer architecture** deals with the engineering considerations involved in designing a computer
5. **Computer Organization** deals with the hardware components that are transparent to the programmer
6. **CPU** is the major component of a computer, which performs all tasks.
7. Microprocessors were first introduced in early **1970**
8. The first general purpose microprocessor, **4004** was developed by **Intel Inc**
9. The **microprocessor** is a programmable multipurpose silicon chip
10. Microprocessor is driven by **clock pulses**
11. The microprocessor is made up of **3** main units
12. **Registers** is also known as Internal memory
13. **Registers** is used to hold the instruction and data for the execution of the processor
14. **Microprocessor** is able to communicate with the memory units and the Input /Output devices

15. The system bus is a bunch of wires that serves as communication channels between the Microprocessor and other devices
16. **Hertz** –is the standard unit of measurement used for measuring frequency
17. One hertz equals **one cycle per second**
18. The average human ear can detect sound waves between **20 and 20,000 Hz**
19. Sound waves close to **20 Hz** have a low pitch and are called **"bass"** frequencies
20. Sound waves above **5,000 Hz** have a high pitch and are called "**treble**" frequencies
21. A Microprocessor's performance depends on **Clock speed, Instruction set and Word size**
22. Every microprocessor has an **internal clock** that regulates the speed at which it executes instructions
23. The speed at which the microprocessor executes instructions is called the **clock speed**
24. Clock speed is measured in **MHz** (Mega Hertz) or in **GHz** (Giga Hertz)
25. A command which is given to a computer to perform an operation on data is called an **instruction**
26. set of machine level instructions that a microprocessor is designed to execute is called as an **instruction set.**
27. The number of bits that can be processed by a processor in a single instruction is called its **word size**
28. **Word size** determines the amount of RAM that can be accessed by a microprocessor at one time
29. Total number of input and output pins in turn determines the **architecture of the microprocessor**
30. Transistors used in Intel 4004 is **2300**
31 .Size of Intel 4004 is **10 Micrometer**
32. Clock speed of Intel 4004 is **740 KHz**
33. Data width of Intel 4004 processor is **4 bits**
34. **MDR – M**emory **D**ata **R**egister
35. **MAR- M**emory **A**ddress **R**egister
36. The **Memory Data Register (MDR)** keeps the data which is transferred between the Memory and the CPU
37. The **Program counter** is a special register in the CPU which always keeps the address of the next instruction to be executed
38. A **bus** is a collection of wires used for communication between the internal components of a computer
39. The **address bus** is used to point a memory location
40. A **decoder, a digital circuit** is used to point to the specific memory location
41. A **data bus** is used to transfer data between the memory and the CPU
42. The **data bus is bidirectional** and the **address bus is unidirectional**
43. The **read operation** fetches data from memory and transfers to MDR.
44. **Write operation** transfers data from the MDR to memory
45. The data bus has **eight** parallel wires
46. If R/W is 1 it means Read operation, if 0 means write operation.
47. Depending on width of data, Microprocessor can be classified into **4** types
48. RISC – **R**educed **I**nstruction **S**et **C**omputers
49. **RISC** have small set of highly optimized instructions
50. Examples of RISC processors are **Pentium IV, Intel P6, AMD K6 and K7**
51. CISC – **C**omplex **I**nstruction **S**et **C**omputers
52. Examples of CISC processors are **Intel 386 & 486, Pentium, Pentium II and III, and Motorola 68000**
53. There are **two** types of accessing methods to access (read or write) the memory
54. In **sequential access**, the memory is accessed in an orderly manner
55. In **random access**, any byte of memory can be accessed directly
56. The main memory is otherwise called as **Random Access Memory**
57. The smallest unit of information that can be stored in the memory is called as a **bit**.
58. RAM is a **volatile** memory
59. There are two basic types of RAM i) Dynamic RAM ii) Static RAM
60. **Dynamic RAM** needs to be refreshed frequently
61. Static RAM needs to be refreshed less often
62. **Read only memory** refers to special memory in a computer with prerecorded data at manufacturing time
63. ROM stores critical programs such as the program that boots the computer
64. **ROM** is called as a non-volatile memory

65. Programmable read only memory is also a **non-volatile memory**
66. **PROM burner** is used to write data to a PROM chip
67. The process of programming a PROM is called **burning the PROM**
68. In Erasable Programmable Read Only the content can be erased using **ultraviolet rays**
69. PROM – **P**rogrammable **R**ead **O**nly **M**emory
70. EPROM- **E**rasable **P**rogrammable **R**ead **O**nly **M**emory
71. EEPROM- **E**lectrically **E**rasable **P**rogrammable **R**ead **O**nly **M**emory
72. Electrically Erasable Programmable Read Only Memory content can be erased by exposing it to an **electrical charge**
73. The **cache memory** is a very high speed and expensive memory
74. Response time is also known as **Access time**
75. **Response time** refers to how quickly the memory can respond to a read / write request.
76. **Secondary storage** devices serve as a supportive storage to main memory
77. Secondary storage is also called as **Backup storage**
78. **Hard disk** is a magnetic disk on which you can store data
79. **Hard disk** has the stacked arrangement of disks accessed by a pair of head for each of the disks
80. **CD-ROM** is made from 1.2 millimeters thick, polycarbonate plastic material
81. CD data is represented as tiny indentations known as **"pits"**
82. The areas between pits are known as **"lands"**
83. The capacity of an ordinary CDROM is **700MB**
84. A **DVD (Digital Versatile Disc or Digital Video Disc)** is an optical disc
85. DVD can store upto **4.7 GB** of data
86. The 8 cm DVD has **1.5 GB** capacity
87. **Double-layered sides** are usually gold-coloured
88. **Single-layered** sides are usually silver-coloured
89. **Flash memory** is an electronic (solid-state) non-volatile computer storage medium
90. Examples for Flash memories are **pendrives, memory cards**
91. The time taken to read or write a character in memory is called **access time**
92. The capacity of the flash memories vary from **1 Gigabytes** (GB) to **2 Terabytes (TB).**
93. **Blu-Ray Disc** is a high-density optical disc similar to DVD
94. A double-layer Blu-Ray disc can store up to **50GB** (gigabytes) of data
95. **DVD** uses a red laser to read and write data
96. **Blu-ray** uses a blue-violet laser to write
97. To connect the external devices **serial port** is used
98. To connect printers **Parallel port** is used
99. **USB Port** is used to connect external devices like cameras, scanners, mobile phones, external hard disks
100. USB 3.0 is the third major version of the Universal Serial Bus
101. **USB 3.0** can transfer data up to 5 Giga byte/second
102. To connect a monitor or any display device like LCD projector **VGA connector** is used
103. **PS/2 Port**-To connect mouse and keyboard to PC.
104. **SCSI Port:** To connect the hard disk drives and network connectors.

EXTRA TWO & THREE MARKS

1. **What are the main units of Microprocessor?**

- **Arithmetic and Logic unit (ALU):** To perform arithmetic and logical instructions based on computer instructions.
- **Control unit:** To control the overall operations of the computer through signals.
- **Registers (Internal Memory):** They are used to hold the instruction and data for the execution of the processor.

2. Define System bus

The system bus is a bunch of wires which is the collection of address bus, data bus and control bus that serves as communication channels between the Microprocessor and other devices.

3. Write a note on Cache memory

- The cache memory is a very high speed and expensive memory, Without cache memory, every time the CPU requests the data, it has to be fetched from the main memory which will consume more time.
- It helps to achieve the fast response time, response Time, (Access Time) refers to how quickly the memory can respond to a read / write request.

4. List the characteristic of microprocessor

a) Clock speed
b) Instruction set
c) Word size

5. Define clock speed

• Every microprocessor has an **internal clock** that regulates the speed at which it executes instructions.
• The speed at which the microprocessor executes instructions is called the **clock speed**.
• Clock speed is measured in MHz (Mega Hertz) or in GHz (Giga Hertz).

6. What is meant by Instruction set?

• A command which is given to a computer to perform an operation on data is called an **instruction**.
• Basic set of machine level instructions that a microprocessor is designed to execute is called as an **instruction set**.
Instruction performs set of operations.

1. Data transfer
2. Arithmetic operations
3. Logical operations
4. Control flow
5. Input/output

7. Define word size

- The number of bits that can be processed by a processor in a single instruction is called its word size.
- **Word size** determines the amount of RAM that can be accessed by a microprocessor at one time
- Total number of input and output pins in turn determines the architecture of the microprocessor.

8. Define bus.

A bus is a collection of wires used for communication between the internal components of a computer.

9. What is meant decoder?

Decoder, a digital circuit is used to point to the specific memory location where the **word** can be located.

FIVE MARKS

1. Explain the different types of Microprocessors

Microprocessors can be classified based on:

i. **The width of data that can be processed**
ii. **The instruction set**

i. **Depending on the data width**, microprocessors can process instructions.

The microprocessors can be classified as follows:

- 8-bit microprocessor
- 16-bit microprocessor
- 32-bit microprocessor
- 64-bit microprocessor

ii. **Classification based on Instruction set:**

1. **RISC** stands for **Reduced Instruction Set Computers**.
   - They have a small set of highly optimized instructions.
   - Complex instructions are also implemented using simple instructions, thus reducing the size of the instruction set.

Examples of RISC processors are Pentium IV, Intel P6, AMD K6 and K7.

2. **Complex Instruction Set Computers (CISC)**

- CISC stands for **Complex Instruction Set Computers**.
- They support hundreds of instructions.
- It accomplish a wide variety of tasks, making them ideal for personal computers.

Examples of CISC processors are Intel 386 & 486, Pentium I, II and III, and Motorola 68000.

2. Write a note on RAM

- The main memory is otherwise called as **Random Access Memory**.
- This is available in computers in the form of Integrated Circuits (ICs).
- It is the place in a computer where the Operating System, Application Programs and the data` are kept temporarily
- The smallest unit of information that can be stored in the memory is called as a bit.
- RAM is a volatile memory, which means that the information stored in it is not permanent.
- It allows both read and write operations.

RAM are of two types:

1) Static RAM
2) Dynamic RAM

- These two types differ in the technology they use
- Static RAM needs to be refreshed less often, which makes it faster.
- Static RAM is more expensive than Dynamic RAM.

3. Explain the various types of Ports and Interfaces

i. **Serial Port:** To connect the external devices,
ii. **Parallel Port:** To connect the printers,
iii. **USB Ports:** To connect external devices like cameras, scanners, mobile phones, external hard disks and printers to the computer.
iv. **USB 3.0** is the third major version of the Universal Serial Bus (USB) standard to connect computers with other electronic gadgets USB 3.0 can transfer data up to 5 Giga byte/second.
v. **VGA Connector:** To connect a monitor or any display device like LCD projector.
vi. **Audio Plugs:** To connect sound speakers, microphone and headphones.
vii. **PS/2 Port:** To connect mouse and keyboard to PC.
viii. **SCSI Port:** To connect the hard disk drives and network connectors.
ix. **High Definition Multimedia Interface (HDMI):**

High-Definition Multimedia Interface is an audio/video interface transfers the uncompressed video and audio data from a video controller, to a compatible computer monitor, LCD projector, digital television etc.

4. Explain the various secondary storage devices

Hard disk:

- Hard disk is a magnetic disk on which you can store data.
- The hard disk has the stacked arrangement of disks accessed by a pair of heads for each of the disks.
- The hard disks come with a single or double sided disk.

Compact Disk

- A CD or CD-ROM is made from 1.2 millimeters thick, polycarbonate plastic material.
- A thin layer of aluminum or gold is applied to the surface.
- CD data is represented as tiny indentations known as "pits",
- The areas between pits are known as "lands".
- A motor within the CD player rotates the disk.
- The capacity of an ordinary CDROM is 700MB.

Digital Video Disk

- A **DVD (Digital Versatile Disc or Digital Video Disc)** is an optical disc
- Capable of storing up to 4.7 GB of data,
- DVDs are often used to store movies at a better quality.
- DVDs are read with a laser.
- The disc can have one or two sides, and one or two layers of data per side;
- The number of sides and layers determines how much it can hold.
- A 12 cm diameter disc with single sided, single layer has 4.7 GB capacity,
- The single sided, double layer has 8.5 GB capacity.
- The 8 cm DVD has 1.5 GB capacity.
- Double-layered sides are usually gold-coloured,
- Single-layered sides are usually silver-coloured

Flash memory devices

- Flash memory is an electronic(solid-state) non-volatile computer storage medium that can be electrically erased and reprogrammed.
- Examples for Flash memories are pendrives, memory cards etc.
- Flash memories can be used in personal computers, Personal Digital Assistants (PDA), digital audio players, digital cameras and mobile phones.
- Flash memory offers fast access times. The time taken to read or write a character in memory is called access time.
- The capacity of the flash memories vary from 1 Gigabytes (GB) to 2 Terabytes (TB).

Blu-ray disc

- Blu-Ray Disc is a high-density optical disc similar to DVD.
- Blu-ray disc is used for PlayStation games and for playing High-Definition (HD) movies.
- A double-layer Blu-Ray disc can store up to 50GB (gigabytes) of data.
- The format was developed to enable recording, rewriting and playback of high-definition video, as well as storing large amount of data.
- DVD uses a red laser to read and write data.
- Blu-ray uses a blue-violet laser to write.

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CHAPTER - 4

THEORETICAL CONCEPTS OF OPERATING SYSTEM

Part I

1) Operating system is a
   A) Application Software B) Hardware **C) System Software** D) Component
2) Identify the usage of Operating Systems
   A) Easy interaction between the human and computer
   B) Controlling input & output Devices
   C) Managing use of main memory
   D) All the above
3) Which of the following is not a function of an Operating System?
   A) Process Management B) Memory Management
   C) Security management **D) Complier Environment**
4) Which of the following OS is a commercially licensed Operating system?
   A) Windows B) UBUNTU C) FEDORA D) REDHAT
5) Which of the following Operating systems support Mobile Devices?
   A) Windows 7 B) Linux C) BOSS **D) iOS**
6) File Management manages
   A) Files B) Folders C) Directory systems **D) All the Above**
7) Interactive Operating System provides
   A) Graphics User Interface (GUI) B) Data Distribution
   C) Security Management D) Real Time Processing
8) Android is a
   A) Mobile Operating system B) Open Source
   C) Developed by Google **D) All the above**
9) Which of the following refers to Android operating system's version?
   A) JELLY BEAN B) UBUNTU C) OS/2 D) MITTIKA

Part II

1) **What are the advantages of memory management in Operating System?**
   - Keeping track of which portion of memory are currently being used and who is using them.
   - Determining which processes (or parts of processes) and data to move in and out of memory.
   - Allocation and de-allocation of memory blocks as needed by the program in main memory. (Garbage Collection)

2) **What is the multi-user Operating system?**
   - It is used in computers and laptops that allow same data and applications to be accessed by multiple users at the same time.
   - The users can also communicate with each other. Windows, Linux and UNIX are examples for multi-user Operating System

3) **What is a GUI?**
   - The GUI is a window based system with a pointing device to direct I/O, choose from menus, make selections and a keyboard to enter text.
   - Its vibrant color's attract the user very easily.

4) **List out different distributions of Linux operating system.**
   - There are a few different distributions of Linux, like Ubuntu, Mint, Fedora, RedHat, Debian, Google's Android, Chrome OS, and Chromium OS.

5) **What are the security management features available in Operating System?**
   (1) File access level
   (2) System level
   (3) Network level

6) What is multi-processing?

This is a one of the features of Operating System. It has two or more processors for a single running process (job). Processing takes place in parallel is known as parallel processing.

7) What are the different Operating Systems used in computer?

- Single User Operating Systems
- Multi-user Operating Systems
- Multi-Processing Operating Systems
- Distributed Operating Systems
- Prominent Operating Systems

Part III

1) What are the advantages and disadvantages of Time-sharing features?

Time-Sharing Operating System	
Advantages	**Disadvantages**
It allows execution of multiple tasks or processes concurrently	Problem of Reliability
Quick Response	Questions of security and integrity of uses programs and data
Avoids duplication of software	Problem of data communication
Reduces CPU idle time	Various processes after a time is elapsed.

2) Explain and List out examples of mobile operating system.

A Mobile operating system controls a mobile device and its design supports wireless communication and different types of mobile applications.

i. ***Google Android***
ii. ***Apple iOS***
iii. ***Blackberry***
iv. ***Symbian***

3) What are the differences between Windows and Linux Operating system?

Windows OS	Linux OS
It is a commercial licensed OS	It is a open source OS
Only one Distributer	Many Distributors
It uses GUI	It uses kernal
It boot only from primary partition	It boot either from a primary or from a logical partition
Secure	Insecure

4) Explain the process management algorithms in Operating System.

The following algorithms are mainly used to allocate the job (process) to the processor.

1. FIFO
2. SJF
3. Round Robin
4. Based on Priority

Part IV

1) Explain the concept of a Distributed Operating System.

This feature takes care of the data and application that are stored and processed on multiple physical locations across the world over the digital network (internet/intranet).

The Distributed Operating System is used to access shared data and files that reside in any machine around the world. The user can handle the data from different locations.

The users can access as if it is available on their own computer.

The advantages of distributed Operating System are as follows:

- A user at one location can make use of all the resources available at another location over the network.
- Many computer resources can be added easily in the network
- Improves the interaction with the customers and clients.
- Reduces the load on the host computer.

2) Explain the main purpose of an operating system.

An Operating System (OS) is a system software which serves as an interface between a user and a computer.

Purpose of an operating system:

- This controls input, output and other peripheral devices such as disk drives, printers and electronic gadgets.
- A user cannot communicate directly with the computer hardware, unless an operating system is loaded.
- Operating System has become essential to enable the users to design applications without the knowledge of the computer's internal structure of hardware.
- The need of Operating System is basically - an interface between the user and hardware.
- Operating System works as translator, while it translates the user request into machine language(Binary language), processes it and then sends it back to Operating System.
- To ensure that a computer can be used to extract what the user wants it do.
- Easy interaction between the users and computers.
- Starting computer operation automatically when power is turned on (Booting).
- Controlling Input and Output Devices
- Manage the utilization of main memory.
- Providing security to user programs.

3) Explain advantages and disadvantages of open source operating systems.

Advantages:

i. It is generally free.
ii. It is continually evolving in real time as developers add to it and modify it, which means it can be better quality and more secure and less prone to bugs.
iii. Using open source software also means the users are not locked into using a particular vendor's system that only work with their other system.
iv. The user can modify and adapt open source software for own business requirements.
v. More reliable and flexible.

Disadvantages:

i. Open source software might not be as user friendly as commercial versions because less attention is paid to developing the user interface.
ii. Open source software do not come with extensive support when things go wrong - open source software tends to rely on its community of users to respond to and fix problems.
iii. Open source software may still be involved in collecting indirect costs for external support.
iv. Vulnerable to malicious users.

EXTRA ONE MARK QUESTIONS:

1. A **software** is set of instructions that perform specific task
2. **Software** It interacts basically with the hardware to generate the desired output
3. Software is classified into two types
4. **Application software** is a set of programs to perform specific task
5. **MS-word** is an application software to create text document
6. **VLC player** is application software to play audio, video files
7. **System software** is a type of computer program that is designed to run the computer's hardware and application programs
8. **Operating System** and **Language Processor** are examples of System software
9. **Operating system** is an interface between a user and a computer
10. **Windows**, **UNIX** and **Linux** are some of the popular operating system
11. ioS as mobile **OS** are operating system used in mobile devices.
12. **Operating System** enable the users to design applications without the knowledge of the computer's internal structure of hardware
13. **Operating System** manages all the Software and Hardware
14. **Operating System** translates the user request into machine language
15. **Operating System** converts processed information into user readable form
16. An operating system allows only a single user to perform a task at a time is called **Single user** operating system
17. **MS-DOS** is an example for a single user and single task Operating system
18. Allowing same data and applications to be accessed by multiple users at the same time is called Multi-user Operating Systems
19. **Windows, Linux and UNIX** are examples for multi-user Operating system.
20. **User interface** is one of the significant feature in Operating System
21. GUI – **G**raphical **U**ser **I**nterface
22. The **GUI** is a window based system with a pointing device to direct I/O, make selections and to enter text
23. **User interface** should reduce number of errors committed by the user
24. **Memory Management** is the process of controlling and coordinating computer's main memory and assigning memory to various running programs
25. **Process management** is function that includes creating and deleting processes to communicate and synchronize with each other
26. A **process** is the unit of work (program) in a computer.
27. FIFO- **F**irst **I**n **F**irst **O**ut
28. **FIFO algorithm** is based on queuing technique
29. SJF – **S**hortest **J**ob **F**irst
30. **SJF** algorithm works based on the size of the job
31. The **Round Robin** (RR) scheduling algorithm is designed especially for time sharing systems
32. Operating System provides **three** levels of securities to the user
33. In order to access the files created by other people, you should have the access permission this is called as **File Access Level**
34. **System level** security is offered by the password in a multi-user environment
35. In order to retain the existing state of system the Operating system should have **fault tolerance** capabilities
36. **File management** function of OS handles the data storage techniques
37. FAT- **F**ile **A**llocation **T**able
38. Any type of data in a computer is stored in the form of files and directories/folders through **File Allocation Table (FAT)**
39. The **FAT** stores general information about files like filename, type (text or binary), size, starting address
40. The **file manager** of the operating system helps to create, edit, copy, allocate memory to the files
41. NTFS- **N**ew **T**echnology **F**ile **S**ystem

42. Processing takes place in parallel is known as **parallel processing**
43. Having two or more processors for a single running process is **Multiprocessing**
44. Allowing execution of multiple tasks or processes concurrently is called **Time Sharing**
45. Allocating fixed amount of time for each task is called **Time sharing**
46. The **Distributed Operating System** is used to access shared data and files that reside in any machine around the world
47. **Distributed OS** reduces the load on the host computer
48. User at one location can make use of all the resources available at another location over the network through **Distributed OS**
49. **GUI** lets you use your mouse to click icons, buttons, menus using a combination of graphics and text elements
50. **OS** can be either **proprietary** with a commercial license or can be **open source**
51. **Microsoft windows,Apple Mac OS**,**Apple ios** belongs to Proprietary Licence
52. **Unix,Linux, Google's Android** belongs to Open source Free licence software
53. **UNIX** is a family of multitasking, multi-user operating systems
54. Unix was developed in the year **1970** by **Ken Thompson** & **Dennis Ritchie**
55. **Linux** is a family of open-source operating systems
56. **Ubuntu, Mint, Fedora, RedHat, Debian, Google's Android, Chrome OS, and Chromium OS** are few distribution of Linux
57. The Linux operating system was originated in **1991**
58. Linux is a project of **Linus Torvalds**
59. **Microsoft Windows** is a family of proprietary operating systems designed by **Microsoft Corporation**
60. **ReactOS** is a Windows alternative open source operating system
61. Examples of mobile Operating Systems are **Apple iOS and Google Android.**
62. **Android** is a mobile operating system developed by Google
63. **Android TV** for televisions, **Android Auto** for cars and **Android Wear** for wrist watches
64. Lates version of Android is **Orea**
65. **iOS (formerly iPhone OS)** is a mobile Operating System created and developed by Apple Inc
66. **iOS** is the second most popular mobile Operating System globally after Android

EXTRA TWO MARKS & THREE MARKS

1. Define Software

- Software is set of instructions that perform specific task.
- It interacts basically with the hardware to generate the desired output

2. What are the types of software?

Software is classified into two types:

1) Application Software
2) System Software

3. Write a note on Application software.

- Application software is a set of programs to perform specific task.

Example: **MS-word** is application software to create text document.
VLC player is familiar application software to play audio, video files.

4. Define System software

- ✓ System software is a type of computer program that is designed to run the computer's hardware and application programs.

Example: OS and Language Processor.

5. Define Operating system

- An Operating System (OS) is a system software which serves as an interface between a user and a computer.
- This controls input, output and other peripheral devices such as disk drives, printers and electronic gadgets.

6. What are the functions of Operating system?

The functions of an Operating System include:

- ✓ File management,
- ✓ Memory management,
- ✓ Process management
- ✓ Device management

7. What is the Need for Operating system?

- Operating System enables the users to design applications without the knowledge of the computer's internal structure of hardware.
- Operating System manages all the Software and Hardware.
- It is the interface between the user and hardware.
- Operating System works as translator, it translates the user request into machine language.
- Operating System converts processed information into user readable form.

8. List the uses of Operating system

- To ensure that a computer can be used do to exact if what the user wants it do.
- Easy interaction between the users and computers.
- Starting computer operation automatically when power is turned on (Booting).
- Controlling Input and Output Devices
- Manage the utilization of main memory.
- Providing security to user programs.

9. List the key features of Operating system

- User Interface
- File Management
- Memory Management
- Process Management
- Fault tolerance
- Security Management

10. What are the points should be considered while designing the User Interface?

1. The user interface should enable the user to retain this expertise for a longer time.
2. The user interface should also satisfy the customer based on their needs.
3. The user interface should save user's precious time. Create graphical elements like Menus, Window, Tabs, Icons and reduce typing work will be an added advantage of the Operating System.
4. The User Interface must satisfy the customer.
5. The user interface should reduce number of errors committed by the user with little practice the user should be in a position to avoid errors.

11. Define Fault tolerance.

- The Operating Systems should be robust.
- When there is a fault, the Operating System should not crash, instead the Operating System have fault tolerance capabilities and retain the existing state of system.

12. What is meant by File management?

- File management of OS handles the data storage techniques.
- The operating System manages the files, folders and directory systems on a computer.

1. The **FAT** stores general information about files like **filename, type (text or binary), size, starting address and access mode** (sequential/indexed / indexed-sequential/ direct/relative).
2. Next Generation File System **(NTFS)** and ext2(Linux).

13. Define Multi processing

Two or more processors for a single running process (job).

- Processing takes place in parallel is known as parallel processing.
- Each Processor works on different parts of the same task or on two or more different tasks.
- Since the execution takes place in parallel, this feature is used for high speed execution.

14. Write a note on Time-sharing

- It allows execution of multiple tasks or processes concurrently.
- For each task a fixed time is allocated.
- The division of time is called Time- sharing.
- The processor switches between various processes after a time is elapsed or the process is completed.

For example there are three processes called P1, P2, P3 and time allocated for each process 30, 40, 50 minutes.

15. Define Distributed Operating system

- This feature takes care of the data and application that are stored and processed on **multiple physical locations** across the world over the **digital network** (internet/intranet).
- The Distributed Operating System is used to **access shared data and files** that reside in any machine around the world.
- The user can handle the data from different locations.
- The users can access as if it is available on their own computer.

16. List the advantages of Distributed Operating system

- A user at one location can make use of all the resources available at another location over the network.
- Many computer resources can be added easily in the network improves the interaction with the customers and clients.
- Reduces the load on the host computer.

17. Write a note on Open source software Unix:

- **UNIX** is a family of multitasking, multi-user operating systems that Developed at AT&T Bell Labs, in the year 1970 - Developed by Ken Thompson and Dennis Ritchie.

18. Write a note on Windows operating system

Microsoft Windows is a family of proprietary operating systems Designed by Microsoft Corporation Primarily targeted to Intel and AMD architecture based computers.

19. Write a note Mobile Operating system Android

Android is a mobile operating system developed by **Google**, based on **Linux** and designed primarily for touch screen mobile devices such as smart phones and tablets.

- Google has developed Android TV for televisions, Android Auto for cars and Android Wear for wrist watches, Variants of Android are also used on game consoles, digital cameras, PCs and other electronic gadgets.
- **Android OS Versions are**: Alpha, Beta, Cupcake, Donut, Éclair, Gingerbread, Jellybean, Kitkat, Lollipop, Nougat, Oreo.

iOS:

- iOS (formerly iPhone OS) is a mobile Operating System created and developed by Apple Inc., exclusively for its hardware.
- This Operating System is used in iPhone, iPad and iPod Touch.
- It is the second most popular mobile Operating System globally after Android.

EXTRA FIVE MARKS

1. Explain Memory Management in Operating system

- Memory Management is the process of controlling and coordinating computer's main memory.
- Assigning memory block (space) to various running programs to optimize overall computer performance.
- The Memory management involves the allocation of **specific memory blocks** to **individual programs** based on user demands.
- Memory management ensures the availability of adequate memory for each running program at all times.
- The objective of Memory Management process is to improve both the utilization of the CPU and the speed of the computer's response to its users via main memory.

The Operating System is responsible for the following activities in connection with memory management:

- ✓ Keeping track of which portion of memory are currently being used and who is using them.
- ✓ Determining which processes (or parts of processes) and data to move in and out of memory.
- ✓ Allocation and de-allocation of memory blocks as needed by the program in main memory.

2. Explain Process management technique in Operating system

Process management is function that includes creating and deleting processes providing mechanisms for processes to communicate and synchronize with each other.

The Operating System is responsible for the following activities associated with the process management:

Scheduling processes and threads on the CPUs Creating and deleting both user and system processes providing mechanisms for process synchronization Providing mechanisms for process communication.

The following algorithms are mainly used to allocate the job (process) to the processor.

1. FIFO
2. SJF
3. Round Robin
4. Based on Priority

1. FIFO (First In First Out)Scheduling:

- This algorithm is based on queuing technique.
- The process that enters the queue first is executed first by the CPU, followed by the next and so on.
- The processes are executed in the order of the queue (row).

2. SJF (Shortest Job First)Scheduling:

This algorithm works based on the size of the job being executed by the CPU.
Consider two jobs A and B.

1) A = 6 kilo bytes 2) B = 9 kilo bytes. First the job "A" will be assigned and then job "B" gets its turn.

3. Round Robin Scheduling

- The Round Robin (RR) scheduling algorithm is designed for time sharing systems.
- Jobs (processes) are assigned and processor time in a circular **method**.

Example take three jobs A, B, C.

- First the job A is assigned to CPU then job B and job C and then again A, B and C

4. Based On Priority

- The given job (process) is assigned based on a Priority.
- The job which has higher priority is processed first Take two jobs A and B.
- Let the priority of A be 5 and priority B be 7.
- Job B is assigned to the processor before job A.

3. Explain the security management in Operating system

The Operating System provides three levels of securities to the user.

(1) File access level
(2) System level
(3) Network level

File access level:

- In order to access the files created by other people, you should have the access permission.
- Permissions can either be granted by the creator of the file or by the administrator of the system.

System Level:

- System level security is offered by the password in a multi-user environment.
- Windows and Linux offer the password facility.

Network Level:

- Network security is an indefinable one.
- People from all over the world try to provide such a security.

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CHAPTER – 5

WORKING WITH TYPICAL OPERATING SYSTEMS

PART I

Choose the Best Answer

1. From the options given below, choose the operations managed by the operating system.
   a. Memory b. Processor c. I/O devices **d. all of the above**
2. Which is the default folder for many Windows Applications to save your file?
   a. My Document b. My Pictures c. Documents and Settings d. My Computer
3. Under which of the following OS, the option Shift + Delete – permanently deletes a file or folder?
   a. Windows 7 b.Windows 8 c.Windows10 **d. All of the OS**
4. What is the meaning of "Hibernate" in Windows XP/Windows 7?
   a. Restart the Computer in safe mode
   b. Restart the Computer in hibernate mode
   c. Shutdown the Computer terminating all the running applications
   d. Shutdown the Computer without closing the running applications
5. Which of the following OS is not based on Linux?
   a. Ubuntu b. Redhat c. CentOs **d. BSD**
6. Which of the following in Ubuntu OS is used to view the options for the devices installed?
   a. Settings b. Files c. Dash d. VBox_GAs_5.2.2
7. Identify the default email client in Ubuntu.
   a. Thunderbird b. Firefox c. Internet Explorer d. Chrome
8. Which is the default application for spreadsheets in Ubuntu? This is available in the software launcher.
   a. LibreOffice Writer **b. LibreOffice Calc**
   c. LibreOffice Impress d. LibreOffice Spreadsheet
9. Which is the default browser for Ubuntu?
   a. Firefox b. Internet Explorer c. Chrome d. Thunderbird
10. Where will you select the option to log out, suspend, restart, or shut down from the desktop of Ubuntu OS?
    a. Session Indicator b. Launcher c. Files d. Search

PART II

1. Differentiate cut and copy options.

Cut	Copy
It is the process of moving a block from one place to another.	It is the process of making duplicate copies of the block of a worksheet.
Shortcut : Ctrl+X	Shortcut : Ctrl+C
Ex: sastra - select the text - cut Sastra - Paste	**Ex**: sastra - select the text Sastra - Copy Sastra - Paste

2. What is the use of a file extension?

- File Extension is used to know which type of the file can be stored.
- To know the file is associated with.

3. **Differentiate Files and Folders.**

Files	Folders
File is the collections of data/information. (Records)	Folder is a collection of files.
Create a File: Start → All programs → select application → ok	**Create a folder:** Right click → new → Folder → ok

4. **Differentiate Save and save As option.**

"Save" option save a new document in first time. (Ctrl+S)

"Save As" option save an already saved the document with a new name and also create a copy of already saved document with a new name obviously.

5. **What is Open Source?**

Open source code refers to a program or software in which the source code is available in the web to the general public free of cost.

6. **What are the advantages of open source?**

- The open source software is free to use, distribute, and modify.
- It has lower cost in most cases in only the fraction of the cost of their proprietary counter parts.
- It is most secured as the code is accessible to everyone.

7. **Mention the different server distributions in Linux OS.**

i. Ubuntu
ii. CentOS
iii. RedHat
iv. SUSE
v. Fedora

8. **How will you log off from Ubuntu OS?**

When you have finished working on your computer, you can choose to Log Out, Suspend or Shut down through the Session Indicator on the far right side of the top panel.

PART III

1. **Analyze: Why the drives are segregated?**

- Save space and increase performance.
- To include other operating systems, isolate programs and keep files tidy.
- It might helps to isolate operating system or programs from other user.

2. **If you are working on multiple files at a time, sometimes the system may hang. What is the reason behind it. How can you reduce it?**

- Due to low capacity of main memory (RAM) the system many hang while working with multiple files.
- To reduce it increase the size of main memory and other reasons for hanging is overheating, driver corruption corruption or errors, software errors and computer virus.

3. Are drives such as hard drive and floppy drives represented with drive letters? If so why, if not why?

Yes, hard drive and floppy drives represented with drive letters.

4. Write the specific use of Cortana.

- Gives reminders based on time, places or people.
- Track packages, teams, interests and flights.
- Send emails and tests.
- Find facts, files, places and information.
- Open any application on your system.

5. List out the major differences between Windows and Ubuntu OS.

S.No	Ubuntu OS	Windows
1	Open source (Licensing freedom)	Closed source (Licensing Restriction)
2	Online peer support	Paid-help – Desk support
3	Full hardware support	Partial hardware support
4	Support CUI	No CUI support
5	Flexibility	Rigidity

6. Are there any difficulties you face while using Ubuntu? If so, mention it with reasons.

- Different desktop managers lead to a fragmented experience.
- Too many package managers makes Ubuntu hard to learn and master.
- Lack of software.
- Hardware compatibility.

7. Differentiate Thunderbird and Firefox in Ubuntu OS.

Firefox is a browser. Thunderbird is email client which can be used view emails received.

8. Differentiate Save, Save As and Save a Copy in Ubuntu OS.

Save – This will save the document without asking for a new name or location. It will overwrite the original.

Save As – This will prompt you to save the document using a dialog box. This allows to change the file name or location.

PART IV

1. Explain the versions of Windows Operating System.

Versions	Logo	Year	Specific features
Windows 1.x		1985	• Introduction of GUI in 16 - bit. processor • Mouse was introduced as an input device.
Windows 2.x		1987	• Supports to minimize or maximize windows. • Control panel feature was introduced with various system settings and customising options.
Windows 3.x		1992	• Introduced the concept of multitasking. • Supported 256 colours which brought a more modern, colourful look to the interface.
Windows 95		1995	• Introduced Start button, the taskbar, Windows Explorer and Start menu. • Introduced 32 - bit processor and focused more on multitasking.

Windows 98		1998	• Integration of the Web browser (Internet Explorer) with the Operating System. • DOS gaming began to disappear as Windows based games improved. • Plug and play feature was introduced.
Windows NT			• Designed to act as servers in network.
Windows Me		2000	• It introduced automated system diagnostics and recovery tools.
Windows 2000		2000	• Served as an Operating System for business desktop and laptop systems. • Four versions of Windows 2000 were released: Professional (for business desktop and laptop systems), Server (both a Web server and an office server), Advanced Server (for line-of-business applications) and Data Centre Server (for high-traffic computer networks).
Windows XP		2001	• Introduced 64-bit Processor. • Improved Windows appearance with themes and offered a stable version.
Windows Vista		2006	• Updated the look and feel of Windows.
Windows 7		2009	• Booting time was improved, introduced new user interfaces like Aero Peek, pinning programs to taskbar, handwriting recognition etc. and Internet Explorer 8.
Windows 8		2012	• Windows 8 is faster than previous versions of Windows. • Start button was removed. • Windows 8 takes better advantage of multi-core processing, solid state drives (SSD), touch screens and other alternate input methods. • Served as common platform for mobile and computer.
Windows 10		2015	• Start Button was added again. • Multiple desktop. • Central Notification Center for App notification and quick actions. • Cortana voice activated personal assistant.

2. Draw and compare the icon equivalence in Windows and Ubuntu.

S.No	Windows	Ubuntu
1	Recycle Bin	Trash
2	My computer	Files
3	Ms word	Libreoffice writer

3. Complete the following matrix

S.No	Navigational method	Located on	Ideally suited for
1	Start button	Task bar	Quick access common apps and settings.
2	My computer	Desktop	Exploring your disk drives and using system tools.
3	Windows Explorer	Task bar	Seeing hierarchy of all computer contents and resources in one window.
4	Quick Launch	Task bar	To open the programs quickly.

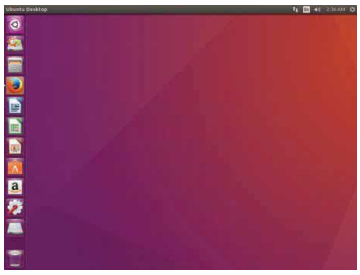
4. Observe the figure and mark all the window elements. Identify the version of the Windows OS.

- Title Bar
- Menu Bar
- The Workspace
- Corners and borders
- Start Menu
- Taskbar
- Computer Icon

5. Write the procedure to create, rename, delete and save a file in Ubuntu OS. Compare it with Windows OS.

In Ubuntu OS :

i. **Create a file :** By right clicking in the desktop and also files be created by using file menu.
ii. **Delete a file :** By using right click and choosing move to trash or by using menu.
iii. **Rename a file :** By using right click and choosing rename option.
iv. **Save a file :** Press ctrl + x or F2 to exit. You will then be asked if you want to save. (or) Press ctrl+ O or F3 and ctrl + x or F2 for save and exit.



In windows OS :

i. **Create file :** Open an application and created by using file menu.
ii. **Deletea file :** By right click on a file and choose delete option to delete a file.
iii. **Rename a file :** By right click on a file and choose rename option to rename a file.
iv. **Save file :** Press ctrl+S or file → save to save the file.

EXTRA TWO MARKS & THREE MARKS

1. How will you log off from Ubuntu OS?

When we has finished working on our computer, we can choose to Log Out through the Session Indicator on the far right side of the top panel.

2. Name any four icons in Ubuntu OS desktop

Amazon, Trash, Files, System Settings..

3. What is Launcher?

- The vertical bar of icons on the left side of the desktop is called the Launcher.
- The launcher provides easy access to applications, mounted devices, and the Trash.

4. Name the icons which is equivalent to MS- office applications.

- Libre Office Writer - MS-Word
- Libre Office Calc - MS-Excel
- Libre Office Impress – MS-Powerpoint

5. What is Multi-Tasking?

Multiple applications which can execute simultaneously in windows is known as “Multi-Tasking”

6. Write the prominent feature of Windows 95 OS.

- Introduced Start button and Start menu.
- Introduced a 32 bit environment, the task bar and forced on multitasking.

7. Write the prominent feature of Windows 98 OS.

- Integration of the Web browser (Internet Explorer) with the Operating System.
- DOS gaming began to disappear as Windows gaming improved.

8. Write the prominent feature of Windows 7 OS.

- Faster boot times, introduced new user interfaces and Internet Explorer 8.
- Most used operating system on the internet and also the most used for PC gaming.

9. What is desktop?

The basic working platform of windows is called desktop or the opening screen of windows is called desktop.

10. Name the parts of Task bar.

The Task bar is at the bottom of the Desktop and contains the Start button. Windows Notification Area time and date.

11. What is the use of Aero peek?

Aero Peek is used to get the desktop at any time.

12. What is the use of wild card character (?) Question mark?

The use of question mark as a substitute for a single character in a name.

13. Observe the following and answer the following.

a) Name of the Root directory.
b) Name of the Sub-directory.
c) Name of the Files.
Ans:

(a) X
(b) Y, A
(c) Z, B, C

14. What is Ubuntu?

- A quality that includes the essential human virtues, comparison and humanity is called ubuntu.
- Ubuntu is an open source OS for computer.
- It is a Linux distribution based on the debian architecture.

15. How will you delete files and folders using file menu?

- Select the file or folder you wish to delete.
- Click on the File menu and select Delete.
- The file will be moved to recycle bin

16. List down the differences in security for Windows7 , Windows8 and Windows10 Operating system.

Windows 7 - Ordinary password security while logging.
Windows 8 - Ordinary password security while logging.
Windows 10 - Windows Hello, one of the security which lets you log-in using a fingerprint, face or iris scan instead of a password.

17. What is OS (Operating System)?

An Operating System is a software program that enables the computer hardware to communicate and operate with the computer software.
It also acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.

18. Differentiate Unix and Linux.

S.No	UNIX	LINUX
1	Unix is a proprietary operation system.	Linux is a open source Operating system.
2	Unix OS primarily uses a command line Interface.	Linux OS primarily uses GUI Interface.

19. Write a note on Windows Scroll bars.

A scrollbar is an interaction technique in which continuous text, pictures, or any other content can be scrolled in a predetermined direction (up, down, left or right) on a computer display so that all contents can be viewed, even if only fraction of the content cab be seen on a device's screen at a time.

20. What is Shutdown?

Shut down is the team used to describe the process of closing all software programs in preparation to turn off a computer's power.

21. What is Log off?

Referred to as logoff, logout, disconnecting, and sign out, sign off process of disconnecting from network or what occur

22. What is Recycle Bin?

It is a folder which contains all deleted files and folders have an opportunity to recover from it.

23. What is the use of VBox in Ubuntu OS?

The expansion for VBox is VirtualBox. The reason to use Oracle VirtualBox is Ubuntu Linux can be run as a guest OS within the Virtual machine.

24. What is Trash in Ubuntu OS?

Trash is the equivalent of Recycle bin. All the deleted Files or Folders are moved here.

25. Name the four versions of Windows 2000.

The four versions of Windows 2000 were released:

- Professional (for business desktop and laptop),
- Server (for both Web Server and an Office Server),
- Advanced Server (for line of business application) and
- Data Center Server (for high-traffic computer networks).

26. Name the commonly used icons in the desktop.

Commonly used icons are: My Computer, Documents, Recycle bin, application icons, Shortcut icons, Document icons and Disk-drive icon.

27. What is meant by Document icon?

Active document window which is a window within an application window is called as document icon.

28. What is meant by Window?

Window is a typical rectangular area in an application or a document. It is an area on the screen that displays information for a specific program.

29. What is meant by Application Window?

It is an area on a computer screen with defined boundaries, and within which information is displayed. Such windows can be resized, maximized, minimized, placed side by side, overlap.

30. What is Document Window?

A document window is a section of the screen used to display the contents of a document.

31. Name the elements of Application Window.

Title bar, Menu bar, Tool bar, Scroll bars, Status bar, Work Space (area) and Control buttons.

32. **Name the elements of Windows.**

Title bar, Menu bar, Tool bar, Scroll bars, Status bar, Borders , Work Space (area) and Corners.

33. Name the Control Buttons.

Minimize, Maximize/ Restore and Close buttons.

34. What is meant by Title Bar? (Or) What will displayed on the Windows title bar?

The title bar will display the name of the application and the name of the document opened. It will also contain minimize, maximize and close button.

35. What is meant by Work Space in Document Window?

- The workspace is the area in the document window to enter or type the text of your document.
- It is the point of insertion for typing within the document.

36. What is Scroll Bar?

The scroll bars are used to scroll the workspace horizontally or vertically.

37. What is the use of Corners and Borders?

The corners and borders of the windows help to drag and resize the windows. The mouse pointer changes to a double headed arrow when positioned over a border or a corner.

Drag the border or corner in the direction indicated by the double headed arrow to the desired size. The window can be resized by dragging the corners diagonally across the screen.

38. Where will the Start menu is available?

In the lower left-hand corner of the windows screen is the Start button. When you click on the button, the Start menu will appear. Using the start menu, you can start any application.

39. What the use of Task bar? Or what are all available on Taskbar?

At the bottom of the screen is a horizontal bar called as Taskbar. This bar contains (from left to right) the Start button, shortcuts to various programs, minimized programs and in the extreme right corner you can see the system tray which consist of volume control, network, date and time etc. Next to the Start button is the quick Launch Toolbar which contains task for frequently used applications.

40. What is root directory?

The first level in a multilevel or hierarchical directory system is root directory, which is created automatically at the time of disk formatting.

41. What is the use wildcard character (*) Asterisk?

The use of asterisk as a substitute of zero or more characters.

42. What is the use of wild card character (?) Question mark?

The use of question mark as a substitute for a single character in a name.

43. Differentiate Windows 7 and Windows 8.

Windows 7	Windows 8
Faster boot times, introduced new user interface and Internet Explorer 8.	It was faster than previous versions of Windows.
Most used operating system on the internet and also the most used for PC gaming.	Windows 8 takes better advantage of multi-core processing, solid state drives (SSD), touch screens and other alternative input methods.

44. How will you delete files and folders using file menu?

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- Click on the File menu and select Delete.
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UNIT II ALGORITHMIC PROBLEM SOLVING

CHAPTER 6

SPECIFICATION AND ABSTRACTION

PART I Choose the Best Answer

1. Which of the following activities is algorithmic in nature?
   (a) Assemble a bicycle. (b) Describe a bicycle.
   (c) Label the parts of a bicycle. (d) Explain how a bicycle works.
2. Which of the following activities is not algorithmic in nature?
   (a) Multiply two numbers. (b) Draw a kolam.
   (c) Walk in the park. **(d) Braid the hair.**
3. Omitting details inessential to the task and representing only the essential features of the task is known as
   (a) specification **(b) abstraction** (c) composition (d) decomposition
4. Stating the input property and the as :-output relation a problem is known
   (a) specification (b) statement (c) algorithm (d) definition
5. Ensuring the input-output relation is
   (a) the responsibility of the algorithm and the right of the user.
   (b) the responsibility of the user and the right of the algorithm.
   (c) the responsibility of the algorithm but not the right of the user.
   (d) the responsibility of both the user and the algorithm.
6. If i = 5 before the assignment i := i-1 after the assignment, the value of i is
   (a) 5 **(b) 4** (c) 3 (d) 2
7. If 0 < i before the assignment i := i-1 after the assignment, we can conclude that
   (a) 0 < i **(b) 0 ≤ i** (c) i = 0 (d) 0 ≥ i

PART II Very Short Answers

1. Define an algorithm.

- An algorithm is a step-by-step sequence of statements to solve a problem.
- As an algorithm is executed, a process evolves which solves the problem.

`

2. Distinguish between an algorithm and a process.

ALGORITHM	PROCESS
An algorithm is a step-by-step sequence of statements to solve a problem	An instruction describes an action
As an algorithm is executed, a process evolves which solves the problem.	When the instructions are executed, a process evolves, which accomplishes the intended task or solves the given problem

3. Initially,
farmer, goat, grass, wolf = L, L, L, L
and the farmer crosses the river with goat. Model the action with an assignment statement.

1. the goat cannot be left alone with the grass:
   if goat = grass then farmer = goat
2. the goat cannot be left alone with the wolf:
   if goat = wolf then farmer = goat

4. Specify a function to find the minimum of two numbers.

Minimum(A,B)
--inputs:A an B are integers (or) Real numbers
--Outputs: A is minimum (A<B) (or) B is minimum (B<A)

5. If √2 = 1.414, and the square_root() function returns -1.414, does it violate the following specification?

-- square_root (x)
-- inputs: x is a real number , x ≥ 0
-- outputs: y is a real number such that $y^2=x$

Yes, it violate the specification.

Ex: x=9, y=?
Square(x)
Square(9)=3x3
Square(9)=3^2
$3^{2=}9$ ➡ $Y^2=X$

PART III Short Answers

1. When do you say that a problem is algorithmic in nature?

We usually say that a problem is algorithmic in nature when its solution involves the construction of an algorithm. Some types of problems can be immediately recognized as algorithmic.

2. What is the format of the specification of an algorithm?

Let **P** be the required property of the inputs and **Q** the property of the desired outputs. Then the algorithm S is specified as

1. **algorithm_name (inputs)**
2. **--inputs : P**
3. **--outputs: Q**

3. What is abstraction?

A problem can involve a lot of details. Several of these details are unnecessary for solving the problem. Only a few details are essential.

Abstraction is the process of ***hiding or ignoring*** the details irrelevant to the task so as to model a problem only by its essential features.

4. How is state represented in algorithms?

- State is a basic and important abstraction.
- Computational processes have state. A computational process starts with an initial state. As actions are performed, its state changes. It ends with a final state.
- State of a process is abstracted by a set of variables in the algorithm. The state at any point of execution is simply the values of the variables at that point.

5. What is the form and meaning of assignment statement?

Assignment statement

- Variables are named boxes to store values. Assignment statement is used to store a value in a variable.
- It is written with the variable on the left side of the assignment operator and a value on the right side.

Format / Form:

variable := value

Example:

m := 2

6. What is the difference between assignment operator and equality operator?

ASSIGNMENT OPERATOR	EQUALITY OPERATOR
Assignment operator is used to assign the right hand side value into left hand side variable.	Equality operator is used to the values of both right hand side variable and left hand side variable and results in either true or false.
Example: A=5 B=10	**Example:** A==B (a=5, b=5) True A≠B (a=5, b=10) True

PART IV Explain

1. Write the specification of an algorithm hypotenuse whose inputs are the lengths of the two shorter sides of a right angled triangle, and the output is the length of the third side.

Answer:

Hypotenuse (S_1, S_2)

--Inputs: $\mathbf{S_1}$ and $\mathbf{S_2}$ are Real numbers or Integers.

--Outputs: **L** is a Real number such that $\mathbf{L^2 = S_1^{2} + S_2^{2}}$

Explanation:

S_1, S_2 – Input Length of the Real number variables

L – Length of the Third side.

2. Suppose you want to solve the quadratic equation ax2 + bx + c = 0 by an algorithm.
quadratic_solve (a, b, c)
-- inputs : ?
-- outputs: ?
You intend to use the formula and you are prepared to handle only real number roots. Write a suitable specification.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Answer:

quadratic_solve (a, b, c)

-- inputs : a, b are integers, a≠0

-- outputs: X is a real number, the quadration equation ax^2+bx+c

= 0 is satisfied by exactly two values fx, namely

$$X_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

and

$$X_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

3. Exchange the contents: Given two glasses marked A and B. Glass A is full of apple drink and glass B is full of grape drink. For exchanging the contents of glasses A and B, represent the state by suitable variables, and write the specification of the algorithm.

Answer:

Exchange (a, b)

--Inputs: a, b are integers, a≠0, b≠0

--Outputs: a, b are Integers,

```
t:=a
a:=b
b:=t
```

EXTRA QUESTIONS:

2 Marks:

1. Write the basic building blocks of construct algorithm?

We construct algorithms using basic building blocks such as,

- Data
- Variables
- Control flow
- Functions

2. What is Variable?

- Variables are named boxes for storing data. When we do operations on data, we need to store the results in variables.
- The data stored in a variable is also known as the value of the variable.

3. What are the three important control flow statements to alter the control flow depending on the state.

- sequential control flow
- alternative control flow
- iterative control flow

4. Define: State

State is a basic and important abstraction. Computational processes have state. A computational process starts with an initial state.

5. Specification abstracts:

Specification abstracts a problem by the essential variables of the problem.

6. What is state of the process?

The values of the variables in an algorithm define the state of the process. Assignment statement changes the values of variables, and hence the state.

3 Marks:

1. **What is Control flow? Explain.**
   - An algorithm is a sequence of statements. However, after executing a statement, the next statement executed need not be the next statement in the algorithm. The statement to be executed next may depend on the state of the process.
   - Thus, the order in which the statements are executed may differ from the order in which they are written in the algorithm. This order of execution of statements is known as the control flow.

2. **Define: Function.**
   - The parts of an algorithm are known as functions.
   - A function is like a sub algorithm. It takes an input, and produces an output, satisfying a desired input output relation.

3. **What are the Algorithm Design Techniques?**
   - Specification
   - Abstraction
   - Composition
   - Decomposition

4. **Explain: Composition**
   - An algorithm is composed of assignment and control flow statements.
   - A control flow statement tests a condition of the state and, depending on the value of the condition, decides the next statement to be executed.

5. **What is Decomposition?**
   - We divide the main algorithm into functions.
   - We construct each function independently of the main algorithm and other functions.
   - Finally, we construct the main algorithm using the functions. When we use the functions, it is enough to know the specification of the function.

5 Marks:

1. Explain the types of control flow statements.

There are three important control flow statements to alter the control flow depending on the state.

- In sequential control flow, a sequence of statements are executed one after another in the same order as they are written.
- In alternative control flow, a condition of the state is tested, and if the condition is true, one statement is executed; if the condition is false, an alternative statement is executed.
- In iterative control flow, a condition of the state is tested, and if the condition is true, a statement is executed. The two steps of testing the condition and executing the statement are repeated until the condition becomes false.

2. Explain in detail how you will construct an algorithm.

We construct algorithms using basic building blocks such as

- Data
- Variables
- Control flow
- Functions

1. Data

Algorithms take input data, process the data, and produce output data. Computers provide instructions to perform operations on data.

For example, there are instructions for doing arithmetic operations on numbers, such as add, subtract, multiply and divide. There are different kinds of data such as numbers and text.

2. Variables

Variables are named boxes for storing data. When we do operations on data, we need to store the results in variables. The data stored in a variable is also known as the value of the variable. We can store a value in a variable or change the value of variable, using an assignment statement.

3. Control flow

An algorithm is a sequence of statements. However, after executing a statement, the next statement executed need not be the next statement in the algorithm. The statement to be executed next may depend on the state of the process**.**

4. Functions

The parts of an algorithm are known as functions. A function is like a sub algorithm. It takes an input, and produces an output, satisfying a desired input output relation.

3. Explain how you will design algorithms.

There are a few basic principles and techniques for designing algorithms.

1. Specification:

The first step in problem solving is to state the problem precisely. A problem is specified in terms of the input given and the output desired. The specification must also state the properties of the given input, and the relation between the input and the output.

2. Abstraction:

A problem can involve a lot of details. Several of these details are unnecessary for solving the problem. Only a few details are essential. Ignoring or hiding unnecessary details and modeling an entity only by its essential properties is known as abstraction.

3. Composition:

An algorithm is composed of assignment and control flow statements. A control flow statement tests a condition of the state and, depending on the value of the condition, decides the next statement to be executed.

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UNIT II ALGORITHMIC PROBLEM SOLVING

CHAPTER 6

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EXTRA QUESTIONS:

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****

CHAPTER 7

COMPOSITION AND DECOMPOSITION

1. Suppose u, v = 10, 5 before the assignment. What are the values of u and v after the sequence of assignments?

```
1  u := v
2  v := u
```

(a) u, v = 5 ,5 **(b) u, v = 5 ,10** (c) u, v = 10 ,5 (d) u, v = 10 ,10

2. Which of the following properties is true after the assignment (at line 3?

```
1 -- i+j = 0
2 i, j := i+1, j-1
3 -- ?
```

(a) i+j >0 (b) i+j < 0 **(c) i+j =0** (d) i = j

3. If C1 is false and C2 is true, the compound statement

```
1   if C1
2    S1
3   else
4      if C2
5         S2
6      else
7         S3
```

Executes

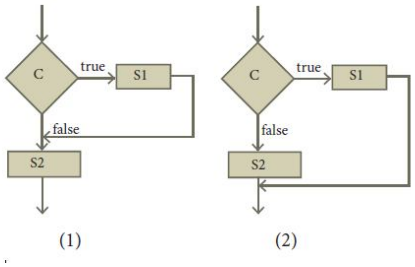
(a) S1 **(b) S2** (c) S3 (d) none

4. If C is false just before the loop, the control flows through

```
1   S1
2    while C
3       S2
4    S3
```

(a) S1 ; S3 (b) S1 ; S2 ; S3 (c)S1 ; S2 ; S2 ; S3 (d) S1 ; S2 ; S2 ; S2 ; S3

5. If C is true, S1 is executed in both the flowcharts, but S2 is executed in



(a) (1) only (b) (2) only (c) both (1) and (2) (d) neither (1) nor (2)

6. How many times the loop is iterated?

```
i := 0
  while i ≠ 5
        i := i + 1
```

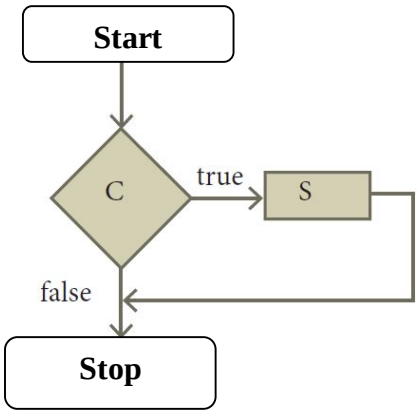
(a) 4 **(b) 5** (c) 6 (d) 0

Part II

1. Distinguish between a condition and a statement.

CONDITION	STATEMENT
Condition is the Checking process of either True / False.	Processing the condition
A condition is contained in a diamond shaped box with two outgoing arrows, labeled true and false.	A statement is contained in a rectangular box with a single outgoing arrow, which points to the box to be executed next.
EX: a>b	**EX:** Print a (a-is a Biggest value)

2. Draw a flowchart for conditional statement.



3. Both conditional statement and iterative statement have a condition and a statement. How do they differ?

- Conditional statement is executed only if the condition is true. Otherwise nothing is done.
- Iterative statement repeatedly evaluates a condition and executes a statement as long as the condition is true.

4. What is the difference between an algorithm and a program?

ALGORITHM	PROGRAM
An algorithm is a self-contained step-by-step set of operations to be performed to solve specific problems.	A Computer program is a sequence of instructions that complete the rules of a specific programming language, written to perform a specified task with a computer.
Method / Procedure of a program	Computer Coding / Program

5. Why is function an abstraction?

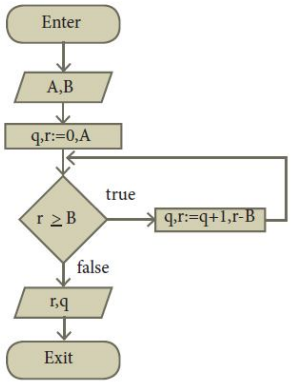
- The parts of an algorithm are known as functions. A function is like a sub algorithm.
- It takes an input, and produces an output, satisfying a desired input output relation.

6. How do we refine a statement?

In refinement, starting at a high level, each statement is repeatedly expanded into more detailed statements in the subsequent levels.

Part III

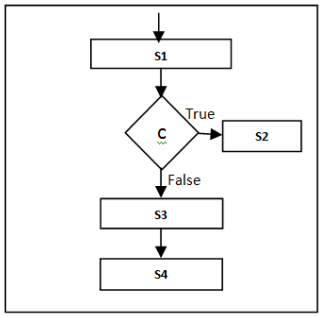
1. For the given two flowcharts write the pseudo code.



1. Enter A, B
2. Initialize Q = 0, r = A
3. if r ≥ B, then do Q = Q+1; r = r – B else r, q
4. Exit

2. If C is false in line 2, trace the control flow in this algorithm.

1. ***S1***
2. ***- - C is false***
3. ***if C***
4. ***S2***
5. ***else***
6. ***S3***
7. ***S4***

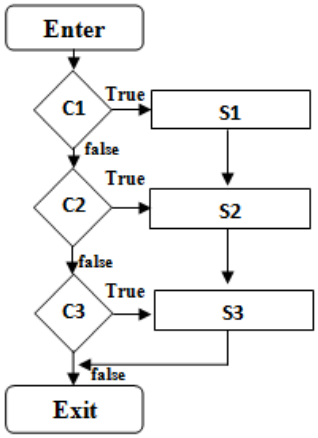


Answer: **S_1; S_3; S_4**

3. What is case analysis?

- Alternative statement analyses the problem into two cases. Case analysis statement generalizes it to multiple cases.
- Case analysis splits the problem into an exhaustive set of disjoint cases.

4. Draw a flowchart for -3case analysis using alternative statements.



5. Define a function to double a number in two different ways: (1) n + n, (2) 2 x n

(1) n + n

- - Input: **n** is a real number or an integer, **n>0**
- - Output: **y** is a real number or an integer such that **y = n + n**

(2) 2 x n

- - Input: **n** is a real number or an integer, **n>0**
- - Output: **y** is a real number or an integer such that **y = 2** x **n**

Example:

n=3 (assume)

1. n+n= 3+3= **6**
2. 2xn=2x3= **6**

(Double a Value in above 2 Methods)

Part IV

1. Exchange the contents: Given two glasses marked A and B. Glass A is full of apple drink and glass B is full of grape drink. Write the specification for exchanging the contents of glasses A and B, and write a sequence of assignments to satisfy the specification.

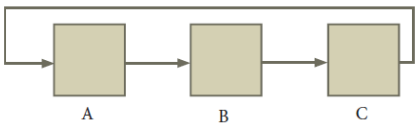
Solution:

Exchange (A, B)

-- inputs : A, B are real number or an integers, A≠0, B≠0

-- outputs : t is an integer such that t :=A; A:=B; B:=t.

2. Circulate the contents: Write the specification and construct an algorithm to circulate the contents of the variables A, B and C as shown below: The arrows indicate that B gets the value of A, C gets the value of B and A gets the value of C.



Solution:

Circulate (A, B, C)

--Inputs : A, B, C are real numbers or an integers, A≠0, B≠0, C≠0

--Outputs : t_1:=B; t_2:=C such that B:=A; C:=t_1; A:=t_2;

3. Decanting problem. You are given three bottles of capacities 5 ,8, and 3 litres. The 8L bottle is filled with oil, while the other two are empty. Divide the oil in 8L bottle into two equal quantities. Represent the state of the process by appropriate variables. What are the initial and final states of the process? Model the decanting of oil from one bottle to another by assignment. Write a sequence of assignments to achieve the final state.

Solution:

1. A := 8, B := 0, C := 0
2. E, F, T := A, B, C
3. F := E − 3
4. T := F − 3
5. E := E + T
6. T := F
   F := F − 2
7. F := E − 1
8. F := F − 1
   T := T + 1
9. E := E + T
   T := T − 3

	E	F	T
1.	8,	0,	0
2.	3,	5,	0
3.	3,	2,	3
4.	3+3		
	6	2	0
	E	F	T
	6,	2,	0
	1,	5,	2
	1,	4,	3
	4,	4,	0

4. Trace the step-by-step execution of the algorithm for factorial (4).

factorial(n)
-- inputs : n is an integer , n ≥ 0
-- outputs : f = n!
f, i := 1 ,1
while i ≤ n
f, i := f × i, i+1

Solution:

Factorial (4)
i = 1, f = 1;
= f = 1 x 1
= f = 1 x 2
= f = 2 x 3
= f = 6

EXTRA QUESTIONS:

1. Define: Algorithm.

An algorithm expressed in a programming language is called a program.

Ex: C, C++ and Python

2. What is Pseudo code?

- Pseudo code is a mix of programming language.
- It uses the same building blocks as programs.
- Condition based statement execution process.
- Pseudo code is the most widely used notation to represent algorithms.

3. Define : Flowcharts

Flowchart is a diagrammatic notation for representing algorithms. They show the control flow of algorithms using diagrams in a visual manner. In flowcharts, rectangular boxes represent simple statements, diamond-shaped boxes represent conditions, and arrows describe how the control flows during the execution of the algorithm.

4. What are three important control flow statements?

- Sequential
- Alternative
- Iterative

5. What is Alternative statement?

A condition is a phrase that describes a test of the state. If C is a condition and both S1 and S2 are statements, then

if C
S1
else
S2

is a statement, called an alternative statement.

6. Define: Iterative statement

An iterative process executes the same action repeatedly, subject to a condition C. If C is a condition and S is a statement, then

while C
S

is a statement, called an iterative statement.

7. Explain: Composition and Decomposition

Composition

- A statement is a phrase that commands the computer to do an action.
- We have already seen assignment statement.
- It is a simple statement, used to change the values of variables.

Decomposition

- Problem decomposition is one of the elementary problem-solving techniques.
- It involves breaking down a problem into smaller and more manageable problems, and combining the solutions of the smaller problems to solve the original problem.

****

CHAPTER 8

ITERATION AND RECURSION

1. A loop invariant need not be true

   (a) at the start of the loop. (b) at the start of each iteration
   (c) at the end of each iteration **(d) at the start of the algorithm**

2. We wish to cover a chessboard with ▭ dominoes, the number of black squares and the number of white squares covered by dominoes, respectively, placing a domino can be modeled by

   (a) b := b + 2 (b) w := w + 2 (c) b, w := b+1, w+1 **(d) b := w**

3. If m x a + n x b is an invariant for the assignment a, b : = a + 8, b + 7, the values of m and n are

   (a) m = 8, n = 7 **(b) m = 7, n = -8** (c) m = 7, n = 8 (d) m = 8, n = -7

4. Which of the following is not an invariant of the assignment?
   m, n := m+2, n+3

   (a) m mod 2 (b) n mod 3 (c) 3 X m - 2 X n **(d) 2 X m - 3 X n**

5. If Fibonacci number is defined recursively as

$$F(n)=\begin{cases}0 & n=0\\ 1 & n=1\\ F(n-1)+F(n-2) & \text{otherwise}\end{cases}$$

   to evaluate F(4), how many times F() is applied?

   (a) 3 (b) 4 (c) 8 (d) 9

6. Using this recursive definition

$$a^n=\begin{cases}1 & \text{if } n=0\\ a \times a^{n-1} & \text{otherwise}\end{cases}$$

   how many multiplications are needed to calculate a10?

   (a) 11 (b) 10 **(c) 9** d) 8

Part II

1. What is an invariant?

- An expression involving variables, which remains unchanged by an assignment to one of these variables, is called an invariant of the assignment.
- An expression of the variables has the same value before and after an assignment, it is an invariant of the assignment.

2. Define a loop invariant.

- An invariant the loop body is known as a loop invariant.
- When the loop ends, the loop invariant has the same value.

3. Does testing the loop condition affect the loop invariant? Why?

Yes, it affects. When a loop ends, the loop invariant is true. In addition, the termination condition is also true.

4. What is the relationship between loop invariant, loop condition and the input output recursively?

LOOP INVARIANT	LOOP CONDITION
An invariant for the loop body is known as a loop invariant.	An loop condition that produce the result based particular condition.
A loop invariant is a condition that is necessarily true immediately before and immediately after each iteration of a loop.	A loop invariant is some condition that holds for every iteration of the loop.

5. What is recursive problem solving?

Each solver should test the size of the input. If the size is small enough, the solver should output the solution to the problem directly. If the size is not small enough, the solver should reduce the size of the input and call a sub-solver to solve the problem with the reduced input.

6. Define factorial of a natural number recursively.

"The **factorial** of a **number** is the product of all the integers from 1 to that **number**."

For example, the **factorial** of 4 (denoted as 4!) is 1*2*3*4= 24.

Factorial (4)
i = 1, f = 1;
= f = 1 x 1= 1
= f = 1 x 2= 2
= f = 2 x 3= 6
= f = 6 x 4= 24

7. What is Iteration?

In iteration, the loop body is repeatedly executed as long as the loop condition is true. Each time the loop body is executed, the variables are updated. However, there is also a property of the variables which remains

8. Define :Recursion

Recursion is another algorithm design technique, closely related to iteration, but more powerful.Using recursion, we solve a problem with a given input, by solving the same problem with a part of the input, and constructing a solution to the original problem from the solution to the partial input.

9. Write the recursive process with solvers for calculating power(2, 5)

power (2,5)

= 2 × power (2,4)
= 2 × 2 × power(2,3)
= 2 × 2 × 2 × power(2, 2)
= 2 × 2 × 2 × 2 × power (2,1)
= 2 × 2 × 2 × 2 × 2 × power (2,0)
= 2 × 2 × 2 × 2 × 2 × 1
= 2 × 2 × 2 × 2 × 2
= 2 × 2 × 2 × 4
= 2 × 2 × 8
= 2 × 16
= 32

Part III

1. **There are 7 tumblers on a table, all standing upside down. You are allowed to turn any 2 tumblers simultaneously in one move. Is it possible to reach a situation when all the tumblers are right side up? (Hint: The parity of the number of upside down tumblers is invariant.)**

Solution:

This Tumbler problem Result (Output) is needs to be turn all tumblers UP.

[u – no of tumblers]

1. Two tumblers can be both upside up. After turning u – increments by 2.
2. Two tumblers are both upside down. After turning u – decrements by 2.
3. One is upside down and another is proper.
   U – is not changed.

So, after every step.

U – is either incremented by 2 or decremented 2 or kept the same.

We can ignore the condition of u – not beging changed.

Now, u := u + 2 (or) u := u – 2

The invariant in this is that parity of u – is not changing. i.e; if u – is even at the beginning, its not changed at all and similary if u – is odd.

That invariant is the initial state that needs to be defined. The final requirement is that u-needs to become zero. This is possible only when the parity of u-is zero, u is even.

The final solution is if the number of tumblers that are upside down is even it is possible to get to a state by repeating the process for all the tumblers that are upside up.

2. **A knockout tournament is a series of games. Two players compete in each game; the loser is knocked out (i.e. does not play any more), the winner carries on. The winner of the tournament is the player that is left after all other players have been knocked out.**
Suppose there are 1234 players in a tournament. How many games are played before the tournament winner is decided?

Solution:

Knockout tournament

1 2 3 4 initial number of players

each round a player is laid off thus

n. number of remaining players.

r - total number of rounds

k - number of rounds held assuming *n* is even

n, r : = n - k, r + k

n + r is invariant

winners is decided when n = 1

initially n + r = 1234, therefore r - 1233! (makes sense = 1233 rounds will eliminate 1233 players).

3. **King Vikramaditya has two magic swords. With one, he can cut off 19 heads of a dragon, but after that the dragon grows 13 heads. With the other sword, he can cut off 7 heads, but 22 new heads grow. If all heads are cut off, the dragon dies. If the dragon has originally 1000 heads, can it ever die? (Hint:The number of heads mod 3 is invariant.)**

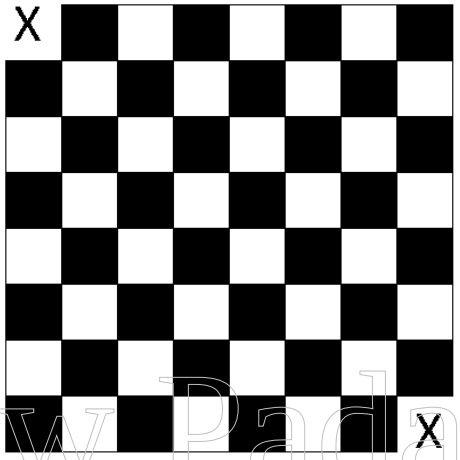
Solution:

- If it is 1000 heads:
- You can now cut off 981 heads (multiple of 3) then cut the last 19 and the dragon will die.
- The 13 heads won't come back after the dragon is killed. Unless it's a magic dragon.

Part IV

1. Assume an 8 × 8 chessboard with the usual coloring. "Recoloring" operation changes the color of all squares of a row or a column. You can recolor re-peatedly. The goal is to attain just one black square. Show that you cannot achieve the goal. (Hint: If a row or column has b black squares, it changes by (|8 - b) - b|).

Solution:



2. Power can also be defined recursively as

$$a^n = \begin{cases} 1 & \text{if } n = 0 \\ a \times a^{n-1} & \text{if } n \text{ is odd} \\ a^{n/2} \times a^{n/2} & \text{if } n \text{ is even} \end{cases}$$

Construct a recursive algorithm using this definition. How many multiplications are needed to calculate a10?

Solution:

Power (a, n)

Input n - is am integer, n ≥0

-- Output : a^n

if n = 0 – base case

1

else

if(n%2! = 0) – recursion step in case of odd

a x power(a, n – 1)

else

a x power(a, n/2) --- recursion step in case of even.

3. **A single-square-covered board is a board of 2n x 2n squares in which one square is covered with a single square tile. Show that it is possible to cover the this board with triominoes without overlap.**

Solution:

2^2n – 1

To identify the 2-by-2 square containing the missing square; and we place our first L-shaped piece to finish covering that 2-by-2 square:

```
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 a a
0 0 0 0 0 0 X a
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 0
```

ABBREVIATIONS:

1. **ALU – Arithmetic Logic Unit**
2. **CPU – Central Processing Unit**
3. **CU – Control Unit**
4. **IC – Integrated Circuits**
5. **GUI - Graphical User Interface**
6. **VLSI - Very Large Scale Integrated Circuits.**
7. **ULSI – Ultra Large Scale Integration**
8. **ENIAC - Electronic Numerical Integrator And Calculator**
9. **NLP - Natural Language Processing**
10. **AI - Artificial Intelligence**
11. **RAM – Random Access Memory**
12. **ROM – Read Only Memory**
13. **QR – Quick Response**
14. **OCR – Optical Character Reader**
15. **CCD - Charge Coupled Device**
16. **CRT - Cathode Ray Tube**
17. **LCD - Liquid Crystal Display**
18. **LED - Light Emitting Diode**
19. **VGA - Video Graphics Array**
20. **CPS - Character Per Second**
21. **PIXEL – Picture Element**
22. **CPS - Character Per Second**
23. **DPI - Dots Per Inch**
24. **PPM - Page Per Minute**
25. **POST - Power on Self Test**

26. **BIOS - Basic Input Output System**
27. **OS - Operating system**
28. **BIT - Binary Digits**
29. **KB - KiloByte**
30. **MB - MegaByte**
31. **GB - GigaByte**
32. **TB - TeraByte**
33. **EBCDIC – Extended Binary Coded Decimal Interchange Code**
34. **ASCII – American Standard Code for Information Interchange**
35. **ISCII - Indian Standard Code for Information Interchange.**
36. **MSB - Most Significant Bit**
37. **LSB - Least Significant Bit**
38. **BCD – Binary Coded Decimal**
39. **HZ – Hertz**
40. **MHz - Mega Hertz**
41. **GHz - Giga Hertz**
42. **Memory Data Register**
43. **Memory Address Register**
44. **PC – Program counter / Personal Computer**
45. **R / W – Read and Write**
46. **RISE-Reduced Instruction Set Computers**
47. **CISE-Complex Instruction Set Computers**
48. **DRAM - Dynamic RAM**
49. **SRAM - Static RAM**
50. **Programmable Read Only Memory**
51. **EPROM - Erasable Programmable Read Only Memory**
52. **EEPROM - Electrically Erasable Programmable Read Only Memory**
53. **CD - Compact Disc**
54. **DVD - Digital Versatile Disc or Digital Video Disc)**
55. **NTFS - Next Generation File System.**
56. **PDA - Personal Digital Assistants**
57. **USB - Universal Serial Bus**
58. **VGA – Video Graphical Adapter**
59. **HDMI - High Definition Multimedia Interface**
60. **BOSS - Bharat Operating System Solution.**
61. **MS-DOS - Micro Soft Disk Operating System.**
62. **GUI - Graphical User Interface.**
63. **CUI - Command User Interface.**
64. **FIFO - First In First Out.**
65. **SJF - Shortest Job First.**
66. **RR - Round Robin**
67. **NRCFOSS - National Resource Center for Free / Open Source Software.**
68. **FAT - File Allocated Table.**
69. **UI - User Interface**
70. **iOS - iPhone OS)**

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GO GREEN PROJECT IN SASTRA

A graceful view of our school garden.

1st yield from our vegetable garden

Students harvesting vegetables in the garden