Chapter 1
ICT: World & Bangladesh perspective

Global village

Global Village: The whole world is considered economically, socially, and politically connected and interdependent through modern telecommunications. This is called the Global Village.

Herbert Marshall McLuhan, a Canadian philosopher, came up with the idea of the first Global Village in the 1960s.

That elements/components are needed for implementing Global Village:

Network/connectivity (backbone of global village)

Human ability

Human awareness

People's interest, knowledge, skills

Hardware

Software

Data storage

Sample MCQ   Ans.

1. Who introduced the concept of the "Global Village"?

a) Steve Jobs   b) Mark Zuckerberg   c) John McCarthy   d) Marshall McLuhan   1.d

2 What is the backbone of establishing the Global Village?

a) Connectivity   b) Hardware   c) Software   d) Television   2.a

3 The advantages of the Global Village are----

i) Enhanced social interaction

ii) Reduction in overall cost of living

iii) Increased opportunities for employment

Which option is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

Communication

Old communication relied on physical travel, which was slow, while new communication enables instant information exchange, making the process much faster. This shift plays a key role in transforming the world into a global village, connecting people across vast distances in real time.

Evolution of Communication Technology:

- New technology = new ways to communicate.
- Shift from wired phones to wireless (mobile phones, internet, email).
- Instant global connection is now possible.

Types of Communication:

a) Telecommunication

b) Information Communication

a) Telecommunication:

- Earlier: Only wired telephones.
- Now: Mobile phones, radio, TV, walkie-talkies, etc.

b) Information Communication:

- Focuses on sharing information securely using protocols.
- Includes the Internet, email, social media, video calls, and websites.

Benefits of Modern Communication:

1. Saves time and money.
2. Provides better results and global connectivity

Internet-Based Communication:

Email: Replaced physical addresses; used for instant messaging.

Social Media: Shares personal info, photos, videos, and news.

Has even influenced social and political changes.

Video Conferencing: Virtual meetings for organizations.

Websites: Used by companies to showcase their work globally.

Challenges of Modern Communication:

-Overuse of the Internet and social media can lead to addiction.

-Negative effects on younger generations have sparked global reevaluation of these tools.

-Makes people rethink the use of the Internet and social media.

Sample MCQs   **Ans.**

1. Which technology allows people to attend meetings remotely from different locations?

a) E-mail   b) Photoshop   c) Teleconferencing   d) SMS   1.c

2. At present, video conferencing is commonly used in ------------- sector

i) Health

ii) Business

iii) Education

Which option is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   2.d

3. What is the full form of GPS?

a) Global Positioning System   b) Global Positing System   c) Global Positioning Software   d) General Positioning System   3.a

4. After getting a chance in the BUET admission test, Mizan sent his pictures and informed his friends and relatives using 3G technology. Some of them congratulated him through video calls or Facebook.

Based on the technology mentioned in the passage, we will benefit in:

i) Virtual driving

ii) Outsourcing

iii) Online banking

Which option is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   4.c

Sample CQ
The Prime Minister of Bangladesh inaugurated the 3rd seaport located in Kalapara, Patuakhali, via video conferencing while staying at Gonobhaban. What are the advantages of the technology used for inaugurating the seaport?

Employment

Global Unemployment Challenge:

Unemployment remains a significant issue worldwide.

Information technology (IT) and communication systems have revolutionized work opportunities.

The Digital Solution of unemployment:

Information technology enables remote work and job applications.

-Work from anywhere.

-Apply for jobs online.

Websites like bdjobs.com, chakri.com, and everjobs.com facilitate online job applications.

-Secure personal information.

-Easy online application.

Information Services Centers in every union of Bangladesh have created new work opportunities.

Entrepreneurs are inspired to generate employment for others.

Freelancing:

Freelancing refers to working independently on various tech-related projects without being permanently employed by a single company.

Freelancers offer their skills and services to clients on a contractual or project basis.

-Flexible hours and location.

-Utilize personal skills.

Freelancing opportunities includes:

- ✓ Data analysis
- ✓ Copywriting
- ✓ Graphics design
- ✓ Software development
- ✓ Affiliate marketing
- ✓ SEO
- ✓ AdSense
- ✓ Virtual assistance,
- ✓ Research, and article writing

Popular marketplaces for freelancing:

-Upwork

-Freelancer

-Belancer

-Fiverr

Challenges of Freelancing:

- • Separation from family
- • Late-night shifts
- • Mismatch between skills and available work
- • Mental stress
- • Lack of proper evaluation
- • Payment difficulties

Local Job Creation:

New Job Opportunities: Ride-Sharing Services, mobile banking, currier etc.

-Services like Uber and Pathao, bKash, Darazz, foodpanda created numerous job opportunities.

Outsourcing:

Outsourcing is the business practice of hiring external personals or companies to perform tasks, services, or production

Advantages of Outsourcing:

-Cost Savings

-Focus on Core Activities

Disadvantages of Outsourcing:

-Loss of Control

-Security Risks

Sample CQ
Jaman went to South Korea, taking up driving as his profession. There, he underwent one month of training in an artificial environment. During this period, he learned various driving techniques. Besides, he worked part-time in another company as a data entry operator. With his earnings, their house has now been developed into a multistoried building.   In which sectors of employment was Jaman involved abroad?

Education

Education creates social and environmental awareness, fosters freethinking, and shapes compassionate global citizens. Adapting to modern education is vital in a fast-changing world.

Role of ICT in education:

-ICT is a powerful educational tool.

-ICT provides access to vast knowledge and resources.

-E-books have made education more affordable.

   -Free / low cost

   -Any time download

-Students can learn from anywhere in the world.

Online Learning:

-The Covid-19 pandemic accelerated online learning.

-Teachers use various platforms for live classes and tutorials.

-Schools, colleges, and universities used platforms like Zoom, Google Meet, and WhatsApp for live classes.

-Video tutorials and lectures became widely available through social media and communication tools.

Students have learned by watching video tutorials

-Many have created and shared video tutorials

-YouTube

Blogging

Social media

-Students can access foreign university courses remotely.

-Education is no longer limited by location.

E-learning:

E-learning refers to the use of electronic technologies, primarily the internet, to deliver educational content. It can include online courses, virtual classrooms, and digital resources.

It offers interactive learning experiences.

Challenges of E-Learning:

- Lack of Engagement & Interaction
- Technical & Accessibility Issues
- Self-Discipline & Motivation

Sample MCQ   **Ans.**

1. Which of the following are advantages of e-learning over traditional education methods?

   (i) It is more affordable

   (ii) It is more convenient

   (iii) It offers greater flexibility

   Which is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   1.d

2. What does e-learning primarily rely on to deliver education?

   A) Traditional classroom   B) Human interaction   C) Electronic platforms   D) Physical textbooks   2.C

3. How can ICT help in education?

   (i) Institute management

   (ii) Online result publication

   (iii) Virtual classrooms

   Which of the following is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.D

Protap, obtained a higher degree from an American university while studying from home.

What is the process by which Protap obtained his degree in the given context? Explain

Medical Facilities

Telemedicine:

Telemedicine is the remote delivery of healthcare using technology, enabling patients to consult doctors and access care without in-person visits.

Examples:

-Video/teleconferencing for consultations.

-Emailing test results.

-Online healthcare platforms (Teladoc, etc.).

-Pandemic hotlines.

-One doctor can consult another through video conferencing.

-AI helps diagnose diseases and recommend treatments.

-Electronic Health Records (EHR) store patient history, accessible globally.

Benefits of Telemedicine:

-Extends healthcare reach to underserved areas.

-Brings healthcare to people's homes.

-Simplifies consultations and medical history tracking.

-Enhances collaboration among healthcare professionals.

Limitations:

-Technological barriers in remote areas.

-Dependence on internet connectivity and digital literacy.

Sample MCQ   **Ans.**

1.   Neel, Mr. Shuvo's younger brother, went on a UN mission. Mr. Shuvo first used a technology to let

his sick mother talk to Neel. Later, he used another technology so they could talk and see each other.

The technology used by Neel in the stem may also used to:

i) need special software   ii) get telemedicine service   iii) ensure accommodation

Which one is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   1.a

2. What is HER?

a) Electronic Health Record   b) Element of Health record   c) Electronic Heater Record   d) Electronic Health Room   2.a

3. Use of ICT in healthcare includes _____

i) Patient records   ii) Genome analysis   iii) Surgery form distance

Which one is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

4. Though Dr. Raj lives in town, he serves in remote rural areas. The process of treatment in rural area includes__ __

i) ICT devices

ii) telemedicine

iii) Video conference

Which one is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   4.d

5. Which is a EHR software?

a) Zoom   b) Epic care   c) teams   d) Daraz   5.b

6. What is the main goal of telemedicine?

a) Providing specialized surgeries   b) Extend healthcare remotely.   c) Reducing the cost of medical treatment   d) Replacing in-person doctor visits   6.b

Sample CQ
Dr. Karim provides healthcare services to patients who cannot visit hospitals. Using a digital platform, he examines their health conditions, suggests treatments, and prescribes medicines. Even surgeries are sometimes assisted remotely by expert doctors using advanced technology.   What technology does Dr. Karim use to provide healthcare services?

Research

Research is a creative process that uses data, talent, and critical thinking to expand global knowledge.

Importance of Research:

    -Essential for development, involving rigorous study and scientific investigation.

    -Developed countries allocate significant budgets to research, highlighting its importance.

-Research is integral to the concept of a global village and technological advancement.

Connection with Information Technology:

-Collecting, storing, and processing large amounts of data.

-Performing complex calculations and simulations.

-Operating and controlling machinery.

-Facilitating global communication and collaboration among researchers.

-The results of the study are published in an e-journal

Sample MCQ   Ans.

1. The role of artificial intelligence in research _____

   i) To analyze complex data sets and identify patterns

   ii) To replace human researchers in data collection and analysis

   iii) To automate the entire research process

   Which is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   1.d

2. What is the primary purpose of research?

   a) To generate income   b) To share opinions   c) To enrich the knowledge of   d) To develop technology   2.c
                                                     the world

3. What is the function of a search engine in research?

   a) To index and   b) To encrypt and   c) To monitor and regulate   d) To block unauthorized   3.a
   categorize online   secure online data   internet traffic   access to online resources
   resources

Office

Offices are places where professionals work, and modern offices are crucial in expanding the global village concept.

Modernization:

Technology (equipment, software, internet) enhances efficiency and speed.

Automation in government, corporate, and research settings.

Paperless offices and reduced physical filing.

Filing cabinets are becoming obsolete due to digital storage solutions.

Remote Work:

-Technology enables work from home(Virtual office) and flexible hours.

-Time zone differences allow for continuous work cycles (e.g., 24-hour operation).

-Collaboration tools (Dropbox, Office 365, Google Drive) facilitate document sharing and storage.

-Video conferencing replaces face-to-face meetings.

Difficulty:

-Reduced Job Opportunities for IT Inexperienced People

-Less face-to-face interaction, reducing personal connections with colleagues.

- Large companies may misuse or mishandle data centers

-Unemployment Due to Digitalization

-Social distance with colleagues decreases

<p align="center">Sample MCQ</p>

<div align="right">Ans.</div>

1. In virtual office environment the employ NOT need to __

| a) Do the work properly | b) Use social networks | c) Present physically in office | d) communicate by email | 1.c |

2. Because of heavy rainfall and flooding, Mr. Rahim could not attend office. However, he managed to continue his official work while staying at home. What kind of facility did he use?

| a) Paperless office | b) Virtual office | c) Traditional office | d) Village office | 2.b |

3. _____ helps us to prepare and save our files with security

i) dropbox

ii) Office 24/7

iii) google docs

Which one is correct?

| a) i & ii | b) i & iii | c) ii & iii | d) i, ii & iii | 3.d |

Sample CQ
Because of the COVID-19 pandemic, Mr. Zabir could not attend office. However, he managed to continue his official work while staying at home.   What kind of facility did Mr. Zabir use?

<p align="center"><u>Residence/Home</u></p>

Modern information technology is rapidly transforming homes, especially in the context of a global village.

Smart Home:

A residence equipped with advanced technology is called a Smart Home.

Features include remote-controlled security systems, lighting, temperature control, and home appliances.

People can now communicate, shop, access healthcare, and enjoy entertainment from the comfort of their

Benefits of smart home:

-Makes life easier, more comfortable, and secure.

-Enhances safety with smart locks, cameras, and motion detectors linked to law enforcement.

-Especially helpful for physically disabled or elderly individuals who can use automation for daily tasks.

-Voice commands can control doors, windows, temperature, and lights.

-Remote access allows homeowners to monitor and control appliances from anywhere.

-Energy-efficient solutions like smart thermostats and lighting reduce electricity consumption.

-Time-saving automation – chores like vacuuming, laundry, and cooking can be managed by smart devices.

Home Automation System:

A Home Automation System is a technology-driven setup that enables remote control of household devices like lighting, security, temperature, and entertainment through a centralized system.

Challenges of smart home/ Home Automation System:

-High initial cost – Setting up a Smart Home can be expensive.

-Skilled manpower for maintenance

-Privacy issue

-Problems with the voice control device

-Mismanagement – Difficulty in handling multiple automated systems.

-Internet dependency – A stable internet connection is crucial for automation.

-Lack of technical knowledge – Users may struggle to operate advanced smart devices.

Sample MCQ   **Ans.**

1. Home automation system provides __

    i) smart home

    ii) motion camera

    iii) automatic door

    Which one is correct?

    a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   1.d

2. Which technology provide smart home?

    a) video sharing   b) home automation   c) online job portal   d) video sharing   2.b
    website   system   website

3.   The primary benefit of a smart home_____

   i) Increased security

   ii) Greater energy efficiency

   iii) Enhanced entertainment options

   Which is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

Business

E-Commerce:

E-Commerce is the online buying and selling of goods, services, and digital products. It includes retail, digital, and financial transactions, with websites offering product details like prices, quality, shipping, and images.

Advantages of E-commerce:

   Global Reach – Access to a worldwide market.

   24/7 Availability – Operates round the clock.

   Lower Costs – Reduces operational and inventory costs.

   Convenience – Easy shopping from anywhere.

   Wider Product Range – More options for consumers.

   Personalized Experience – Targeted marketing and recommendations.

Disadvantages of E-commerce:

   Security Risks – Vulnerability to fraud and cyber-attacks.

   Lack of Personal Touch – No physical interaction with products.

   Dependence on Internet – Requires stable internet access.

   Delivery Issues – Delays or damage during shipping.

Example of some popular e-commerce websites:

   Local: www.bikroy.com, www.daraz.com

   Global: www.alibaba.com, www.amazon.com, www.ebay.com

EFT (Electronic Funds Transfer):

EFT (Electronic Funds Transfer) is the digital movement of money between bank accounts without paper. It includes mobile banking, direct deposits, ATM transfers, and online banking, accessible via smartphones, computers, debit, or credit cards.

Advantages of EFT:

      Fast Transactions – Quick transfer of funds.

      Convenience – Accessible anytime via online banking.

      Cost-Effective – Reduces paperwork and transaction fees.

      Secure – Minimizes risks of theft or fraud.

      Accurate Records – Provides automatic transaction records

Sample MCQ   Ans.

1. Features of E-commerce is _____

   i) convenience

   ii) time saver

   iii) long-lasting product

   Which one is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   1.a

2. EFT means ___

   a) Electronic Future Treatment   b) Electric Form Transfer   c) Electronic Fund Transection   d) Electronic Fund Transfer   2.d

3. Which one is an e-commerce website?

   a) odesk.com   b) bikroy.com   c) guru.com   d) elance.com   3.b

4. A farmer in the district of Chapainawabgonj planted 200 mango saplings. Staying at home, he sells his mangoes using internet and is financially benefited.

   What is the process of selling mangoes stated in the stem?

   a) E-Service   b) E-Commerce   c) E-Bankiing   d) E-mail   4.b

5. Electronic fund transfer (EFT) includes----

   (i) Online banking

   (ii) Debit card transactions

   (iii) Credit card transactions

   Which is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   5.d

Sample CQ
Liza could not go Eid shopping because of her HSC Examination. However, she managed to purchase all the necessary clothes with the help of information technology. Describe the technology Liza used for buying.

News:

Role of News in the Global Village:

News is a core element contributing to the concept of a global village. Advancements in information technology have enhanced the efficiency and reach of news media. News from any corner of the world can be delivered globally in an instant.

Major News Agencies:

Prominent global agencies include AP, Reuters, BBC, CNN, and Al Jazeera. These agencies maintain vast networks to gather and distribute news swiftly.

Impact of Global News:

Accurate representation of global events like natural disasters, wars, plagues, and famine fosters global empathy and compassion.

Example: The Black Lives Matter movement gained worldwide attention and support through news and social media platforms.

Development in Local News Media:

-Online journalism has become integral to modern media.

-Fact-checking is facilitated by cross-referencing multiple online sources.

-Major newspapers in the country maintain online versions to ensure wide accessibility.

-Telecommunication companies offer breaking news updates as services

Challenges:

      -Misinformation/Fake news

      -Harmful Propaganda

      -Lack of Fact-Checking

      -Clickbait Headlines

      -Unverified Sources

      -Deepfakes and AI-Generated Content

-Political Bias news

-Virality of False Information

-Reduced Journalism Standards

-Information Overload

Solutions and Future Directions:

-Adoption of sophisticated servers and advanced technologies is essential.

-Implementation of AI systems can help detect and prevent fake news and misinformation.

-Responsible use and ethical reporting are key to sustaining the integrity of news media.

Sample MCQ   Ans.

1. "Black Lives Matter" movement gains popularity through ----------

    a) political   b) news and social   c) Corporate funding   d) academic research   1.b
    endorsements   media

2. To prevent false and malicious news ___
    i) artificial intelligence
    ii) own news server
    iii) database system
    Which one is correct?
    a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   2.d

3. What is the key benefit of online news websites?

    a) spreading unverified b) Creating harmful   c) Fact-checking news   d) Cross-referencing   3.c
    news   propaganda   online

Entertainment and social communication

Global Access and Digital Platforms:

Satellites and the internet have enabled access to entertainment from any part of the world.

Streaming services like Netflix have transformed the entertainment landscape, challenging traditional media like Hollywood movies.

Internet gaming, IPTV, and video-sharing platforms provide diverse entertainment options.

Shift in Content Production

Earlier, entertainment was designed considering local culture and trends.

With globalization and internet influence, content now aligns with global cultures and trends.

Role of Smartphones and Social Media

Smartphones have simplified access to entertainment content, making it available at users' fingertips.

Social media platforms like Facebook, Twitter, Instagram, and WhatsApp facilitate entertainment updates and trends.

Users can gauge content popularity through likes, shares, and comments.

These platforms also enable global discussions, debates, and content sharing.

Impact of Global Village Concept

The entertainment industry reflects the global village concept by promoting cross-cultural interaction and understanding.

However, global trends can over-shadow local, unique cultural practices.

Risks and Concerns:

-Addition to internet and social media

-Creates loneliness and depression

-Decline of local cultures and traditions.

-Privacy & Data Security Issues

-Misinformation & Fake News

-Cyberbullying & Online Harassment

-Intellectual Property Theft

-Plagiarism

-Piracy

Sample MCQ   **Ans.**

1. What will happen if someone become addicted to computer game?

    a) will be expert in computer   b) will developed his knowledge and science   c) will learn many things   d) mental growth will disturbed   1.d

2. We should use social network with ___

    i) Sensibly

    ii) Rationality

    iii) Excessively

    Which one is correct?

    a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   2.a

3.   Modern entertainment based on ___

i) TV and radio

ii) smartphone

iii) internet

Which one is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

Exchange of cultural activates

Technology & Cultural Exchange:

Technology bridges cultural gaps, enabling shared experiences across different nations.

Teenagers worldwide experience similar cultural phenomena due to the internet

Challenges for Underdeveloped Countries:

Struggle to preserve traditional languages, customs, and lifestyles.

Global trends often overshadow local cultures.

Threats to Cultural Authenticity:

Pop culture, remixes, and mixing different styles can weaken the uniqueness of traditional cultures. They often take away from the original meaning and value of long-held traditions.

Traditional customs and activities are gradually fading.

Preserving Cultural Identity:

The traditions of the countries lagging behind in the cultural aggression of the developed countries are about to disappear.

Preserving Cultural Identity:

      -Promote local culture meaningfully via the internet.

      -It has to be dealt with information technology.

      -We have to promote our own heritage and culture through blogs, websites, channels etc.

Sample MCQ   **Ans.**

1.   The challenges of cultural globalization are---

(i) The loss of cultural diversity

(ii) The homogenization of culture

(iii) The spread of cultural imperialism

Which is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   1.d

2.   What is blogging?

a) Freely express   b) Online Journalism   c) Sports Website   d) e-library   2.a
personal opinions
online

3.   Which does **NOT** allow for worldwide cultural exchange?

a) YouTube   b) Facebook   c) Microsoft excel   d) Netflix   3.c

Virtual Reality

Virtual reality is a simulated environment created by computer hardware and software that makes the user feel real.

Methods of VR creation:

-Special hardware (e.g., glasses, helmets, gloves, boots) and software are used to simulate a 3D environment.

-Techniques like **Head-Mounted Displays (HMDs)** and **telepresence(controlling VR from distance)** create immersive experiences.

-High-definition graphics, sensors, and real sound effects enhance the perception of reality.

Key Components of VR:

Hardware: Head-Mounted Display (HMD) creates 3D visuals by showing two different images to each eye.

Gloves and Boots: Allow users to interact with the virtual environment.

Software: Generates 3D models and simulations.

Sensory Integration: Adds touch, sound, and visual elements to make the experience feel real.

Impact of Virtual Reality in Everyday Life:

1. Entertainment:

-Widely used in movies, games, and virtual experiences.

-3D and VR-based films, historical reconstructions, and science-fiction applications.

-Augmented Reality (AR) combines real-world elements with virtual enhancements.

2. Driving & Training:

-Pilot training: Simulators help pilots learn to fly before handling real aircraft.

-Driving & navigation training: VR aids in learning to drive cars, ships, and submarines.

3. Education & Research:

-Simulations help explain complex topics in an interactive way.

-Used for scientific modeling, atomic structures, DNA & RNA visualization.

-Enhances medical education by helping students understand human anatomy.

4. Healthcare:

-Medical simulations assist in training surgeons and healthcare professionals.

-Used for prosthetic limb design and complex surgical procedures.

5. Military & Warfare:

-VR creates realistic battlefield scenarios for soldier training.

-Helps prepare for real combat situations without actual risk.

6. Business & Industry:

-Used in product design, testing, and evaluation.

-Helps in handling hazardous materials and conducting dangerous training safely.

Challenges of VR:

-VR affects different age groups differently; excessive use may be harmful to children.

-Overuse of VR may impact mental and physical health.

-Ethical Concerns: Potential overuse or misuse in sensitive areas (e.g., warfare, addiction in gaming).

Sample MCQ   **Ans.**

1.   VR include-

i) listening

ii) watch and smell

iii) effect on brain

Which one is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   1.d

2.   Usually virtual Reality is ___

a) One Dimensional   b) Two Dimensional   c) Three Dimensional   d) Four Dimensional   2.c

3.   Virtual Reality is used in ___

i) Flight Simulator

ii) Video Games

iii) Shooting practices

Which one is correct?

a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

4.   Which one is connected with VR?

a) bioinformatics   b) Nitrogen   c) Graphics   d) Neural network   4.c

5.   Which are the best use of VR?

a) sports and movies   b) education and   c) communication and   d) networking and   5.b
                         training   email   Internet

6.   What is HMD?

a) Head Mountained   b) Head Metal Display   c) Head Metal Diagram   d) Head Mountained   6.a
Display   Divice

7.   The VR controlled from distance called ___

a) telepresence   b) teleconference   c) digital divide   d) digital convergence   7.a

8.   Combination of real life and virtual life is called___

a) Telepresence   b) robotics   c) augmented reality   d) cryosurgery   8.c
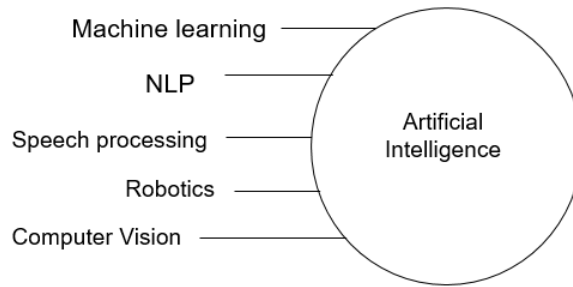
Sample CQ
My friend, Dr. Enam, has gone to France to participate in a training program. He said, "I went to an amusement park yesterday. There, I wore a special helmet and glasses to experience the feeling of traveling to the Moon."   Describe the technology of travelling at moon**.
Jaman went to South Korea to pursue driving as a profession. There, he completed a one-month training program in an artificial environment, where he learned various driving techniques.   Which sectors of technology are involved in Jaman's life abroad?
Scientists at the research organization Alpha have created a simulated environment to observe the internal structure of the brain and cells.   Explain the technology used by scientists for observation.

Artificial Intelligence (AI)

Artificial Intelligence (AI) simulates human intelligence in machines, enabling learning, reasoning, and problem-solving using techniques like machine learning and neural networks**.

Core AI Fields:

-**Machine Learning (ML):** Helps computers learn from data and improve over time.

-**Robotics:** AI-powered machines that can perform tasks autonomously.

-**Natural Language Processing (NLP):** Allows computers to understand and respond in human languages.

-**Computer Vision:** Enables machines to recognize and analyze images like humans.

-**Speech Processing:** Allows computers to understand and generate spoken language.
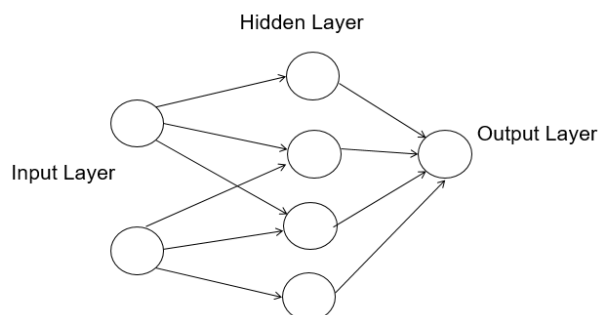

Machine Learning Types:

-**Supervised Learning**: Learns from labeled data (e.g., identifying cats vs. dogs).

-**Unsupervised Learning**: Finds patterns in unlabeled data (e.g., grouping similar animals).

-**Reinforcement Learning**: Learns by trial and error, improving through feedback.

Neural Networks:

The process by which an artificial human brain processes information is called the neural net.

-High power GPU (Graphics Processing Unit) is required.

Consist of 3 layers: input, hidden, and output.

Deep Learning: Uses multiple hidden layers to solve complex problems.

Machine Learning Types:

-Supervised Learning: Learns from labeled data (e.g., identifying cats vs. dogs).

-Unsupervised Learning: Finds patterns in unlabeled data (e.g., grouping similar animals).

-Reinforcement Learning: Learns by trial and error, improving through feedback.

Popular AI tools:

-ChatGPT, Microsoft Copilot, Google Bard/Gemini, Deep seek

Programming Languages for AI: Python, Java , C++ , MATLAB, R, Prolog, LISP

Sample MCQ   Ans.

1. What is the full form of NLP?

| a) New Language Processing | b) Natural Language Progress | c) Natural l Live Processing | d) Natural Language Processing | 1.d |

2. Popular AI tools are___

| a) ChatGPT Microsoft Copilot | b) Photoshop, MS Paint | c) Notepad, Calculator | d) Python, SQL | 2.a |

3. Fields of Artificial Intelligence are __

i) 3 layers

ii) deep learning

iii) self-learning system

Which one is correct?

| a) i & ii | b) i & iii | c) ii & iii | d) i, ii & iii | 3.d |

4. Which programming language is used for machine language?

| a) Python, prolog | b) JavaScript, HTML | c) MySQL, Access | d) C, Fotran | 4.a |

5. Artificial intelligence is the ability to _____

| a) paint pictures | b) think like a human | c) play video games | d) ability to run fast | 5.b |

6. The increasing numbers of hidden layers lead to better Al. This process is called------------- learning

| a) high | b) soft | c) low | d) deep | 6.d |

7. Which is the most successful filed of Al?

| a) bioinformatics | b) Machine learning | c) digital logic learning | d) computer network | 7.b |

8. Reinforcement learning includes ___

    i) machine learning

    ii) learn from mistake

    iii) separate from outside world

    Which one is correct?
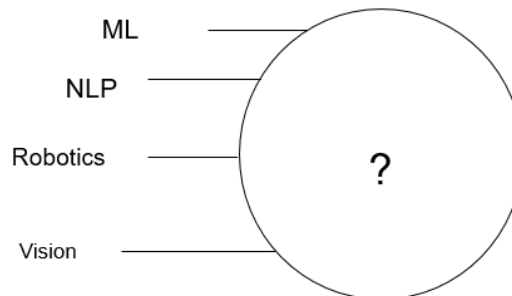
    a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   8.d

9. What is the role of the hidden layer in a neural net?

    a) To input a lot of   b) To provide the   c) To act as a filter for   d) To control the   9.b
    information   output based on input   input information   entire neural net

Sample CQ
Mr. Tomal bought a device name 'Zeevs' that helps him serve breakfast and help him by perform other intellectual tasks. What enables Zeevs to perform all tasks of Mr. Tomal?
 How the '?'sign can implement 4IR?

Dr. Nabi utilized an expert system to analyze patients' chest X-rays for detecting potential medical issues.

Which technology enabled Dr. Nabi to develop the expert system?

Robotics

A robot is a type of device that can work much like a human. In addition to human shapes, there can be robots of different shapes. Robotics is the technology of designing, creating, using and implementing robots. It consists of a combination of science and engineering.

Features of Robots:

-Task-Specific Design: Built physically and functionally for specific jobs.

-Power Requirement: Requires electricity to operate.

-Control: Operated through computer programming.

-AI-powered robots are enhancing capabilities, making robots more efficient and versatile.

Components of Robot:

- Processing Unit (brain of the robot)
- Actuators (enable movement)
- Sensors (detect surroundings)
- Power Unit (provides energy)

Applications of Robots:

Hazardous Work – Bomb disposal, toxic waste handling, deep-sea & space exploration.

Industrial Work – Heavy lifting, packaging, and material transfer.

Precision Work – Microcircuits, PCBs, and integrated circuits

Healthcare – Surgery, medicine dispensing, and patient care

Warfare – Drones, bomb disposal, and handling hazardous materials.

Education & Entertainment – Assisting disabled individuals, learning aids, and gaming.

Surveillance & Security – Public monitoring, VIP security, and reconnaissance.

<div align="center">Sample MCQ</div>   **Ans.**

1. What enables movement in a robot?

   a) Actuator   b) Processor   c) Battery   d) Sensor   1.a

2. Which component detects the robot's environment?

   a) Actuator   b) Processor   c) Battery   d) Sensor   2.d

3. Robot can be used in ___

   i) household works

   ii) design and planning

   iii) inside mine

   Which one is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

4. Which of the following is a characteristic of a robot?

   a) Human-like   b) Specific shape for   c) No need for electricity   d) Not programmed   4.b
   structure   all uses   control

Sample CQ
Rafi has joined as an officer of a non-government Bank. Since he lives alone in his house, he sometimes raise late from his sleep. So he decided to buy a Hikary. It used to wake up Rafi early in the morning saying good mooring. Also help Rafi by serving break fast and to get prepared for office. What type of technology Rafi has?
In a car manufacturing factory, a system is used to assemble parts, weld components, and paint vehicles without human intervention. What type of technology is being used in the factory?

Internet of Thing(IoT)

The Internet of Things (IoT) is a network of connected devices equipped with sensors and software that collect and exchange data online.

IoT devices enable automation and remote control, allowing household appliances like TVs, refrigerators, and lights to be managed via the internet for convenience and efficiency.

How IoT Works:

Sensors/Devices: Sensors collect data from the environment or devices.

For example, temperature sensors in smart thermostats.

Connectivity: The data collected is transmitted through various networks, such as Wi-Fi, Bluetooth, 5G, or Ethernet, to a cloud or other systems.

Data Processing: Cloud computing processes the received data and analyzes it. For example, a smart fridge analyzes the availability of food.

User Interface: The processed information is made available to users through applications, SMS, or alerts, enabling control or action remotely.

Uses of IoT in Real Life:

- o **Smart Homes**: Devices like smart thermostats, lights, and security cameras can be controlled remotely.
- o **Healthcare**: Wearable devices monitor health conditions, remind patients about medication, and alert doctors in emergencies.
- o **Agriculture**: IoT sensors measure soil moisture, recommend crop choices, and automate irrigation systems.

o **Transportation**: GPS tracking, traffic management, and autonomous vehicles rely on IoT for efficient operation.

o **Industrial Applications**: Predictive maintenance of machinery, energy management, and automation in manufacturing.

o **Environment Monitoring**: IoT monitors air and water quality, weather patterns, and natural disasters for early warnings.

Advantages of IoT:

- **Automation and Efficiency**: Reduces human intervention, increases productivity, and saves time.

- **Cost-Effectiveness**: Energy management and predictive maintenance lower operational costs.

- **Enhanced Decision-Making**: Real-time data insights lead to better decisions.

- **Improved Quality of Life**: Smart homes, healthcare solutions, and IoT-enabled services make life more convenient.

- **Scalability**: IoT systems can integrate new devices easily as needs grow.

Disadvantages of IoT:

✓ **Security Risks**: IoT devices are vulnerable to hacking, which can lead to data breaches.

✓ **Privacy Concerns**: Continuous data collection can compromise personal privacy.

✓ **Compatibility Issues**: Lack of universal standards may cause device incompatibility.

Sample MCQ   **Ans.**

1. What does IoT stand for?

| a) Internet of Things | b) Internal Operations Technology | c) Interactive Online Tools | d) Internet of Transformation | 1.a |

2. What are IoT devices primarily connected to?

| a) The local server | b) The power grid | c) The satellite network | d) The cloud | 2.c |

3. What is a characteristic feature of IoT devices?

| a) Standalone operation | b) Manual control only | c) Internet connectivity | d) Large physical size | 3.c |

Space Exploration

Space Travel:

When a spacecraft escapes Earth's gravity and stations itself 100 km or more away from Earth's surface, it's called space travel.

Key Players:

Major achievements by the USA and USSR (now Russia).

Milestones in Space Exploration:

- **October 4, 1957:** First man-made satellite, Sputnik, launched.
- **April 12, 1961:** Yuri Gagarin becomes the first man in space.
- **July 20, 1969:** Neil Armstrong becomes the first man to step on the Moon.
- **December 2, 1971:** Mars-3 craft lands on Mars.
- **April 12, 1981:** First Space Shuttle launched.

Challenges:

-Spacecraft must reach **40,000 km/h** to escape Earth's gravity.

-Re-entry involves managing extreme heat from atmospheric friction.

-ICT (Information and Communication Technology) ensures trajectory control, machine maintenance, and Earth communication.

Geostationary Satellites: Satellites orbit 36,000 km above Earth at the same speed as Earth's rotation, making them appear stationary for observers. These are crucial for telecommunication.

Bangabandhu-1 Satellite: Bangladesh launched its own geostationary satellite, Bangabandhu-1, becoming the 57th country to have a satellite in space.

-Ensures uninterrupted telecommunication and broadcasting.

-Helps provide internet in remote areas.

-Controlled from **Joydebpur (main station) and Betbunia (backup station)**.

-Saves and earns foreign currency by renting transponders to TV channels.

Applications of satellite

     -Television broadcasts depend on satellites.

     -GPS in smartphones relies on satellite signals.

     -Weather forecasting

     -Space Exploration

     -Communication

     -Military and Defense

Challenges and Risks of Satellites:

     -High Costs

     -Collision

     -Launch Risks

     -Limited Lifespan

     -Environmental Impact

     -Militarization and Spying

     -Orbital Congestion

     -Cybersecurity Threats

Sample MCQ   Ans.

1.   _____is a kind of satellite

     a) telepresence   b) Geo Stationery   c) cry probe   d) hidden layer   1.b

2.   How far the satellite is located above the earth's antenna?

     a) 12,000 KM   b) 20,000 KM   c) 36,000 KM   d) 72,000 KM   2.c

3.   The services that can be provided through the Bangabandhu-1 satellite are--

     i) Online banking

     ii) Telemedicine

     iii) communication

     Which is correct?

     a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

ICT dependent production system

Factory Automation

-Modern factories use computer-operated supply chains.

-Machines reduce waste and increase production speed.

-Software like Computer Aided Design (CAD), simulation, and management.

Technology in Manufacturing

-Robotics and computer-aided machines enhance precision.

-Automated control in chemical, medicine, and cosmetic production.

-Software manages workforce, planning, and supply chains.

24/7 Productivity

-Advanced technology boosts factory efficiency.

-Factories can operate continuously with minimal human intervention.

Agriculture & IT

-IT improves farming, forestry, and livestock management.

-Internet and mobile tech help farmers access real-time data.

-Genetics and modern IT aid in developing new crops and animals.

Knowledge & Accessibility

-Online resources provide farming solutions and updates.

-Weather, fertilizers, and pest control info are crucial for farmers.

-Various Bangladeshi websites offer agricultural insights.

	Sample MCQ			**Ans.**
1.	Which used to control instrument automatically?			
	a) ATM b) PLC c) CAD		d) META	1.b
2.	What is CAD?			
	a) Computer Aided Design b) Computer Assigned Design c) Computer Aided Development		d) Computer Arithmetic Development	2.a
3.	ICT in production includes _____			
	i) labor management			
	ii) keep account of store			
	iii) calculation of expenditure			
	Which one is correct?			
	a) i & ii b) i & iii c) ii & iii		d) i, ii & iii	3.d
4.	Which software used to design machinery?			
	a) CAD b) PLC c) ATM		d) COD	4.a

Defense

ICT & Defense Integration:

-Smart bombs and missiles operate with precision.

-Drones and UAV(Unmanned Aerial Vehicle)s reshape modern warfare.

-Satellite & internet technologies are crucial in battlefields.

Applications of IT in Defense:

-Simulation Training: Virtual reality enhances military training.

-Remote Commanding: Leaders can control battles from a distance.

-Satellite Communications: Essential for battlefield monitoring.

-Jamming Technology: Disrupts enemy communication.

-Remote-Controlled Missiles: Targets can be hit from far distances.

-Drones: Used for spying and attacking enemy sites.

-Anti-Missile Systems: Defends against aerial threats.

Bangladesh Armed Forces:

-Comprises the Army, Navy, and Air Force.

-Adopting modern technology with support from MIST (Military Institute of Science and Technology).

Impact of Defense Technology:

Positive: Innovations like GPS and the internet emerged from military research.

Negative: Resource depletion, environmental harm, and destruction due to weapon production and testing.

	Sample MCQ			**Ans.**
1.	Which institute is playing an important role in the self-sufficiency of modern technology in the Armed Forces of Bangladesh?			
	a. Bangladesh University of Engineering and Technology	b. Dhaka of University	c. Military Institute of Science and Technology	d. Chittagong University of Engineering and Technology	1.c
2.	What is full form of UAV?			
	a) Unmanned Aerial Vehicle	b) Unknown Aerial Vehicle	c) Unmanned Air VAT	d) Uniform Aerial Vehicle	2.a

3. ICT in battle includes _____

    i) smart bomb

    ii) drone command center

    iii) protection system of missile

    Which one is correct?

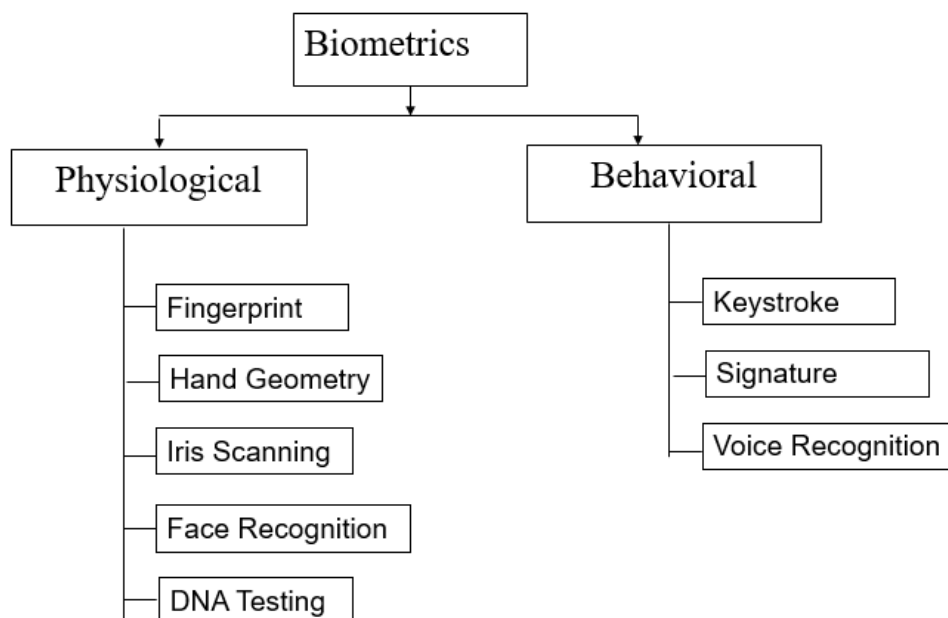   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

Biometric

The technology used to uniquely identify a person based on human physical structure or behavioral characteristics is called biometrics.

Physiological Biometrics System:

Fingerprint: A system that uses fingerprints for identification and authentication.

How Fingerprint works:

1. **Scanning** – Fingerprint is captured using a sensor.
2. **Feature Extraction** – Important patterns (ridges & minutiae) are identified.
3. **Matching** – New scan is compared with stored fingerprint templates.
4. **Access Decision** – If matched → Access granted; If not → Access denied.

Uses of finger print:

- **Smartphones** (Unlocking, payments)
- **Attendance Systems** (Workplaces, schools)
- **Security & Access Control** (Airports, offices)
- **Law Enforcement** (Criminal identification)

Hand Geometry: Uses hand shape, finger length, and palm patterns (less effective).

Can be affected by injuries, dirt, or manual labor.

Iris Scanning: Scans unique iris patterns, precise but affected by contact lenses.

Used in high-security areas like airports and government buildings.

Face Recognition: Identifies a person by analyzing facial features.

Widely used in surveillance, unlocking devices, and social media tagging.

DNA(DNA=Deoxyribo Nucleic Acid) Testing: Most accurate method, using hair, blood, saliva, or nails; time-consuming and costly.

Commonly used in forensic investigations and parental identification.

Behavioral Biometrics System:

- **Keystroke:** Tracks typing speed & patterns.
- **Signature Verification:** Checks writing speed, pressure, stroke style.
- **Voice Recognition**: Matches voice pitch, tone, tempo.
- **Issue:** Affected by cold/flu.

Uses of Biometrics:

- **Security** – ATM, online banking, smart cards.
- **Government** – National ID, voter registration, driving license.
- **Forensics** – Crime scenes, identifying bodies.
- **Access Control** – Offices, smartphones, high-security areas.

Sample MCQ   **Ans.**

1. What is full form of DNA?

   a) Deoxyribo New Acid   b) Diehard Nucleic Acid   c) Deoxyribo Nucleic Acid   d) Deoxyribo Nucleic Air   1.c

2. Which method is easy to implement in biometric?

   a) Finger print   b) voice recognition   c) iris scan   d) signature verification   2.a

3. Biometrics technology can be used in ___
   i) Passport
   ii) Birth registration
   iii) National Identify card
   Which one is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

4. Which one is NOT a physiological biometric?

   a) voice recognition   b) DNA test   c) Finger print   d) Iris scan   4.a

5. Hand geometry is NOT convenient for people of which profession?

   a) teacher   b) labor   c) doctor   d) scientist   5.b

6. Mainly how many types of biometric there are?

   a) 1   b) 2   c) 3   d) 4   6.a

Sample CQ
Rafi decided to secure the house by only allowing entry to authorized persons after scanning their thumb on the designated button. However, for added security, access to the office's money vault is restricted through voice verification via a microphone." What type of security system did Rafi apply in his house and office? Which is better?
The door opens after looking at camera for few seconds during entry time at Salam's business organization. As a result, unauthorized individuals cannot enter, and ensuring the timely entry of laborers has significantly increased profit. Earlier, identifying deceased workers after accidents was difficult, but a government tech initiative helped identify most of them. c) Explain the entry process of the employees in the organization based on the given information. d) Evaluate the method used for identifying the dead bodies of the laborers in the given situation.

Bioinformatics

Bioinformatics is a subject consisting of biology, computer science, information engineering, mathematics and statistics.

This was originally born to collect, store and properly process large amounts of biological data to explain them.

Applications:

    -Cancer Research: Personalized medicine based on genetic data.

    -Protein Structure Analysis: Helps understand protein functions.

    -Evolutionary Studies: Reveals species' evolutionary patterns.

Key Fields of Bioinformatics:

    -Molecular Biology and Medicine: Work for Source Analysis.

    -Database – Storage & retrieval of biological data.

    -Programs/Algorithms – For data analysis.

    -Mathematics & Statistics: The feasibility is verified with the help of mathematics & statistics

Sample MCQ

				Ans.

1. Bioinformatics is the subject consisting of -------------

a) biology, geography and soil science	b) biology, computer science, mathematics	c) physics and computer science, soil science	d) chemistry and computer science, geography	1.b

2. What is the main purpose of bioinformatics?

a) To create new plants	b) DNA analysis	c) Analysis of ICT information	d) Identifying humans	2.b

3. Bioinformatics can be applied ___

i) genome technology

ii) creating biological weapon

iii) astronomy

Which one is correct?

a) i & ii	b) i & iii	c) ii & iii	d) i, ii & iii	3.a

4. Which of the following is NOT a use of Bioinformatics in medicine?

a) Gene therapy	b) Making medicines	c) Geographical mapping	d) Protein reaction monitoring	4.c

5. How many different branches of the bioinformatics system usually work with a combination of components and techniques?

a) 2   b) 3   c) 4   d) 5   5.c

Sample CQ
Mr. Dipu works as a researcher, specializing in the analysis of biological data, which he diligently organizes and stores within a computer database."   What type of research method does Mr. Dipu use?
Mr. Reza employs a combination of mathematics, statistics, and computer science to address biological issues concerning trees. Additionally, he undertakes the collection, storage, and meticulous processing of vast quantities of biological data in order to elucidate their complexities.   Explain Mr. Reza's activities.
Mr. X went to his father's laboratory. Inside the lab, he saw biological information arranged by an information system."   Explain the technologies used in the laboratory.

Genetic Engineering

Genetic engineering is the process of modifying an organism's DNA to achieve desired characteristics. It involves altering genes or combining DNA from different organisms.

Cells & DNA: All living things have cells with chromosomes that contain **DNA (double helix structure)**.

Genomes & Genes: **Genes** determine traits, and a **genome** is the complete set of genes. Longer genomes store more information.

Modifying DNA: Scientists **cut and insert new gene sequences** using **Recombinant DNA (rDNA) technology** to change traits.

GMOs: Organisms with modified DNA are called **Genetically Modified Organisms (GMOs)**, with ongoing research for new applications.

Applications of Genetic Engineering:

- **Agriculture:** Creating stronger crops that survive harsh conditions (e.g., drought-resistant plants).
- **Medicine:** Developing new treatments and vaccines.
- **Research:** Scientists are still studying how to edit DNA for more benefits.

Use and Usefulness of Genetic Engineering:

Solving Food Shortage:

- Helps produce **high-yield hybrid crops and livestock** to meet food demand.
- Increases **livestock size, meat quality, and milk production** to fight food scarcity.

Medical Advancements:

- Producing insulin & hormones for diseases (e.g., diabetes).
- Fighting cancer, AIDS, and viral diseases by modifying bacteria (like E. coli) and yeast.
- Curing genetic disorders (e.g., dwarfism).

Improved Breeding:

- Faster & safer **than selective breeding.**
- Precise control **over desired traits.**

Genetic Engineering in Bangladesh:

- Institutes like Rice Research Institute, Jute Research Institute, and Sugarcane Research Institute develop better crops and livestock.
- BRRI rice and Ufshi rice have increased production significantly.
- Dr. Magsudul Alam discovered the jute genome sequence, helping make disease-resistant jute for economic benefit.

Ongoing Research:

- Crops like **corn, rice, cotton, tomato, and papaya** are being modified for **higher yield, disease resistance, and pest control**.

Risks & Concerns:

-**Ethical Concerns:** Modifying human genes (designer babies, cloning) raises moral and ethical debates.

-**Loss of biodiversity** (fewer natural varieties).

-**Unethical mutations** (unknown long-term effects).

-**Superbugs & viruses** (antibiotic resistance, bio-weapons).

-**Environmental Impact**: GM crops may harm ecosystems by disrupting natural food chains.

-**Crossbreeding Issues**: GM plants/animals may crossbreed with wild species, leading to uncontrollable genetic changes.

-**Economic Dependence**: Farmers may become dependent on biotech companies for patented GM seeds.

-**Allergic Reactions**: Some GM foods can trigger new allergies in humans.

Sample MCQ   Ans.

1. Genetic Engineering is the technology of ---

| a) creating new organisms cells | b) removing organisms cells | c) killing organisms cells | d) preserving organisms cells | 1.a |

2. There is a similarity between Bioinformatics and Genetic Engineering. In both cases _____ are done

a) Ethical issue concerned | b) Research about VIRUS | c) Deal with DNA | d) Concern about identification | 2.b

3. A farmer in Chapainawabgonj planted 200 mango trees. The trees are full of mangoes, and he sells them online from home, gaining financial benefit. Based on this, what benefit did the farmer get?

i) Harvesting more crops

ii) Able to use tissue culture

iii) Able to reduce global warming

Which is correct?

a) i & ii | b) i & iii | c) ii & iii | d) i, ii & iii | 3.d

4. What is the genome?

a) Complete cell DNA | b) DNA format order | c) Organism traits | d) Chromosome segment | 4.a

5. By genetic engineering ___

i) identify a human uniquely

ii) produce insulin commercially

iii) new genome can be discovered

Which one is correct?

a) i & ii | b) i & iii | c) ii & iii | d) i, ii & iii | 5.c

6. Dr. Siraz is a Agriculturalist and Scientist. He invented a special type of papaya which is 5 KG weighted. The purpose of Dr. Siraz was ___

i) increase production

ii) protection from diseases

iii) ensure production in inconvenient environment

Which one is correct?

a) i & ii | b) i & iii | c) ii & iii | d) i, ii & iii | 6.d

7. In which sector Genetic Engineering is applicable?

a) Security | b) Treatment | c) Sports | d) software | 7.b

What is full form of GMO?

8. a) Genetically Matured Organism | b) Genetically Modified Organization | c) German Modified Organism | d) Genetically Modified Organism | 8.d

Sample CQ
Dr. Abir is an agriculturalist and scientist. He invented a special type of mango that is very tasty and survive in adverse conditions. What type of technology did he use?
Mr. Lokman used a new technique to produce various types of flowers and fruits. By this method, he was able to grow large, high-quality fruits and flowers. What technology did Mr. Lokman use stem?

Nanotechnology

Using science and technology to create and use something 1 to 100 nanometers in size is called nanotechnology.

1 Nanometer $=10^{-9}$ Meter

Objects at this scale are called **nanoparticles**.

Methods of Nanotechnology:

      1) Small to Large (Button Up)

      2) Large to Small (Top Down)

Applications & Impact:

      -Computing: Used in integrated circuit chips and quantum computing.

      -Medical Advancements: Smart medicines and nano-robots to fight diseases like cancer.

      -Manufacturing: Helps create strong, lightweight, cost-effective products.

      -Energy & Environment: Low-cost energy production with minimal environmental impact.

Use of Nanotechnology:

      -Food Industry

      -Computing & Electronics

      -Sports Equipment

      -Medical Applications

      -Energy Sector

      -Automobiles

      -Environmental Protection

      -Cosmetics

Challenges & Risk:

- **Deadly Weapons** (Advanced and undetectable weapons)
- **Wealth Gap** (Only the rich may afford nanotech, increasing inequality)
- **Black Market Misuse** (Illegal nanotech drugs, weapons, and surveillance)
- **Health Risks** (Nanoparticles may harm human cells if misused)
- **Environmental Damage** (Unregulated nanomaterials may pollute air, water, and soil)
- **Privacy Issues** (Nano-surveillance could invade privacy)
- **Job Losses** (Automation replacing human labor)
- **Ethical Concerns** (Genetic modifications, human enhancement, and bioweapons)
- **Economic Disruption** (Replacing oil/gas may harm economies)

Sample MCQ   **Ans.**

1. Nanometer = _____ meter?

    a) 10^{-3} b) 10^{-6} c) 10_{-9} d) 10^{-9} 1.d

2. Nano technology can be used to produce ___
    i) computer
    ii) cryoprobe
    iii) Robot
    Which one is correct?

    a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   2.d

3. Nanotechnology ___
    i) top-down
    ii) Left-right
    iii) Bottom-up
    Which one is correct?

    a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.b

Sample CQ
Mr. Shihab is a pilot. He bought a 1 TB hard disk from a computer fair. He was surprised because it was very small in size. Due to advancements in technology, devices are becoming smaller day by day. Describe the technology used for producing hard disks in the passage.
Mr. Arif established a laboratory to create devices on an atomic and nuclear scale. Will the laboratory contribute to the betterment of human life? Analyze.

1. Which technology is used for capture, extraction, and matching?

    a) virtual reality   b) biometrics   c) robotics   d) nanotechnology   1.b

2. Which one is related to both Al and Engineering?

    a) Space Application   b) Robotics   c) Cryosurgery   d) Genetic Engineering   2.b

3. Rupali Bangla a reputed company research 15 years to produce a new types of paddy which will not damage affect by flood. Recently the company started sharing their research information with other institutes. They also applied modern technology to increase their internal security and employee management. The stem above:

    i) Genetic Engineering

    ii) Biometric

    iii) Bio-informatics

    Which one is correct?

    a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.b

4. Which is used to determine DNA sequence?

    a) biometrics   b) bioinformatics   c) nanotechnology   d) genetic engineering   4.b

5. BRRI concerned with ___

    a) biometric   c) bioinformatics   c) Nano technology   d) genetic engineering   5.d

6. Which technology used for food packaging?

    a) Biometrics   b) Nano-technology   c) Bioinformatics   d) Genetic Engineering   6.b

7. Skin cancer treatment can be cured by ___

    a) Plastic surgery   b) Cryosurgery   c) Nano technology   d) Bioinformatics   7.b

8. Which technology identifies an organism by characteristics?

    a) Nanotechnology   b) Genetic Engineering   c) Biometric   d) Bioinformatics   8.c

9. What is the technology to make protein sequences?

    a. Biometrics   b. Bioinformatics   c. Nanotechnology   d. Genetic engineering   9.d

10. Which one can change thinking capability of human being?

    a) Virtual Reality   b) Biometrics   c) Robotics   d) Nanotechnology   10.a

After reading previous all topics try the following CQs
Every morning, as Mr. Jashim arrives at his office, the first thing he does is place his finger on a biometric device to unlock the door. This device scans his fingerprint, ensuring that only authorized personnel can access the office. To further enhance the office experience and ensure employees are well-prepared for any challenges, Mr. Jashim arranged a special training program. The program is conducted in a state-of-the-art, computer-simulated environment, where employees can engage in real-life scenarios without the consequences of real-world mistakes. c) Security and monitoring systems have become easier because of modern technology. –Explain in it in the light of stem d) Why is the training method mentioned in the stem much more effective now? Analyze.
Dr. Jamal treats his patients using a low-cost method that is not only more affordable but also more convenient compared to the previous traditional surgery. This innovative approach significantly reduces the complexity and risks associated with conventional procedures. A special device is required for this surgery, and it is crafted using advanced molecular technology, which enhances precision and effectiveness. c) What is the new treatment method used by Dr. Jamal? Why is it effective in Bangladesh? d) Which technology enables the production of the special device for surgery?
Dr. Nabi utilized an expert system to analyze patients' chest X-rays for detecting potential medical issues. His friend Mr. Dipu is an agricultural scientist. He analyzes seedling growth, plant development, and flowering using a computer.
c) Which technology enabled Dr. Nabi to develop the expert system? d) Which technology helps Mr. Dipu to work smoothly?
Mr. Salam is a farmer. He has cows and goats. He went to an agriculture office, where an officer suggested he take advantage of modern technology so he could get more meat and milk from his farm. Mr. Salam's brother lives in a town. He bought a machine that can move from one place to another and help him with various domestic tasks. c) What is technology suggested by agriculture office? d) Which machine helps Mr. Salam's brother to lead an easy life? Analyze.
Shamim is a medical student who underwent training on various complex subjects by wearing a special headset. This headset allowed him to experience immersive, hands-on learning. His senior doctors trained him on a special treatment where temperature changes are used as an effective way to destroy infected cells. This method involves precise control of temperature to target and eliminate harmful cells without affecting surrounding tissue. c) Why the training method used by Shamim is effective? d) What is the treatment method taught by Shamim's senior doctors? Why is it effective in Bangladesh?
As the employees in Mr. Kashem's office were not sincere, they used to come late to the office and often go outside. So, Mr. Kashem implemented a new system that will track the employees' incoming and outgoing activities. The new system will also restrict unauthorized entry. Mr. Kashem's office manufactures a special type of sports goods that are both lightweight and sustainable. These products combine durability with ease of use, meeting high-performance standards.

c) Which method is used in office manufacturing sports goods?

d) The security enhances actions taken by Mr. Kashem will make his company more profitable. Explain.

Nupur brought a machine designed to perform tasks autonomously, often using sensors and actuators for interaction with its environment. It can be programmed to carry out repetitive or complex tasks with high precision and efficiency. Later She applied a scientific process that involves altering an organism's DNA to achieve desired traits or characteristics. It involves changing the genes of an organism to make it better, such as making it resistant to diseases or helping it grow more.

c) What is the machine brought by Nupur?

d) Which scientific process applied by Nupur later?

Sophia, a biologist, used advanced software to analyze large sets of genetic data, helping her discover patterns that could lead to new medical treatments. With the help of algorithms, the system processed vast amounts of information much faster than the human mind could. Meanwhile, her colleague Ethan, a computer scientist, developed a program that could learn from data and make decisions without direct human input. This allowed Ethan's system to predict possible outcomes in complex experiments.

c) What method used by Sophia?

d) Why the intuitive of her colleague Ethan is very important in modern world?

Ethics of ICT usages

Why Ethics is Important in ICT?

-Many people use the internet, so ethical behavior is necessary.

-Small unethical acts can lead to serious crimes.

-Ethical education helps prevent online fraud and cybercrimes.

In 1992, the Institute of Computer Ethics issued 10 guidelines:

1) You will not harm others by using computer

2) You will not interfere in other people's computer related work

3) You will not sniff at anyone else's work

4) You will not use the computer for the purpose of theft

5) You will not use the computer for false information

6) You will not use unlicensed software

7) You will not use other computer related resources without permission

8) You will not continue the work of others as your own work

9) You should think about its impact on society before using information technology

10) When you use a computer, you will judge the good and bad of others and show respect

Hacking:

Hacking is the process of accessing any computer, network, data, database, web site admin panel, etc. without permission. Hacking damages data or computer systems. Those who do such things are called hackers. Some hackers expose security weaknesses without causing damage. (ethical hacking).

Phishing:

Phishing is a technique that tricks users into visiting fake websites through emails or messages to steal sensitive information, such as credit card numbers, passwords, bank account details, access codes, and PINs. Exposes users to financial fraud and identity theft.

Spamming:

Spamming is the act of sending unwanted emails or messages, often in bulk. Spammers collect email addresses from websites, group chats, and online forums without permission. This practice is commonly used to spread fraud, scams, or malware, posing security risks to users.

Software piracy:

Software piracy is the unauthorized copying, distribution, or use of software without a valid license. It violates copyright laws and deprives developers of rightful earnings.

Software is an intellectual property created by programmers, protected by copyright laws. According to a BSA report, **36% of software in use is pirated**, prompting many countries to enforce stricter regulations to combat piracy.

Plagiarism:

Plagiarism is the act of using someone else's work, ideas, or content without proper credit, presenting it as one's own. It prevents students from developing critical thinking and creativity.

Types of Plagiarism:

1. **Clone** – Copying exactly, no changes.
2. **Remix** – Mixing info from many sources, pretending it's original.
3. **Hybrid** – Copying a well-cited work but rearranging without credit.
4. **Recycle (Self-Plagiarism)** – Reusing your old work without saying so.
5. **404 Error** – Using fake/wrong citations.
6. **Aggregator** – Only citations, no original work.
7. **Re-tweet** – Copying structure/writing style, even with citations.

Causes of Plagiarism:

- Easy to **copy-paste** from the internet.

- Don't understand **why plagiarism is wrong**.
- Think **no one will catch them**.
- Too lazy to **write their own ideas**.

Ways to Detect Plagiarism:

- Plagiarism-checking popular tools: **Turnitin, Grammarly, PlagiarismChecker, Plagium, Quetext**.
- These tools highlight copied content, allowing corrections before submission.

Problems Caused by Plagiarism:

- **Kills creativity** – No new ideas are generated.
- **Hurts original authors** – They lose credit and potential earnings.
- **Encourages laziness** – No effort or real learning happens.
- **Weakens critical thinking** – Limits independent analysis and problem-solving.
- **Leads to moral corruption** – Promotes dishonesty and unethical behavior.
- **Reduces originality** – Discourages hard work and genuine research.

How to Stop Plagiarism?

- **Strict rules** in schools/universities.
- **Copyright laws** punish plagiarists (in many countries).
- **Teach students** about plagiarism & proper citations.
- **Use plagiarism checkers** before submitting work.

Sample MCQ   **Ans.**

1. How many instructions were given by the computer ethics institute?

    a) 8   b) 10   c) 12   d) 14   1.b

2. Which is a common phishing tactic?

    a) Sending friendly   b) Offering costly   c) Fake urgent e-mails   d) Sharing weather   2.c
    memes   software   updates

3. Forbidden by the Computer Ethics Institute _____ by using computer

    i) for theft

    ii) to harm others

    iii) use unlicensed software

    Which is correct?   a) i & ii b) i & iii   c) ii & iii   d) i, ii & iii

    a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

4. What is hacking?

    a) Using a computer   b) Stealing   c) Sending unsolicited   d) use pirated software   4.a
    without permission   information via email   emails

5. Jamil has downloaded some content from the Internet. After making a few changes, he submitted it to his teacher as his home assignment. The activity of Jamil belongs to which category of work?

    a) Cybercrime   b) Hacking   c) Plagiarism   d) Spamming   5.c

6. Using copied software without permission is called _____

    a) hacking   b) piracy   c) spamming   d) copyright   6.b

7. hat is full form of BSA?

    a) Business software   b) Business software   c) Beta software   d) Business Software   7.a
    Alliance   Alien   Alliance   Allocation

8. What kind of cybercrime happened when someone used to send thousands of email?

    a) plagiarism   b) spamming   c) piracy   d) hacking   8.b

Sample CQ
In a business meeting, Mr. Sabbir showed some videos about his business organization. In the absence of Mr. Sabbir, one of his business competitors tried to copy the videos but failed to obtain anything. After some time, Mr. Sabbir returned and showed the video again when the competitor requested him.   Explain the competitor's activities in light of ICT.
Gaining unauthorized access to computer systems can lead to serious ethical and legal consequences. Manipulating digital networks without permission violates privacy and security laws.   What type of crime mentioned in the stem?

Cyber act

2006 ICT Act (Section 57(1)): If someone uploads or shares false, obscene, or defamatory content online that incites the public, they can be punished.

Punishment: Up to 10 years in jail or a fine of up to 1 crore taka.

2012 Pornography Act:

If someone shares pornography using the internet, websites, mobile phones, or electronic devices, they can be punished.

Punishment: Up to **5 years in jail** or a **fine of 2 lakh taka**.

Digital Security Act (2018):

    -Unauthorized access to confidential data, networks, or systems is prohibited.

    -Hacking, altering, or deleting data is illegal.

-Fraudulent activities using digital media are banned.

-Defaming Bangladesh's Liberation War, National Flag, or Father of the Nation is a crime.

-Spreading hate speech, religious insults, or false info that harms society is illegal.

-Defaming individuals or institutions online is punishable.

-Hacking banks or stealing financial data is a serious offense

Punishments: Different cybercrimes have different punishments under the law.

Prevention:

-Follow ethical guidelines when using the internet

-Be responsible and avoid harmful actions.

-Awareness and education are the best ways to prevent cybercrimes.

Sample MCQ   Ans.

1. Which is a crime according to digital security law?

| a) Opening mail account for his/her self | b) open a social media account in name others | c) browsing YouTube for long time | d) create network hybrid topology | 1.b |

2. Which Act contains Section 57(1) related to punishment for publishing false and obscene content?

| a) Digital Security Act 2018 | b) ICT Act 2006 | c) Cyber Security Act 2012 | d) E-Transactions Act 2002 | 2.a |

3. What is the best way to prevent cybercrimes?

| A) Strict laws only | B) Avoiding the internet | C) Awareness and education | D) Reporting every online activity | 3.c |

4. Which of the following is an example of digital fraud?

| A) Online financial scam | B) Writing a blog | C) Watching videos | D) Sending emails to friends | 4.a |

Different Types of Cyber Crimes

Not Just Small Hackers – Big Companies Commit Cyber Crimes Too!

We often think of hackers or small fraudsters, but big tech companies have also been involved in major cybercrimes.

Examples of Big Companies Involved in Cyber Crimes:

- **Facebook** shared user data with Cambridge Analytica for political purposes.
- **Facebook** also tried to defame WhatsApp and was fined **€110 million**.

- **Apple** was fined **€14.5 billion** for avoiding taxes.
- **Google** has been fined a total of **€10 billion** for various violations.
- **Amazon** is under investigation in Germany for illegal activities.

Why This Matters:

These companies control most of the world's data.

These big companies collect and control **huge amounts of user data**.

Information = Power – they influence politics, economy, and our lives.

We are being controlled by a few tech giants without realizing it.

What Can We Do:

-Be aware of how these companies use our data.

-Limit unnecessary sharing on social media.

-Protect personal data and privacy online.

-Demand stronger laws to protect privacy & prevent corporate abuse.

Sample MCQ   **Ans.**

1.   To whom Facebook provided personal information of its user?

   a) gooogle llc   b) Cambridge Analytica   c) micro soft corporation   d) apple computer   1.b

2.   Those who have _____ controlling the world now.

   a) money   b) weapon   c) data   d) oil mine   2.c

3.   What is a key step to prevent corporate cyber misuse?

   a) Ignore warnings   b) Trust all firms   c) Use all features   d) Demand strong laws   3.d

Impact of ICT in Social life

We live in the Information Age, where ICT is an inseparable part of life. Rapid advancements have led to the Fourth Industrial Revolution (4IR) and now Fifth Industrial Revolution (5IR).

Positive Impacts of ICT:

1. Education

- Online admissions, fee payments, exams, results – everything is digital.
- E-learning – Students & teachers can attend classes, take quizzes, and study from home.

2. Science & Healthcare

- ICT helps in disease diagnosis, telemedicine, and remote healthcare.
- Latest medical research & treatments are easily accessible.

3. Financial Institutions (Banks)

- ATM, mobile banking, online transactions, loans – all managed digitally.
- Faster, error-free, and secure financial operations.

4. Workplaces

- HR management, salary processing, project tracking – all done via software.
- Paperless offices save time, cost, and improve efficiency.

5. Industries & Factories

- Automation & robotics improve production & safety.
- Supply chain, demand forecasting, online orders – all managed digitally.

6. Agriculture (Especially in Bangladesh)

- Satellite imaging, weather forecasts, market monitoring help farmers.
- Smartphones & Internet provide farming tips, crop management, and online sales.

7. Communication

- Smartphones, social media, emails connect people worldwide.

8. Culture & Entertainment

- Streaming, gaming, social media – entertainment is now digital.
- Global culture exchange – people experience different traditions easily.

Negative Impacts of ICT:

1. Addiction

- Social media (Facebook, Instagram) & online gaming are highly addictive.
- Wasting time, lack of focus, family neglect are common issues.
- Some games lead to violence, accidents, and even suicides.

2. Cultural Erosion

- Foreign culture influences change local traditions & lifestyles.
- Unethical fashion & behavior trends are increasing.

3. Cybercrime

- Hacking, phishing, online scams, privacy breaches are rising.
- Cyberbullying, pornography, fake news harm society.

4. Health Problems

- Excessive screen time causes eye strain, back pain, headaches.
- Depression & mental health issues due to overuse of technology.

1. What is considered a major addiction issue in today's society?

   a) Internet   b) Television   c) Newspaper   d) Book   1.a

2. What is a key benefit of digital communication?

   a) Local calls   b) Global connection   c) Written letters   d) Closed networks   2.b

3. Problem of using social media ___

   i) waste of time

   ii) create obsession

   iii) harm to their duties

   Which one is correct?

   a) i & ii   b) i & iii   c) ii & iii   d) i, ii & iii   3.d

4. What is a negative impact of ICT related to addiction?

   a) Increased family time   b) Enhanced focus   c) Social media addiction   d) Improved mental health   4.c

5. What cybercrime is enabled by ICT?

   a) Bank robberies   b) Phishing scams   c) Shop lifting   d) Car thefts   5.b

ICT in Economic Development

Role of ICT in Economic Development:

1. Job Opportunities

- **Freelancing & outsourcing** – Many young people earn online.
- **New IT jobs** – Software, digital marketing, e-commerce, etc.

2. Increased Investment

- **Faster & secure transactions** attract investors.
- **Easier business setup** – Online banking, digital payments.

3. Higher Productivity

- **Less manpower, more work** – Automation & AI reduce costs.
- **Faster business operations** – Cloud computing, digital tools.

4. Better Communication

- **Instant global business** – Video calls, emails, social media.
- **Easier trade & partnerships** – Companies connect worldwide.

5. Environmental Protection

- **Green technology** – ICT helps reduce pollution (smart energy, e-waste management).
- **Paperless offices** – Less deforestation.

6. Business Expansion

- **E-commerce & m-commerce** – Online shops (Daraz, Amazon).
- **Digital marketing** – Businesses reach more customers.

E-Services in Economic Development:

1. E-Banking

- **24/7 banking** – ATMs, mobile banking (bKash, Nagad).
- **Easy remittance** – Fast money transfers from abroad.

2. E-Commerce

- **Online shopping** – Order anything from home (Foodpanda, Daraz).
- **Digital payments** – No need for cash.

3. E-Agriculture

- **Weather & crop info** – Farmers get advice online.
- **Smart farming** – Better seeds, pest control, market prices.

4. E-Governance

- **Online govt. services** – Fast & transparent (land records, licenses).
- **Less corruption** – Digital systems reduce bribery.

5. E-Paper Service

- **Online land records** – No need to visit offices.

ICT in Bangladesh – "Digital Bangladesh"

1. Made in Bangladesh

- **Local tech production** – Computers, laptops, robots.
- **Exporting IT products** – Africa, other countries.

2. National Data Centre

- **750 TB storage** – Supports IT growth.
- **IT labs in universities** – Skilled graduates.

3. IT Parks & Hubs

- **Bangabandhu Hi-Tech City (Gazipur)** – Big IT projects.
- **Sheikh Hasina Software Park (Jessore)** – Thousands of jobs.

4. Startup Culture

- **Government funding** – Startup Bangladesh supports new tech companies.
- **Success stories** – Pathao, Sheba.xyz, Shohoz.

5. Cashless Bangladesh

- **QR payments** – No cash needed (bKash, Nagad).
- **Smart Bangladesh 2041** – Digital economy goal.

6. Infrastructure Development

- **Internet in every upazila** – Govt. offices connected.
- **Telemedicine & digital labs** – Better healthcare & education.

Sample MCQ   **Ans.**

1. Which project aims to provide information and communication services to remote areas of Bangladesh?

| a) Access to Technology Initiative | b) Access to Information Project | c) Access to Knowledge Program | d) Access to Health Services Initiative | 1.b |

2. How does ICT attract investment?

| a) Faster & secure transactions | b) Banning digital banking | c) Increasing paperwork | d) Slowing business setup | 2.a |

3. What is a benefit of e-governance?

| a) Increased corruption | b) Slow service delivery | c) Fast and transparent services | d) Complicated processes | 3.c |

4. What helps farmers through ICT?

| a) Online games | b) Weather apps | c) Social media | d) Video calls | 4.b |

5. Which enables cashless payments?

| a) QR codes | b) Paper checks | c) Gold coins | d) Barter system | 5.a |