# Chapter One – Information and Communication Technology: Global and Bangladesh Perspective

At a Glance: What's in This Chapter

Information Technology, Global Village, Virtual Reality, Artificial Intelligence, Robotics, Robot, IoT, Cryosurgery, Space Exploration, ICT-Based Production System, Biometrics, Bioinformatics, Genetic Engineering, Nanotechnology, Ethics of Information and Communication Technology, Hacking, ICT in the Development of Bangladesh: Digital Bangladesh.

## Information Technology

The English word is Technology, which is derived from the Greek words Techne and Logia. Imagine you are sending a parcel to someone through a nearby courier service. Before the recipient receives it, they get a message with the parcel's tracking ID. Later, using that ID, the recipient collects the parcel. That ID is a piece of information delivered through a system, and that system is referred to as technology. In simple terms, when information is exchanged through technology, it is called Information Technology.

Claude Elwood Shannon was named the Father of Information Technology in 1916.

## Contributions of Information Technology:

The contributions of information technology today are limitless. There is hardly any field where IT has not made an impact.

Video Lecture on Information Technology and Global Village

1. We can now access all types of information from home.
2. We can get news from any part of the world.
3. Wastage is reduced.
4. Saves time.
5. Many official tasks can be done from home.
6. Education can be acquired online from home.
7. Products can be ordered and purchased from home.
8. Various bills—water, electricity, gas, telephone, broadband—can be paid from home.
9. Food can be ordered.

There are many such unimaginable tasks that can now be easily done through IT.

**Components of Information Technology:** 1. Mobile. 2. Telephone. 3. Computer. 4. Fax. 5.Radio. 6. Television. 7. Satellite. 8.Terrestrial. 9. Tower and all electronic communication devices

## Concept of Global Village

The global village is essentially a concept where people around the world are connected through electronic communication, forming a single community. The global village is a social or cultural system based on information and communication technology, where people from every corner of the world live as one unified society. Canadian philosopher and English professor Marshall McLuhan brought this concept to the forefront in 1964, describing the entire world as a Global Village. He is considered the pioneer of the Global Village. He envisioned a world under one umbrella where people would exchange cultures and share information easily. The global village primarily refers to the internet system.

## Advantages of the Global Village:

1. Communication with anyone in the world within a very short time.
2. Geographic distances feel reduced in communication.

3. Lower management costs.
4. Access to any library worldwide through the internet.
5. Education from international institutions can be acquired from home.
6. Awareness of global situations.
7. Understanding of different cultures.
8. Business can be conducted from home.
9. Buying and selling products can be done from home.
10. Through telemedicine, patients can consult renowned doctors globally.
11. Online outsourcing and freelancing provide income opportunities.

**Disadvantages of the Global Village:**

1. Excessive internet use causes health problems.
2. It can lead to mental issues.
3. One person may handle multiple roles, leading to increased unemployment.
4. Hacking or theft of important confidential information may cause significant harm.
5. False information spreads quickly, creating social unrest.
6. People often believe in information without verification.
7. People tend to have more virtual than real friends.
8. Cultural degradation may occur due to unhealthy cultural exchanges.

**Components Required to Establish a Global Village:**

1. **Hardware:** Includes computers, mobile phones, telephones, smartphones, audio-video recorders, satellites, terrestrial systems, radios, televisions and related ICT devices.
2. **Software:** Operating systems, browsers, Google, Facebook Messenger, WhatsApp, Viber and programming languages are crucial.
3. **Internet Connectivity:** Without internet, even with hardware and software, communication is impossible. Internet is the backbone of the global village.
4. **Data:** The smallest unit of information. Without data exchange, the concept of the global village is meaningless.
5. **Human Knowledge/Skill:** The most important component. Without human intelligence, the global village cannot exist.

**Components of the Global Village:**

**Communication:**

The primary goal is to create communication networks, achieved through telephones, mobile phones, Skype, Viber, teleconferencing, video conferencing, radio, television, walkie-talkies etc.

**Email:**

Electronic mail (email) requires an address like: username@gmail.com.

Example: shahriarnazim.pust@gmail.com

**Teleconferencing:**

Communicating between two or more people from different geographic locations using devices like telephones or mobile phones. It allows participation in meetings remotely, saving time and money.

**Types:**

1. Video Conferencing
2. Audio Conferencing

## Knowledge-Based Questions and Answers

**1. What is Information Technology?**
Information technology is the exchange of information using electronic technology.

**2. What is Telemedicine?**
Telemedicine is a method of receiving medical care from home. It refers to providing medical services via mobile phone or video conferencing.

**3. What is Electronic Fund Transfer?**
EFT stands for Electronic Fund Transfer. It's a system that allows money to be transferred or exchanged through websites or electronic banking.

**4. What is CAD?**
CAD stands for Computer-Aided Design. It's specialized software used in engineering for various tasks like graphics, drafting, design, or simulation.

**5. What is a Barcode?**
A barcode is a type of scanner that can read barcodes (a series of parallel lines) and send the data to a computer.

**6. What is Nanotechnology?**
Nano is a unit of length measurement. The word "nano" means tiny, and "technology" means technology. Technologies developed at the nanometer scale are referred to as nanotechnology.

**7. What is a 'Smart Home'?**
A smart home is a living space where various essential systems, including security control, heating, cooling, fans, lights, TVs, ACs, air coolers, windows and window coverings, room doors, house gates, and the main gate system, can be controlled remotely from anywhere.

**8. What is Bioinformatics?**
Bioinformatics is the branch of technology that interprets and analyzes problems and biological data in biology, and develops various methods, software, or tools for this interpretation and analysis.

**9. What is Genetic Engineering?**
Genetic engineering, or gene engineering, involves extracting a specific gene from a living cell using biotechnology, inserting it into another living cell and making it functional, or modifying an organism's DNA to create new characteristics.

**10. What is a Robot?**
A robot is a computer-program-controlled electronic device that operates autonomously or under human instruction.

**11. What is Artificial Intelligence?**
Artificial Intelligence (AI) is the ability of machines to perform tasks that typically require human intelligence, such as learning, reasoning, and problem-solving.

**12. What is an Expert System?**
An expert system is a computer-controlled system that combines human problem-solving capabilities and thinking skills.

**13. What is a Neural Network?**
A neural network is an advanced computing architecture designed to mimic the neurons found in the human brain.

**14. What is Office Automation?**
Office automation refers to a system for managing one or more offices with the help of a computer system.

**15. What is Hacking?**
Hacking involves accessing another person's computer or computer network without permission to delete information, steal information, alter information, or introduce viruses.

**16. What is a Cryoprobe?**
A cryoprobe is an extremely fine, needle-tipped instrument used in cryosurgery to apply cryogenic agents (gases) to diseased areas.

**17. What are Cryogenic Agents?**
Cryogenic agents are liquid gases used in cryosurgery to bring the diseased area to a specific cold temperature. liquid nitrogen,
liquid argon gas, liquid carbon dioxide gas,
dimethyl ethyl propane,
nitrous oxide, ethyl chloride, fluorinated hydrocarbons, etc.

## Comprehension-Based Questions and Answers

**01. Explain: "The technology-based world is a global village."**

The global village is essentially a concept where people around the world become a community through communication, transportation and electronic connectivity. The global village refers to a technology-dependent social or cultural system in which people from all corners of the world live together as a single society.

**02. Describe the method of identifying a person through behavioral characteristics.**

With the help of biometric technology, a person is identified based on behavioral characteristics using behavioral data such as voice recognition systems, signature verification methods, and typing keystroke recognition systems. The system takes a person's behavioral traits as input data and compares them to previously stored data for identification.

**03. Explain how training is possible through simulator and modeling software.**

Simulator and modeling software create an imaginary 3D environment, known as virtual reality. It is a simulated setting where experiences feel real. Nowadays, training is made possible through virtual reality. For example, soldiers can receive advanced and precise training by simulating real battlefields. Similarly, in driving, sailing, or flying training, the trainees can easily learn the necessary rules and procedures as if they were in real-life situations.

**04. Which technology enables mango production throughout the year? Explain.**

Through genetic engineering, completely new crop varieties are being produced from existing ones. Using recombinant DNA technology, genes responsible for nutrition, fruit growth, photosynthesis efficiency, and year-round productivity are collected from various plants and inserted into mango saplings. As a result, it is possible to grow mangoes throughout the year.

**05. Explain Artificial Intelligence.**

If a computer or machine can make decisions on its own, it is called Artificial Intelligence (AI). Artificial Intelligence is a type of computer-controlled intelligence that mimics human thinking through computer programs or software. It attempts to simulate human intelligence and decision-making abilities.

**06. Explain the top-down approach technology.**

In the top-down approach, larger structures are created without using atomic-level nano-objects. In this method, a larger object is cut down into smaller parts to give it a specific shape. Our current electronics follow this top-down approach, whereas nanotechnology generally follows a bottom-up approach.

**07. Explain how Information Technology and Communication Technology complement each other.**

Collecting information using any technology is called Information Technology, while the process of transferring that information from one place to another is Communication Technology. Just collecting data is not beneficial if it cannot be transmitted. One is incomplete without the other. Therefore, it is said that information technology and communication technology complement each other.

**08. Explain why hacking is an unethical activity.**

At present, hacking is considered one of the major unethical activities. Those involved in hacking are called hackers. They access others' computers or networks without permission, delete data, steal or alter information, and insert viruses. These activities are known as hacking. Hackers are often identified by "hat" categories.

## Important MCQ Board Exams 2025

1. What is the design or layout of biological characteristics called? [Dhaka Board-2025]
(A) Gene (B) Genome
(C) Nucleus (D) Chromosome
Ans: B

2. Which one is an interdisciplinary science? [Dhaka Board-2025]
(A) Robotics (B) Biometrics
(C) Bioinformatics (D) Genetic Engineering
Ans: C

3. What is the term for visualization using both hardware and software? [D.B: 2025]
(A) Robotics
(B) Biometrics
(C) Virtual Reality
(D) Artificial Intelligence
Ans: C

4. Which technique allows a computer to speak and listen? [Mymensingh Board-2025]
(A) Machine Learning
(B) Image Processing
(C) Speech Processing
(D) Natural Language Processing
Ans: C

5. Which of the following technologies is used in creating national ID cards? [M.B-2025]
(A) Biometrics
(B) Digital Land Service
(C) Geographic Information
(D) Optical Fiber
Ans: A

**Answer questions 6 and 7 based on the following stimulus:**

Scientist Suman and Dr. Shefa are conducting experiments on molecular scale technology and simulated surgery respectively.

6. Which field is related to Scientist Suman's activities? [Comilla Board-2025]
(A) Cryosurgery (B) Nanotechnology
(C) Robotics (D) Biometrics
Ans: B

7. What is a feature of Dr. Shefa's experimental subject? [Comilla Board-2025]
(A) Application of low temperature
(B) Use of cold argon gas
(C) Use of telepresence
(D) Use of fine needle tubes
Ans: C

8. Which technology is used to increase the durability of tennis balls? [J.B: 2025]
(A) Artificial Intelligence (B) Robotics
(C) Nanotechnology (D) Bioinformatics
Ans: C

9. Which is the technology of the hidden layer? [Jessore Board-2025]
(A) Genetic Engineering (B) Biometrics
(C) Artificial Intelligence (D) Robotics
Ans: C

10. In the low-temperature treatment method— [Jessore Board-2025]
i. Side effects are less
ii. Patients do not need prior preparation
iii. Patients do not have to stay long in the hospital after treatment
Which of the following is correct?
(A) i & ii (B) i & iii
(C) ii & iii (D) i, ii & iii
Ans: A

11. Which is used for sterilization purposes? [Chittagong Board-2025]
(A) Nanotechnology (B) Genetic Engineering
(C) Robot (D) Cryosurgery
Ans: A

12. How many layers are there in a neural network? [Chittagong Board-2025]
(A) 2 (B) 3 (C) 4 (D) 5
Ans: B

13. Which of the following is an outsourcing marketplace? [Barisal Board-2025]
(A) Facebook (B) Myspace
(C) Upwork (D) Digg
Ans: C

## Important multiple choices selected from multiple choices

1. What is the meaning of online interaction? (S.Bo-24)

(A) E-Study (B) E-Learning
(C) On Learning (D) Interactive Classes
Ans:B

2. What is the process of working like the human brain? (Ch. Board-24)

(A) Deep Learning (B) Neural Network
(C) Machine Learning (D) Neural Path
Ans:B

3. Which of the following is used in cryosurgery medical procedures? (J.B-23)

(A) Cryogenic agent (B) Surgery
(C) Radio therapy (D) Chemotherapy
Ans:A

4. The cryogenic agent is- (D. Bo-24)

I. Liquid nitrogen
II. Liquid hydrogen
III. Oxygen

(A) I ও II (B) I ও III
(C) II ও III (D) I , II ও III
Ans:A

5. What is needed to make product design? [R.Bo-24]

(A) PAT (B) PLC (C) NAT (D) CAD
Ans:D

6. Capture, Extraction Comparison and Matching are used in which technology? [C.Bo, M.Bo-23]

(A) Robotics
(B) Biometrics
(C) Artificial Intelligence
(D) Genetic Engineering
Ans:B

7. What is the technology to uniquely identify individuals? (R. Board 17)

(A) Bioinformatics (B) Biometrics
(C) Nanotechnology (D) Robotics
Ans:B

8. Biometrics are used- (D.B-23)

I. DNA Mapping
II. Gene Finding
III. Machine Learning

(A) I & II (B) I & III
(C) II & III (D) I , II & III
Ans:A

9. Scientist Maksudul Alam gained fame in the world court by researching on which subject? (Ch.Bo-24)

(A) Corn (B) Rice (C) Rice (D) Jute
Ans:D

10. What is the shape of a nanoparticle? (D. B-23)

(A) 1 to 100 nm (B) 1 to 200 nm
(C) 1 to 300 nm (D) 1 to 400 nm
Ans:A

11. How many methods is nanotechnology used? (Ch.Bo-23)

(A) 2 (B) 3 (C) 4 (D) 5
Ans: A

12. What is the technology used to make sunscreen and moisturizer? (B.Bo-23)

(A) Bioinformatics (B) Cryosurgery
(B) Genetic Engineering (D) Nanotechnology
Ans:D

13. Which technology is used to decontaminate the waste of tannery industry? [D.Bo-24]

(A) Virtual reality (B) Bioinformatics
(C) Nanotechnology (D) Genetic engineering
Ans:C

14. Which of the following is required to operate computer related equipment properly? [B.B.19]

(A) Hardware (B) Software
(C) The Internet (D) The Internet
Ans:B

15. Which is the most important element in the case of a global village ? [H. Bo-2017]

(A) The Internet (B) Newspapers
(C) The television (D) The mobile
Ans:A

16. What is the name of the book written by Marshall Mcluhan in 1964?

(A) Understanding Media
(B) Engins of Creation

(C) Tha Gutenberg Galaxy
(D) Tha Global Village
Ans:A

17. What is outsourcing? [D.B.-16]
(A) Working at specific working hours
(B) Internet-based work
(C) Special Browsing Facility
(D) Worldwide network system

Outsourcing is the work of a third person or organization with the help of technology without doing the work of an organization itself.

Ans:B

18. What is the field of application of computer simulation ?
(A) Cryosurgery (B) Virtual Reality
(C) Internet (D) Video conferencing

Morton L. Helgi made the first virtual reality debut with a device called the Sensorama Stimulator.

Ans:B

20. What is the technology of expressing human thoughts through machines ? [C.Bo.-19]
(A) Biometrics (B) Bioinformatics
(C) Artificial Intelligence (D) Virtual Reality

Artificial Intelligence (AI) is a type of **computer-controlled** knowledge that controls human thinking through computer programs or software.

Ans:C

21. What is robotics? [K.B.-16]
(A) Robot science
(B) Robot activity
(C) Robots used in industry
(D) Language used in making robots

Robotics is a branch of technology that discusses the design, construction, structure, operation and application of robots.

Ans:A

22. What is the technology of human difficulty? D.B.-2017]
(A) Robotics (B) Virtual Reality
(C) Nanotechnology (D) Artificial intelligence

Robots are used as an alternative to humans for dangerous work and to defuse bombs.

Ans:A

23. What is the function of a robot ? [R.B.16]
(A) In complex surgical treatment
(B) Recognizing the person's signature
(C) Production of new varieties of seeds
(D) To make the shape of a tennis ball
Ans:A

24. Actuators are used in- [Ch.B.-17]
(A) Robotics (B) Biometrics
(C) Virtual Reality (D) Bioinformatics

The actuator is called the robot that can move in different directions and manage its activities.

Ans:A

25. Main ingredients used in cryosurgery- [J.B-19]
(A) Oxygen (B) Nitrogen
(C) Hydrogen (D) Methane

In this method, the following cryogenic agents or gases are used to freeze diseased parts – liquid nitrogen, liquid argon gas, liquid carbon dioxide gas, dimethyl ethyl proprene, nitrous oxide, ethyl chloride, fluorinated hydrocarbons etc.

Ans:B

26. Cryosurgery is used in the medical procedure-
(A) Argon (B) Carbon monoxide
(C) Solid nitrogen (D) Dimethanol ethane
Ans:A

27. Which one is related to cryosurgery? [D.B.-16]
(A) Fuzzy Logic (B) Special type of gloves
(C) Nitrogen (D) Navigation
Ans:C

28. Cryosurgery is used- [J.B.-16]
(A) Plastic surgery (B) Heart bypass
(C) Eye lens replacement (D) Liver cancer

In surgery, cryosurgery is used in the treatment of abnormally diseased tissue, in the treatment of cancer.

Ans:D

29. Which technology can be used to uniquely identify humans ? [R.B.17;B.B.-16;Cu.Bo.-16]

(A) Nanotechnology (B) Biometrics

(C) Genetic engineering (D) Bioinformatics

A person is uniquely identified based on their body structure and behavioral characteristics.

Ans:B

30. Which technology helps the customer in purchasing a mobile SIM? [J.B-16]

(A) Biometrics (B) Genetic engineer

(C) Nanotechnology (D) Cryosurgery

Fingerprint is a biometric method of identifying individuals in a unique way by matching previously stored data with human fingerprints.

Ans:A

31. Behavioral Characteristics of Biometrics- [C.B-19]

(A) Key Stoke (B) DNA Structure

(C) Retina scan (D) Facial recognition

Ans: A

32. In which of the following is biology combined with databases, algorithms, statistics etc.? [S.Bo.-16]

(A) Biometrics (B) Robotics

(C) Bioinformatics (D) Genetic engineering

Ans:C

33. Which is the technology of making new sequences of DNA? [S.Bo.-16]

(A) Nanotechnology (B) Genetic engineer

(C) Biometrics (D) Bioinformatics

Ans:D

34. Which technology is working to discover the cause of various complex diseases?[D.B-19]

(A) Bioinformatics (B) Nanotechnology

(C) Genetic Engineer (D) Cryosurgery

Ans: A

35. Computer technology has been applied to the management of biological information.

(A) Bioinformatics (B) Genetic engineer

(C) Cryosurgery (D) Biometrics

Ans:A

36. What is used in gene findine research ?

(A) Biometrics (B) Bioinformatics

(C) Genetic Engineer (D) Nanotechnology

Sequence alignment
DNA analysis (DNA analysis)
Gene Finding
Drug Design (Drug Design)
Bioinformatics is used in the study.

Ans:B

37. Who is the father of genetic engineering? [B.B.19]

(A) JackWilliamson (B) E. Coli

(C) Paul Berg (D) Stanley Cohen

In 1972, Paul Berg created the world's first recombinant DNA molecule by combining the DNA of monkey virus SV40 and lambda virus. That's why Paul Berg is called the father of genetic engineering.

Ans:C

38. Which technology is used to produce high yielding crops ? [ch.Bo.-2017]

(A) Biometrics (B) Virtual Reality

(C) Nanotechnology (D) Genetic engineering

Genetic engineering is used to make medicines, to make hormones, to increase the quality of crops, to produce insulin.

Ans:D

39. What is an object made from a molecular component called? [J. Bo-16]

(A) Biometrics (B) Genetic engineer

(C) Nanotechnology (D) Bioinformatics

Ans:C

40. In the top-down method, something is given a specific shape . What is the technology involved ? [ch.Bo.-19]

(A) Biometrics (B) Bioinformatics

(C) Genetic Engineer (D) Nanotechnology

Ans:D

# Selected Important Creative

**Creative Questions-01.**

I won't stay in a closed room.
Let's see the world now.
……
I'll listen to any indication
Flying from Mars
I will see the world
Put it in your hand.

A. What is Software Piracy?

B. How has robotics technology made people's work easier?

C. What concept of information technology is reflected in the scenario? Explain.

D. Analyze the two technologies used as the medium to create the scenario that complement each other.

**Creative Question-01 Solution**

**A. Answer:**

Software piracy refers to copying, using, distributing or modifying any software without the permission of an authorized owner or manufacturer.

**B. Answer:**

Robotics is a branch of technology, which discusses the design, construction, structure, operation and application of robots, that branch is called robotics. Able to complete any work quickly and accurately. Can work continuously or without fatigue. Robots can work in any risky place. Robotics technology has made human work easier by performing various tasks.

**C. Answer:**

The concept of information technology reflected in the scenario is Global Village or Global Village.

Global Village is basically a concept where people of the world become a community through communication, transportation, electronic communication. Global village or global village is a social or cultural system based on information and communication technology, where people from all parts of the world live in a single society. And based on the interaction of the people of this village, Canadian philosopher and professor of English Marshall McLuhan brought the whole world on one platform. Which is called Global Village or Global Village. He brought the whole world under one umbrella where people would exchange their cultures. It will easily exchange information. Because of which the whole world has come into the hands of people.

**D. Answer:**

The two technologies used to create the stimulus scenario are information technology, the global village and space exploration. They complement each other and are analyzed below -

At present, the use of information technology is playing a very important role in space missions. A space mission is a mission to study objects in outer outer space.

With the help of information and communication technology, spacecraft management, space observation, analysis of various data, creation of spacecraft, constant communication etc. are done for space missions.

Starting with the world's first manned spacecraft, Vostok-1, all the spacecraft made till date have used very modern technology. Space missions can be conducted automatically or by remote control or by astronaut-carrying spacecraft . Unmanned rovers are capable of sending images from Mars and other planets.

So it can be said that information technology, the global village and space exploration are complementary to each other.

**Creative Questions-02.**

After completing his studies, Surya did not get a job and chose the path of earning money by working at home through the internet. Within a few years, he became financially self-reliant and earned a lot of foreign currency. Later, many people in his area became self-reliant by following this path. His brother Pratap stayed at home and studied at a university in America and obtained a higher degree.

A. What is plagiarism?

B. What is the data used in bioinformatics? Explain.

C. What is the process of attaining a higher degree of glory in the stimulus? Explain.

D. Analyze the rationale of the activities of the sun in the reality of Bangladesh.

**Creative Question-02 Solution**

**A. Answer:**

Plagiarism is the publication of any writing, information, literature, research work of a person or organization by copying or partially changing it in the name of one's own or one's own organization.

**B. Answer:**

Bioinformatics is the branch of technology that analyzes biological problems and interprets biological data and creates various methods of software or tools to analyze explanations . DNA, genes, amino acids, nucleic acids, etc.

**C. Answer:**

Pratap's university degree has been possible tAArough the benefits of information and communication technology through e-learning or distance learning.

E-learning is electronic learning, internet or technology-based education. Through e-learning, we can learn any education at home for free. You need an e-book for that. E-book or electronic book refers to the document book of text, images, etc. in digital form, which can be read using a computer, tab, e-book reader and smart phone etc. By connecting to the internet, a student can study and earn a degree in any educational institution in the world. Can exchange views on education with teachers of different countries.

So it can be said that Pratap earned a degree from an American university through a distance learning process.

**D. Answer:**

Outsourcing is the activity of the sun to the stimulus.

Outsourcing is the work of a third person or organization with the help of technology without doing the work of an organization itself. That is, outsourcing is the work of others at a specific time. In this case, organizations post their jobs on their various job / job sharing websites (such as upwork.com, fiverr.com, freelancer.com). Many educated unemployed people in our country are able to earn money by using outsourcing. Which has now become a profession for many. Bangladesh earns millions of dollars every year from outsourcing. As a result, many people are getting involved in various activities, creating employment.

That is, in the reality of Bangladesh, the activities of the sun will play a key role in earning foreign currency.

**Creative Questions-03.**

Sabbir and Asif are two friends. After completing his studies, Sabbir started a business of his own. In order to buy and sell business products and conduct other business activities, open its own website and e-mail account and advertise the products in a short time, he gains business growth and fame in a short time. On the other hand, Asif has been unemployed for a long time without getting a job, finally after receiving computer training from the local youth-development center, he has become economically self-reliant by earning foreign currency in a special way at home. Inspired by Asif's success, the unemployed youth of the neighborhood were interested in following Asif.

## SELF TEST

**1. Which of the following is an e-commerce website?**

a) www.odesk.com b) www.bikroy.com
c) www.guru.com d) www.elance.com

**2. With the help of which complex medical problems can be solved?**

a) Mycsyma b) Prospector
c) Mycin d) Navigation

**3. What is biometrics used for?**

a) To prepare identity cards
b) To prepare medicines
c) To create new advanced animals
d) To create solar energy

**4. Which of the following factors played the most important role in establishing a global village?**

a) The Internet b) The Internet
c) Television d) Telephone

**5. What is the modern method for conducting meetings between multiple people located remotely?**

a) Satellite b) Email
b) Bulletin board d) Video conference

**6. What is the website to find outsourcing ?**

a) bdjobs.com b) yahoo.com.
c) upwork.com d) microsft.com

**7. What is the employment opportunity through the Internet ?**

a) E-commerce b) E-commerce
c) Google d) Outsourcing

**8. How is it possible to read all the famous library books of the world sitting at home**

a) Internet b) Email
c) By radio d) By phone

**9. Who first introduced the word robot?**

a) Joseph Frederick b) Karel Capek
c) John McCarthy d) Aija Asimov

**10. Which is not a component of information technology ?**

(A) Computer (B) Internet
c) Radio/TV c) Light

**11. Which was the world's first satellite sent into space?**

a) Sputnik 1 b) V2
c) Vostok-1 d) Rover

**12. What biometric method is usually used for criminal identification?**

a) Signature identification b) DNA
c) Fingerprint d) Retinal scan

**13. The technology of making very small devices at the molecular scale is called-**

a) Artificial Intelligence b) Nanotechnology
c) DNA mapping d) Cryosurgery

**14. What is the backbone of a global village?**

a) Hardware b) Hardware
c) Connectivity d) Data

**15. In which way is the biometric method used?**

a) Sensor b) Digital meter
c) Wet meter d) Thermometer

**16. Which of the following expresses the Latin word meaning of the word robot?**

a) Alien b) Artificial device
c) Humans d) Humans

**17. Which science fiction writer first used the term robotics?**

a) Karel Kapeck b) Isaac Ashimov
c) Jack Williamson d) Zulvern

**18. Which of the following expresses the meaning of the word cryo?**

a) Very hot b) Too hot
c) Illness d) Cold as ice

**19. How many parts does the computer hardware have?**

a) 3 b) 4 c) 5 d) 6

**20. What is outsourcing ?**

a) Working specific hours of work
b) Internet-based work
c) Special browsing facility
d) Worldwide network

Self Test Answer Page-261

# Chapter Two: Communication Systems and Computer Networking

At a Glance – What's in the Chapter:

Data and Information, Concept of Communication, Elements of Communication, Bandwidth (Narrow, Voice, Broadband), Data Transmission Methods, Transmission Modes, Wired Media (Telephone Cable, Co-axial Cable, Twisted Pair Cable, Fiber Optic Cable), Wireless Media (Radio Wave, Microwave, Infrared), Wireless Communication Systems (Bluetooth, Wi-Fi, WiMAX), Mobile Communication and Generations, Computer Network, Network Devices, Network Topology, Cloud Computing.

## Data

Any event or item is called data. The word *Data* is the plural form of the Latin word *Datum*. Data means the basic element of information. Data refers to raw facts or figures — such as letters, words, numbers, symbols, images, audio, video etc. which are not yet organized or processed. These are input into the computer to produce specific output or results.

## Information

When data is processed to produce meaningful output, it is called *Information*. That is, when raw data is processed as needed using a computer to generate a report, the result is considered information.

Data Communication and Material

## Concept of Communication

Communication means the exchange of information from one place to another. The word *communication* comes from the Latin word *Communicare*, which means "to share" or "to exchange". In other words, transferring data or information from one device to another through a network is called *data communication*. A system that sends data from one location or device to another is called a *data communication system*. Therefore, a system used to carry out data communication is referred to as a Data Communication System.

## Elements of Communication

There are five elements of communication, namely:


**1. Source:** The role of the source in data communication is to generate the data. Examples: microphone, camera, keyboard, computer, telephone, workstation, etc.

**2. Transmitter:** A device that helps transmit data is called a transmitter. Examples: modem, mobile phone, router, radio station, television station, telephone, video device.

**3. Medium / Transmission System:** The channel through which data is transmitted is called the medium. It can be wired or wireless. Examples: various types of cables, different waves (microwave, radio wave, etc.).

**4. Receiver:** The receiver's function is to receive the signal from the transmission system and convert it into understandable output via the destination device. Examples: modem, telephone exchange, router.

**5. Destination:** This is the final component where the data is stored. It receives the original data from the receiver device. Examples: computer, workstation, telephone, loudspeaker.

**Data Transmission Bandwidth/Speed**

Bandwidth's Video Lecture

Every physical quantity has a unit of measurement. For example, the unit of length is meter (m), mass is kilogram (kg), and speed is meters per second ($ms^{-9}$). Similarly, data transmission also has a unit. The rate at which data is transferred from one location to another, or from one computer or device to another, is called **data transmission bandwidth** or **speed**. That is, the amount of data transmitted per second from one point to another is called **bandwidth**.

Bandwidth is measured in **bits per second (bps)**.

Note: The smallest unit of data is the **bit**. *Bit* stands for **Binary Digit**. The combination of 0s and 1s is counted in bits. Examples: 101 = 3 bits, 1011 = 4 bits, 11010 = 5 bits, 11 = 2 bits

| As a bit | As a byte |
|---|---|
| 1024 bits = 1 kilobit (Kb) | 8 bits = 1 Byte (B) |
| 1024 kilobits = 1 megabit (Mb) | 1024 Bytes = 1 Kilobyte (KB) |
| 1024 megabits = 1 gigabit (Gb) | 1024 Kilobytes = 1 Megabyte (MB) |
| 1024 gigabits = 1 terabit (Tb) | 1024 Megabytes = 1 Gigabyte (GB) |
| | 1024 Gigabytes = 1 Terabyte (TB) |

Data transmission speed is divided into three types based on the amount of data transmitted per second from one place to another. These are: 1. Narrowband. 2. Voice Band. 3. Broadband.

**Narrowband:** "Narrow" means small, thin, or low. This type of bandwidth can transmit a very small amount of data. In other words, bandwidth that allows for the transfer of a small amount of data is called narrowband. Narrowband typically has a speed of 45 to 300 bps. This band is used for slow-speed data transfer. It is used in telegraphy. Narrowband usually transfers data at frequencies from 300 to 3400 Hz. It is used in telegraphy, walkie-talkies, Bluetooth, Zigbee, etc.

**Voice Band:** Voice band typically has a speed of 1200 bps to 9600 bps. Since the bandwidth of voice band is greater than that of narrowband, it transfers data faster than narrowband. It is generally used more in telephones. However, in computer data communication, this band is used for data transfer from computer to printer, keyboard to computer, and card reader to computer. Voice band usually transfers data at frequencies from 300 to 3600 Hz.

**Broadband:** High-speed bandwidth is called broadband. The speed of this band can range from 1 megabit per second (Mbps) to 1 gigabit per second (Gbps). This bandwidth is typically used for data transfer in coaxial cables, microwave, radio links, optical fibers, and satellite communication.

**Data Transmission Method:** The method by which data is sent from one place to another, from one device to another, that is, the method of sending data from sender to receiver, is called the data transmission method.

Data Transmission Method

Data transmission methods are of 2 types:

1. Parallel Data Transmission.
2. Serial Data Transmission.

**Parallel Data Transmission:**

The method in which data is sent bit by bit from one place to another simultaneously and in parallel through multiple channels is called parallel data transmission. It is used for transmitting a large amount of data in less time.

**Serial Data Transmission:** The method in which data is sent bit by bit from one place to another sequentially or continuously, one after another, is called serial data transmission. It is used for

# Chapter Three – Part One: Number System

**At a Glance – What's in This Chapter**

History of Number Discovery, History of Zero, Number System, Types of Number Systems, Base-based Number Systems, Conversion Between Number Systems, Binary Addition and Subtraction, Octal Addition and Subtraction, Hexadecimal Addition and Subtraction, Complements, Complement Addition and Subtraction, Computer Coding

**History of Inventing Numbers**

Since the dawn of civilization, humans have felt the need to count and perform calculations. In ancient times, people used various tools for counting, such as fingers, pebbles, sticks, shells, knotted ropes, and marks on walls. Over time, different symbols and signs began to be used for counting. Around 3400 BC, written numbers were first used in counting through the **Hieroglyphic number system**. Later, other systems such as the **Mayan**, **Roman**, and the widely used **Decimal Number System** emerged. The concept of **fractions** was introduced in **Egypt**. The smallest symbol used to represent a number is called a **digit**.

**History of the Invention of Zero**

The concept of **zero** in mathematics was discovered in **India**. The earliest recorded use of zero can be found in ancient Indian texts. The Indian mathematician **Pingala** is often credited with the invention of zero. **Aryabhata**, another renowned Indian mathematician, is also considered one of the pioneers in the development and use of zero.

## Important Tips: History of Number Systems

Lecture on Number System

1. The Babylonians used a base-60 number system.
2. The Mayans used both base-20 and base-5 number systems.
3. The method of counting numbers is known as a number system.
4. The Roman and European civilizations did not use zero.
5. In ancient times, symbols or signs were used for counting.
6. The Egyptian number system was based on base-10.
7. The Greek number system was also decimal (base-10).
8. Zero is considered a revolutionary invention in mathematics.
9. The base-10 number system developed due to the ten fingers on human hands.
10. Christian rulers once believed that zero was the symbol of the devil.

**number system**

A number system is a method for representing and calculating numbers using a set of symbols, characters, digits, and special signs. There are two main types of number systems:

1. Positional Number System. 2. Non-Positional Number System

**Positional Number System**

A positional number system is one where the value of a digit depends on its position within the number.

**Non-Positional Number System**

A non-positional number system is one where digits have a fixed value, but no positional value. Examples of non-positional number systems used in ancient times include **Hieroglyphics**, Mayan, and Roman numerals.

**Conversion of numbers**

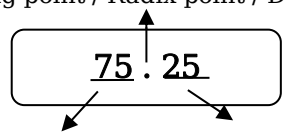
Lecture on Conversion of Number System

A number primarily consists of two parts:

1. Integer part. 2. Fractional part

And it typically has three components:

Floating point / Radix point / Decimal point




Integer Conversion The conversion of integers follows three rules:

- D to any => (Division method)
- any to D=>(Multilication method)
- B, O, H =>(Bit method)

B= Binary
O= Octal
D= Decimal
H=Hexadecimal
Any= Any Number System

## D to any => (Divison System)

To convert a number **D** to **any other base**, you need to **divide D by the target base**. You'll then **save the remainder** from each division. When writing the answer, you should list these remainders from **bottom to top**.

**Q-1.** $(75)_{10} \longrightarrow (\,?\,)_2$

| | | | |
|---|---|---|---|
| 2 | 75 | | LSB |
| 2 | 37 | → 1 | |
| 2 | 18 | → 1 | |
| 2 | 9 | → 0 | |
| 2 | 4 | → 1 | |
| 2 | 2 | → 0 | |
| 2 | 1 | → 0 | |
| | 0 | → 1 | MSB |

**Ans:** $(1001011)_2$

**Q-2.** $(175)_{10} \longrightarrow (\,?\,)_8$

| | | | |
|---|---|---|---|
| 8 | 175 | | LSB |
| 8 | 21 | → 7 | |
| 8 | 2 | → 5 | |
| | 0 | → 2 | MSB |

**Ans:** $(257)_8$

**Q-3.** $(380)_{10} \longrightarrow (\,?\,)_{16}$

| | | | |
|---|---|---|---|
| 16 | 380 | | LSB |
| 16 | 23 | → 12/C | |
| 16 | 1 | → 7 | |
| | 0 | → 1 | MSB |

**Ans:** $(17C)_{16}$

# Chapter 3 - Part Two: Digital Devices

Chapter Overview: At a Glance.....

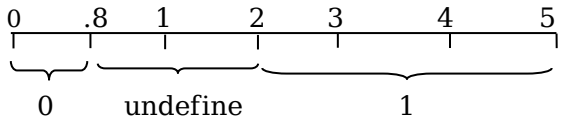
Boolean Algebra, Fundamental Theorems and De Morgan's Theorems, Equation Simplification. Logic Gates (Basic Gates, Universal Gates, and Special Gates) Universal Gate Implementation. Deriving Equations from Gates and Deriving Gates from Equations, Deriving Truth Tables from Gates and Deriving Gates from Truth Tables. Implementing X-OR/X-NOR Gates with

## Boolean Algebra

George Boole demonstrated in 1854 that there is a relationship between mathematics and logic. At this time, he invented two constants by considering high voltage electricity as 1 and low voltage electricity as 0. These later became known as Boolean constants. Every algebra contains these two values. 1 is also referred to as (True/High/Yes) and 0 as (False/Low/No). During this period, he proposed three fundamental operations: -

1. Logical Addition or OR Operation
2. Logical Multiplication or AND Operation
3. Logical Complementation or NOT Operation

In digital devices, the presence of electricity is considered 1 and its absence is considered 0.
0 to 0.8 volts is considered 0, and 2 to 5 volts is considered 1. The intermediate range of 0.8 to 2 volts is considered undefined.




## Boolean Variable

In Boolean algebra, a Boolean variable is a mathematical quantity whose value can change. For example, in the expression A = B + C, B and C are Boolean variables.

## Boolean Constant

In Boolean algebra, a Boolean constant is a mathematical quantity whose value remains unchanged. For example, in the expression Y = A + 0 + 1, 0 and 1 are Boolean constants.

## Boolean Complement

In Boolean algebra, any variable can have a value of either 0 or 1. These 0 and 1 are called Boolean complements of each other. This means if you invert 0, it becomes 1, and if you invert 1, it becomes 0, making them complements of one another. The Boolean complement is represented by the '—' (bar) symbol. In mathematical notation, the complement of A is written as A'.

## Characteristics of Boolean Algebra

Here are the key characteristics of Boolean Algebra:

- Only two digits, '0' and '1', are used in Boolean algebra.
- Because Boolean variables have only two values, Boolean algebra is a much simpler system compared to decimal algebra.
- In Boolean algebra, you cannot use fractions, logarithms, squares, negative numbers, imaginary numbers, or similar mathematical concepts.
- All mathematical operations in Boolean algebra are performed using only logical addition (OR), multiplication (AND), and complementation (NOT).
- No geometric or trigonometric formulas can be used in Boolean algebra.

**Fundamental Postulates/Theorems of Boolean Algebra:**

| | |
|---|---|
| $A+0=A$ | $A.0=0$ |
| $A+1=1$ | $A.1=A$ |
| $A+A=A$ | $A.A=A$ |
| $A+\overline{A}=1$ | $A.\overline{A}=0$ |

**Boolean Theorems:**

| | |
|---|---|
| **Commutative Theorem:** | **Distributive Theorem:** |
| $A+B= B+A$ | $A(B+C) = A.B + A.C$ |
| $A.B = B.A$ | $A+B.C = (A+B) (A+C)$ |
| **Associative Theorem:** | **Complementary Theorem:** |
| $A+(B+C)=(A+B)+C$ | $A+AB = A$ |
| $A.(B.C) = (A.B).C$ | $A+\overline{A}B = A+B$ |
| | $\overline{\overline{A}} =A$ (Double Complement) |

**De Morgan's Theorem and its Proof**

**Two-Variable:**

1. $\overline{(A+B)}= \overline{A}. \overline{B}$
2. $\overline{A.B} = \overline{A} + \overline{B}$

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|
| A | B | $\overline{A}$ | $\overline{B}$ | A+B | $\overline{A+B}$ | $\overline{A}.\overline{B}$ | A.B | $\overline{A.B}$ | $\overline{A}+\overline{B}$ |
| 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |

In the table provided, De Morgan's First Theorem is proven by comparing columns 6 and 7. Similarly, De Morgan's Second Theorem is proven by comparing columns 9 and 10.

**Three-Variable:**

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

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | B | C | $\overline{A}$ | $\overline{B}$ | $\overline{C}$ | A+B+C | $\overline{A+B+C}$ | $\overline{A}.\overline{B}.\overline{C}$ | A.B.C | $\overline{A.B.C}$ | $\overline{A} + \overline{B} + \overline{C}$ |
| 0 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| 1 | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |

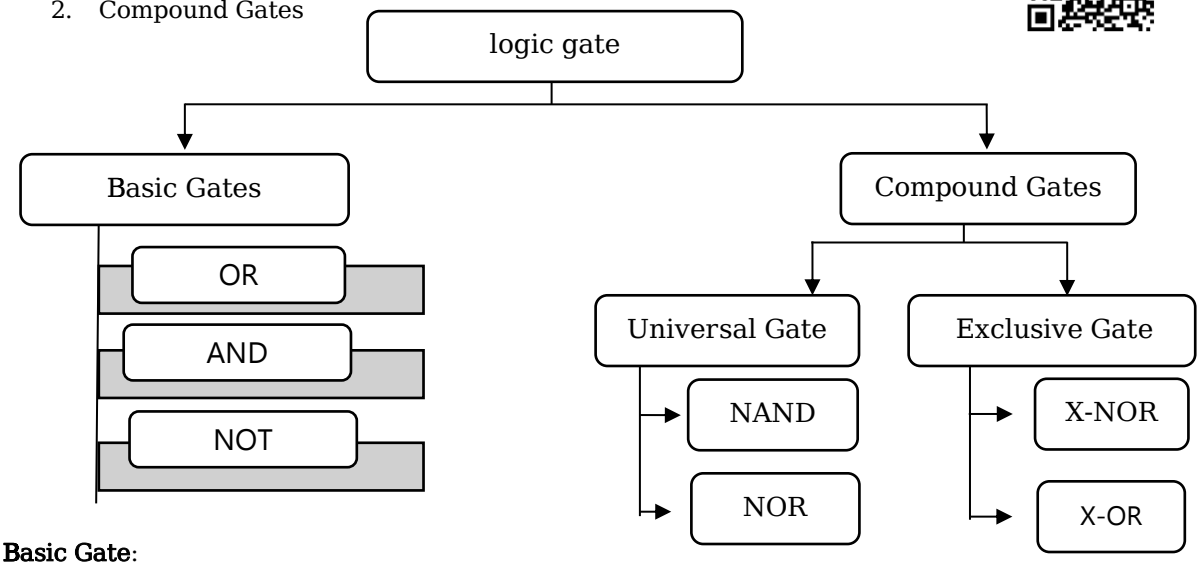
De Morgan's First Theorem is proven by comparing columns 8 and 9 in the table. Similarly, De Morgan's Second Theorem is proven by comparing columns 11 and 12.

**Logic gate**

A logic gate is a digital electronic circuit used to implement the fundamental operations in Boolean algebra.

Logic gates are primarily of two types:

1. Basic Gates
2. Compound Gates




**Basic Gate**:

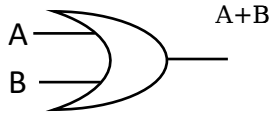
A gate that does not require any other gate for its implementation is called a basic gate.

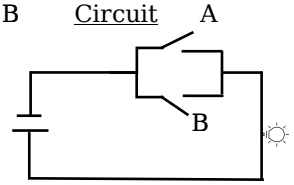
**Basic gates are of three types:**

**1. OR Gate or Logical Addition Gate:**

A gate that performs the operation of logical addition is called an OR gate. Truth Table

Logic Diagram: Equation: F=A+B Circuit



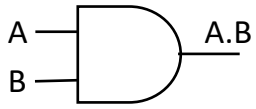



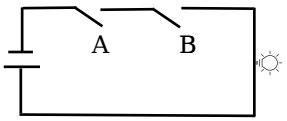

| A | B | A+B |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

**2. AND Gate or Logical Multiplication Gate:**

An **AND gate** is a gate that performs the operation of logical multiplication. Truth Table

Logic Diagram: Equation: F=A.B Circuit:



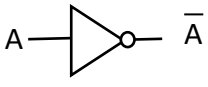



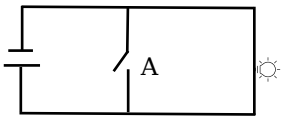

| A | B | A.B |
|---|---|---|
| 0 | 0 | 0 |
| 0 | 1 | 0 |
| 1 | 0 | 0 |
| 1 | 1 | 1 |

3. NOT Gate or Logical Inversion/Complement Gate: The number of inputs and outputs in a NOT gate is equal. A NOT gate is a gate that performs the operation of logical complement/inversion.

Truth Table

Logic Diagram: Equation: $A=\overline{A}$ Circuit:



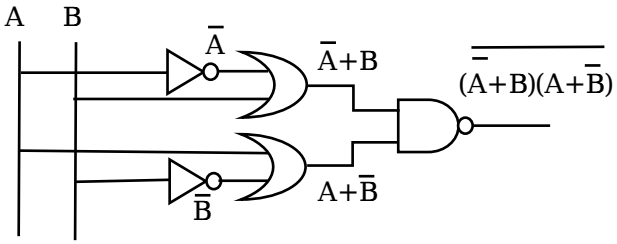




| A | $\overline{A}$ |
|---|---|
| 0 | 1 |
| 1 | 0 |

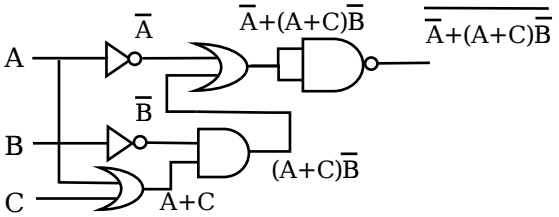
## Important Tips for Boolean Algebra, Digital Devices and Gates

1. Boolean algebra is the foundation of digital electronics.
2. There are three basic operations in Boolean algebra.
3. The inverter gate is also known as the NOT gate.
4. The number of inputs and outputs remains the same in a buffer gate / NOT gate.

**Determining Equations from Gates:**




Derived Equation:
$\overline{(\overline{A}+B)(A+\overline{B})}$

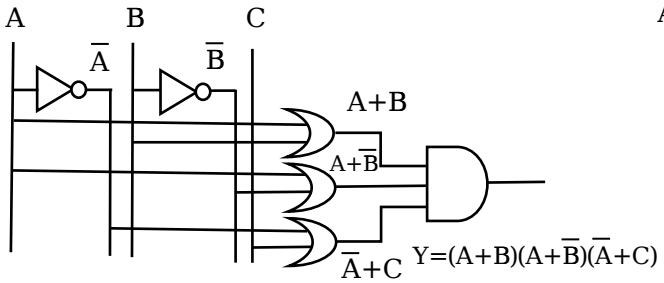



Derived Equation:
$\overline{\overline{A}+(A+C)\overline{B}}$

**Determining Gates from Equations:**

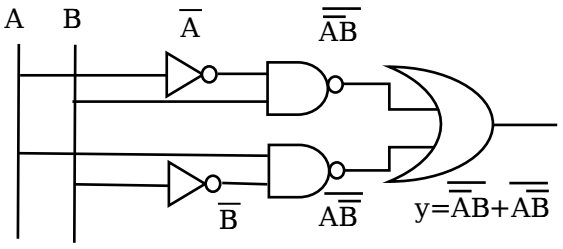
$=(A+B)\ (A+\overline{B})\ (\overline{A}+C)$

The logic circuit is as follows:




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

The logic circuit is as follows:




**Truth Table from Equation**:

$F=\overline{A+BA}$

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

**Equation from Truth Table:**

| A | B | F |
|---|---|---|
| 0 | 0 | 1 |
| 0 | 1 | 0 |
| 1 | 0 | 1 |
| 1 | 1 | 1 |

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

"Video lecture on gates, equations and truth tables

# Chapter Four: Introduction to Web Design and HTML

**At a glance, the chapter includes the following topics:**

webpage, website, server, components of a website, client, client computer, web portal, web browser, search engine, URL, IP address, static and dynamic websites, linear/hierarchical/web-link/hybrid websites, local and remote websites, HTML, HTML tag syntax, text formatting tags, structure of HTML, <p> tag, <font> tag, line break tag, <marquee> tag, <address> tag, <img> tag, creating tables using HTML, lists, hyperlink, steps to publish a website, color codes,  tag, style attribute.

If we need any information nowadays, the first thing we usually do is search on the internet. We search for data or information on websites and find them on the web pages of those sites.

**Document:** A document is a collection of various pieces of information or data.

**Web Document:** A web document is a collection of information or data available on the internet.

**Web Page:** A web page is a combination of multiple web documents.

**Website:** A website is a collection of multiple web pages. Every website has a unique address called a **URL (Uniform/Universal Resource Locator)**. The first website was created on **August 6, 1991**.

**Server:** A server is a place where multiple websites are stored.

**Components of a Website:** Images, audio, video, graphics, files, and information.

**Advantages of a Website:**

A website is one of the most effective means of collecting or publishing information quickly and at a low cost. Some of the major benefits of websites are listed below:

1. Any organization can create a website at a very low cost and promote their business or products.
2. Information can be found very quickly.
3. Exam forms can be filled out from home, saving both time and money.
4. Images, audio, and video can be uploaded and downloaded.
5. Recently occurring events can be uploaded and viewed.
6. It saves a lot of time for users.
7. Bus, train, air, and launch tickets can be bought and their schedules viewed from home.
8. Any course on any subject can be learned from home.
9. Any book can be read online from home.
10. Hospital or hotel bookings can be made.
11. Food can be ordered online.
12. If there is no one at home to do the grocery shopping, online orders can be placed and the items are delivered to the doorstep.
13. Current market prices of products can be checked.
14. There is almost no product that cannot be ordered online—everything is now within reach.

## Important Tips for Web Designing

1. One of the main tasks of web page design is designing the layout.

2. The **World Wide Web (WWW)** was developed at CERN (*Conseil Européen pour la Recherche Nuclêaire*) in Switzerland.

# Chapter Five: Programming Language

At a glance, this chapter includes….

Concept of program, programming language, levels of programming languages, some popular high-level programming languages (C, C++, Python, Visual Basic, ALGOL, FORTRAN, Oracle), translator programs (assembler, compiler, interpreter), program structure, characteristics of an ideal program, debugging, algorithm, flowchart, pseudocode, program design model, C programming language, data types, variables, operators, format specifiers, functions, arrays, and library functions.

**Concept of Program:**

A program is a collection of several instructions. A computer program is also a set of instructions.

**Programming Language:**

A programming language is the technique of creating a program using letters, symbols, digits, and special characters.

**Levels of Programming Languages:**

Computer programming languages are divided into five levels:

1. First Generation: Machine Language (1945)
2. Second Generation: Assembly Language (1950)
3. Third Generation: High-Level Language (1960)
4. Fourth Generation: Very High-Level Language (1970)
5. Fifth Generation: Natural Language (1980)

**Based on Program Composition, Programming Languages are Divided into Two Types:**

1. Low-Level Languages: Machine and Assembly Language
2. High-Level Languages: High-level, Very High-level, and Natural Languages

**Machine Language:**

The language in which programs or code are written using 0 and 1 is called machine language. The computer's own language is machine language. A program written in machine language is called an object program.

**Advantages of Machine Language:**

1. The biggest advantage of machine language is that the program written in this language is directly understood by the computer.
2. No translator program is required.
3. Works quickly.
4. Programs written in machine language require very little memory.

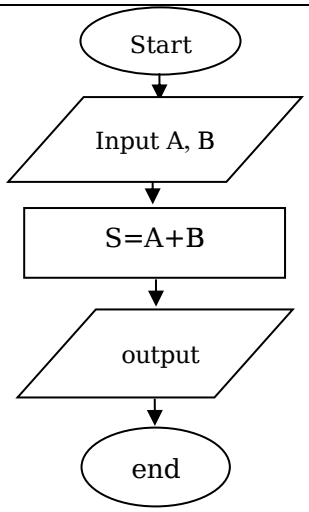
**Disadvantages of Machine Language:**

1. Since only 0 and 1 are used, learning machine language and writing programs is difficult.
2. It takes a lot of time to write programs.
3. Programs written in this language are not easy to understand.
4. There is a high chance of errors when writing programs in this language.
5. If there are errors, it is very difficult to identify and correct them.
6. This is a hardware-dependent language, so a program written for one type of machine cannot be used in another type.
7. Writing programs in this language require a good understanding of the computer's internal structure.

# Some important algorithms, flowcharts, and C

**Scan the QR code beside you to learn programming easily**

1. Write the algorithm, flowchart, and C program to calculate the sum of two numbers.

| Algorithm | Flowchart | C program |
|---|---|---|
| Step-1: Start<br>Step-2: Input A, B.<br>Step-3: S = A + B<br>Step-4: Result.<br>Step-5: End.<br><br>Problem 1 video Lecture |  | #include<stdio.h><br>#include<conio.h><br>main( )<br>{<br>int A, B, S;<br>printf("Enter the value of A:");<br>scanf("%d",&A);<br>printf("Enter the value of B:");<br>scanf("%d",&B);<br>S=A+B;<br>printf("Sum=%d",S);<br>getch( ) ;<br>} |

**2.** Write the algorithm, flowchart and C program to calculate the **difference** of two numbers.

Lecture on 2 to 6

**3.** Write the algorithm, flowchart and C program to calculate the **product** of two numbers.

**4.** Write the algorithm, flowchart and C program to calculate the **quotient** of two numbers.

**5.** Write the algorithm, flowchart and C program to calculate the **sum of three numbers**.

**6.** Write the algorithm, flowchart and C program to calculate the **average of three numbers**.

# Chapter Six: Database Management System

**At a Glance: What's in the Chapter...**

Database Management System (DBMS), Data Hierarchy, Entity, Entity Set, Attribute, Value, Field, Record, Key, Relational Database Management System (RDBMS), Data Types of Database Fields, Queries, Sorting a Database, Indexing, Query Language, SQL, Database Relation, Data Security, Data Encryption.

## Database Management System (DBMS)

The Database Management System (DBMS) is a software-controlled system that manages security, backups, allows data collection and stores data.

### Functions of DBMS

Lecture Video on DBMS

1. Creating a database, entering data, and storing data
2. Inserting new data and records
3. Generating and printing reports
4. Deleting unnecessary data and records
5. Sorting the entire database based on any field as needed
6. Searching and correcting spelling or numerical errors in data
7. Ensuring data security using passwords
8. Minimizing repeated use of the same information
9. Detecting and correcting data errors
10. Searching for specific data/records and performing queries
11. Sorting the database based on specific fields
12. Reducing data duplication
13. Printing the entire data or a selected portion of the database as required
14. Performing data backup and recovery
15. Ensuring data security and managing user access
16.

### Advantages of DBMS

1. Recorded data can be sorted in ascending or descending order based on one or more fields.
2. The same data is not used repeatedly, reducing storage space requirements.
3. Recorded data can be used in other application programs.
4. All data can be stored accurately and centrally managed.
5. Multiple users can work on the same data simultaneously.
6. It offers strong backup and recovery systems.
7. Data can be easily retrieved in the shortest possible time.
8. Databases can be created quickly and easily.

### Disadvantages of DBMS

1. Requires skilled and experienced personnel.
2. The system can be procedurally complex.
3. It can be costly.
4. Incorrect data entry can affect the entire database.
5. May require large memory space.
6. Virus or hacker attacks can disrupt the entire operation and cause financial loss.

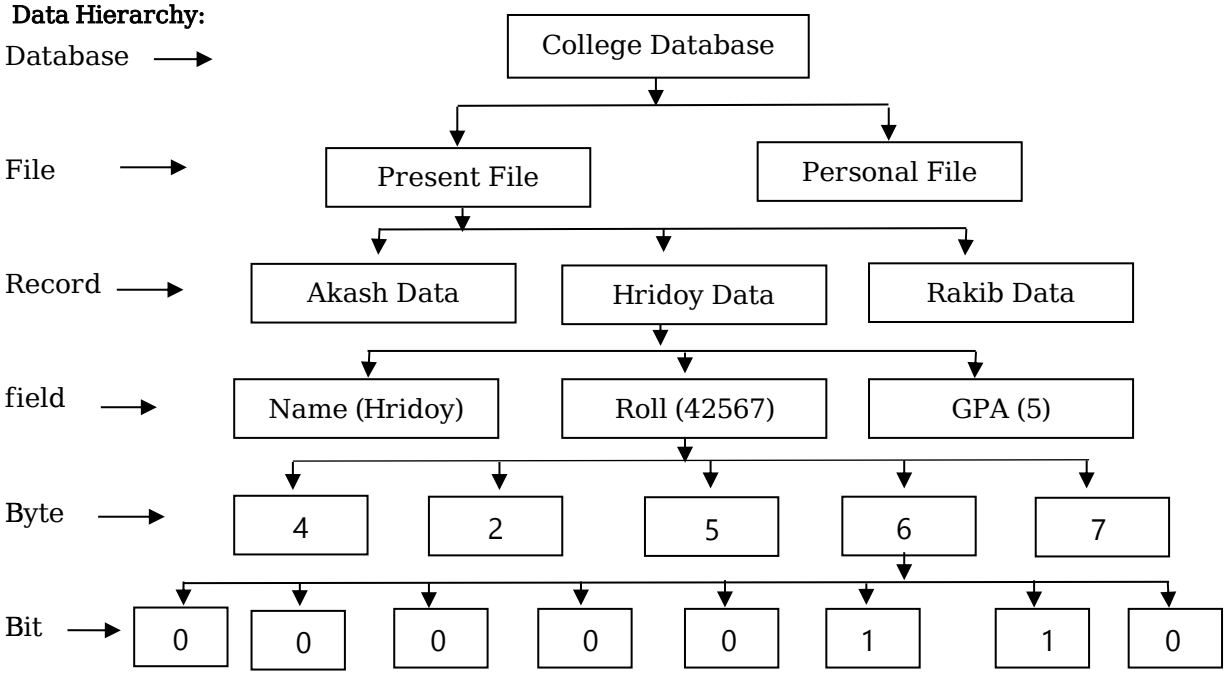
**Computer Memory and Files:**

When I work on a computer or a program, the computer basically works with two types of memory. One is RAM (RAM=Random Access Memory) and the other is ROM (ROM=Read Only Memory). RAM is a primary memory. Which is able to access any data on the computer at any time. This is volatile/temporary storage memory. Because when the computer is shut down, its entire data is erased. ROM and a primary memory. The ROM can store data permanently. That is, when the computer is shut down, its entire data is not erased. If you put any data in the file, it is basically stored in the ROM. Even when the computer is turned on, the data remains. Previously, computers were used to work with files or store data, which had problems in attaching new information, finding and updating data. This problem has been solved with the database management system.

**Data Hierarchy:**

Data hierarchy is a structure composed of various components of a database such as bit, byte, field, record, file, etc. In other words, the sequential organization from database to file, record, field, byte, and bit is called a hierarchy.

**Data Hierarchy:**




**Data Hierarchy Sequence:**

Database > File > Record > Field > Byte/Character > Bit

**Entity:**

An entity is a being that can represent an object. The name given to represent a data table is called an entity. For example, if a student table is created, then "student" is the entity.

**Entity Set:**

Similar types of entities are called an entity set.

**Attribute:**

The fields or items or elements used to express the characteristics of an entity are called attributes. For example, a student's name, roll, address, etc., are each attribute.

**Value:**