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UNIT-1

FUNDAMENTALS OF COMPUTER AND WORKING WITH A TYPICAL OPERATING SYSTEMS (WINDOWS & LINUX)

CHAPTER 1 INTRODUCTION TO COMPUTERS

CHAPTER SNAPSHOT

- * 1.1. Introduction to Computers
- * 1.2. Generations of Computers
- * 1.3. Sixth Generation Computing
- * 1.4. Data and Information
- * 1.5. Components of a Computer
 - 1.5.1. Input Unit
 - 1.5.2. Central Processing Unit
 - 1.5.3. Output Unit
 - 1.5.4. Memory Unit
 - 1.5.5. Input and Output devices
- * 1.6. Booting of Computer

EVALUATION

SECTION - A

CHOOSE THE CORRECT ANSWER

1. First generation computers used [HY. 2019]
(a) Vacuum tubes (b) Transistors
(c) Integrated circuits (d) Microprocessors
[Ans. (a) Vacuum tubes]
2. Name the volatile memory
(a) ROM (b) PROM
(c) RAM (d) EPROM
[Ans. (c) RAM]
3. Identify the output device [Mar. 2020]
(a) Keyboard (b) Memory
(c) Monitor (d) Mouse
[Ans. (c) Monitor]
4. Identify the input device [FMT 2018]
(a) Printer (b) Mouse
(c) Plotter (d) Projector
[Ans. (b) Mouse]
5. Output device is used for printing building plan.
(a) Thermal printer (b) Plotter
(c) Dot matrix (d) inkjet printer
[Ans. (b) Plotter]
6. Which one of the following is used to in ATM machines
(a) Touch Screen (b) Speaker
(c) Monitor (d) Printer
[Ans. (a) Touch Screen]
7. When a system restarts which type of booting is used.
(a) Warm booting (b) Cold booting
(c) Touch boot (d) Real boot.
[Ans. (a) Warm booting]
8. Expand POST [FMT 2018; Sep. 2020]
(a) Post on self Test
(b) Power on Software Test
(c) Power on Self Test
(d) Power on Self Text
[Ans. (c) Power on Self Test]
9. Which one of the following is the main memory?
(a) ROM (b) RAM
(c) Flash drive (d) Hard disk
[Ans. (b) RAM]
10. Which generation of computer used IC's?
(a) First (b) Second (c) Third (d) Fourth
[Ans. (c) Third]

SECTION - B

VERY SHORT ANSWERS

1. What is a computer? [Sep. 2021]

Ans. (i) A computer is an electronic device that manipulates information, or data. It has the ability to store, retrieve, and process data.

(ii) Computer works faster than human being and given the values more accuracy and reliable

2. Distinguish between data and information.

[FMT 2018]

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.
(Eg) 134, 16, 'Kavitha', 'C'	(Eg) Kavitha is 16 years old.

3. What are the components of a CPU? [Sep. 2020]

Ans. The CPU has three components which are Control unit, Arithmetic and Logic unit (ALU) and Memory unit.

4. What is the function of an ALU? [Mar. 2020]

Ans. (i) The ALU performs arithmetic operations.

(ii) The result of an operation is stored in internal memory of CPU.

(iii) The logical operations of ALU promote the decision making ability of a computer.

5. Write the functions of control unit.

Ans. 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?

Ans. 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.	An output unit is any hardware component that conveys information to users in an understandable form.
Example : Keyboard, mouse etc.	Example : Monitor, Printer etc.

8. Distinguish Primary and Secondary memory.

Primary Memory	Secondary Memory
It is used to temporarily store the programs and data when the instructions are ready to execute.	It is used to store the data permanently.
It is volatile, the content is lost when the power supply is switched off. Eg. RAM.	It is non-volatile, the content is available even after the power supply is switched off. Eg. ROM, CD-ROM, DVD ROM.

SECTION - C

SHORT ANSWERS

1. What are the characteristics of a computer?

Ans. (i) Computer is the powerful machine.

(ii) It can perform large number of tasks.

(iii) 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.

Ans. The various applications of computers are,

(i) Business **(ii)** Education

(iii) Marketing **(iv)** Banking

(v) Insurance **(vi)** Communication

(vii) Health care

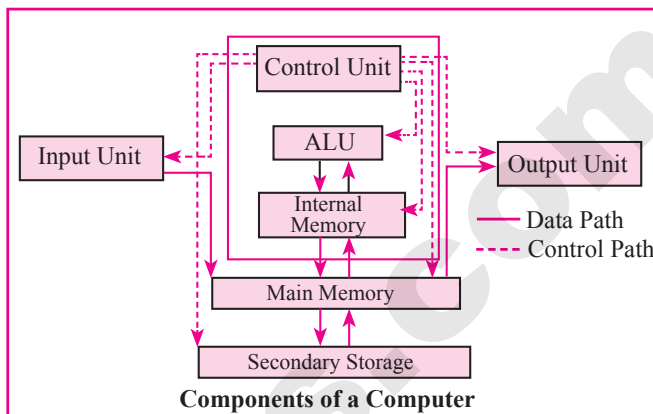
(viii) Engineering - Robotics, Nano technology, Bio Engineering

3. What is an input device? Give two examples.

Ans. 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.

- (iii) **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.
- (iv) **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.
- (v) **Output Unit** : An output unit is any hardware component that conveys information to users in an understandable form. Example : Monitor, Printer etc.
- (vi) **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 when the instructions are ready to execute. The secondary memory is used to store the data permanently. The Primary Memory is volatile, that is, the content is lost when the power supply is switched off. The Random Access Memory (RAM) is an example of a main memory. The Secondary memory is non volatile, that is, the content is available even after the power supply is switched off. Hard disk, CD-ROM and DVD ROM are examples of secondary memory.



2. Discuss the various generations of computers.

[QY. 2018; June 2019; Mar. 2020; Sep. 2021]

Ans.	S.No	Generation	Period	Main Component used	Merits/ Demerits
	1	First Generation	1940-1956	Vacuum tubes	<ul style="list-style-type: none"> ❑ Big in size ❑ Consumed more power ❑ Malfunction due to overheat ❑ Machine Language was used
First Generation Computer - ENIAC, EDVAC, UNIVAC 1 ENIAC weighed about 27 tons, size 8 feet × 100 feet × 3 feet and consumed around 150 watts of power					
	2.	Second Generation	1956-1964	Transistors	<ul style="list-style-type: none"> ❑ 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.
Second Generation Computers - IBM 1401, IBM 1620, UNIVAC 1108					
	3.	Third Generation	1964-1971	Integrated Circuits (IC)	<ul style="list-style-type: none"> ❑ Computers were smaller, faster and more reliable ❑ Consumed less power. ❑ High Level Languages were used
Third Generation Computers - IBM 360 series, Honeywell 6000 series					

GOVERNMENT EXAM QUESTIONS AND ANSWERS

1 MARK

1. How many types of Booting process in system ?
 (a) 3 (b) 2 [QY. 2018]
 (c) 5 (d) 4 [Ans. (b) 2]
2. Which of the following is a Third generation computers?
 (a) Vacuum tubes (b) Transistor [Govt.MQP-2018]
 (c) Integrated Circuits (d) Microprocessor
 [Ans. (b) Transistor]
3. Which one of the following is Biometric Device?
 (a) Scanner (b) Fingerprint Scanner [QY. 2018]
 (c) Light Pen (d) Mouse
 [Ans. (b) Fingerprint Scanner]
4. Identify the Input device [FMT 2018]
 (a) Printer (b) Mouse
 (c) Plotter (d) Projector
 [Ans. (b) Mouse]
5. Expansion of GUI is [QY. 2018]
 (a) Graphics User Interface
 (b) Graphical User Information
 (c) Geographical User Information
 (d) Graphical User Interface
 [Ans. (d) Graphical User Interface]
6. Which generation of computer used Transistors?
 (a) First (b) Second [June 2019]
 (c) Third (d) Fourth
 [Ans. (b) Second]
7. Plotter is a _____ device. [QY. 2019]
 (a) storage (b) input
 (c) output (d) memory
 [Ans. (c) output]
8. Line printers are capable of printing much more than _____ lines per minute. [QY. 2019]
 (a) 1000 (b) 1200 (c) 1500 (d) 1300
 [Ans. (a) 1000]
9. Which Generations of computer used ULSI?
 (a) Third (b) Fourth [HY. 2018]
 (c) Fifth (d) Sixth
 [Ans. (c) Fifth]

10. Expand ULSI. [Sep. 2021]

- (a) Ultra Large Scale Information
- (b) Ultra Low Scale Integration
- (c) Ultra Low Software Integration
- (d) Ultra Large Scale Integration

[Ans. (d) Ultra Large Scale Integration]

2 MARKS

1. Expand (i)BIOS (ii)ENIAC (iii)RAM (iv)ALU

[Govt.MQP-2018]

- Ans. (i)** BIOS - Basic Input Output System.
(ii) ENIAC - Electronic Numerical Integrator And Calculator.
(iii) RAM - Random Access Memory
(iv) ALU - Arithmetic and Logic unit

2. Give examples for Impact and Non impact printers. [FMT 2018]

- Ans. Impact:** Dot Matrix printer and line dot matrix printer.
Non - Impact : Laser printer and Inkjet printer.

3. Write short note on registers. [FMT 2018]

- Ans.** Registers are the high-speed temporary storage locations in the CPU. Hence, their contents can be handled much faster than the contents of memory.

4. Write Demerits of Artificial Intelligence. [QY. 2018]

- Ans. (i)** Machines need repairing and maintenance which need plenty of cost.
(ii) The increasing number of machines leading to unemployment and job security issues.

5. Write notes on fifth generation computers.

- Ans. (i)** Parallel Processing [QY. 2019]
(ii) Super conductors
(iii) Computers size was drastically reduced.
(iv) Can recognise Images and Graphics
(v) Introduction of Artificial Intelligence and Expert Systems
(vi) Able to solve high complex problems including decision making and logical reasoning

3 MARKS

1. Write the mechanism of laser mouse. [FMT 2018]

- Ans. (i)** Measures the motion and acceleration of pointer.
(ii) Laser mouse uses laser light.
(iii) Laser mouse is highly sensitive and able to work on any hard surface.

2. Write the sequence of steps in boot process? (or) Explain the types of booting in computer.

[Govt.MQP, FMT-2018]

Ans. Booting process is of two types.

- (i) Cold Booting (ii) Warm Booting [HY. 2019]

(i) 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.

(ii) Warm Booting: 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. Differentiate optical mouse and laser mouse.

3. Write notes on multimedia projector.

[QY. 2019]

Ans. (i) Multimedia projectors are used to produce computer output on a big screen.

(ii) These are used to display presentations in meeting halls or in classrooms.

4. How Finger Print Scanner Working?

[QY. 2018]

Ans. Finger print Scanner: Fingerprint Scanners is a fingerprint recognition device used for computer security, equipped with the fingerprint recognition feature that uses biometric technology. Fingerprint Reader / Scanner is very safe and convenient device for security instead of password, that is vulnerable to fraud and is hard to remember.



1. Short answer on the following:

[QY. 2018]

- a) Data b) Hardware c) Natural Language Processing
d) Types of Memory e) Bit

Ans. (a) 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.

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

(c) Natural Language Processing : Natural Language Processing is a method used in artificial intelligence to process and derive meaning from the human language.

(d) Types of Memory : The memory unit is of two types - Primary memory, Secondary memory.

(e) Bit : Machine language is a collection of binary digits or bits that the computer reads and interprets.

2. Differentiate Impact Printers and Non-Impact Printers.

[QY. 2019]

Ans.	S.No	Impact Printers	Non-Impact Printers
	1.	It uses ribbons / carbon papers to leave the impressions on the paper.	It use ink cartridges and the impressions appear on the paper with the flow of ink.
	2.	The quality of printing is a draft quality.	The quality of printing is a high quality.
	3.	Striking Mechanism used to produce output.	No striking mechanism used to produce output.
	4.	Faster speeds around 250 words per second,	Slower speeds around 1 page per seconds.
	5.	Example : Dot Matrix printers and line matrix printers	Example : Laser printers and Inkjet printers.

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWERS 1 MARK

I. CHOOSE THE CORRECT OPTIONS FOR THE BELOW QUESTIONS.

1. Which of the following led us today to extremely high speed calculating device?

- (a) Laptop (b) Tabulating Machine
(c) Abacus (d) ENIAC

[Ans. (c) Abacus]

2. In which year the concept of the analytical engine was invented?

- (a) 1837 (b) 1910 (c) 1991 (d) 1836

[Ans. (a) 1837]

3. Which of the following period the first generation computers belongs?

- (a) 1956-1963 (b) 1940-1956
(c) 1964-1971 (d) 1980-1990

[Ans. (b) 1940-1956]

4. Which of the following is not a first generation computers?

- (a) ENIAC (b) EDVAC
(c) UNIVAC 1 (d) IBM1401

[Ans. (d) IBM1401]

5. Which component used in third generation computers?

- (a) Vacuum Tubes (b) Transistors
(c) IC (d) Microprocessor

[Ans. (c) IC]

6. In which generation, the Voice Recognition software developed?

- (a) Sixth (b) Fourth (c) Third (d) Second

[Ans. (a) Sixth]

7. Which generation gave a start to parallel computing?

- (a) fourth (b) fifth (c) sixth (d) seventh

[Ans. (c) sixth]

8. Which of the following is not a form of parallel computing?

- (a) bit level (b) instruction level
(c) task parallelism (d) Robotics

[Ans. (d) Robotics]

9. Which of the following holds the data and instructions during the processing?

- (a) Input unit (b) output unit
(c) Memory unit (d) Software

[Ans. (c) Memory unit]

10. Which unit does the processing of data?

- (a) CPU (b) Registers
(c) Input unit (d) Output unit

[Ans. (a) CPU]

11. Which of the following is the heart of the computer?

- (a) CPU (b) HDD (c) SDD (d) ANN

[Ans. (a) CPU]

12. Which of the following operations of ALU promote decision-making ability of a computer?

- (a) Logical (b) Relational
(c) Arithmetic (d) Binary

[Ans. (a) Logical]

13. Which of the following is not a non volatile memory?

- (a) ROM (b) Hard disk
(c) CD-ROM (d) RAM

[Ans. (d) RAM]

14. Who invented the computer mouse?

- (a) Douglas Engelbart (b) Bill English
(c) Apple Lisa (d) Henry Babbage

[Ans. (a) Douglas Engelbart]

15. Which device works like a xerox machine?

- (a) Retinal scanner (b) OCR
(c) OMR (d) Scanner

[Ans. (d) Scanner]

16. Which device is very safe and convenient for security instead of password?

- (a) Scanner (b) Fingerprint Scanner
(c) Track ball (d) Retinal Scanner

[Ans. (b) Fingerprint Scanner]

17. Which of the following device uses CCD Electronic chip?

- (a) OCR (b) BCR
(c) Voice Input Systems (d) Digital Camera

[Ans. (d) Digital Camera]

18. In which device the keys are arranged in a cluster?

- (a) Keyboard
- (b) Keyer
- (c) Barcode Reader
- (d) Touch Screen

[Ans. (b) Keyer]

19. Who was the inventor of the electronic digital computer?

- (a) John Vincent Atanasoft
- (b) J. Presper Eckert
- (c) John Mauchly
- (d) Charles babbage

[Ans. (a) John Vincent Atanasoft]

20. Which company developed first digital computer?

- (a) Atanasoft Berry Computer
- (b) AT & T bell
- (c) IBM
- (d) Microsoft

[Ans. (a) Atanasoft Berry Computer]

21. Which of the following are the computer systems inspired by the biological neural networks?

- (a) NLP
- (b) IBM
- (c) Robotics
- (d) ANN [Ans. (d) ANN]

22. Which of the following has become the dominant paradigm in computer architecture?

- (a) Parallel computing
- (b) parallel processing
- (c) Multi tasking
- (d) Multi processing [Ans. (a) Parallel computing]

23. Which of the following concerned with the interactions between computers and human language?

- (a) Artificial Neurons
- (b) Neural network
- (c) Artificial intelligence
- (d) Natural language processing

[Ans. (c) Artificial intelligence]

24. Which of the following is the logical machine which interprets and executes software instructions?

- (a) CPU
- (b) ALU
- (c) Control Unit
- (d) Memory Unit

[Ans. (a) CPU]

25. How many classification of memories in memory unit?

- (a) 2
- (b) 3
- (c) 4
- (d) more than 2

[Ans. (a) 2]

26. How many types of Keyboards used to input the data?

- (a) 3
- (b) 2
- (c) 4
- (d) 5

[Ans. (a) 3]

27. How many types of pointing device are there?

- (a) 2
- (b) 3
- (c) 1
- (d) Many

[Ans. (a) 2]

28. Which mouse has as many as 12 buttons?

- (a) Laser
- (b) Optical
- (c) Mechanical
- (d) Both a and b

[Ans. (a) Laser]

29. Which printer do not use striking mechanism for printer?

- (a) Inkjet
- (b) Laser
- (c) Thermal
- (d) All of these

[Ans. (d) All of these]

30. Which device is used to produce computer output on a big screen?

- (a) Monitor
- (b) LED
- (c) Projector
- (d) Monochrome Monitor

[Ans. (c) Projector]

31. Which of the following is the diagnostic testing sequence of the computer hardware?

- (a) POST
- (b) BIOS
- (c) MAR
- (d) MBR

[Ans. (a) POST]

32. Which of the following issue an error message if any computer hardware not defected?

- (a) BIOS
- (b) BUS
- (c) RAM
- (d) POST

[Ans. (a) BIOS]

33. Which device produce graphical output on papers?

- (a) Scanner
- (b) Touch Screen
- (c) Plotter
- (d) Track ball

[Ans. (c) Plotter]

34. Which code checks partition table for an active partition in a computer?

- (a) MBR
- (b) Marse
- (c) Binary
- (d) Object

[Ans. (a) MBR]

- 2. The component used in second generation computers is**
 (a) Transistors (b) ICs
 (c) Vacuum tubes (d) Microprocessors
[Ans. (a) Transistors]
- 3. The Second generation computers belongs to period**
 (a) 1940-1956 (b) 1956-1964
 (c) 1980-1990 (d) 1964-1971
[Ans. (b) 1956-1964]
- 4. The fourth generation belongs to**
 (a) 1940-1956 (b) 1971-1980
 (c) 1964-1971 (d) 1980-1990
[Ans. (b) 1971-1980]
- 5. The component used in fourth generation computers are**
 (a) ICS (b) Transistors
 (c) VLSI (d) Vacuum tube
[Ans. (c) VLSI]
- 6. Laptops, Notebook, Tablets are belongs to generation computers.**
 (a) First (b) Second (c) Third (d) Fourth
[Ans. (d) Fourth]
- 7. The fifth generation computers belongs to**
 (a) 1971-1980 (b) 1980- till date
 (c) 1964-1971 (d) 1940-1956
[Ans. (b) 1980-till date]
- 8. Name the software introduced in fifth generation computers**
 (a) Artificial Neural Networks
 (b) Artificial Intelligence
 (c) Robotics
 (d) Natural language processing
[Ans. (b) Artificial Intelligence]
- 9. Robotics developed in generation.**
 (a) Third (b) Fourth (c) Fifth (d) Sixth
[Ans. (d) Sixth]
- 10. ENIAC was invented by**
 (a) John Vincent
 (b) Cliff Berry
 (c) Presper Eckert, John Mauchly
 (d) Earl R Johnson and Atanasoff
[Ans. (c) Presper Eckert, John Mauchly]
- 11. Expand NLP**
 (a) National Language Problem
 (b) Natural Language Processing
 (c) Network Language Program
 (d) Network Local Processing
[Ans. (b) Natural Language Processing]
- 12. NLP is a component of**
 (a) Expert systems
 (b) Robotics
 (c) Parallel computing
 (d) Artificial Intelligence
[Ans. (d) Artificial Intelligence]
- 13. Every task given to a computer-follows a(n) cycle.**
 (a) BPO (b) IPO
 (c) ANN (d) NLP **[Ans. (b) IPO]**
- 14. Expansion of CPU is**
 (a) Control processing unit
 (b) Central processor unique
 (c) Central processing unit
 (d) Control processor unit
[Ans. (c) Central processing unit]
- 15. Expansion of ALU is**
 (a) Arithmetic Logical Unit
 (b) Accumulator Logical Unit
 (c) Arithmetic Language Unit
 (d) None of these
[Ans. (a) Arithmetic Logical Unit]
- 16. The memory unit is of kinds.**
 (a) 3 (b) 4 (c) 2 (d) 5
[Ans. (c) 2]
- 17. Optical Mouse invented in the year**
 (a) 1968 (b) 1973 (c) 1988 (d) 1981
[Ans. (c) 1988]
- 18. Laser mouse has as many as buttons.**
 (a) 10 (b) 11 (c) 12 (d) 3
[Ans. (c) 12]
- 19. Expansion of CCD is**
 (a) Coupled Changed Device
 (b) Changed Coupled Device
 (c) Changed Couple Device
 (d) Camera changed Divider
[Ans. (b) Changed Coupled Device]

IV. PICK THE ODD ONE OUT.

1. (a) Keyboard (b) Mouse
(c) Track Ball (d) Monitor

[Ans. (d) Monitor]

Reason : Monitor is the most commonly used output device to display the information. Other three are examples of input device.

2. (a) Mechanical Mouse (b) Laser Mouse
(c) Plotter (d) Optical Mouse

[Ans. (c) Plotter]

Reason : Plotter is an output device that is used to produce graphical output on papers other three are types of mouse.

V. WHICH ONE OF THE FOLLOWING IS NOT CORRECTLY MATCHED?

1. (a) Impact printers – Dot Matrix printer
(b) Non-Impact printers – Laser printer
(c) Hardware – Keyboard
(d) Software – CPU

[Ans. (d) Software – CPU]

2. (a) Second generation – Transistors
(b) Third generation – Integrated circuits
(c) Fourth generation – Vacuum tubes
(d) Fifth generation+ – ULSI

[Ans. (c) Fourth generation – Vacuum tubes]

VI. CONSIDER THE FOLLOWING STATEMENT.

1. **Assertion (A) :** Computers have now become an indispensable part of our lives.

Reason (R) : Computers have revolutionized our lives with their accuracy and speed of performing a job, it is truly remarkable.

- (a) Both (A) and (R) are true and (R) is the correct explanation of A.
(b) Both (A) and (R) are true and (R) is not the correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.

[Ans. (a) Both (A) and (R) are true and (R) is the correct explanation of (A)]

2. **Assertion (A) :** CPU is the major component which interprets and executes software instructions.

Reason (R) : The ALU is a part of the CPU where various computing functions are performed on data.

- (a) Both (A) and (R) are true and (R) is the correct explanation of A.
(b) Both (A) and (R) are true and (R) is not the correct explanation of A.
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.

[Ans. (b) Both (A) and (R) are true and (R) is not the correct explanation of (A)]

3. **Assertion (A) :** Microphone serves as a voice Input device.

Reason (R) : Digital camera uses a CCD electronic chip.

- (a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true and (R) is not the correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true.

[Ans. (b) Both (A) and (R) are true and (R) is not the correct explanation of (A)]

VII. CHOOSE THE CORRECT STATEMENT.

1. Which of the following statements are true?

- (i) Machine language programs are done in first generation
(ii) Third generation computers are not more reliable
(iii) Voice recognition software developed in fifth generation computer
(iv) Micro processors are used in fourth generation computer
(a) Only (i)
(b) Only (i) and (iv)
(c) Only (iii) and (iv)
(d) Only (i) (iii) and (iv)

[Ans. (b) Only (i) and (iv)]

VERY SHORT ANSWERS**2 MARKS****1. Name the first generation computers.****Ans.** ENIAC, EDVAC, UNIVAC 1.**2. Name the Second generation computers.****Ans.** IBM 1401, IBM 1620, UNIVAC 1108.**3. Name the Third generation computers.****Ans.** IBM 360 Series, Honeywell 6000 series.**4. Name the softwares introduced in fifth generation computers.****Ans.** (i) Artificial Intelligence
(ii) Expert Systems**5. Name the types of computer introduced in Fourth generation computers.****Ans.** (i) Microcomputer
(ii) Portal Computers.**6. Write the developments of Sixth generation computers.****Ans.** (i) Parallel Computing
(ii) Artificial Neural Networks
(iii) Robotics
(iv) Natural Language Processing**7. What is NLP?****Ans.** Natural Language Processing is the ability of a computer program to understand human language. It is a component of artificial intelligence.**8. What is the use of Microphone?****Ans.** Microphone serves as a voice Input device. It captures the voice data and send it to the Computer.**9. Write a note on Digital Camera.****Ans.** It captures images / videos directly in the digital form. It uses a CCD (Charge Coupled Device) electronic chip. When light falls on the chip through the lens, it converts light rays into digital format.**10. What is use of VGA?****Ans.** The screen monitor works with the VGA (Video Graphics Array). 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 motherboard incorporates built in video card.**11. Write the two main categories of Printer.****Ans.** Printers are divided into two main categories:

- (i) Impact Printers
- (ii) Non Impact printers

12. What is booting a computer?**Ans.** Booting a computer is to load an operating system into the computer's main memory or random access memory (RAM).**13. What makes Charles Babbage the father of computing?****Ans.** Charles Babbage radical ideas and concept of the Analytical Engine (It contained an ALU, basic flow control and integrated memory) makes him the father of computing.**14. What is the goal of neural network approach?****Ans.** The original goal of the neural network approach was to solve problems in the same way that a human brain would. Over time, attention focused on matching specific mental abilities, leading to deviations from biology.**15. Write the tools in which nano technology was born.****Ans.** The right tools, such as the scanning tunneling microscope (STM) and the atomic force microscope (AFM), the age of nano-technology was born.**16. Define IPO Cycle.****Ans.** The functional components of a computer performs. Every task given to a computer follows an Input-Process- Output Cycle (IPO cycle).**17. Name the different keys available in the keyboard.****Ans.** 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.**18. Which device is used to draw a lines?****Ans.** Light Pen is an input device which is used to draw lines or figures on a computer screen. It is touched to the CRT screen where it can detect faster on the screen as it passes.

CHAPTER 2

NUMBER SYSTEMS

CHAPTER SNAPSHOT

Part I - Number Systems

- * 2.1 Number Systems - Introduction
- * 2.2 Data Representations
- * 2.3 Different Types of Number Systems
 - 2.3.1 Decimal Number System
 - 2.3.2 Binary Number System
 - 2.3.3 Octal Number System
 - 2.3.4 Hexadecimal Number System
- * 2.4 Number System Conversions
 - 2.4.1 Decimal to Binary Conversion
 - 2.4.2 Decimal to Octal Conversion
 - 2.4.3 Decimal to Hexadecimal Conversion
 - 2.4.4 Conversion of fractional Decimal to Binary
 - 2.4.5 Binary to Decimal Conversion
 - 2.4.6 Binary to Octal Conversion
 - 2.4.7. Binary to Hexadecimal Conversion
 - 2.4.8 Conversion of fractional Binary to Decimal equivalent
 - 2.4.9. Octal to Decimal Conversion
 - 2.4.10 Octal to Binary Conversion
 - 2.4.11 Hexadecimal to Decimal Conversion
 - 2.4.12 Hexadecimal to Binary Conversion
- * 2.5 Binary Representation for Signed Numbers
 - 2.5.1 Signed Magnitude representation
 - 2.5.2 1's Complement representation
 - 2.5.3 2's Complement representation
- * 2.6 Binary Arithmetic
 - 2.6.1 Binary Addition
 - 2.6.2 Binary Subtraction

- * 2.7 Representing Characters in Memory
 - 2.7.1 Binary Coded Decimal (BCD)
 - 2.7.2 American Standard Code for Information Interchange (ASCII)
 - 2.7.3 Extended Binary Coded Decimal Interchange Code (EBCDIC)
 - 2.7.4 Indian Standard Code for Information Interchange (ISCII)
 - 2.7.5 Unicode

Part II - Boolean Algebra

- * 2.8. Boolean Algebra - Introduction
 - 2.8.1 Binary valued quantities
 - 2.8.2 Logical Operations
 - 2.8.3 Truth Table
 - 2.8.4 AND operator
 - 2.8.5 OR operator
 - 2.8.6 NOT operator
 - 2.8.7 NAND operator
 - 2.8.8 NOR operator
- * 2.9. Basic Logic Gates
 - 2.9.1 AND Gate
 - 2.9.2 OR Gate
 - 2.9.3 NOT Gate
 - 2.9.4 NOR Gate
 - 2.9.5 Bubbled AND Gate
 - 2.9.6 NAND Gate
 - 2.9.7 Bubbled OR Gate
 - 2.9.8 XOR Gate
 - 2.9.9 XNOR Gate

EVALUATION

SECTION - A

CHOOSE THE CORRECT ANSWER:

1. Which refers to the number of bits processed by a computer's CPU?

- (a) Byte (b) Nibble
(c) Word length (d) Bit

[Ans. (c) Word length]

2. How many bytes does 1 KiloByte contain?

- (a) 1000 (b) 8
(c) 4 (d) 1024 [Ans. (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

[Ans. (b) American Standard Code for Information Interchange]

4. 2^{50} is referred as

- (a) Kilo (b) Tera
(c) Peta (d) Zetta

[Ans. (c) Peta]

5. How many characters can be handled in Binary Coded Decimal System?

- (a) 64 (b) 255
(c) 256 (d) 128 [Ans. (a) 64]

6. For 1101_2 the equivalent Hexadecimal equivalent is?

- (a) F (b) E
(c) D (d) B [Ans. (c) D]

7. What is the 1's complement of 00100110?

- (a) 00100110 (b) 11011001
(c) 11010001 (d) 00101001

[Ans. (b) 11011001]

8. Which amongst this is not an Octal number?

- (A) 645 (B) 234 (C) 876 (D) 123

[Ans. (c) 876]

SECTION - B

VERY SHORT ANSWERS

1. What is data?

Ans. 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.

Ans. 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).

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

2	46	
2	23 - 0	
2	11 - 1	
2	5 - 1	
2	2 - 1	
2	1 - 0	

Ans. 2 1 - 0

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

4. We cannot find 1's complement for $(28)_{10}$. State reason. [QY. 2019]

Ans. $(28)_{10}$ 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 that represents characters in memory. [FMT 2018]

- Ans.** (i) BCD – Binary Coded Decimal.
(ii) EBCDIC – Extended Binary Coded Decimal Interchange Code.
(iii) ASCII – American Standard Code for Information Interchange.
(iv) Unicode.
(v) ISCII - Indian Standard Code for Information Interchange.

SECTION - D

EXPLAIN IN DETAIL

1. a) Write the procedure to convert fractional Decimal to Binary
- b) Convert $(98.46)_{10}$ to Binary

[FMT 2018 ; Sep.2020]

Ans. a) 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.

b) 98.46_{10}

1. Integer part

$$\begin{array}{r} 2 \overline{) 98} \\ 2 \overline{) 49} - 0 \\ 2 \overline{) 24} - 1 \\ 2 \overline{) 12} - 0 \\ 2 \overline{) 6} - 0 \\ 2 \overline{) 3} - 0 \\ 1 - 1 \end{array}$$

2. Fractional part

$0.46 \times 2 = 0.92 = 0$

$0.92 \times 2 = 1.84 = 1$

$0.84 \times 2 = 1.68 = 1$

$0.68 \times 2 = 1.36 = 1$

$0.36 \times 2 = 0.72 = 0$

$0.72 \times 2 = 1.44 = 1$

$98.46_{10} = (1100010.011101....)_2$

2. Find 1's Complement and 2's Complement for the following Decimal number. a) -98 b) -135

Ans. a) -98

$$\begin{array}{r} 2 \overline{) 98} \\ 2 \overline{) 49} - 0 \\ 2 \overline{) 24} - 1 \\ 2 \overline{) 12} - 0 \\ 2 \overline{) 6} - 0 \\ 2 \overline{) 3} - 0 \\ 1 - 1 \end{array} \quad 98_{10} = 1100010$$

8 bit format of $98_{10} = 01100010$

1's complement = 10011101

Add 1 bit = +1

2's complement = 10011110

b) -135

$$\begin{array}{r} 2 \overline{) 135} \\ 2 \overline{) 67} - 1 \\ 2 \overline{) 33} - 1 \\ 2 \overline{) 16} - 1 \\ 2 \overline{) 8} - 0 \\ 2 \overline{) 4} - 0 \\ 2 \overline{) 2} - 0 \\ 1 - 0 \end{array} \quad 135_{10} = 10000111$$

1's complement = 01111000

Add 1 bit = +1

2's complement = 01111001

3. a) Add $1101010_2 + 101101_2$ [Sep. 2020]

b) Subtract $1101011_2 - 111010_2$

Ans. a) $1101010_2 + 101101_2$

$$\begin{array}{r} 1101010 \\ +101101 \\ \hline 10010111 \\ = 10010111_2 \end{array}$$

- b) $1101011_2 - 111010_2$ [HF. 2018]

$$\begin{array}{r} 1101011 \\ - 111010 \\ \hline 110001 \\ = 110001_2 \end{array}$$

WORKSHOP

1. Identify the number system for the following numbers.

Ans.	S.No	NUMBER	NUMBER SYSTEM
	1.	$(1010)_{10}$	Decimal Number system
	2.	$(1010)_2$	Binary Number System
	3.	$(989)_{16}$	Hexadecimal Number System
	4.	$(750)_8$	Octal Number System
	5.	$(926)_{10}$	Decimal Number System

2. State whether the following numbers are valid or not. If invalid, give reason.

Ans.	S.No	STATEMENT	YES / NO	REASON (IF INVALID)
	1.	786 is an Octal number	No	In. octal number, the allowable digits is between 0 and 7
	2.	101 is a Binary number	No	No Radix is mentioned
	3.	Radix of Octal number is 7	No	Radix of octal number is 8

3. Convert the following Decimal numbers to its equivalent Binary, Octal, Hexadecimal.

1) 1920 2) 255 3) 126

Ans. 1) $1920_{10} = ?_2$

$$\begin{array}{r}
 2 \overline{) 1920} \\
 \underline{2 960} - 0 \\
 2 \underline{480} - 0 \\
 2 \underline{240} - 0 \\
 2 \underline{120} - 0 \\
 2 \underline{60} - 0 \\
 2 \underline{30} - 0 \\
 2 \underline{15} - 0 \\
 2 \underline{7} - 1 \\
 2 \underline{3} - 1 \\
 1 - 1 \\
 \hline
 1920_{10} = 1111000000_2
 \end{array}$$

$$1920_{10} = ?_8$$

$$\begin{array}{r}
 8 \overline{) 1920} \\
 \underline{8 240} - 0 \\
 8 \underline{30} - 0 \\
 3 - 6
 \end{array}$$

$$1920 = 3600_8$$

[Mar. 2019]

$$\begin{array}{r}
 16 \overline{) 1920} \\
 \underline{16 120} - 0 \\
 7 - 8
 \end{array}$$

$$= 1920_{10} = 780_{16}$$

2) 255_{10}

[Mar. 2019]

$$\begin{array}{r}
 2 \overline{) 255} \\
 \underline{2 127} - 1 \\
 2 \underline{63} - 1 \\
 2 \underline{31} - 1 \\
 2 \underline{15} - 1 \\
 2 \underline{7} - 1 \\
 2 \underline{3} - 1 \\
 2 \underline{1} - 1
 \end{array}$$

$$255_{10} = 11111111_2$$

$$255_{10} = ?_8$$

$$\begin{array}{r}
 8 \overline{) 255} \\
 \underline{8 31} - 7 \\
 3 - 7
 \end{array}$$

$$255_{10} = 377_8$$

$$255_{10} = ?_{16}$$

$$\begin{array}{r}
 16 \overline{) 255} \\
 \underline{16 15} - 15
 \end{array}
 \quad \boxed{15 - F}$$

$$255_{10} = FF_{16}$$

3) 126_{10}

$$\begin{array}{r} 2 \overline{) 126} \\ \underline{63} \quad -0 \\ 2 \overline{) 31} \quad -1 \\ \underline{15} \quad -1 \\ 2 \overline{) 7} \quad -1 \\ \underline{3} \quad -1 \\ 1 \quad -1 \end{array}$$

$126_{10} = 1111110_2$

$$\begin{array}{r} 8 \overline{) 126} \\ \underline{15} \quad -6 \\ 1 \quad -7 \end{array}$$

$126_{10} = 176_8$

$126_{10} = ?_{16}$

$$\begin{array}{r} 16 \overline{) 126} \\ \underline{7} \quad -14 \\ \underline{14} \quad -E \end{array}$$

$126_{10} = 7E_{16}$

4. Convert the given Binary number into its equivalent Decimal, Octal and Hexadecimal number.

1) 101110101 2) 1011010 3) 101011111

Ans. 1) 101110101

Decimal Equivalent :

$$= 1 \times 2^8 + 0 \times 2^7 + 1 \times 2^6 + 1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$$

$$= 256 + 64 + 32 + 16 + 4 + 1 = 373_{10}$$

Octal Equivalent :

$$= \begin{array}{ccc} \overline{101} & \overline{110} & \overline{101} \\ \downarrow & \downarrow & \downarrow \\ 5 & 6 & 5 \end{array}$$

$$= 565_8$$

Hexadecimal Equivalent :

$$= \begin{array}{ccc} \overline{10} & \overline{1110} & \overline{101} \\ \downarrow & \downarrow & \downarrow \\ 1 & 7 & 5 \end{array}$$

$$= 175_{16} ; 10110101_2 = 373_{10} = 565_8 = 175_{16}$$

2) 1011010_2

Decimal Equivalent :

$$= 1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$$

$$= 64 + 16 + 8 + 2 = 90_{10}$$

Octal Equivalent :

$$= \begin{array}{ccc} \overline{10} & \overline{110} & \overline{110} \\ \downarrow & \downarrow & \downarrow \\ 1 & 3 & 2 \end{array}$$

$$= 132_8$$

Hexadecimal Equivalent :

$$= \begin{array}{cc} \overline{101} & \overline{1010} \\ \downarrow & \downarrow \\ 5 & 10 \\ \downarrow & \downarrow \\ 5 & A \end{array}$$

$$= 5A_{16}$$

$$1011010_2 = 90_{10} = 132_8 = 5A_{16}$$

3) 101011111

Decimal Equivalent :

$$= 1 \times 2^8 + 0 \times 2^7 + 1 \times 2^6 + 0 \times 2^5 + 1 \times 2^4 + 1 \times 2^3 + 1 \times 2^2 + 1 \times 2^1 + 1 \times 2^0$$

$$= 256 + 64 + 16 + 8 + 4 + 2 + 1 = 351_{10}$$

Octal Equivalent :

$$= \begin{array}{ccc} \overline{101} & \overline{011} & \overline{111} \\ \downarrow & \downarrow & \downarrow \\ 5 & 3 & 7 \end{array}$$

$$= 537_8$$

Hexadecimal Equivalent :

$$= \begin{array}{ccc} \overline{10} & \overline{101} & \overline{1111} \\ \downarrow & \downarrow & \downarrow \\ 1 & 5 & 15 \\ \downarrow & \downarrow & \downarrow \\ 1 & 5 & F \end{array}$$

$$= 15F_{16}$$

$$101011111_2 = 351_{10} = 537_8 = 15F_{16}$$

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWER 1 MARK

I. CHOOSE THE CORRECT OPTIONS FOR THE BELOW QUESTIONS.

1. How the information entered in a computer?
(a) Knowledge (b) data
(c) ASCII Value (d) BCD [Ans. (b) data]
2. Which establishment done convention using groups of 8 bits as a basic unit of storage medium?
(a) Apple (b) Microsoft
(c) IBM (d) DELL [Ans. (c) IBM]
3. Who coined the term byte?
(a) Charles Babbage (b) John von newmann
(c) Werner Buchholz (d) Herman Hollerith
[Ans. (c) Werner Buchholz]
4. How many standard number system are there to use?
(a) 2 (b) 4 (c) 8 (d) 16
[Ans. (b), 4]
5. Which of the following is not a standard number system?
(a) Pentagon (b) Hexadecimal
(c) Decimal (d) Binary
[Ans. (a) Pentagon]
6. What are the two symbols used in Binary number system?
(a) 0, 1 (b) +, -
(c) 2, 4 (d) $2^0, 2^1$ [Ans. (a) 0, 1]
7. How many parameters can be considered to know the magnitude of the number?
(a) 2 (b) 4 (c) 3 (d) 5
[Ans. (c) 3]
8. Which is used to measure the number of bits in each word?
(a) Word length (b) length
(c) Size (d) word size
[Ans. (a) Word length]
9. How many ways are there to represent signed binary number?
(a) 2 (b) 4 (c) 1 (d) 6
[Ans. (c) 1]
10. In binary numbers, the signed negative number has a prefix?
(a) - (b) 0 (c) 1 (d) 2
[Ans. (c) 1]

11. How many unique symbols in Octal number system?
(a) 4 (b) 16 (c) 2 (d) 8
[Ans. (d) 8]
12. How many procedures are there to convert from decimal to binary?
(a) 2 (b) 4 (c) 8 (d) 3
[Ans. (a) 2]
13. How many common coding schemes are used to represent a character?
(a) 2 (b) 3 (c) 4 (d) 5
[Ans. (c) 4]
14. How many coding schemes are used to represent character in India?
(a) 2 (b) 3 (c) 4 (d) 5
[Ans. (a) 2]
15. Which complement performs the logical negation on each individual bit?
(a) Signed (b) Unsigned
(c) 2's (d) 1's
[Ans. (b) Unsigned]
16. Which of the following is not a common coding schemes to represent a character?
(a) BCD (b) Unicode
(c) ASCII Code (d) Byte code
[Ans. (d) Byte code]
17. Which of the following programs uses ASCII code?
(a) only C (b) only C++
(c) both C, C++ (d) Java
[Ans. (c) both C, C++]
18. Which of the programs used Unicode?
(a) C (b) C++
(c) Java (d) None of these
[Ans. (c) Java]
19. Which of the following is the idea behind positional numbering systems?
(a) Absolute Value (b) Place Volume
(c) Radix (d) All of these
[Ans. (c) Radix]
20. Which is an elementary building block of the digital circuit?
(a) Gate (b) Digital gate
(c) Logic gate (d) Physical gate
[Ans. (c) Logic gate]

21. Which one of the following are fundamental logic gates?

- (a) NAND, NOR, NOT (b) AND, OR, NOT
(c) NAND, XOR, XNOR (d) AND, XOR, NOT

[Ans. (b) AND, OR, NOT]

22. Which one of the following are called universal gates?

- (a) AND, OR, NOT (b) XOR AND XNOR
(c) NAND and NOR (d) NAND and AND

[Ans. (c) NAND and NOR]

23. Which digit is not allowed in hexadecimal number system?

- (a) G (b) B (c) E (d) D

[Ans. (a) G]

24. Which coding scheme is used to LCD?

- (a) Unicode (b) ASCII
(c) EBCDIC (d) BCD [Ans. (d) BCD]

25. How many parameters are considered to find the magnitude of a number?

- (a) 3 (b) 4 (c) 2 (d) 5

[Ans. (a) 3]

II. MATCH LIST I WITH LIST II AND SELECT THE CORRECT ANSWER USING THE CODES GIVEN BELOW.

	List I		List II
(i)	Binary Number System	1	Base 16
(ii)	Hexa Decimal Number System	2	Base 8
(iii)	Decimal Number System	3	Base 2
(iv)	Octal Number System	4	Base 10

Codes:

- | | | | |
|-------|------|-------|------|
| (i) | (ii) | (iii) | (iv) |
| (a) 4 | 1 | 3 | 2 |
| (b) 1 | 3 | 2 | 4 |
| (c) 3 | 1 | 4 | 2 |
| (d) 4 | 3 | 1 | 2 |

[Ans. (c) (i)-3, (ii)-1, (iii)-4, (iv)-2]

	List I		List II
(i)	0 to 9 , A o F	1	Binary
(ii)	0, 1	2	Hexadecimal
(iii)	0 to 9	3	Octal
(iv)	0 to 7	4	Decimal

Codes:

- | | | | |
|-------|------|-------|------|
| (i) | (ii) | (iii) | (iv) |
| (a) 4 | 1 | 3 | 2 |
| (b) 1 | 3 | 2 | 4 |
| (c) 3 | 4 | 1 | 2 |
| (d) 4 | 3 | 1 | 2 |

[Ans. (c) (i)-3, (ii)-4, (iii)-1, (iv)-2]

III. CHOOSE THE CORRECT OPTION AND FILL IN THE BLANKS.

1. Data means

- (a) a set of values (b) a set of information
(c) a set of records (d) a set of files

[Ans. (a) a set of values]

2. The singular form of data is

- (a) Record (b) File
(c) Datum (d) Values

[Ans. (c) Datum]

3. "75% of Men likes cricket" is

- (a) Information (b) data
(c) knowledge (d) Record

[Ans. (c) knowledge]

4. The processed data is called

- (a) Information (b) Knowledge
(c) datum (d) files

[Ans. (a) Information]

5. In a computer, a data is converted into

- (a) ASCII form (b) BCD form
(c) Binary form (d) Octal form

[Ans. (c) Binary form]

6. The most basic unit of information in a digital computer is called a

- (a) word (b) data
(c) nibble (d) bit [Ans. (d) bit]

7. Expansion of BIT is

- (a) BASIC DIGITS (b) BINARY DIGIT
(c) BINARY INFORMATION TECHNOLOGY
(d) BASE DIGIT [Ans. (b) BINARY DIGIT]

CHAPTER 3 COMPUTER ORGANIZATION

CHAPTER SNAPSHOT

- * 3.1. Introduction
- * 3.2. Basics of Microprocessors
- * 3.3. Data Communication between CPU and memory
- * 3.4. Types of Microprocessors
 - 3.4.1. Classification of Microprocessors Based on the Data Width
 - 3.4.2. Classification of Microprocessors Based on Instruction set
- * 3.5. Memory Devices
 - 3.5.1. Random Access Memory(RAM)
 - 3.5.2. Types of RAM
 - 3.5.3. Read Only Memory (ROM)
 - 3.5.4. Cache Memory
- * 3.6. Secondary Storage Devices
 - 3.6.1. Hard Disks
 - 3.6.2. Compact Disc (CD)
 - 3.6.3. Digital Versatile Disc (DVD)
 - 3.6.4. Flash Memory Devices
 - 3.6.5. Blu-Ray Disc
- * 3.7. Ports and Interfaces

EVALUATION

SECTION - A

CHOOSE THE CORRECT ANSWER

1. Which of the following is said to be the brain of a computer?

- (a) Input devices (b) Output devices
(c) Memory device (d) Microprocessor

[Ans. (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

[Ans. (c) Cache memory]

3. How many bits constitute a word?

- (a) 8 (b) 16 (c) 32
(d) determined by the processor used.

[Ans. (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

[Ans. (c) decoder]

5. Which of the following is a CISC processor?

- (a) Intel P6 (b) AMD K6
(c) Pentium III (d) Pentium IV

[Ans. (c) Pentium III]

6. Which is the fastest memory? [FMT 2018]

- (a) Hard disk (b) Main memory
(c) Cache memory (d) Blue-Ray disc

[Ans. (c) Cache memory]

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

[Ans. (c) 256]

8. What is the capacity of 12cm diameter DVD with single sided and single layer?

- (a) 4.7 GB (b) 5.5 GB
(c) 7.8 GB (d) 2.2 GB

[Ans. (a) 4.7 GB]

9. What is the smallest size of data represented in a CD?

- (a) blocks (b) sectors
(c) pits (d) tracks [Ans. (c) pits]

10. Display devices are connected to the computer through

- (a) USB port
(b) Ps/2 port
(c) SCSI port
(d) VGA connector [Ans. (d) VGA connector]

SECTION - B

VERY SHORT ANSWERS

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

Ans. A Microprocessor's performance depends on the following characteristics:

- (i) Clock speed
(ii) Instruction set
(iii) Word size

2. What is an instruction?

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

3. What is a program counter? [Mar. 2019]

Ans. 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? [FMT 2018; HY. 2019; Sep. 2020]

Ans. High-Definition Multimedia Interface is an audio/video interface which 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?

Ans. Ultra-violet-rays is used to erase the content of a EPROM.

SECTION - C

SHORT ANSWERS

1. Differentiate Computer Organization from Computer Architecture.

Ans. (i) Computer Organization deals with the hardware components that are transparent to the programmer.

(ii) Computer architecture deals with the engineering considerations involved in designing a computer.

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

Ans. Microprocessors can process instructions. The microprocessors can be classified as follows based on the size of the data.

(i) 8-bit microprocessor

(ii) 16-bit microprocessor

(iii) 32-bit microprocessor

(iv) 64-bit microprocessor

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

Ans. The two types of microprocessors which are based on their instruction sets.

(i) Reduced Instruction Set Computers (RISC)

(ii) Complex Instruction Set Computers (CISC)

4. Differentiate PROM and EPROM.

	PROM	EPROM
(i)	Programmable Read only memory.	Erasable Programmable Read only memory.
(ii)	It is also a non-volatile memory on which data can be written only once.	It is also a non-volatile memory and a special type of memory.
(iii)	PROM burner is used to write data to a PROM chip.	EPROM serves as a PROM, but the content can be erased using ultraviolet rays

5. Write down the interfaces and ports available in a computer. [HY. 2019; Sep. 2020]

Ans. (i) Serial Port

(ii) Parallel Port

(iii) USB 3.0

(iv) VGA Connector

(v) Audio Plugs

(vi) PS/2 Port

(vii) SCSI Port

(viii) High Definition Multimedia Interface(HDMI).

6. Differentiate CD and DVD. [FMT 2018; June 2019; Mar. 2020]

	CD	DVD
(i)	Expansion is Compact-Disk	Expansion is Digital Versatile Disc.
(ii)	A standard CD can store about 700 MB of Data.	A standard DVD can hold 4.7 GB of data.
(iii)	CD players cannot play DVDs.	DVD players can play CDs.
(iv)	It stores upto 80 min of audio.	It can range from 4.7 GB to 17.08 GB.

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

Ans. Flash memory devices:

(i) Flash memory is an electronic (solid-state) non-volatile computer storage medium that can be electrically erased and reprogrammed.

(ii) Flash memories can be used in personal computers, Personal Digital Assistants (PDA), digital audio players, digital cameras and mobile phones.

(iii) Flash memory offers fast access times. The time taken to read or write a character in memory is called access time.

(iv) Examples for Flash memories are pen drives, memory cards etc.

EEPROM:

(i) Electrically Erasable Programmable Read Only Memory can be erased by exposing it to an electrical charge.

(ii) EEPROM is non-volatile.

(iii) EEPROM is slower in performance.

SECTION - D

EXPLAIN IN DETAIL

1. Explain the characteristics of a microprocessor.

[FMT; HY. 2018; June 2019; HY. 2019]

Ans. A Microprocessor's performance depends on the following characteristics:

- (i) Clock speed
- (ii) Instruction set
- (iii) Word size
- (i) **Clock Speed** [Govt.MQP-2018; QY. 2019]

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 clock speed. Clock speed is measured in MHz (Mega Hertz) or in GHz (Giga Hertz).

- (ii) **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:
 1. Data transfer
 2. Arithmetic operations
 3. Logical operations
 4. Control flow
 5. Input/output.

(iii) **Word Size :** [Govt.MQP-2018]

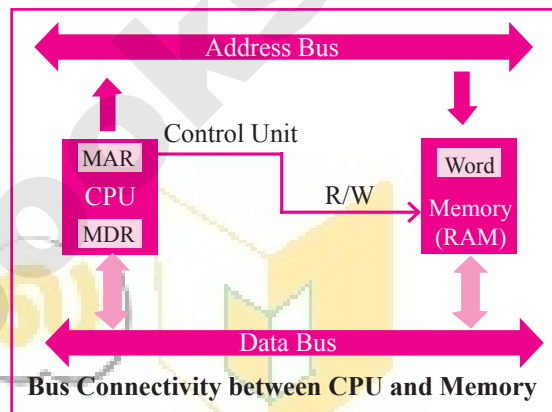
The number of bits that can be processed by a processor in a single instruction is called its word size. Word size determines the amount of RAM that can be accessed by a microprocessor at one time and the total number of pins on the microprocessor. Total number of input and output pins in turn determines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

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

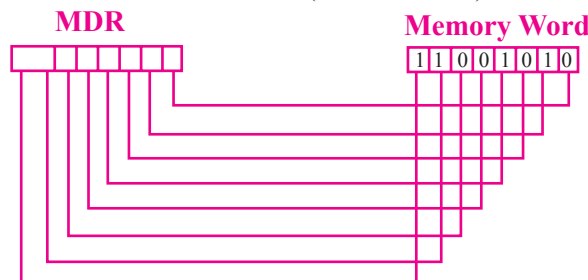
Ans. (i) The Central Processing Unit(CPU) has a Memory Data Register (MDR) and a Memory Address Register (MAR).

(ii) 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.

- (iii) A bus is a collection of wires used for communication between the internal components of a computer.
- (iv) 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.
- (v) The read operation fetches data from memory and transfers to MDR. A single control line performs two operations like read write using 1 or 0.
- (vi) Also, the write operation transfers data from the MDR to memory.



- (vii) The word in the RAM has the same size (no. of bits) as the Memory Data Register (MDR).
- (viii) 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).



Before the read operation

- (ix) This control line is labeled as R/W, which becomes 1 means READ operation and 0 means WRITE operation. 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.

LONG ANSWERS

5 MARKS

1. Explain the classification of Microprocessor based on Instruction set?

Ans. (i) The size of the instruction set is another important consideration while categorizing microprocessors. Initially, microprocessors had very small instruction sets because complex hardware was expensive as well as difficult to build.

(ii) As technology had developed to overcome these issues, more and more complex instructions were added to increase the functionality of microprocessors.

(iii) Reduced Instruction Set Computers (RISC): 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.

(iv) Complex Instruction Set Computers (CISC): CISC stands for Complex Instruction Set Computers. They support hundreds of instructions. Computers supporting CISC can accomplish a wide variety of tasks, making them ideal for personal computers.

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

2. Define the following.

- (i) Bus (ii) Data bus**
(iii) Address bus (iv) Control Bus

Ans. (i) Bus : A bus is a collection of wires used for communication between the internal components of a computer.

(ii) Data bus : Data bus is a collection of wires to carry data in bits. A data bus is used to transfer data between the memory and the CPU. The data bus is bidirectional.

(iii) Address bus : Address bus is a collection of wires to carry data in bits. The address bus is used to point a memory location. The address bus is unidirectional.

(iv) Control bus : Control bus is a control line, collection of wires to control the operation functions. The control bus controls both read and write operations.

3. Explain any two secondary storage devices.

Ans. Hard disk :

(i) 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.

(ii) The hard disks come with a single or double sided disk.

Compact Disk (CD) :

(i) 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.

(ii) CD data is represented as tiny indentations known as "pits", encoded in a spiral track moulded into the top of the polycarbonate layer. The areas between pits are known as "lands".

(iii) A motor within the CD player rotates the disk. The capacity of an ordinary CD- ROM is 700MB.



CHAPTER 4 THEORETICAL CONCEPTS OF OPERATING SYSTEM

CHAPTER SNAPSHOT

- * 4.1. Introduction to Software
 - 4.1.1. Types of Software
- * 4.2. Introduction to Operating System (OS)
- * 4.3. Types of Operating System
 - 4.3.1. Single User Operating Systems
 - 4.3.2. Multi-user Operating Systems
- * 4.4. Key features of the Operating System
 - 4.4.1. User Interface (UI)
 - 4.4.2. Memory Management
 - 4.4.3. Process Management
 - 4.4.4. Security Management
 - 4.4.5. Fault Tolerance
 - 4.4.6. File Management
 - 4.4.7. Multi-Processing
 - 4.4.8. Time-sharing
 - 4.4.9. Distributed Operating Systems
- * 4.5. Prominent Operating Systems

EVALUATION

SECTION - A

CHOOSE THE CORRECT ANSWER

1. Operating system is a
 - (a) Application Software (b) Hardware
 - (c) System Software (d) Component

[Ans. (c) System Software]
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

[Ans. (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) Compiler Environment

[Ans. (d) Compiler Environment]
4. Which of the following OS is a Commercially licensed Operating system?
 - (a) Windows (b) UBUNTU
 - (c) FEDORA (d) REDHAT

[Ans. (a) Windows]
5. Which of the following Operating systems support Mobile Devices?
 - (a) Windows 7 (b) Linux
 - (c) BOSS (d) iOS

[Ans. (d) iOS]
6. File Management manages
 - (a) Files (b) Folders
 - (c) Directory systems (d) All the Above

[Ans. (d) All the Above]
7. Interactive Operating System provides
 - (a) Graphics User Interface (GUI)
 - (b) Data Distribution
 - (c) Security Management
 - (d) Real Time Processing

[Ans. (a) Graphics User Interface (GUI)]

8. An example for single task operating system is

- (a) Linux (b) Windows
(c) MS-DOS (d) Unix

[Ans. (c) MS-DOS]

9. The File management system used by Linux is

- (a) ext2 (b) NTFS (c) FAT (d) NFTS

[Ans. (a) ext2]

SECTION - B

VERY SHORT ANSWERS

1. List out any two uses of Operating System.

Ans. (i) To ensure that a computer can be used to extract what the user wants it do.

(ii) Easy interaction between the users and computers.

2. What is multi-user Operating system?

Ans. Multi-user Operating Systems : [Mar. 2019]

(i) It is used in computers and laptops that allow same data and applications to be accessed by multiple users at the same time.

(ii) The users can also communicate with each other. Windows, Linux and UNIX are examples for multi-user Operating System.

3. What is a GUI? [Govt.MQP-2018; June 2019]

Ans. 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 colours attract the user very easily.

4. What are the security management features available in Operating System?

[HY. 2018; Sep. 2020]

Ans. The Operating System provides three levels of securities to the user end. They are

(i) File access level

(ii) System level

(iii) Network level.

5. What is multi-processing?

Ans. Multi-processing 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.

6. What are the different Operating Systems used in computer? [Sep. 2021]

Ans. The different types of operating system used in the computer:

(i) Single User and Single Task Operating Systems

(ii) Multi User Operating Systems

(iii) Multi Processing Operating Systems

(iv) Distributed Operating Systems

(v) Prominent Operating Systems

SECTION - C

SHORT ANSWERS

1. What are the advantages and disadvantages of Time-sharing features? [QY. 2018]

Time - Sharing Operating System	
Advantages	Disadvantages
Provides the advantage of quick response.	Problem of reliability.
Avoids duplication of software.	Question of security and integrity of uses programs and data.
Reduces CPU idle time.	Problem of data communication.

2. List out the key features of Operating system

Ans. The various key features are given below

(i) User Interface

(ii) File Management

(iii) Memory Management

(iv) Fault Tolerance

(v) Process Management

(vi) Security Management.

3. Write a note on Multiprocessing.

Ans. (i) Multi-processing is a one of the features of Operating System.

(ii) It has two or more processors for a single running process (job).

(iii) Processing takes place in parallel is known as parallel processing.

(iv) Since the execution takes place in parallel, this feature is used for high speed execution which increases the power of computing.

ADDITIONAL QUESTIONS AND ANSWERS

CHOOSE THE CORRECT ANSWERS 1 MARK

I. CHOOSE THE CORRECT OPTIONS FOR THE BELOW QUESTIONS.

1. Which of the following acts as an interface between a user and a computer?

- (a) Input device (b) Output device
(c) Operating system (d) Bus

[Ans. (c) Operating system]

2. Which one of the following is not a function of an operating system?

- (a) Program Management
(b) Process Management
(c) Device Management
(d) Memory Management

[Ans. (a) Program Management]

3. Which is used to perform any computer operation?

- (a) Application software
(b) Hardware
(c) Operating system
(d) File Management

[Ans. (c) Operating system]

4. Which of the following operating systems not used in laptops?

- (a) Windows (b) Linux
(c) iOS (d) Unix [Ans. (c) iOS]

5. Which of the following operating system are not in mobile phones?

- (a) Symbian (b) Linux
(c) Apple iOS (d) Google Android

[Ans. (b) Linux]

6. Which of the following is a concept of having more than one operating system on single PC?

- (a) Multiuser (b) Multi tasking
(c) Multiprocessor (d) Virtual

[Ans. (d) Virtual]

7. Which of the following is a single user Operating system?

- (a) MS-DOS (b) Unix
(c) Linux (d) Windows

[Ans. (a) MS-DOS]

8. On which operating system more than one tasks executed concurrently?

- (a) Single-user
(b) Time sharing
(c) Multi-user
(d) Multiprocessing

[Ans. (b) Time sharing]

9. Which scheduling technique employed by time sharing OS?

- (a) Spooling (b) LIFO
(c) FIFO (d) Round Robin

[Ans. (d) Round Robin]

10. Which of the following is not true about Timesharing OS?

- (a) Provides the advantage of quick response
(b) Promotes duplication of software
(c) Reduces CPU idle time
(d) Problem of reliability

[Ans. (b) Promotes duplication of software]

11. In which operating system, given tasks done within a fixed timeline?

- (a) Real time (b) Multi-tasking
(c) Multiprocessor (d) Online

[Ans. (a) Real time]

12. Which operating system is used to access shared data and files any machine around the world?

- (a) Real time (b) Multiuser
(c) Multiprocessor (d) Distributed

[Ans. (d) Distributed]

13. In which operating system the user can exchange the data which each other in real time?

- (a) Distributed (b) Real time
(c) Time sharing (d) Multi-user

[Ans. (a) Distributed]

14. Which operating system provides GUI?

- (a) Distributed (b) Real time
(c) Interactive (d) Multi-User

[Ans. (c) Interactive]

15. How many functions are there in OS?

- (a) 4 (b) 5 (c) 3 (d) 2

[Ans. (b) 5]

EVALUATION

SECTION - A

CHOOSE THE CORRECT ANSWER

1. From the options given below, choose the operations managed by the operating system.

- (a) Memory
- (b) Processes
- (c) Disks and I/O devices
- (d) all of the above **[Ans. (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 **[Ans. (a) My Document]**

3. Under which of the following OS, the option Shift + Delete – permanently deletes a file or folder?

- (a) Windows 7
 - (b) MS-DOS
 - (c) Linux
 - (d) Android OS
- [Ans. (a) Windows 7]**

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

[Ans. (d) Shutdown the Computer without closing the running applications]

5. The shortcut key used to rename a file in windows

- (a) F2
- (b) F4
- (c) F5
- (d) F6 **[Ans. (a) F2]**

SECTION - B

VERY SHORT ANSWERS

1. What is known as Multitasking? **[QY. 2018]**

Ans. Microsoft windows is one of the most popular graphical user Interface. Multiple applications can execute simultaneously in windows, and this is known as 'Multitasking'.

2. What are called standard icons?

Ans. The icons which are available on desktop by default while installing Windows OS are called standard icons. The standard icons available in all Windows OS are My Computer, Documents and Recycle Bin.

3. Differentiate Files and Folders.

Files	Folders
File is the collection of records.	Folder is a collections of files.
Create a file : Start → All Programs → select application → ok	Create a folders : Right click → New → folder → ok

4. Differentiate Save and save As option. **[QY. 2019]**

Ans. "Save" option save a document in first time. "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. How will you Rename a File? **[Sep. 2021]**

Ans. There are number of ways to rename files or folders. You can rename using the File menu, left mouse button or right mouse button.

SECTION - C

SHORT ANSWERS

1. What are the functions of Windows Operating system? **[HY. 2019]**

Ans. Some of the functions of Windows Operating System are:

- (i) Access applications (programs) on the computer (word processing, games, spread sheets, calculators and so on).
- (ii) Load any new program on the computer.
- (iii) Manage hardware such as printers, scanners, mouse, digital cameras etc.,
- (iv) File management activities (For example creating, modifying, saving, deleting files and folders).
- (v) Change computer settings such as colour scheme, screen savers and the resolution of monitor.

2. Write a note on Recycle bin.

[QY 2018, 2019; Mar.2020]

Ans. Recycle bin is a special folder to keep the files or folders deleted by the user, which means you still have an opportunity to recover them. The user cannot access the files or folders available in the Recycle bin without restoring it. To restore file or folder from the Recycle Bin

- (i) Open Recycle bin.
- (ii) Right click on a file or folder to be restored and select Restore option from the pop-up menu.
- (iii) To restore multiple files or folders, select Restore all items.
- (iv) To delete all files in the Recycle bin, select Empty the Recycle Bin.

3. Write a note on the elements of a window.

Ans. Elements of a window :

- (i) **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.
- (ii) **Menu Bar :** The menu bar is seen under the title bar. Menus in the menu bar can be accessed by pressing Alt key and the letter that appears underlined in the menu title. Additionally, pressing Alt or F10 brings the focus on the first menu of the menu bar.
- (iii) **The Workspace :** The workspace is the area in the document window to enter or type the text of your document.
- (iv) **Scroll bars :** The scroll bars are used to scroll the workspace horizontally or vertically
- (v) **Corners and borders :** The corners and borders of the window helps 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.

4. Write the two ways to create a new folder.

Ans. There are two ways in which you can create a new folder:

Method I:

- Step 1 : Open Computer Icon.
- Step 2 : Open any drive where you want to create a new folder. (For example select D:)
- Step 3 : Click on File → New → Folder.
- Step 4 : A new folder is created with the default name “New folder”.
- Step 5 : Type in the folder name and press Enter key.

Method II:

In order to create a folder in the desktop:

- Step 1 : In the Desktop, right click → New → Folder.
- Step 2 : A Folder appears with the default name “New folder” and it will be highlighted as shown.
- Step 3 : Type the name you want and press Enter Key.
- Step 4 : The name of the folder will change.

5. Differentiate copy and move.

[Sep. 2021]

Ans.

	Copy	Move
(i)	It means to make a duplicate copy of a file.	It means to transfer a file from one location to another.
(ii)	It uses the 'copy and paste' option.	It uses the 'cut and paste' option.
(iii)	The original file remains at the source location.	The original file is moved to the destination location.

UNIT- II

ALGORITHMIC PROBLEM SOLVING

CHAPTER

6

SPECIFICATION AND ABSTRACTION

CHAPTER SNAPSHOT

* 6.1 Algorithms	* 6.4 Algorithm Design Techniques
* 6.2 Algorithmic Problems	* 6.5 Specification
* 6.3 Building Blocks of Algorithms	6.5.1 Specification as contract
6.3.1 Data	* 6.6 Abstraction
6.3.2 Variables	6.6.1 State
6.3.3 Control flow	6.6.2 Assignment Statement
6.3.4 Functions	

EVALUATION

SECTION - A

CHOOSE THE CORRECT 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

[Ans. (a) Assemble a bicycle]

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) Swaping of two numbers.

[Ans. (d) Swaping of two numbers.]

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

[Ans. (b) abstraction]

4. Stating the input property and the input - output relation a problem is known [Sep. 2021]

- (a) specification
- (b) statement
- (c) algorithm
- (d) definition

[Ans. (a) specification]

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.

[Ans. (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

[Ans. (b) 4]

7. If $0 < i$ before the assignment $i := i-1$ after the assignment, we can conclude that [QY. 2018]

- (a) $0 < i$ (b) $0 \leq i$ (c) $i = 0$ (d) $0 \geq i$

[Ans. (b) $0 \leq i$]

SECTION - B

VERY SHORT ANSWERS

1. Define an algorithm.

Ans. An algorithm is a sequence of instructions to accomplish a task or solve a problem.

2. Distinguish between an algorithm and a process.

[Govt.MQP-2018]

Ans.	S.No	Algorithm	Process
	(i)	An algorithm is a step-by-step sequence of statements to solve a problem.	An instruction describes an action.
	(ii)	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.

- Ans.** (i) -- farmer, goat, grass, wolf = L, L, L, L
(ii) farmer, goat := R, R
(iii) -- farmer, goat, grass, wolf = R, R, L, L
(iv) farmer := L
(v) farmer, goat, grass, wolf = L, R, L, L
(vi) farmer, grass := R, R
(vii) -- farmer, goat, grass, wolf = R, R, R, L
(viii) farmer, goat := L, L
(ix) -- farmer, goat, grass, wolf = L, L, R, L
(x) farmer, wolf := R, R
(xi) -- farmer, goat, grass, wolf = R, L, R, R
(xii) farmer := L
(xiii) -- farmer, goat, grass, wolf = L, L, R, R
(xiv) farmer, goat := R, R
(xv) - farmer, goat, grass, wolf = R, R, R, R

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

Ans. (i) Minimum (A, B)

(ii) -- inputs : A and B are integers or real numbers.

(iii) -- outputs : A is minimum, ($A < B$)

B is minimum, ($B < A$)

5. If $\sqrt{2} = 1.414$, and the square_root() function returns -1.414, does it violate the following specification?

-- square_root (x)

-- inputs: x is a real number, $x \geq 0$

-- outputs: y is a real number such that $y^2 = X$

Ans. Yes, it violate the specification.

SECTION - C

SHORT ANSWERS

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

Ans. 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?

Ans. 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? [HY. 2018; QY. 2019]

Ans. 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.

4. How is state represented in algorithms?

Ans. (i) State is a basic and important abstraction.

(ii) 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.

(iii) 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?

Ans. 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 : $m := 2$

When this assignment is executed, the value on the right side is stored in the variable on the left side.

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

Ans. Assignment operator is used to assign the right hand side value into left hand side variable.

Example : $A = 5, B = 10$

Equality operator is used compare the values of both right hand side variable and left hand side variable and results in either true or false.

Example : $A == B$ ($a = 5, b = 5$) True

$A \neq B$ ($a = 5, b = 0$) True.

SECTION - D

EXPLAIN IN DETAIL

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.

Ans. (i) Let us name the algorithm hypotenuse.

(ii) It takes the number as the input. Let us name the input S_1, S_2 should not be negative.

(iii) It produces the Hypotenuse of S_1, S_2 as the output. Let us name the output l . Then S_1, S_2 should be the square of l .

Now the specification of the algorithm is

Hypotenuse (S_1, S_2)

- **inputs :** S_1 and S_2 are real numbers or integers.

- **outputs :** l is a real number such that $l^2 = S_1^2 + S_2^2$

2. Suppose you want to solve the quadratic equation $ax^2 + bx + c = 0$ by an algorithm. [QY. 2018]

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.

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

Ans. Quadratic_solve (a, b, c)

-- **inputs :** a, b, c are real numbers, $a \neq 0$

-- **outputs :** x is a real number, the quadratic equation $ax^2 + bx + c = 0$ is satisfied by exactly two values x , namely

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \text{ and}$$

$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

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. [HY. 2018]

Ans. (i) Let us name the algorithm exchange.

(ii) It takes the number as the input. Let us name the input a, b . a, b should not be zero.

(iii) It produces the exchange of a, b by using third variable t as the output. Let us name the output. Then a, b, t should be exchange of the drinks.

Now the specification of the algorithm is

Exchange (a, b)

-- **inputs :** a, b are integers, $a \neq 0, b \neq 0$

-- **outputs :** a, b are integers,

$t := a$

$a := b$

$b := t$

LONG ANSWERS

5 MARKS

1. Explain in detail how will you construct an algorithm. Whatever with in (or) Explain the Building Blocks of Algorithms.

Ans. To construct algorithms using basic building blocks such as. Data, Variables, Control flow, Functions.

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.

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.

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. 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.

Functions :

Algorithms can become very complex. The variables of an algorithm and dependencies among the variables may be too many. Then, it is difficult to build algorithms correctly. In such situations, we break an algorithm into parts, construct each part separately, and then integrate the parts to the complete algorithm.

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.

2. Explain the types of control flow statements.

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

- (i) In sequential control flow, a sequence of statements are executed one after another in the same order as they are written.
- (ii) 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.
- (iii) 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.

