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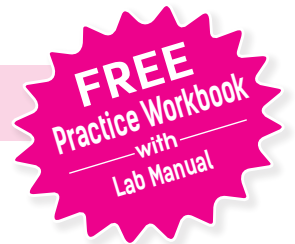
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UNIT- I

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. '19]*
(a) Vacuum tubes   (b) Transistors
(c) Integrated circuits   (d) Microprocessors
[Ans. (a) Vacuum tubes]

2. Name the volatile memory   *[Mar. & July '23]*
(a) ROM   (b) PROM
(c) RAM   (d) EPROM
[Ans. (c) RAM]

3. Identify the output device   *[Mar. 2020; HY.'23]*
(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; QY. '23; July-'24]*
(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   *[QY-'24]*
(c) Flash drive (d) Hard disk
[Ans. (b) RAM]

10. Which generation of computer used IC's?
[May '22, QY. '23; Mar-'24]
(a) First   (b) Second   (c) Third   (d) Fourth
[Ans. (c) Third]

[1]

SECTION - B

VERY SHORT ANSWERS

1. What is a computer?   *[Sep. 2021; Aug '22; QY-'24]*

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]

Ans.

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; July-'24]

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.   *[Mar. '23]*

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?   *[QY.'23]*

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.

Ans.

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.

[HY. '23; Mar-'24]

Ans.

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?

[Mar. '23]

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. *[QY-'24]*

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.

4. Name any three output devices.

Ans. (i) Monitor

(ii) Printer

(iii) Plotter

(iv) Speaker

(v) Multimedia projectors are the output devices.

5. Differentiate optical and Laser mouse. *[HY. 2018]*

Ans.

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

6. Write short note on impact printer. *[Mar. 2019]*

Ans. Impact printers :

(i) 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. For example, Dot Matrix printers and Line matrix printers are impact printers.

(ii) A Dot matrix printer that prints using a fixed number of pins or wires.

(iii) Line matrix printers use a fixed print head for printing.

7. Write the characteristics of sixth generation.

[May '22; QY.'23]

Ans. (i) Parallel and Distributed computing

(ii) Computers have become smarter, faster and smaller

(iii) Development of robotics

(iv) Natural Language Processing

(v) Development of Voice Recognition Software

8. Write the significant features of monitor. *[Mar- '24]*

Ans. Monitor:

(i) Monitor is the most commonly used output device to display the information. It looks like a TV.

(ii) Pictures on a monitor are formed with picture elements called PIXELS.

(iii) Monitors may either be Monochrome which display text or images in Black and White or can be color, which display results in multiple colors.

(iv) There are many types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes).

(v) The video graphics card helps the keyboard to communicate with the screen.

(vi) It acts as an interface between the computer and display monitor.

SECTION - D

EXPLAIN IN DETAIL

1. Explain the basic components of a computer with a neat diagram. *[Govt. MQP; FMT-2018; Mar. 2019 & '24; July-'23; QY-'24]*

Ans. Components of a Computer :

The computer is the combination of hardware and software. Hardware is the physical component of a computer like motherboard, memory devices, monitor, keyboard etc., while software is the set of programs or instructions. Both hardware and software together make the computer system to function. Every task given to a computer follows an Input-process - output cycle (IPO cycle).

**(i)** **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.

(ii) **Central Processing Unit :** CPU is the major component which interprets and executes software instructions. It also control the operation of all other components such as memory, input and output units.

(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.

Components of a Computer
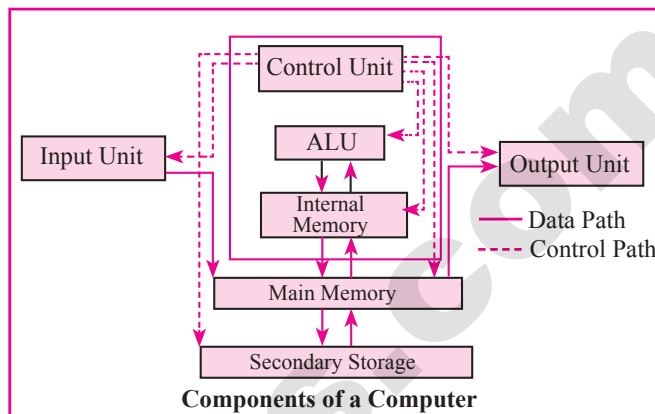
2. Discuss the various generations of computers.   *[QY.-'18; June-'19; Mar. 2020 & '23; Sep. 2021; Aug '22; July-'24]*

Ans.

S.No	Generation	Period	Main Component used	Merits/ Demerits
1	**First Generation**	1940-1956	Vaccum tubes	❑ 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	❑ 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)	❑ Computers were smaller, faster and more reliable ❑ Consumed less power. ❑ High Level Languages were used

Third Generation Computers - **IBM 360 series, Honeywell 6000 series**				
4.	**Fourth Generation**	1971-1980	**Microprocessor** Very Large Scale Integrated Circuits (VLSI)	❑ Smaller and Faster. ❑ Microcomputer series such as IBM and APPLE were developed. ❑ Portable Computers were introduced.
5.	**Fifth Generation**	1980-till date	**Ultra Large Scale Integration (ULSI)**	❑ Parallel Processing ❑ Super conductors ❑ Computers size was drastically reduced. ❑ Can recognize Images and Graphics ❑ Introduction of Artificial Intelligence and Expert Systems ❑ Able to solve high complex problems including decision making and logical reasoning
6.	**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 following :

a. **Inkjet Printer**   b. **Multimedia projector**   c. **Bar code / QR code Reader**

***Ans.* a) Inkjet Printers:**

(i) 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 ionised ink at a sheet of paper.

(ii) They use the technology of firing ink by heating it so that it explodes towards the paper in bubbles or by using piezoelectricity in which tiny electric currents controlled by electronic circuits are used inside the printer to spread ink in jet speed.

(iii) An Inkjet printer can spread millions of dots of ink at the paper every single second.

b) Multimedia Projectors:

(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.

c) Bar Code / QR Code Reader:

(i) 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.

(ii) 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 interpret the image.

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?**　　　　　　*[Govt.MQP-2018]*
(a) Vacuum tubes　　(b) Transistor
(c) Integrated Circuits　(d) Microprocessor
　　　　　　　　　　　　[Ans. (b) Transistor]

3. **Which one of the following is Biometric Device?**
　　　　　　　　　　　　　　　　　[QY. 2018]
(a) Scanner　　　　　(b) Fingerprint Scanner
(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]

11. **In _____ generation portable computers were introduced.** *[CRT '22]*
(a) First　　(b) Second
(c) Third　　(d) Fourth　　**[Ans. (d) Fourth]**

12. **_____ is first known Calculating Device.** *[CRT '22]*
(a) Computer　　(b) Analytical Engine
(c) Abacus　　　(d) Calculator　**[Ans. (c) Abacus]**

13. **_____ is the main component of Second Generation computers.** *[Aug '22]*
(a) Vacuum tubes　　(b) Transistors
(c) Integrated circuits　(d) Microprocessors
　　　　　　　　[Ans. (b) Transistors]

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 - Imapct : 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; HY. 2019; July-'23; QY.'23]

Ans. Booting process is of two types.

(i) Cold Booting   (ii)   Warm Booting

(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.

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.

5 Marks

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 & '23]*

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.

3. Explain Data and Information. *[CRT & May '22]*

Ans. Computer is an electronic device that processes the input according to the set of instructions provided to it and gives the desired output at a very fast rate. Computers are very versatile as they do a lot of different tasks such as storing data, weather forecasting, booking airlines, railway or movie tickets and even playing games.

Data: Data is defined as an un-processed collection of raw facts, suitable for communication, interpretation or processing.

For example, 134, 16 'Kavitha', 'C' are data. This will not give any meaningful message.

Information: Information is a collection of facts from which conclusions may be drawn. In simple words we can say that data is the raw facts that is processed to give meaningful, ordered or structured information. For example Kavitha is 16 years old. This information is about Kavitha and conveys some meaning. This conversion of data into information is called data processing.

INPUT → PROCESS → OUTPUT

DATA
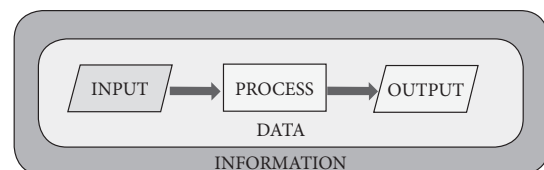
INFORMATION

4. **What is an output unit? Explain any three output devices.** *[Mar-'24]*

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

Output Devices :

(i) **Monitor :** Monitor is the most commonly used output device to display the information. It looks like a TV. 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 video graphics card helps the keyboard to communicate with the screen. It acts as an interface between the computer and display monitor.

(ii) **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.

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

- Impact Printers

- Non Impact printers

Impact Printers : These printers print with striking of hammers or pins on ribbon.

For example, Dot Matrix printers and Line matrix printers are impact printers.

Non-Impact Printers : These printers do not use striking mechanism for printing. For example, Laser printers and Inkjet printers are non-impact 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. 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]

19. Which company developed first digital computer?

(a) Atanasoft Berry Computer

(b) AT & T bell   (c) IBM

(d) Microsoft

[Ans. (a) Atanasoft Berry Computer]

20. 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]**

21. 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]**

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

(a) Keyboard   (b) Keyer

(c) Barcode Reader   (d) Touch Screen

[Ans. (b) Keyer]

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]

35. Which of the following is a type of computation in which many calculations are carried out simultaneously?

(a) NLP   (b) ANN

(c) Parallel Processing   (d) Parallel Computing

[Ans. (d) Parallel Computing]

36. Which of the following devices not stores the date permanently?

(a) HDD   (b) SSD

(c) Tape Drives   (d) RAM

[Ans. (d) RAM]

37. Which of the following devices stores the data permanently?

(a) HDD   (b) Tape drives

(c) SSD   (d) All of these

[Ans. (d) All of these]

38. Who assisted Douglas Engelbart to invent the mouse?

(a) Berry   (b) Steve Kirsch

(c) Bill English   (d) Bill Gates

[Ans. (c) Bill English]

39. Which device is used to enter information directly into the computer's memory?

(a) Keyboard   (b) Scanner

(c) Mouse   (d) Plotter

[Ans. (b) Scanner]

40. Which device used CCD chip?

(a) Light pen   (b) Scanner

(c) Microphone   (d) Digital Camera

[Ans. (d) Digital Camera]

41. Which device is used to input by pressing one or more switches?

(a) Keyboard   (b) Mouse

(c) Touch Screen   (d) Keyer

[Ans. (d) Keyer]

42. How many types of monitors are there?

(a) 2   (b) 3   (c) 4   (d) Many

[Ans. (b) 3]

43. Which of the following is an impact priners

(a) Inkjet   (b) Fax

(c) Dot Matrix   (d) Laser

[Ans. (c) Dot Matrix]

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

1.

	List I		List II
(i)	Expert System	1	Second Generation
(ii)	Batch Processing	2	Fourth Generation
(iii)	NLP	3	Six Generation
(iv)	Introduction of Laptop	4	Fifth Generation

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. (a) (i)-4, (ii)-1, (iii)-3, (iv)-2]

2.

	List I		List II
(i)	EDVAC	1	Second Generation Computer
(ii)	APPLE	2	Fifth Generation Computer
(iii)	IBM 1620	3	First Generation Computer
(iv)	Expert System	4	Fourth Generation Computer

Codes:

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

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

3.

	List I		List II
(i)	Out device	1	Executes Instruction
(ii)	CPU	2	Delivers the data processed by CPU
(iii)	Memory	3	Retrieve the data is possible
(iv)	Mass Storage Device	4	Temporarily stores data

Codes:

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

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

4.

	List I		List II
(i)	Used to feed data to the computer	1	CPU
(ii)	Controls the operation of memory Unit	2	ALU
(iii)	Computing functions are performed on data	3	Control Unit
(iv)	Controls the flow of data between memory unit and I/O Units.	4	Input Unit

Codes:

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

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

5.

	List I		List II
(i)	First generation	1	Integrated Circuits
(ii)	Second generation	2	Microprocessor
(iii)	Third generation	3	Transistors
(iv)	Fourth generation	4	Vacuum tubes

Codes:

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

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

6.

	List I		List II
(i)	Input unit	1	I/o devices
(ii)	Memory unit	2	Monitor
(iii)	Control unit	3	Rom
(iv)	Output unit	4	Keyboard

Codes:

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

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

7.

	List I		List II
(i)	Information	1	Motherboard
(ii)	Hardware	2	Set of programs
(iii)	Data	3	Convey some meaning
(iv)	Software	4	Set of raw facts

Codes:

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

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

III. Choose the Correct Option and Fill in the Blanks.

1. The component used in second generation computers is ....
(a) Transistors   (b) ICs
(c) Vacuum tubes   (d) Microprocessors

[Ans. (a) Transistors]

2. The Second generation computers belongs to period ....
(a) 1940-1956   (b) 1956-1964
(c) 1980-1990   (d) 1964-1971

[Ans. (b) 1956-1964]

3. The fourth generation belongs to ....
(a) 1940-1956   (b) 1971-1980
(c) 1964-1971   (d) 1980-1990

[Ans. (b) 1971-1980]

4. The component used in fourth generation computers are ....
(a) ICS   (b) Transistors
(c) VLSI   (d) Vacuum tube

[Ans. (c) VLSI]

5. Laptops, Notebook, Tablets are belongs to .... generation computers.
(a) First   (b) Second (c) Third   (d) Fourth

[Ans. (d) Fourth]

6. The fifth generation computers belongs to ....
(a) 1971-1980   (b) 1980- till date
(c) 1964-1971   (d) 1940-1956

[Ans. (b) 1980-till date]

7. 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]

8. Robotics developed in .... generation.
(a) Third   (b) Fourth (c) Fifth   (d) Sixth

[Ans. (d) Sixth]

9. 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]

10. Expand NLP ....
(a) National Language Problem
(b) Natural Language Processing
(c) Network Language Program
(d) Network Local Processing

[Ans. (b) Natural Language Processing]

11. NLP is a component of ....
(a) Expert systems   (b) Robotics
(c) Parallel computing
(d) Artificial Intelligence

[Ans. (d) Artificial Intelligence]

12. Every task given to a computer-follows a(n) .... cycle.
(a) BPO   (b) IPO
(c) ANN   (d) NLP **[Ans. (b) IPO]**

13. 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]

14. **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]

15. **The memory unit is of .... kinds.**
   (a) 3   (b) 4   (c) 2   (d) 5
                    [Ans. (c) 2]

16. **Optical Mouse invented in the year ....**
   (a) 1968   (b) 1973   (c) 1988   (d) 1981
                    [Ans. (c) 1988]

17. **Laser mouse has as many as .... buttons.**
   (a) 10   (b) 11   (c) 12   (d) 3
                    [Ans. (c) 12]

18. **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]

19. **Expansion of CPS is ....**
   (a) Character Per Second (b) Copy Per Second
   (c) Code Per Second   (d) Character Per Screen
                    [Ans. (a) Character Per Second]

20. **The first computer monitor was released in the year ....**
   (a) 1980   (b) 1983   (c) 1963   (d) 1973
                    [Ans. (d) 1973]

21. **The expansion of VLSI is ....**
   (a) Verified Logical Scale Integrated Circuits
   (b) Very Logical Small Integer Circuits
   (c) Very Large Scale Integrated Circuits
   (d) Volatile Large Scale Integrated Circuits
                    [Ans. (c) Very Large Scale Integrated Circuits]

22. **The first digital computer name was ....**
   (a) EDVAC   (b) UNIVACI
   (c) ENIAC   (d) IBM 1620
                    [Ans. (c) ENIAC]

23. **Artificial neurons are organized in ....**
   (a) Nodes   (b) Layers
   (c) Signals   (d) Units
                    [Ans. (b) Layers]

24. **The conversion of data to information is called ....**
   (a) Data Digitization
   (b) Data Processing
   (b) Data Management
   (d) All of these
                    [Ans. (b) Data Processing]

25. **A set of instructions given to the computer is called ....**
   (a) Information   (b) Data
   (c) Input   (d) Program
                    [Ans. (d) Program]

26. **The mechanical mouse introduced in the year ....**
   (a) 1978   (b) 1988   (c) 1968   (d) 1958
                    [Ans. (c) 1968]

27. **The Red, Green or Blue led used mouse in invented by ....**
   (a) John Mauchly   (b) Steve Kirsch
   (c) Henry babbaje
   (d) Presper Eckert   **[Ans. (b) Steve Kirsch]**

28. **The expansion of USB is ....**
   (a) Universal Serial Bus
   (b) Uniform Serial Bus
   (c) Uniform Serious Bus
   (d) Universal Serial BIOS
                    [Ans. (a) Universal Serial Bus]

29. **The expansion of CRT is ....**
   (a) Cathode Ray Tube
   (b) Cathode Radio Tube
   (c) Cathode Ray Technology
   (d) Cathode Radio Technology
                    [Ans. (a) Cathode Ray Tube]

30. **The expansion of LCD is ....**
   (a) Liquid Cathode Diodes
   (b) Liquid Cluster Display
   (c) Liquid Crytal Display
   (d) Live Extract Display
                    [Ans. (b) Liquid Cluster Display]

31. **The expansion of LED is ....**
   (a) Light Extract Display
   (b) Light Emitting Diodes
   (c) Liquid Emitting Diodes
   (d) Liquid Extract Display
                    [Ans. (c) Liquid Emitting Diodes]

32. **The first computer Monitor was released in the year ....**
   (a) 1974   (b) 1972   (c) 1971   (d) 1973

   [Ans. (d) 1973]

33. **The expansion of VGA is ....**
   (a) Visual Graphics Adapter
   (b) Video Graphics Adapter
   (c) Video Graphics Array
   (d) Voice Graphics Array

   [Ans. (c) Video Graphics Array]

34. **An error will half the boot process found in ....**
   (a) BIOS   (b) POST
   (c) HDD   (d) I/O System   **[Ans. (b) POST]**

35. **The process of loading an OS in a computer RAM is known as ....**
   (a) POST   (b) BIOS
   (c) Booting   (d) All of these

   [Ans. (c) Booting]

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 out 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.

19. Define Pixels.

Ans. Pictures on a monitor are formed with picture elements called PIXELS.

20. Name the types of Monitors available.

Ans. The types of monitors available such as CRT (Cathode Ray Tube), LCD (Liquid Crystal Display) and LED (Light Emitting Diodes).

21. How the date travel through control bus?

Ans. The date travel in both unidirectional and bidirectional due to the internal connection with in the computer architecture.

22. Name the type of registers are essential for instruction execution.

Ans. **(i)** Program counter
(ii) Instruction Register
(iii) Memory Address Registers
(iv) Memory Buffer Register
(v) Accumulator

23. Expand (a) MAR (b) MBR

Ans. **(a)** MAR - Memory Address Register
(b) MBR - Memory Buffer Register

24. Why POST is essential?

Ans. If the hardware is not detected, a particular pattern of beeps will inform about the error. An error found in the POST is usually fatal (that is, it causes current program to stop running) and will halt the boot process, since the hardware check is absolutely essential for the computer's functions.

25. What does reboot mean?

Ans. It means to reload the operating system.

26. Write the limitations of impact printer.

Ans. **(1)** It is slow as compared to non-impact printers
(2) It is not best suited for graphics
(3) It is not possible to obtain colour output.

SHORT ANSWERS   3 MARKS

1. Write a note Vaccum tube.

Ans. **(i)** Vaccum tubes contain electrodes for controlling electron flow and were used in early computers as a switch or an amplifier.
(ii) Vaccum tubes are big in size and consumed more power.

2. Define Transistor.

Ans. **(i)** The transistor ("transfer resistance") is made up of semi-conductors.
(ii) It is a component used to control the amount of current or voltage used for amplification/ modulation or switching of an electronic signal.

3. Define Punched cards.

Ans. Punch cards also known as Hollerith cards are paper cards containing several punched or perforated holes that were punched by hand or machine to represent data.

4. Differentiate Dot Matrix Printer and Laser Printer.

Ans.

Dot Matrix Printer	Laser Printer
Printing speed is slow.	Printing speed is high.
Suitable for black and white printing.	Suitable of colour printing.
It makes noise while printing.	It is silent while printing.

5. What is Integrated circuits?

Ans. **(i)** IC is short for Integrated Circuit or Integrated Chip.
(ii) The IC is a package containing many circuits, pathways, transistors, and other electronic components all working together to perform a particular function or a series of functions.

6. **What is Robotics?**

Ans. **(i)** Robot is a term coined by Karel Capek in the 1921 play RUR (Rossum's Universal Robots).

(ii) It is used to describe a computerized machine designed to respond to input received manually or from its surroundings.

7. **What is Nano-technology?**

Ans. Nano-technology, is an engineering, science, and technology that develops machines or works with one atom or one molecule that is 100 nanometers or smaller.

8. **Write a note on Touch Screen.**

Ans. **(i)** A touch screen is a display device that allows the user to interact with a computer by using the finger.

(ii) It can be quite useful as an alternative to a mouse or keyboard for navigating a Graphical User Interface (GUI).

(iii) Touch screens are used on a wide variety of devices such as computers, laptops, monitors, smart phones, tablets, cash registers, and information kiosks.

(iv) Some touch screens use a grid of infrared beams to sense the presence of a finger instead of utilizing touch-sensitive input.

9. **Define POST.**

Ans. **(i)** POST (Power-On Self-Test) is the diagnostic testing sequence that a computer's basic input/ output system runs to determine if the computer keyboard, random access memory, disk drives and other hardware are working correctly.

(ii) If the necessary hardware is detected and found to be operating properly, the computer begins to boot.

LONG ANSWERS 　 5 MARKS

1. **Explain any two input and output devices.**

Ans. **Input Devices :**

(i) **Scanner:** Scanners are used to enter the information directly into the computer's memory. This device works like a xerox machine. The scanner converts any type of printed or written information including photographs into a digital format, which can be manipulated by the computer.

(ii) **Finger print Scanner:** Finger print Scanner is a fingerprint recognition device used for computer security, equipped with the fingerprint recognition feature 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.

Output Devices :

(i) **Monitor:** Monitor is the most commonly used output device to display the information. It looks like a TV. 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 video graphics card helps the keyboard to communicate with the screen. It acts as an interface between the computer and display monitor.

(ii) **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.

2. **Explain in detail the different types of Mouse.**

Ans. **(i)** **Mechanical Mouse :**

A small ball is kept inside and touches the pad through a hole at the bottom of the mouse. When the mouse is moved, the ball rolls. This movement of the ball is converted into signals and sent to the computer.

(ii) **Optical 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.

(iii) **Laser Mouse:**

Measures the motion and acceleration of pointer. Laser Mouse uses Laser Light. Laser Mouse is highly sensitive and able to work on any hard surface.

3. Explain Impact Printers with an Example.

Ans. Impact Printers :

(i) 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.

(ii) For example, Dot Matrix printers and Line matrix printers are impact printers.

(iii) 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, either directly or through a set of small levers.

(iv) It generally prints one line of text at a time. The printing speed of these printers varies from 30 to 1550 CPS (Character Per Second).

4. Explain Non-Impact printers with an examples.

Ans. Non-Impact Printers :

(i) These printers do not use striking mechanism for printing. They use electrostatic or laser technology.

(ii) Quality and speed of these printers are better than Impact printers. **For example,** Laser printers and Inkjet printers are non-impact printers.

Laser Printers :

(i) Laser printers mostly work with similar technology used by photocopiers.

(ii) It makes a laser beam scan back and forth across a drum inside the printer, building up a pattern. It can produce very good quality of graphic images.

Inkjet Printers:

(i) Inkjet Printers use colour cartridges which combined Magenta, Yellow and Cyan inks to create color tones.

(ii) A black cartridge is also used for monochrome output. Inkjet printers work by spraying ionised ink at a sheet of paper.

(iii) They use the technology of firing ink by heating it so that it explodes towards the paper in bubbles or by using piezoelectricity in which tiny electric currents controlled by electronic circuits are used inside the printer to spread ink in jet speed.

(iv) An Inkjet printer can spread millions of dots of ink at the paper every single second.

☆ ☆ ☆

CHAPTER 2

NUMBER SYSTEMS

CHAPTER SNAPSHOT

EVALUATION

SECTION - A

CHOOSE THE CORRECT ANSWER:

1. **Which refers to the number of bits processed by a computer's CPU?** *[Mar-'24]*

(a) Byte   (b) Nibble

(c) Word length   (d) Bit

[Ans. (c) Word length]

2. **How many bytes does 1 KiloByte contain?** *[Aug '22]*

(a) 1000   (b) 8   *[QY. '23 & '24; July-'24]*

(c) 4   (d) 1024   **[Ans. (d) 1024]**

3. **Expansion for ASCII** *[HY. '23]*

(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** *[CRT '22]*

(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 equalent Hexadecimal equivalent is?** *[May ' 22; QY-'24]*

(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?** *[Sep. 2020]*

(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.** *[Aug '22]*

Ans.

```
2 | 46
2 | 23 – 0
2 | 11 – 1
2 | 5  – 1
2 | 2  – 1
2 | 1  – 0
```

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

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; July-'23; QY-'24]*

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 - C

SHORT ANSWERS

1. **What is radix of a number system? Give example.** *[Aug '22; QY-'24]*

Ans. 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.

Example :

Binary Number System - Radix 2
Octal Number System - Radix 8
Decimal Number System - Radix 10
Hexadecimal Number System - Radix 16.

2. **Write note on binary number system.** *[July-'23]*

Ans. (i) 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.

(ii) The left most bit in the binary number is called as the Most Significant Bit (MSB) and it has the largest positional weight.

(iii) The right most bit is the Least Significant Bit (LSB) and has the smallest positional weight.

3. **Convert $(150)_{10}$ into Binary, then convert that Binary number to Octal.** *[FMT 2018]*

Ans. 150_{10} = ?

```
2 | 150
2 | 75  – 0
2 | 37  – 1
2 | 18  – 1
2 | 9   – 0
2 | 4   – 1
2 | 2   – 0
    1   – 0
```

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

10010110_2 = ?

$$\overline{10}\ \overline{010}\ \overline{110}$$
$$\downarrow\ \ \downarrow\ \ \downarrow$$
$$2\ \ \ 2\ \ \ 6$$

$10010110_2 = 226_8$.

4. **Write short note on ISCII.**

Ans. (i) ISCII is the system of handling the character of Indian local languages. This as a 8-bit coding system.

(ii) Therefore it can handle 256 (2^8) 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).

(iii) Now this coding system is integrated with Unicode.

5. **Add a) $-22_{10}+15_{10}$ b) $20_{10}+25_{10}$** *[QY '23; July-'24]*

Ans. (a) $-22_{10}+15_{10}$ *[Govt.MQP; HY. 2018]*

```
2 | 22              2 | 15
2 | 11  – 0         2 | 7   – 1
2 | 5   – 1         2 | 3   – 1
2 | 2   – 1         2 | 1   – 1
    1   – 0
```

$(1111)_2 \Rightarrow (00001111)_2$

$(10110)_2 \Rightarrow (00010110)_2$

1's complement	= 11101001
2's complement	= 11101010
$(-22)_{10} + (15)_{10}$	= 11101001
	= 00001111
	= 11111001

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

```
2 | 20              2 | 25
2 | 10  – 0         2 | 12  – 1
2 | 5   – 0         2 | 6   – 0
2 | 2   – 1         2 | 3   – 0
    1   – 0             1   – 1
```

= $(10100)_2$	= $(11001)_2$
8 bit format of 20_{10}	= 00010100
8 bit format of 25_{10}	= 00011001
$20_{10} + 25_{10}$	= 00101101

$20_{10} + 25_{10} = 00101101_2$

SECTION - D

EXPLAIN IN DETAIL

1. a) **Write the procedure to convert fractional Decimal to Binary** *[CRT '22; Mar. '23]*
    b) **Convert $(98.46)_{10}$ to Binary**
        [FMT 2018 ; Sep.2020; Mar. '23]

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

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

2. Fractional part

$0.46 \times 2 = 0.92 = 0$
$0.92 \times 2 = 1.84 = 1$
$0.84 \times 2 = 1.68 = 1$
$0.68 \times 2 = 1.36 = 1$
$0.36 \times 2 = 0.72 = 0$
$0.72 \times 2 = 1.44 = 1$
$98.46_{10} = (1100010.011101....)_2$

2. **Find 1's Complement and 2's Complement for the following Decimal number. a) -98   b) -135**
    [CRT '22; QY.'23]

Ans. 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 $1101010_2 + 101101_2$** *[Sep. 2020; July-'23 & '24]*
    b) **Subtract $1101011_2 - 111010_2$**

Ans. a) **$1101010_2 + 101101_2$**

```
  1101010
+  101101
  --------
 10010111
```
$= 10010111_2$

b) **$1101011_2 - 111010_2$** *[HY. 2018; July-'24]*

```
  1101011
–  111010
  --------
   110001
```
$= 110001_2$

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 mentional
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)** $1920_{10} = ?_2$

2	1920	
2	960	– 0
2	480	– 0
2	240	– 0
2	120	– 0
2	60	– 0
2	30	– 0
2	15	– 0
2	7	– 1
2	3	– 1
	1	– 1

$1920_{10} = 11110000000_2$

$1920_{10} = ?_8$

8	1920	
8	240	– 0
8	30	– 0
	3	– 6

$1920 = 3600_8$ *[Mar. 2019]*

16	1920	
16	120	– 0
	7	– 8

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

2) 255_{10} *[Mar. 2019]*

2	255	
2	127	– 1
2	63	– 1
2	31	– 1
2	15	– 1
2	7	– 1
2	3	– 1
2	1	– 1

$255_{10} = 11111111_2$

$255_{10} = ?_8$

8	255	
8	31	– 7
	3	– 7

$255_{10} = 377_8$

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

16	255	
	15	– 15

$\boxed{15 - F}$

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

3) 126_{10}

$$
\begin{array}{r|l}
2 & 126 \\
2 & 63 \quad - 0 \\
2 & 31 \quad - 1 \\
2 & 15 \quad - 1 \\
2 & 7 \quad\; - 1 \\
2 & 3 \quad\; - 1 \\
 & 1 \quad\; - 1
\end{array}
$$

$126_{10} = 1111110_2$

$126_{10} = ?_8$

$$
\begin{array}{r|l}
8 & 126 \\
8 & 15 - 6 \\
 & 1 - 7
\end{array}
$$

$126_{10} = 176_8$

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

$$
\begin{array}{r|l}
16 & 126 \\
 & 7 - 14 \\
 & 14 - E
\end{array}
$$

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

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 :

$= \overline{101} \;\; \overline{110} \;\; \overline{101}$
$\quad\; \downarrow \quad\;\; \downarrow \quad\;\; \downarrow$
$\quad\; 5 \quad\;\; 6 \quad\;\; 5$

$= 565_8$

Hexadecimal Equivalent :

$= \overline{10} \;\; \overline{1110} \;\; \overline{101}$
$\quad\; \downarrow \quad\;\; \downarrow \quad\;\; \downarrow$
$\quad\; 1 \quad\;\; 7 \quad\;\; 5$

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

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 :

$= \overline{10} \;\; \overline{110} \;\; \overline{110}$
$\quad\; \downarrow \quad\;\; \downarrow \quad\;\; \downarrow$
$\quad\; 1 \quad\;\; 3 \quad\;\; 2$

$= 132_8$

Hexadecimal Equivalent :

$= \overline{101} \;\; \overline{1010}$
$\quad\;\; \downarrow \quad\;\;\; \downarrow$
$\quad\;\; 5 \quad\;\;\; 10$
$\quad\;\; \downarrow \quad\;\;\; \downarrow$
$\quad\;\; 5 \quad\;\;\; A$

$= 54_{16}$

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

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 :

$= \overline{101} \;\; \overline{011} \;\; \overline{111}$
$\quad\; \downarrow \quad\;\; \downarrow \quad\;\; \downarrow$
$\quad\; 5 \quad\;\; 3 \quad\;\; 7$

$= 537_8$

Hexadecimal Equivalent :

$= \overline{10} \;\; \overline{101} \;\; \overline{1111}$
$\quad\; \downarrow \quad\;\; \downarrow \quad\;\; \downarrow$
$\quad\; 1 \quad\;\; 5 \quad\;\; 15$
$\quad\; \downarrow \quad\;\; \downarrow \quad\;\; \downarrow$
$\quad\; 1 \quad\;\; 5 \quad\;\; F$

$= 15F_{16}$

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

5. Convert the following Octal numbers into Binary numbers. (A) 472 (B) 145 (C) 347 (D) 6247 (E) 645

[Sep. 2020]

***Ans.* A)** 472_8 *[July-'23]*

$$\begin{array}{ccc} 4 & 7 & 2 \\ \downarrow & \downarrow & \downarrow \\ 100 & 111 & 010 \end{array}$$

$$\begin{array}{c|c} 2 & 4 \\ \hline 2 & 2-0 \\ \hline & 1-0 \end{array} \qquad \begin{array}{c|c} 2 & 7 \\ \hline 2 & 3-1 \\ \hline & 1-1 \end{array} \qquad \begin{array}{c|c} 2 & 2 \\ \hline & 1-0 \end{array}$$

$472_8 = 100111010_2$

(B) 145

$$\begin{array}{ccc} 1 & 4 & 5 \\ \downarrow & \downarrow & \downarrow \\ 1 & 100 & 101 \end{array} \qquad \begin{array}{c|c} 2 & 4 \\ \hline 2 & 2-0 \\ \hline & 1-0 \end{array} \qquad \begin{array}{c|c} 2 & 5 \\ \hline 2 & 2-1 \\ \hline & 1-0 \end{array}$$

$145_8 = 1100101_2$

(C) 347_8

$$\begin{array}{ccc} 3 & 4 & 7 \\ \downarrow & \downarrow & \downarrow \\ 11 & 100 & 111 \end{array}$$

$$\begin{array}{c|c} 2 & 3 \\ \hline & 1-1 \end{array} \rightarrow \begin{array}{c|c} 2 & 4 \\ \hline 2 & 2-0 \\ \hline & 1-0 \end{array} \qquad \begin{array}{c|c} 2 & 7 \\ \hline 2 & 3-1 \\ \hline & 1-1 \end{array}$$

$347_8 = 11100111_2$

(D) 6247_8

$$\begin{array}{cccc} 6 & 2 & 4 & 7 \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 110 & 010 & 100 & 111 \end{array} \qquad \begin{array}{c|c} 2 & 6 \\ \hline 2 & 3-0 \\ \hline & 1-1 \end{array}$$

$6247_8 = 110010100111_2$

(E) 645_8

$$\begin{array}{ccc} 6 & 4 & 5 \\ \downarrow & \downarrow & \downarrow \\ 110 & 100 & 101 \end{array}$$

$645_8 = 110100101_2$

6. Convert the following Hexadecimal numbers to Binary numbers (A) A6 (B) BE (C) 9BC8 (D) BC9

***Ans.* (A)** $A6_{16}$

$$\begin{array}{cc} A & 6 \\ \downarrow & \downarrow \\ 10 & 6 \\ \downarrow & \downarrow \\ 1010 & 0110 \end{array} \qquad \boxed{A = 10}$$

$A6_{16} = 10100110_2$

(B) BE_{16}

$$\begin{array}{cc} B & E \\ \downarrow & \downarrow \\ 11 & 14 \\ \downarrow & \downarrow \\ 1010 & 1110 \end{array} \qquad \boxed{B = 11 ; E = 14}$$

$BE_{16} = 10111110_2$

(C) $9BC8_{16}$

$$\begin{array}{cccc} 9 & B & C & 8 \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 9 & 11 & 12 & 8 \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 1001 & 1011 & 1100 & 1000 \end{array}$$

$9BC8_{16} = 1001101111001000_2$

D) $BC9_{16}$

$$\begin{array}{ccc} B & C & 9 \\ \downarrow & \downarrow & \downarrow \\ 11 & 12 & 9 \\ \downarrow & \downarrow & \downarrow \\ 1011 & 1100 & 1001 \end{array}$$

$BC9_{16} = 101111001001_2$

7. Write the 1's complement number and 2's complement number for the following decimal numbers: (A) 22 (B) −13 (C) −65 (D) − 46

[Sep. 2020]

***Ans.* (A) 22**

$$\begin{array}{c|c} 2 & 22 \\ \hline 2 & 11 \quad -0 \\ \hline 2 & 5 \quad -1 \\ \hline 2 & 2 \quad -1 \\ \hline & 1 \quad -0 \end{array}$$

Binary equivalent of + 22 = 10110
8 bit format = 00010110

(B) − **13**

$$
\begin{array}{r|l}
2 & 13 \\
2 & 6 \quad -1 \\
2 & 3 \quad -0 \\
  & 1 \quad -1
\end{array}
$$

Binary equivalent of + 13   = 1101
8 bit format   = 00001101
1's complement   = 11110010
Add 1 to LSB   =   +1
2's complement of −13   = $\overline{11110011}$

(C) − **65**

$$
\begin{array}{r|l}
2 & 65 \\
2 & 32 \quad -1 \\
2 & 16 \quad -1 \\
2 & 8 \quad -1 \\
2 & 4 \quad -1 \\
2 & 2 \quad -0 \\
2 & 1 \quad -0
\end{array}
$$

Binary equivalent of + 65   = 1000001
8 bit format   = 01000001
1's complement   = 10111110
Add 1 to LSB   =   +1
2's complement of −65   = $\overline{10111111}$

(D) − **46**

$$
\begin{array}{r|l}
2 & 46 \\
2 & 23 \quad -0 \\
2 & 11 \quad -1 \\
2 & 5 \quad -1 \\
2 & 2 \quad -1 \\
  & 1 \quad -0
\end{array}
$$

Binary equivalent of + 46   = 101110
8 bit format   = 00101110
1's complement   = 11010001
Add 1 to LSB   =   +1
2's complement of −46   = $\overline{11010010}$

8.   **Perform the following binary computations:**

     (A) $10_{10} + 15_{10}$ **(B)** $-12_{10} + 5_{10}$

     (C) $14_{10} - 12_{10}$ **(D)** $(-2_{10}) - (-6_{10})$.

Ans. **(A)** $10_{10} + 15_{10}$

     Binary equivalent of 10 and 15
     10_{10} = 00001010
     15_{10} = 00001111
     25_{10} = $\overline{00011001}$

     (B) − $12_{10} + 5_{10}$

     Binary addition of −12 and 5
     12_{10} = 00001100
     1's complement   = 11110011
     Add 1 to LSB   =   +1
     2's complement   = $\overline{11110100}$

             -12_{10} = 11110100
             5_{10} = 00000101
             -7_{10} = $\overline{11111001}$

     (C) $14_{10} + 12_{10} = 14_{10} + (-12)_{10}$

     12_{10} = 00001100
     1's complement   = 11110011
     2's complement   = 11110100
     Binary addition of $14 - 12_{10}$

             14_{10} = 00001110
             -12_{10} = 00001100
             2_{10} = $\overline{00000010}$

     (D) $-(2_{10}) - (-6_{10}) = -2_{10} + 6_{10}$

     (-2_{10}) :
     8 bits   = 00000010
     1's complement   = 11111101
                     =   +1
     2's complement   = $\overline{11111110}$

             −2   = 11111110
             + 6   = 00000110
             + 4   = $\overline{100000100}$

PART - II - BOOLEAN ALGEBRA

EVALUATION

SECTION - A

CHOOSE THE CORRECT ANSWER:

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

[Ans. (b) Gate]

2. **Which gate is called as the logical inverter?**
(a) AND (b) OR *[Mar. 2019 & 2020]*
(c) NOT (d) XNOR

[Ans. (c) NOT]

3. **A + A = ?**
(a) A (b) O
(c) I (d) A **[Ans. (a) A]**

4. **NOR is a combination of?** *[FMT 2018]*
(a) NOT(OR) (b) NOT(AND)
(c) NOT(NOT) (d) NOT(NOR)

[Ans. (a) NOT(OR)]

5. **NAND is called as …… Gate** *[QY-'24]*
(a) Fundamental Gate (b) Derived Gate
(c) Logical Gate (d) Universal gate

[Ans. (d) Universal gate]

SECTION - B

VERY SHORT ANSWERS

1. **What is Boolean Algebra?**

Ans. 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. **Example:** X = A +B.

2. **Write a short note on NAND Gate.**

Ans. **(i)** The NAND gate operates an AND gate followed by a NOT gate.

(ii) 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".

3. **Draw the truth table for XOR gate.**

[[Mar. 2019; QY. & HY. '23]

Ans. The truth table for XOR gate is

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

4. **Write the associative laws.** *[July-'24]*

Ans. Associative

$A + (B + C) = (A + B) + C$

$A \cdot (B \cdot C) = (A \cdot B) \cdot C$

5. **What are derived gates?** *[June 2019]*

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

SECTION - C

SHORT ANSWERS

1. **Write the truth table of fundamental gates.**

Ans. The fundamental gates are AND, OR, NOT gates

(i) **AND Gate Truth Table :** *[Mar. 2020]*

A	B	A.B
0	0	0
0	1	0
1	0	0
1	1	1

(ii) **OR Gate Truth Table :**

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

(iii) NOT Gate Truth Table :

A	Ā
0	1
1	0

2. Write a short note on XNOR gate.

Ans. 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?   *[QY '23]*

Ans. 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.   *[Mar. & QY-'24]*

Ans.

A	B	A⊕B
0	0	0
0	1	1
1	0	1
1	1	0

5. Write the De Morgan's law.   *[July-'24]*

Ans. De Morgan's

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

SECTION - D

EXPLAIN IN DETAIL

1. Explain the fundamental gates with expression and truth table.   *[FMT; QY. 2018 & '23, '24; July-'24]*

Ans. A gate is 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.

AND Gate :

The AND gate can have two or more input signals and produce an output signal. In boolean algebra, a variable can take either of the values '0' or '1'. The logical symbol of the AND gate is
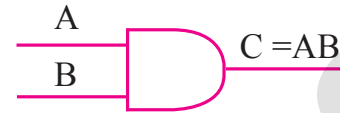
Logic symbol of AND Gate

In boolean algebra the multiplication sign stands for the AND operation. Therefore, the output of the AND gate is

     C = A . B or

simply   C = AB

The truth table for AND Gate is

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

The truth table for AND Gate

OR Gate :

The OR gate gets its name from the face that it behaves like the logical inclusive "OR". The output is "true" if either or both of the inputs are "true". If both inputs are "false" then the output is "false". In otherwords the output will be 1 if and only if one or both inputs are 1; otherwise, the output is 0. The logical symbol of the OR gate is
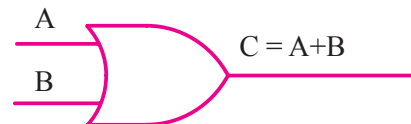
Logic symbol of OR Gate

The OR gate output is

     C = A OR B

We use the + sign to denote the OR function. Therefore,

     C = A + B

The truth table for OR gate is

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

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. The logical symbol of the NOT gate is

$$A \quad \triangleright\!\!\circ \quad C = \overline{A}$$
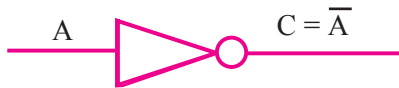
Logic symbol of NOT Gate

The boolean function of NOT gate is

C = NOT A

In boolean algebra, the overbar stands for NOT operation. Therefore, $C = \overline{A}$

The truth table for NOT gate is

Input	Output
A	C
1	0
0	1

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

Ans. (i) AND and OR operation from NAND gates are shown below.

NAND gates AND Operation :
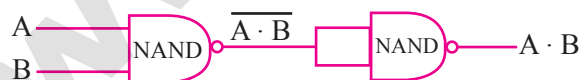
A.B = (A NAND B) NAND (A NAND B)

OR Operation :
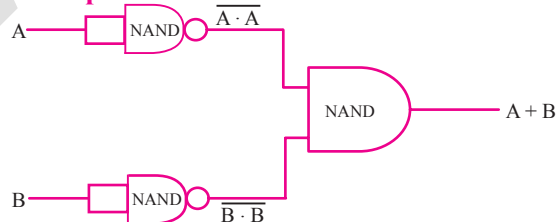
A+B (A NAND A) NAND (B NAND Y)

The truth table for NAND Gate is

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

(ii) AND and OR operation from NOR gates are shown below.

NOR gates AND Operation :
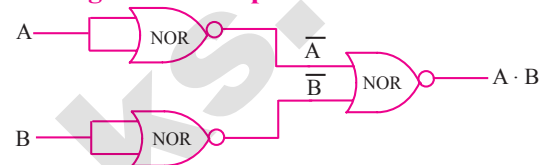
A− B = (A NORA A) NOR (B NOR B)

NOR gate OR Operation :
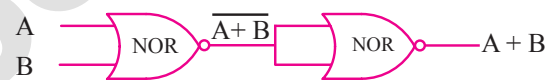
A +B = (A NOR B) NOR (A NOR B).

The truth table for NAND Gate is

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.**

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

(i) **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 $C = \overline{(A \cdot B)}$
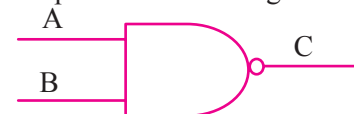
Logic Symbol of NAND Gate

The truth table for NAND gate is

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

(ii) 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".
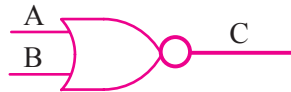
Logic symbol of NOR Gate

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".
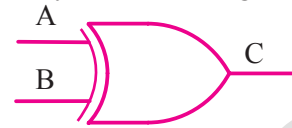
The truth table for NOR gate is

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

(iii) 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 ⊕ or "encircled plus".

Hence $C = A \oplus B$

The logical symbol of XOR gate is

Logic Symbol of XOR Gate

The truth table of XOR gate is

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

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

The logical symbol of XNOR gate is

Logic Symbol of XNOR Gate

The truth table for XNOR Gate is

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

GOVERNMENT EXAM QUESTIONS AND ANSWERS

1 MARK

1. **How many memory size in Tera Bytes contain?** *[QY. 2018; July-'23]*

(a) $2 \wedge 10$ (b) $2 \wedge 30$

(c) $2 \wedge 40$ (d) $2 \wedge 50$ **[Ans. (c) $2 \wedge 40$]**

2. **Which one of the following coding system is integrated with Unicode?** *[Govt.MQP-2018]*

(a) BCD   (b) ASCII

(c) EBCDIC   (d) ISCII

[Ans. (d) ISCII]

3. **A.A=?** *[QY. 2018]*

(a) A   (b) 0

(c) 1   (d) Ā   **[Ans. (a) A]**

4. **NOR is a combination of ....** *[FMT 2018]*

(a) NOT(OR)   (b) NOT(AND)

(c) NOT(NOT)   (d) NOT(NOR)

[Ans. (a) NOT(OR)]

5. $(10100110)_2 = (\underline{\quad})_{16}$ *[QY. 2018]*

(a) A5   (b) B5   (c) A6   (d) B6

[Ans. (c) A6]

6. For 1100_2 What is the Hexadecimal equivalent .... *[HY. 2018]*

(a) D   (b) C   (c) A   (d) B

[Ans. (b) C]

7. NAND and NOR Gates are called as ..... *[QY. 2018]*

(a) Fundamental Gates   (b) Logical Gates

(c) Universal Gates   (d) Electronic Gates

[Ans. (c) Universal Gates]

8. $\bar{\bar{A}} = $ _____ *[QY. 2019]*

(a) $\bar{\bar{A}}$ (b) 1   (c) 0   (d) A

[Ans. (d) A]

9. Which one is XOR gate? *[QY. 2019]*

(a)   (b)

(c)   (d)

[Ans. (c) **]**

10. For 1010_2 the Hexadecimal equivalent is: *[Mar. '23]*

(a) C   (b) B   (c) E   (d) A

[Ans. (d) A]

11. $\overline{A+B}$ = ? *[QY. '23]*

(a) $\bar{A} + \bar{B}$ (b) $\bar{A}.\bar{B}$

(c) $A + (\bar{A}.\bar{B})$ (d) $A.(A+B)$

[Ans. (b) $\bar{A}.\bar{B}$]

2 MARKS

1. Give ASCII codes for the characters A and Z?

Ans. ASCII codes for the characters *[Govt.MQP-2018]*
A = 65 ; Z = 90

2. $(8888)_8$ Is it Exactly Octal Number? State the Reason. *[QY. 2018]*

Ans. No. the numerals used in base 8 are 0 through 7, So 8888 is not a valid base 8 number.

3. Expand (i) EBCDIC (ii) BCD (iii) ASCII (iv) DLNN (v) ISCII *[QY. 2018]*

Ans. (i) EBCDIC - Extended Binary Coded Decimal Interchange Code

(ii) BCD - Binary Coded Decimal

(iii) ASCII - American Standard Code for Information Interchange.

(iv) DLNN - Dynamic Learning Neural Network.

(v) ISCII - Indian Standard Code for Information Interchange

4. Expand the following :1. Bit 2. MSB *[FMT 2018]*

Ans. (i) Bit - Binary Digit

(ii) MSB - Most significant Bit

5. Perform binary addition for the following $(-21)_{10} + (5)_{10}$ *[FMT 2018; Mar-'24]*

Ans. $(-21)_{10} + (5)_{10} - 21$ $= 10101_2$

1's complement $= 00010101$

2's complement $= 11101010$

2	21
2	10 – 1
2	5 – 0
2	1 – 0

               $+\ 1$

               $\overline{11101011}$

$5_{10} = 101_2$

$(-21)_{10} + (5)_{10}$ $= 11101011$

            00000101

-16_{10} Result $= \overline{11110000}$

6. Convert 340_{10} to its equivalent Binary, Octal and Hexadecimal. *[June 2019]*

Ans. $340_{10} = ?_2$

2	340
2	170 - 0
2	85 - 0
2	42 - 1
2	21 - 0
2	10 - 1
2	5 - 0
2	2 - 1
	1 - 0

$340_{10} = 101010100_2$

$340_{10} = ?_8$ $340_{10} = ?_{16}$

8	340
8	42 - 4
	5 - 2

$340_{10} = 524_8$

16	340
16	21 - 4
	1 - 5

$340_{10} = 154_{16}$

7. What is BCD? *[QY. 2019]*

Ans. **BCD :** Binary Coded Decimal is a 4-bit code used to represent the numeric data alone. For example, a number like 9 can be represented using Binary Coded Decimal as 1001_2 . Binary Coded Decimal is mostly used in simple electronic devices like calculators and microwaves.

8.   **C = A̅ .B + A. B̅ → Draw the logic circuit.**

Ans. The logic circuit of XOR gate is   *[QY. 2019]*
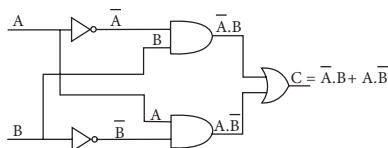
9.   **Convert the given binary number $(11.011)_2$ into its decimal equivalent.**   *[Mar. 2020]*

Ans. $(11.011)_2$

Integer part $(11)_2 = 3$

$2^1 \quad 2^0 \qquad 2^{-1} \quad 2^{-2} \quad 2^{-3}$

↑ ↑ ↑ ↑ ↑

1 1 . 0 1 1

$3 + . (0 \times 0.5 + 1 \times 0.25 + 1 \times 0.125) = 3.375$

$$(11.011)_2 = (3.375)_{10}$$

10.   **Find 2's complement of $(-57)_{10}$.**   *[Sep-2021]*

Ans. $(-57)_{10}$

```
2 | 57
2 | 28 − 1
2 | 14 − 0
2 | 7  − 0
2 | 3  − 1
    1  − 1        57₁₀ = 111001
```

$57_{10} = 111001$

8 bit format of 57_{10} = 00111001

1's complement   =   11000110
Add 1 bit   =   +1
2's complement   =   11000111

11.   **Convert $(44)_{10}$ into Binary number.**   *[May '22]*

Ans.
```
2 | 44
2 | 22 − 0
2 | 11 − 0
2 | 5  − 1
2 | 2  − 1
    1  − 0
```

$$(44)_{10} = 101100_2$$

12.   **Write a note on hexadecimal number system.**   *[Aug- '22]*

Ans. **(i)**   The base or radix is 16. Thus it has 16 possible digit symbols. It uses the digits 0 to 9 plus the letters A, B, C, D, E and F (with respect to 10, 11, 12, 13, 14, 15).

(ii)   It is generally used in micro computers.
Eg. $(ABC)_{16}$.

13.   **Perform binary addition for the following: $15_{10} + 20_{10}$**   *[Mar. '23]*

Ans. $15_{10} + 20_{10}$

Binary equivalent of 15 and 20

$15_{10} = 00001111$

$20_{10} = 00010100$

         00100011

```
2 | 15
2 | 7 − 1
2 | 3 − 1
    1 − 1
```
```
2 | 20
2 | 10 − 0
2 | 5  − 0
2 | 2  − 1
    1  − 0
```

14.   **$(1324)_8$ - convert to equivalent Decimal number.**   *[Mar-'24]*

Ans.

Weight	512	64	8	1
Positional notation	8^3	8^2	8^1	8^0
Given number	1	3	2	4

$(1324)_8 = 512 \times 1 + 64 \times 3 + 8 \times 2 + 1 \times 4$
$\qquad\quad = 512 + 192 + 16 + 4$
$(1324)_8 = (724)_{10}$

15.   **Perform binary addition for the follwoing. $(-12)_{10} + (15)_{10}$**   *[Mar-'24]*

Ans. Binary addition of −12 and 15

$12_{10} = 00001100$

1's complement   = 11110011
Add 1 to LSB   =   +1
2's complement   = 11110100
$(-12)_{10}$ = 11110100
$(15)_{10}$ = 00001111
                   = 100000011

```
2 | 15
2 | 7 − 1
2 | 3 − 1
    1 − 1
```

16.   **Convert the decimal number (88) to Binary, then convert that binary number to Octal.**   *[QY-'24]*

Ans.
```
2 | 88
2 | 44 − 0
2 | 22 − 0
2 | 11 − 0
2 | 5  − 1
2 | 2  − 1
    1  − 0
```

$88_{10} = (1011000)_2$

$88_{10} = ?_8$

$$\begin{array}{c|c} 8 & 88 \\ \hline 8 & 11 - 0 \\ \hline & 1 - 3 \end{array}$$

$88_{10} = 130_8$

3 MARKS

1. **C = A+B This expression belongs to which Operator? Draw the Diagram and Truth Table.** *[QY. 2018]*

Ans. C = A + B expression belongs to OR Gate operator.

Diagram :
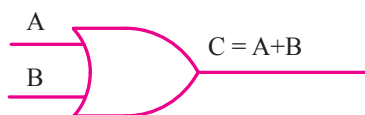
Truth table :

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

2. **Find 2's complement of −35** *[Govt.MQP-2018]*

Ans. −35

$$\begin{array}{c|c} 2 & 35 \\ 2 & 17 - 1 \\ 2 & 8 - 1 \\ 2 & 4 - 0 \\ & 2 - 0 \\ & 1 - 0 \end{array}$$

Binary equivalent of + 22 = 100011

8 bit format = 00100011

1's complement = 11011100

2's complement − 35 = +1

―――――――

11011101

3. **Draw logic symbol of XOR gate.** *[Mar. 2019]*

Ans. **XOR Gate :** The logical symbol of XOR gate is

4. **Explain byte, bit, nibble.** *[QY. & HY. 2019]*

Ans. **Byte :** Byte is a group of 8 bits which is used to represent a character. A byte is considered as the basic unit of measuring the memory size in the computer.

Bit : The most basic unit of information in a digital computer is called a bit. A bit is a binary digit which can be 0, or 1.

Nibble : A nibble is half a byte, which is usually a grouping of 4 bits. Word is the number of bits a processor can bundle (read/write) at a time.

5. **What is word length?** *[HY. 2019]*

Ans. The term word length is used as the measure of the number of bits in each word. For example, a word can have a length of 16 bits, 32 bits and 64 bits.

6. **(a) State whether the following numbers are valid or not, if invalid write reason.** *[Sep-2020]*

(i) $(796)_8$ **(ii) $(7GE)_{16}$** **(iii) $(11110)_2$**

(b) Write the number system for the following numbers.

(i) $(926)_{10}$ **(ii) $(ABC)_{16}$** **(iii) $(450)_8$**

Ans. (a) (i) $(796)_8$ - Invalid. In octal number, the allowable digits between 0 and 7.

(ii) $(7GE)_{16}$ - Invalid. Hexadecimal numbers are used as a shorthand form of binary sequence.

(iii) $(11110)_2$ - Valid.

(b) (i) Decimal Number system

(ii) Hexadecimal Number System

(iii) Octal Number System

7. **Convert $(111011)_2$ into its equivalent decimal number** *[CRT '22]*

Ans.

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

$32 + 16 + 8 + 0 + 2 + 1 = (59)_{10}$

$(111011)_2 = (59)_{10}$

8. **Convert the following Octal numbers into Binary numbers.** *[July- '23]*

(i) 6137 **(ii) 245**

Ans. (i) 6137_8

$6137_8 = 110111111_2$

(ii) 245_8

2   4   5

↓   ↓   ↓

10 100 101

2	5		2	4		2	2
2	2 – 1		2	2 – 0			1 – 0
	1 – 0			1 – 0			

$245_8 = 10100101_2$

5 MARKS

1. Convert the following to binary, then convert the binary number to hexadecimal *[Govt.MQP-2018]*

(a) 456 **(b) 855**

Ans. **(a) 456** Binary Number

	Quotient	Remainder
456/2	228	0
228/2	114	0
114/2	57	0
57/2	28	1
28/2	14	0
14/2	7	0
7/2	3	1
3/2	1	1
1/2	0	1

Binary Number $= (111001000)_2$

Hexadecimal Number $= (1C8)_{16}$

(b) 855

	Quotient	Remainder
855/2	427	1
427/2	213	1
213/2	106	1
106/2	53	0
53/2	26	1
26/2	13	0
13/2	6	1
6/2	3	0
3/2	1	1
1/2	0	1

Binary Number $= (1101010111)_2$

Hexadecimal Number $= (357)_{16}$

2. Convert the followings: *[QY. 2018]*

(i) $(65)_{10}$ $= ( )_2$ *[CRT '22; QY.'23]*

(ii) $(5AF)_{16}$ $= ( )_2$ **(iii)** $(12.29)_{10}$ $= ( )_2$

(iv) $(452)_8$ $= ( )_2$ **(v)** $(1100101)_2$ $= ( )_8$

Ans. **(i)** $(65)_{10} = ( )_2$

2	65
2	32 – 1
2	16 – 0
2	8 – 0
2	4 – 0
2	2 – 0
	1 – 0

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

(ii) $(5AF)_{16}$ $= ( )_2$

        $= (10110101111)_2$

5AF

⟋ ⟍

1455

(iii) $(12.29)_{10} = ( )_2$

1.   Integer Part

2	12
2	6 – 0
2	3 – 0
	1 – 1

2.   Fractional Part

$0.29 \times 2 = 0.58 = 0$

$00.58 \times 2 = 1.16 = 1$

$(12.29)_{10} = 1100.0100_2...$

(iv) $(452)_8 = ( )_2$

4   5   2

↓   ↓   ↓

100 101 010

100101010_2

2	2		2	4
	1 – 0		2	2 – 0
				1 – 0

2	5
2	2 – 1
	1 – 0

(v) $(1100101_2) = ( )_8$

        $= 145_8$

3. Add the following using 2's Complement.
   (i) –18 + –25 (ii) –63 + –14   *[QY. 2018]*

Ans. (i) **–18 + (–25)**

$18_{10} = 00010010$

2	18
2	9 – 0
2	4 – 1
2	2 – 0
	1 – 0

1's complement = 11101101
2's complement = $\underline{\qquad\qquad 1}$
                 11101110
–25

$-25_{10} \qquad = 00011001$

2	25
2	12 – 1
2	6 – 0
2	3 – 0
	1 – 1

1's complement = 11100110
2's complement = $\underline{\qquad\qquad 1}$
                 11100111

$-18_{10} \qquad = \quad 11101110$
$-25_{10} \qquad = \quad \underline{11100111}$
                       $\underline{111010101}$

   (ii) –63 + (–14)

$63_{10} = 00111111$

2	63
2	31 – 1
2	15 – 1
2	7 – 1
2	3 – 1
	1 – 1

1's complement = 11000000
2's complement = $\underline{\qquad\qquad 1}$
                 11000001

–14 = 00001110

1's complement = 11110001
2's complement = $\underline{\qquad\qquad 1}$

2	14
2	7 – 0
2	3 – 1
	1 – 1

                 11110010

$-63 - 14 \qquad = \quad 11000001$
                     $\underline{11110010}$
                     $\underline{110110011}$

4. Prove DeMorgan's First Law using truth table.
                                              [QY. 2019]

Ans. **Bubbled AND Gate :** The **L**ogic Circuit of Bubbled AND Gate.
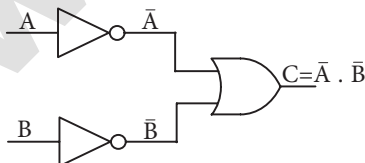
In the above circuit, inverters on the input lines of the AND gate gives the output as C = (A . B).
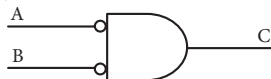
This circuit can be redrawn as the bubbles on the inputs, where the bubbles represent inversion.

We refer this as bubbled AND gate. Let us analyses this logic circuit for all input possibilities.
If A = 0 and B = 0 C=(0.0) = 1.1 = 1
If A = 0 and B = 1 C=(0.1) = 1.0 = 0
If A = 1 and B = 0 C=(1.0) = 0.1 = 0
If A = 1 and B = 1 C=(1.1) = 0.0 = 0
Here the truth table is

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

In other words the circuits are interchangeable.
Therefore $(A + B) = A . B$

5. Which establishes the De Morgan's first theorem.
   Convert: (i) $8BC_{16} = (\ )_2$ (ii) $6213_8 = (\ )_2$
   (iii) $255_{10} = (\ )_{16}$ (iv) Add:$-22_{10} + 15_{10}$ *[QY. 2019]*
   (v) -98_{10}–write the 2's complement.

Ans. (i) $(8BC)_{16} = (\ )_2$ *[Mar. 2019]*

   8   B   C
   ↓   ↓   ↓
   1000   1011   1100

   $8BC_{16} = (100010111100)_2$

(ii) $(6213)_8 = (\ )_2$ *[Mar. 2019]*

   6   2   1   3
   ↓   ↓   ↓   ↓
   110   010   001   011

   $(6213)_8 = (110010001011)_2$

(iii) 255_{10}
   $255_{10} = 377_8$
   $255_{10} = ?_{16}$

16	255		15 – F
	15 – 15		

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

(iv) $-22_{10} + 15_{10}$

```
2 | 22
2 | 11  – 0 ↑
2 | 5   – 1
2 | 2   – 1
    1   – 0
```

```
2 | 15
2 | 7   – 1 ↑
2 | 3   – 1
2 | 1   – 1
```

$(1111)_2 \Rightarrow (00001111)_2$

$(10110)_2 \Rightarrow (00010110)_2$

1's complement	= 11101001
2's complement	= 11101010

$(-22)_{10} + (15)_{10}$ = 11101001
                  = 00001111
                  —————————
                  11111001

(v) -98_{10}

```
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

6. (i) Convert $(923)_{10}$ into Octal and Hexadecimal.

(ii) Convert $(99.76)_{10}$ into Binary   *[Sep-2021]*

Ans. **(i)** $(923)_{10}$

    Octal number:

```
8 | 923
8 | 115 – 3
8 | 14  – 3
    1   – 6
```
$(923)_{10} = (1633)_8$

    Hexadecimal number:

```
16 | 923
16 | 57 – 11
     3  – 9
```
$(923)_{16} = (39B)_{16}$

(ii) $(99.76)_{10}$

    1. Integer Part

```
2 | 99
2 | 49 – 1
2 | 24 – 1
2 | 12 – 0
2 | 6  – 0
2 | 3  – 0
    1  – 1
```

    2. Fractional Part

0.76×2	=	1.52	=	1
0.52×2	=	1.04	=	1
0.04×2	=	0.08	=	0
0.08×2	=	0.16	=	0
0.16×2	=	0.32	=	0
0.32×2	=	0.64	=	0
0.64×2	=	1.28	=	1

$(99.76)_{10} = 1100011.1100001$

7. Explain 1's compliment representation with an example.   *[Aug '22]*

Ans. This is an easier approach to represent signed numbers. This is for negative numbers only i.e. the number whose MSB is 1.

The steps to be followed to find 1's complement of a number:

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

8. (a) Add : 1 1 1 1 0 1 1 1 + 1 0 0 0 1 1   *[QY-'24]*

(b) Subtract : 1 0 0 0 0 0 – 1 0 1 0 1

Ans. **a)** 1 1 1 1 0 1 1 1
     + 1 0 0 0 1 1
     ———————————
     1 0 0 0 1 1 0 1 0 $_2$

b) 1 0 0 0 0 0
    – 1 0 1 0 1
    ——————————
      1 0 1 1 $_2$

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. How many ways are there to represent signed binary number?
  (a) 2   (b) 4   (c) 1   (d) 6
            [Ans. (c) 1]

9. In binary numbers, the signed negative number has a prefix?
  (a) –   (b) 0   (c) 1   (d) 2
            [Ans. (c) 1]

10. How many unique symbols in Octal number system?
  (a) 4   (b) 16   (c) 2   (d) 8
            [Ans. (d) 8]

11. How many procedures are there to convert from decimal to binary?
  (a) 2   (b) 4   (c) 8   (d) 3
            [Ans. (a) 2]

12. How many common coding schemes are used to represent a character?
  (a) 2   (b) 3   (c) 4   (d) 5
            [Ans. (c) 4]

13. Which complement performs the logical negation on each individual bit?
  (a) Signed   (b) Unsigned
  (c) 2's   (d) 1's
            [Ans. (b) Unsigned]

14. 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]

15. 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++]

16. Which of the programs used Unicode?
  (a) C   (b) C++
  (c) Java   (d) None of these
            [Ans. (c) Java]

17. 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]

18. 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]

19. 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]