UNIT 10

Emerging Techonologies in Computer Science

Short introduction of Unit

Artificial Intelligence is a rapidly growing field that is transforming various aspects of our lives. From healthcare to gaming, AI technologies are being applied to solve complex prblems and improve our daily experience. For example, AI- driven systems monitor crop health and predict yields by betting data from sensors and drones to optimize farming practices.

Q.1 Provide a brief description of Artificial Intelligence (AI) and discuss its historical context. 09510001

Ans. Artificial Intelligence is a rapidly growing field that is transforming various aspects of our lives. From healthcare to gaming, AI technologies are being applied to solve complex prblems and improve our daily experience. For example, AI- driven systems monitor crop health and predict yields by getting data from sensors and drones to optimize farming practices.

Understanding AI

Artificial Intelligence denotes the simulation of human thinking ability in computer systems to think and learn in a manner like humans. To fully realize the effect of AI, it is essential to understand its definition and historical context, as well as the evolution of AI technologies over time.

Historical Context of Artifical Intelligence

The term AI was first invented by **John McCarthy in 1956** druing the **Darthmouth** conference, regarded as the origin of artificial intelligence as a discipline of reasearch. The journey of AI has seen several key milestones:

1950s-1660s: Early AI research focused on problem-solving and symbolic methods.

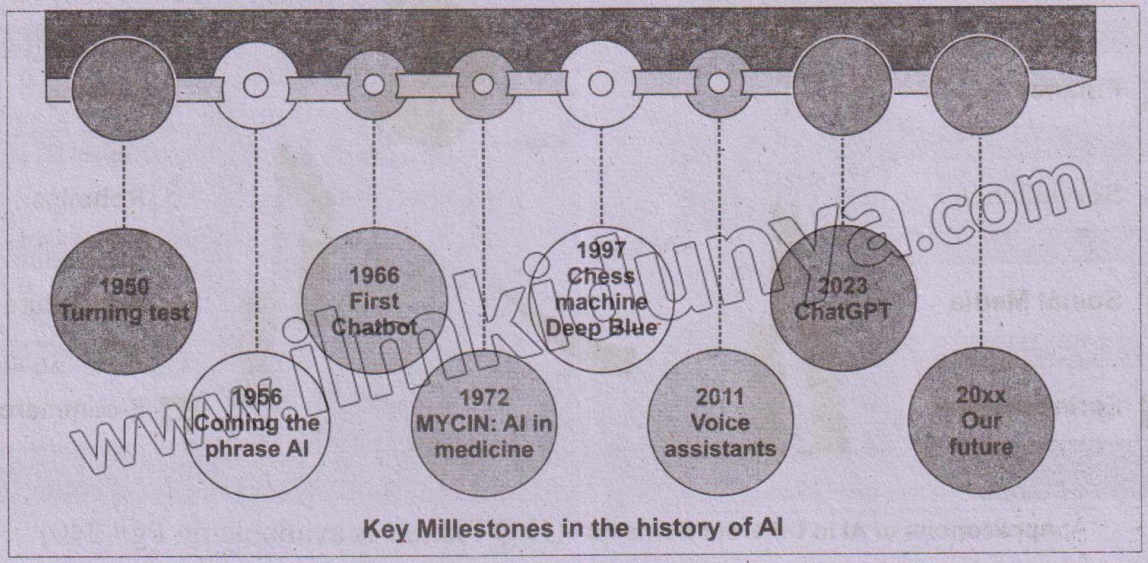
1970s-1980s: The development of expert systems that mimicked human decision-making.

1990s: The rise of machine learning, where computers began to learn from data.

2000s: Advance in deep learning, natural language processing, and robotics have significantly expanded AI's capabilities.

2011s: Voice assistant was used for voice command and voice recognition.

2023s—Present: ChatGPT was introduced that is an AI-based model which is designed to understand human-like text based input.



Key Millestones in the history of AI

Q.2 What are the Applications and Subfields of AI? 09510002

Ans: AI has numerious applications across different fields:

Healthcare: AI is used for diagnosing diseases, personalizing treatment plans and predicting patient outcomes.

Education:AI- powered tools provide personalized learning experiences automate administrative tasks, and offer insights into student performance.

Gaming: AI enhance game deign, creates realistic characters, and improves player experiences.

Transportation: Self –driving cars and traffic management systems rely on AI to improve safety and efficiency.

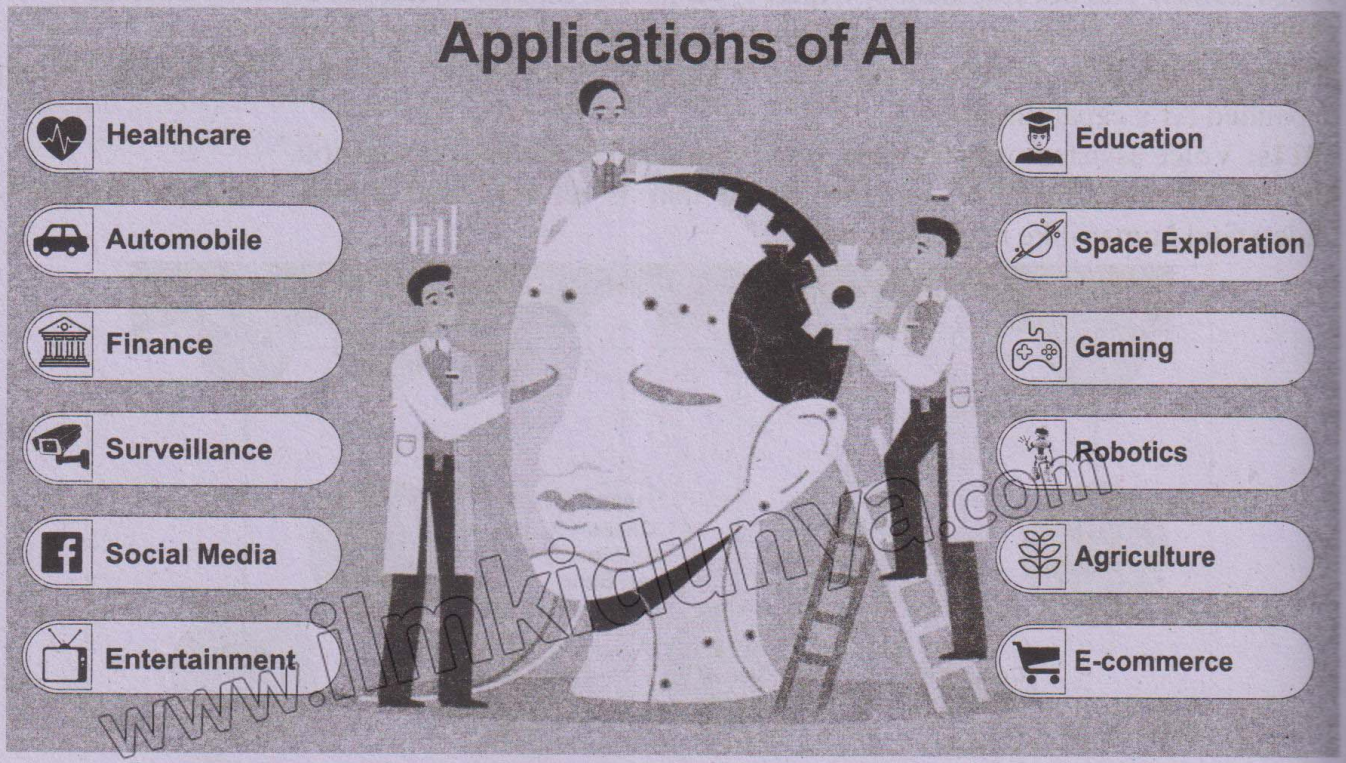
Automobile:AI is transforming the automotive industry by enabling autonomous driving, advanced driver assistance, and optimization of vehicle performance and maintenance. The integration of AI- powered systems is improving safety, efficiency, and user experience in modern vehicles.

Finance: AI is transforming the finance industry by enabling personalized investment recommendations, fraud detection, algorithmic trading, process atomation, and risk assessment to enhance decision-making improve efficiency, and provide customized financial service.

Social Media: AI is extensively used in social media to power personalized content recommendations, automated. Content generation, sentiment analysis, user behavior prediction, and targeted advertising to enhance user engagement and optimize marketing strategies.

Agriculture: AI is transforming agriclture by enabling precision farming techniques, such as predictive analytics for crop yields, automated irrigation systems, and computer vision for disease and pest detection.

E-Commerece: AI is highly integrated into e-commerce platforms, powering personalized product recommendations, intelligent chatbots offer coustomer suport, fraud detection systems, and others.



Applications of AI in Different Domains (H.Q Picture is available on Pg# 240)

Subfields of AI

AI Encompasses several subfields, each focusing on different aspects of intelligence and technology.

1. **Machine Learning:** Machine learning is a type of artificial intelligence where computers learn from experience and improve over time without being explicity programmed.It's like teaching a computer by showing it lots of examples,and it figure out how to do things on its own.
2. **Deep Learning:** Deep learning is special kind of machine learning. It uses complex Structure called neural networks,which are inspired by how our brains work . Thses network help computers learn from lots of data and make decisions or recognize patterns even better.
3. **Natural Language Procesisng (NLP):** Natural Language Processing, or NLP, is a technology that help computers understand and talk to us in our language. It's like teaching a computer to read, write and even chat with us.

Example: When you ask Siri or Alexa a question, they use NLP to understand what you're saying and give you a helpful answer. Another example is when you type a message and your phone suggests words to complete your sentence.That's NLP at works!

4. **Computer Vision:** Computer vision is field of artifical intelligence that enables computers to see and understand the visual world. It helps computers interpret images and videos.
5. **Robotics:** Robotics is the science of building and programming robots. Robots are machines that can do tasks for us, like cleanning the floor or building cars. Some robots can even think and make decisions.

Q.3 Differentiate between explainable (witebox) and unexplainable (blackbox) Al models. 09510003

Ans. Artificial Intelligence (AI) involves using algorithms and techniques to enable machines to perform task that typically require human intelligence. In this section, we will explore different types of AI algorithms and understand their roles in advancing the capabilities of AI, particularly through machine learning models.

Types of AI Algorithms

Explainable (Witebox) vs. Unexplainable(Blackbox)

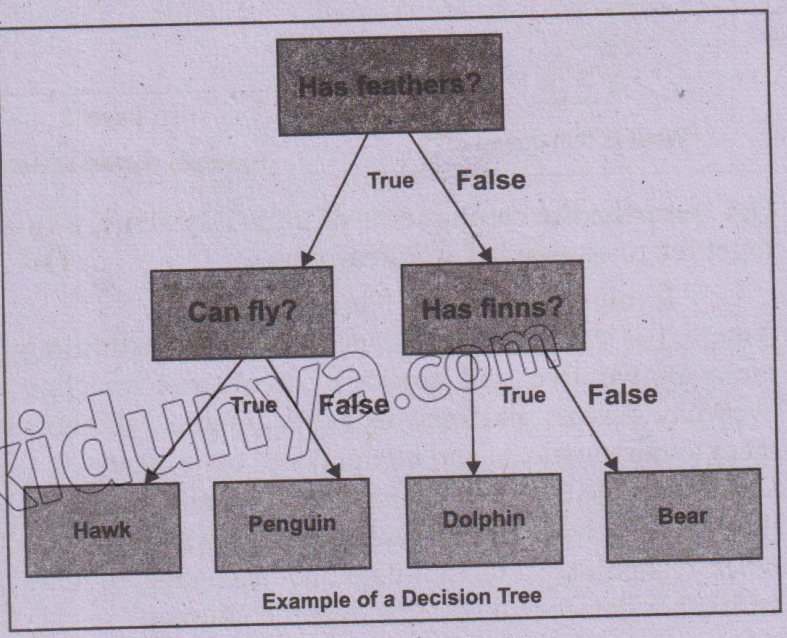
AI algorithms can be broadly categorized into two types based on their interpretability. Explainable (whitebox) and unexplainable (blackbox) algorithms.

1. Explainable (Whitebox) Algorithms

Explainable or whitebox algorithms are those where the decision-making process is transparent and understandable. These algorithms allow users to see and understand how decisions are made. Examples include:

Decision Trees: A decision tree is a tool that helps computers make decisions by following a series of questions. Each question leads to another question or a final answer, much like a flowchart.

Example: Let's look at the example decision tree shown in Figure. This decision tree helps us identify and animal based on its characteristics.



Example of a Decision Tree

Linear Regression: Linear regression is a way to find the relationship between two features. Imagine you want to know how much time you should study to get good grades. Linear regression helps you find a straight line that best fits the data points showing study time and grades.

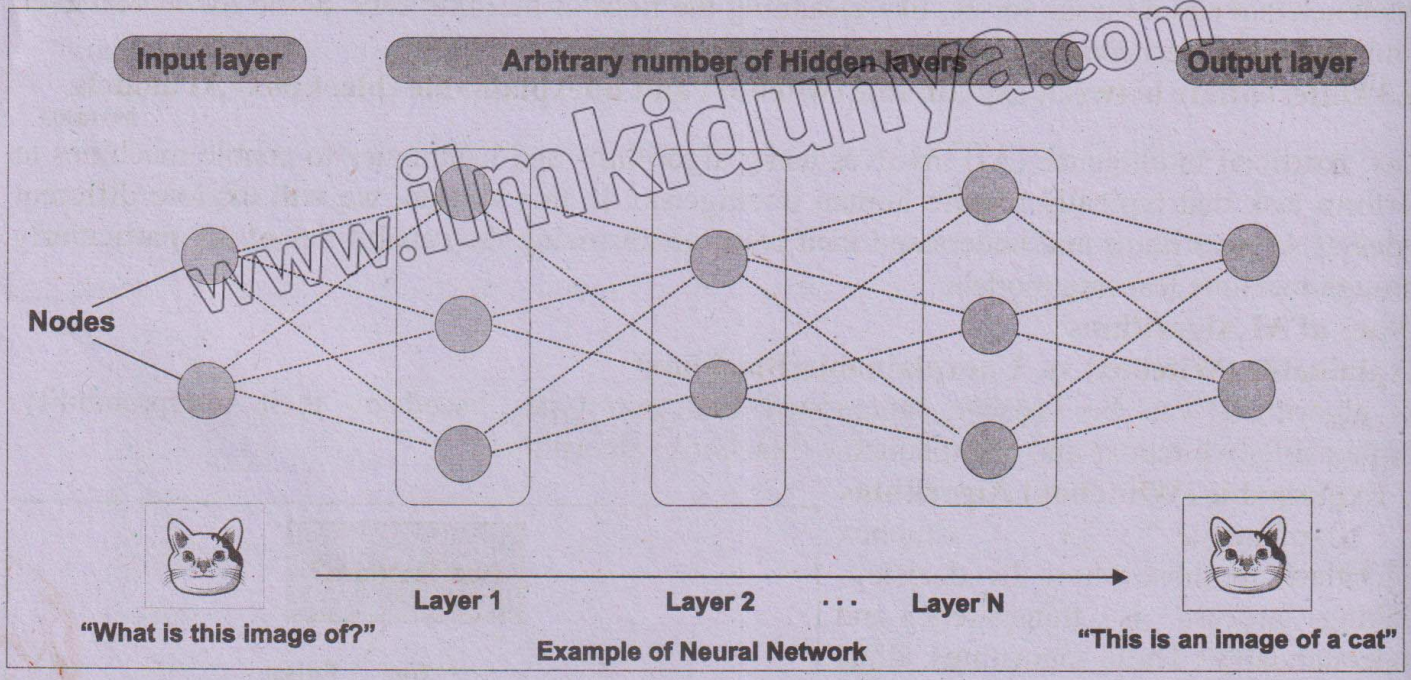
Example: If you have data showing how many hours you studied and the grades you got, linear regression can help you find a line that predicts your grade based on the number of hours you study. If the line show that more study time generally leads to better grades, you can use this information to plan your study schedule.

Rule-Based Systems: Rule-based Systems are like a set of **if-then** rules that computers follow to make decisions. These rule are written by humans to help the computer understand what to do in different situations.

Exmaple: Think of a simple game where you control a character that needs to avoid obstacles. The game might use rule like if the character is about to hit an obstacle, then jump. These rule help the charcter move safely through the game.

2. Unexplainable(Blackbox)Algorithms.

Unexplainable or blackbox algorithms are those where the decision-making process is not easily interpretable. These algorithms often involve complex computations and interactions that make it difficult to understand how a particular decision was reached. Example include neural networks and deep learning models, which we have already discussed in previous Section.



Example of Neural Network

Q.4 Describe the components of an IoT systems. Explain how these components work together to enable IoT applications. **OR** 09510004

Explore Internet of Things in details.

Ans: IoT is a revolutionary concept that is transforming the way we live and work. It involves connecting everyday devices and systems to the internet, allowing them to communicate and interact with each other.

Definition: IoT is a network of physical objects, or things,that are equipped with sensors, software, and other technologies to facilitate the exchange of data with other device and systems over the internet.

Did you know?

The first AI program called the Logic Theorist, was created in **1955** by **Allen Newell and Herbert** A. Simon. It was designed to mimic the problem-solving skills of a human being.

Singificance of IoT

loT is significant because it allows for the seamless integration of the physical and digital worlds. This connection enables device to collect and share data, which can be analysed to improve efficiency, provide better services, and create new opportunities in various fields such as healthcare, agriculture, and smart homes.

Components of IoT Systems

An loT System typically consists of the following components:

1. **Sensors:** These are device that detect and measure physical properties like temperatue, humidity, light, and motion. Sensors collect data from the environment.
2. **Actuators:** These are devices that convert energy into motion-Im loT and actuator can act on data to generate output.
3. **Devices:** These include everyday objects like smart watches, refrigerators, and cars that are connected to the internet. Device use the data collected by sensors to perform specific tasks.
4. **Networks:** These are the communication pathays that connect sensors and device to the internet. Allowing them to share data. Networks can be wired or wireless.
5. **Data Analysis:** This involves processing and analysing the data collected by sensors to gain insights and make decisions. Data analysis can be done on the device itself, in the cloud, or on a central server.

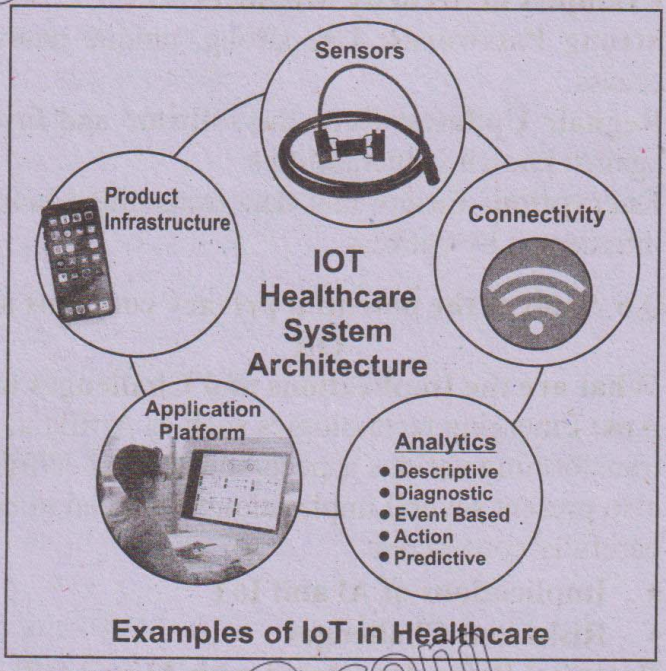
Did you know?

In Pakistan, robots and machines are being used to perform medical operations.

Example: One of the practical uses of IoT is a smart home system. There are several internet-connected appliances in a smart home, including the temperature control system, lighting, and surveillance cameras.

Q.5 Discuss the Applications of IoT.
09510005

Ans: The Internet of Things (IoT) is transforming many aspects of our lives by connecting device and systems in various domains. Let's explore some of the exciting applications of IoT and understand the importance of security and privacy in these deployments.



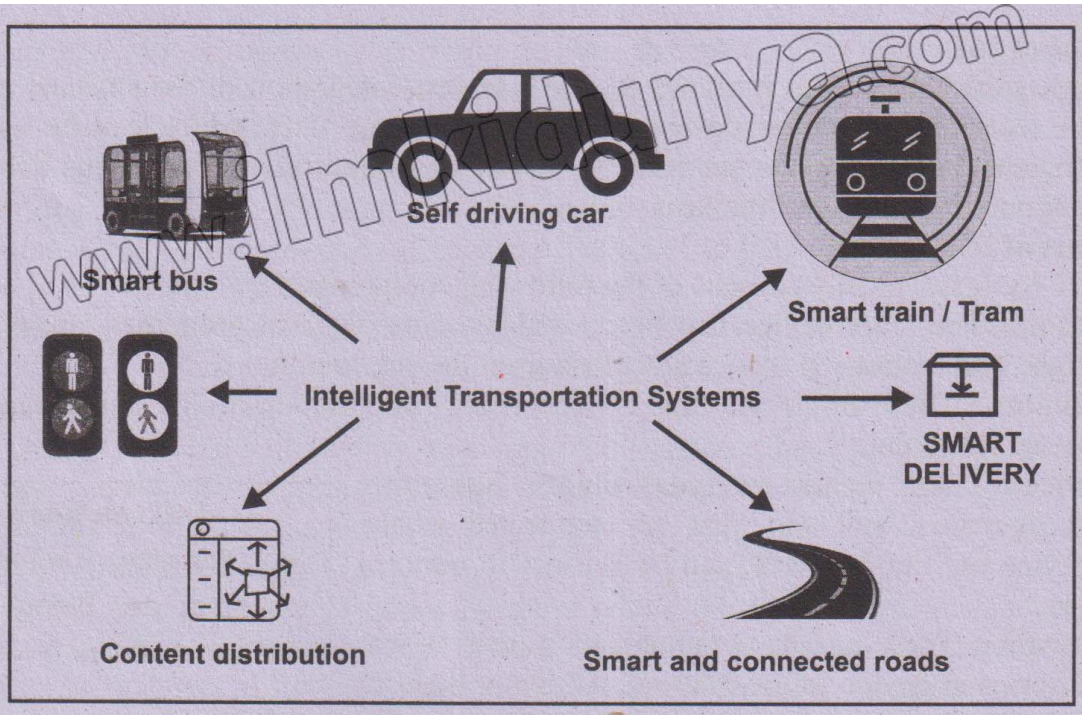
Examples of IoT in Healthcare

1. Healthcare

loT is revolutionising healthcare by providing better patient monitoring and care. IoT devices can track vital signs, remind patients to take medication, and alert healthcare providers in case of emergencies.

2. Transportation

IoT is enhancing transportation systems, making them more efficient and safer. Connected vehicles, smart traffic lights, and real-time tracking systems are some examples of how IoT is used in transportation. The Internet of Things (IoT) is changing the transportation industry through a variety of applications that improve efficiency and safety. Smart traffic management systems use IoT sensors to monitor traffic flow in real time, altering traffic lights to reduce congestion. In fleet management, IoT sensors track cars in real time, providing data on position, speed, and maintenance requirements to help routes and fuel use.



Example of IoT in Transportation

3. Security and Privacy Considerations in IoT Deployments

While IoT offers many benefits, it also raises security and privacy concerns. As more devices are connected to the internet, the risk of cyber-attacks increases. It's important to ensure that IoT systems are secure to protect personal data and privacy.

Examples of Security Measures

Strong Passwords: Use strong, unique passwords for all IoT device to prevent unauthorized access.

Regualr Updates: Keep the software and firmware of your IoT devices to up to date to protect against known vulnerabilities.

Encryption: Ensure that data transmitted betweem devices is encrypted to protect it from being intercepted by hackers.

Q.6 Analyze the potential privacy concerns associated with IoT deployments. 09510006

OR

What are the Implications and Challenges of AI & IoT?

Ans: Emerging technologies such as Artificial Intelligence and the Internet of Things are rapidly transforming various aspects of our lives. While these technologies offer numerous benefits, they also present several implications that need to be carefully considered.

- **Implications of Al and IoT**
- **Risks and Challenges**

Potential Risks Associated with Al and IoT

Data Privacy: As AI and IoT devices collect vast amounts of data, concerns about data privacy become paramount. Personal and sensitive information can be at risk of being misused or accessed by unauthorized parties. Ensuring data privacy involves implementing robust security measures to protect data from breaches and unauthorized access.

Algorithmic Bias: Training of AI systems is conducted on large datasets, and if these datasets comprise biases, the AI models can inadvertently perpetuate or even amplify these biases. This

Did you know?

The term "Artificial Intelligence" was coined by **John McCarthy,** a computer scientist, at the Dartmouth Conference in **1956.**

can lead to unfair outcomes in various applications, such as hiring processes, law enforcement, and lending practices.

Q.7 Discuss the various applications of AI in the field of education. Provide specfic examples and explain how AI can enhance the educational experience. 09510007

Ans. AI based systems in education have many benefits for students, teachers and school/university administration. It enhances student's learning and helps teachers to carry out their tasks efficiently to provide quality education. AI based systems adopt to meet each student's individual learning needs. It helps teachers in grading students' assignments, examinations and essays.

AI is a rapidly evolving technology that involves the development of intelligent machines capable of performing tasks that would normally need human intelligence, such as learning, problem solving, and decision making. Conversational AI has found a useful position in education, as chatbots and virtual tutors give immediate support and promote self-directed learning. These AI chatbots are transforming the student learning experience by leveraging NLP and machine learning algorithms to provide immediate and personalized assistance.

Examples:

- **Khan Academy**
- **Zoom Meetings**
- **Google Classes**
- **LinkedIn Learning**

Q.8 Describe the concept of algorithmic bias and its implications in AI-powered decision-making processes. Suggestion strategies to mitigate the risks of algorithmic bias. 09510008

Ans. Algorithmic Bias: Training of AI systems is conducted on large datasets, and if these datasets comprise biases, the AI models can inadvertently perpetuate or even amplify these biases. This can lead to unfair outcomes in various applications, such as hiring processes, law enforcement, and lending practices. Addressing algorithmic bias makes analysis of training data and implementing techniques to relieve biases. Transparency in AI development is also crucial for combating bias. Organizations must describe how models are trained, tested, and validated so that stakeholders can review decisions and detect potential sources of bias. Regular audits and bias detection techniques should be implemented throughout the AI lifecycle to discover and address issues as they develop. Engaging diverse, interdisciplinary teams in AI development guarantees that many perspectives are considered during the design process, lowering the possibility of blind spots that perpetuate bias.

Q.9 Develop a set of ethical principle and guidelines for the responsible development and deployment of AI and IoT technologies. 09510009

Ans. As AI and IoT devices collect large volumes of data, privacy concerns become increasingly important. Personal and sensitive information may be misused or obtained by unauthorized parties. Data privacy requires strong security measures to safeguard data from breaches and unwanted access. The combination of artificial intelligence (AI) with the Internet of Things (IoT) has immense potential to transform industries and society. Enforcing security requirements for IoT devices to keep them safe from cyber attacks. This includes regular software updates, encryption, and strong authentication systems. To ensure that these technologies are developed and implemented ethically, ethical standards and norms must be set that strike a balance between innovation and social benefit, as well as safety and equity. Setting ethical principles for growth and development.

Q.10 Explain the role of policy and regulatory frameworks in addressing the challenges of A and IoT. Provide examples of existing frameworks and discuss their effectivencess. 09510010

Ans. To mitigate the risks associated with AI and IoT, comprehensive policy and regulator framewor frameworks are essential. These frameworks should focus on:

1. **Data Protection Laws:** Implementing strict data protection regulations to ensure tha personal data is collected, stored, and processed securely. Examples include the **General Data Protection Regulation (GDPR)** in Europe.
2. **Ethical Guidelines:** Establishing ethical guidelines for the development and deployment o AI systems to ensure fairness, transparency, and accountability. Organizations like the **IEEE** have developed guidelines for ethical AI.
3. **Bias Mitigation Standards:** Developing standards and best practices for identifying and mitigating biases in AI models. This includes guidelines for diverse and representative data collection and techniques for bias detection and connection.
4. **Security Standards:** Enforcing security standards for IoT devices to protect them from cyber-attacks. This includes regular software updates, encryption, and secure authentication mechanisms.

Q.11 Evaluate the impact of AI and IoT on the job market and work environment. 09510011

Ans. Job Market: AI and IoT are altering the job market by introducing new roles in sectors such as AI development and IoT management, while also removing typical, manual jobs in industries like manufacturing. This change underscores the importance of reskilling, as demand for technical and analytical abilities rises.

Work Environments: AI is revolutionizing workplaces by automating repetitive tasks, improving efficiency, and enabling data-driven decision-making. IoT devices in industrial settings optimize production processes and monitor equipment health, reducing downtime and maintenance costs.

Topic Wise Short Questions (Additional

AI & Its Applications

Q.1 What is Artificial Intelligence? 09510012

Ans. Artificial Intelligence denotes the simulation of human thinking ability in computer systems to think and learn in a manner like humans.

Q.2 What do you know about Machine learning? 09510013

Ans. Machine learning is a field within Artificial Intelligence that teaches computers to learn from data inputs and experience like humans without direct programming. AI algorithms are based on ML to predict output.

Q.3 What inputs you will choose while predicting the price of a car? 09510014

Ans. For example, assume that we want to predict price of a car. In this case we need to create a dataset of cars having the input like.

- Engine type and power
- Transmission type (manual / automatic)
- Number of seats
- Front-wheel / rear-wheel drive
- Keyless entry
- Push button start
- Safety features
- Country of manufacturing

Q.4 What are the 5 stages of machine learning process? 09510015

Ans. The machine learning process consists of 5 stages.

a) Collection of training data
b) Creating algorithm
c) Learning process
d) Creating training model
e) Predicting results

Q.5 Describe any two disadvantages of AI Algorithm? 09510016

Ans.

- AI based automation can lead job losses in many areas such as automobile manufacturing, business, education, healthcare, agriculture, etc.
- Errors in AI algorithms in healthcare systems can output inaccurate information. For example, the AI system can recommend a wrong medicine for a patient which can be very harmful and can even cause death.

Q.6 Mention any Three usages/benefits of AI Systems? 09510017

Ans. The following are some important benefits of using AI systems.

- Usage of AI based assistants such as Siri and Alexa, suggest products by monitoring our browsing habits.
- Provide better security against cyberattacks.
- Enable new innovations in developing intelligent computer software.

Q.7 What are the most popular AI tools? Make list. 09510018

Ans. Here are some most popular AI tools:

- **ChatGPT**
- **Grammarly**
- **Lovo ai**
- **Virtual Assistants**

Q.8 What is ChatGPT? 09510019

Ans. Chat GPT stands for **Chat Generative Pre-trained transformer** developed by Open AI, Open AI is an American Artificial Intelligence Research Laboratory. ChatGPT helps in performing tasks such as creating essays, emails and coding. It is and easy to use virtual assistant that provides text-based responses to users' questions. It is a very useful AI tool but it raises some ethical issues as well.

Q.9 What do you know about Virtual Assistant? 09510020

Ans. Virtual assistant is an interactive AI based application program that can understand natural language. Popular virtual assistants are Apple's Siri, Amazon Alexa, Google Assistant, Chat GPT and Microsoft Cortana. You ask question to it and it will give you the answer.

Q.10 Describe the term "Lovo ai". 09510021

Ans. Lovo ai is a tool based on AI algorithm that converts text to speech. It is the award winning most realistic online text to speech generator. It uses AI techniques to find out the most suitable voice for your text. It supports 500 high quality voices and more than 100 languages.

Q.11 How speech Recognition works. 09510022

Ans. It is used for various purposes. These include dictating text into a computer instead of typing it to save time. It is used by virtual assistants like Siri and Alex.

Q.12 What is computer vision? 09510023

Ans. Computer vision is a field of AI that enables computer systems to obtain meaningful information from digital images videos. To achieve this, it uses camera, data and algorithms.

NLP & Expert System

Q.13 What do you mean by Natural Language Processing (NLP)? 09510024

Ans. Natural language processing (NLP) is based on AI. It is about giving computers the ability to understand spoken and written words just like we do. The purpose of NLP is to provide easy communication between computers and humans by using natural language.

Q.14 What are the areas of application of NLP in our daily life? 09510025

Ans. The following are some areas of application of NLP in our daily life.

- Language Translation (Google translation)
- Email filtering and spam detection
- Voice recognition
- Web search
- Chatbots
- Personal assistants (Siri, Alexa, Google

Assistant)
- Spell and grammar recheck
- Sentiment analysis
- Bias and fake news detection.
- Advertisement to targeted audience

Robotics & Fields of AI

Q.15 What is a Robot? 09510026

Ans. A robot is a mechanical or virtual artificial agent typically designed by humans to perform tasks automatically, with varying degrees of autonomy. Robots can be programmed to execute specific actions or behaviors, often utilizing sensors, actuators.

Q.16 How AI-based software is useful in healthcare sector? 09510027

Ans. AI-based software for healthcare:

1. Improves medical image analysis.
2. Offers clinical decision support.
3. Promotes drug discovery.
4. Enables personalized medicine.
5. Enables remote patient monitoring.
6. Improves healthcare procedures.
7. Provides medical chatbots and virtual assistants.
8. Predicts disease outbreaks.
9. Assists with robotic surgery.
10. Facilitates healthcare research and data analysis.

Q.17 What is the role of AI in Education? 09510028

Ans. AI based systems in education have many benefits for students, teachers and school/university administration. It enhances student's learning and helps teachers to carry out their tasks efficiently to provide quality education. AI based systems adapt to meet each student's individual learning needs. It helps teachers in grading students' assignments, examinations and essays.

Q.18 Describe AI in Agriculture? 09510029

Ans. AI in agriculture refers to using AI based modern techniques to help farmers produce high quality crops and increase production by using land more efficiently.

Q.19 What are the benefits of application of AI in agriculture? 09510030

Ans. The following are some benefits of application of AI in agriculture.

- AI is used for scanning images of insects that attack crops and livestock to detect and prevent spread of diseases.
- AI can help in monitoring and detecting health problems in livestock using drones, cameras and computer vision to avoid spread of disease.
- AI based drone technology is used for efficient spray of pesticide.

Q.20 How AI is helpful in our daily life? 09510031

Ans. AI improves our daily lives by providing personal assistants, enabling smart home devices, making online recommendations, facilitating language translation, personalizing social media, assisting with navigation, tracking health and fitness, filtering emails, enabling voice recognition, and providing customer service support.

Q.21 Describe the use of AI in business? 09510032

Ans. AI is used in business in the areas of e-commerce, marketing and business management. AI software is used to run the day-to-day business activities. It has many benefits in business.

Q.22 What is Chatbot? 09510033

Ans. A chatbot is a computer program that combines AI with natural language to provide instant answers to website visitor's questions through text or voice interaction. It mimics human conversation as a virtual assistant and automates responses to customers questions.

Q.23 What is a major advantage of AI in surgeries. 09510034

Ans. One significant advantage of AI in surgery is its capacity to improve precision and accuracy, resulting in better surgical outcomes and a lower risk of complications.

Q.24 Why is transparency in AI decision making crucial. 09510035

Ans. Transparency in AI decision-making is critical for accountability, trust development, ethical considerations, bias identification, and mitigation.

Q.25 Briefly describe the positive impact of AI in our daily life. 09510036

Ans. Using AI technology, computer can be trained to perform various tasks by imitating actions of human beings. It is the technology related with making intelligent machines and developing intelligent software.

Q.26 Differentiate Machine Learning and Deep learning. 09510037

Ans.

Machine Learning	Deep Learning
Machine learning is a type of artificial intelligence where computers learn from experience and improve over time without being explicity programmed.It's like teaching a computer by showing it lots of examples,and it figure out how to do things on its own.	Deep learning is special kind of machine learning.it uses complex Structure called neural networks, which are inspired by how our brains work. The network help computers learn from lots of data and make decisions or recognize patterns even better.

Q.27 Describe how computer visions applications help in automation of tasks. 09510038

Ans. AI computer vision gives ability to computer to see just like it gives ability to think. Computer vision applications are used in various fields. These include healthcare, security and surveillance, facial recognition, self-driving car, parking occupation detection, traffic flow analysis, manufacturing, construction, etc.

Q.28 Compare the use of Natural Language Processing (NLP) with computer languages for interaction with computer. 09510039

Ans. Comparison

Ease of Use: NLP enables non-technical users to interact intuitively with natural language.

Flexibility vs. Control: NLP allows for greater flexibility in human-computer interaction, with a focus on context and semantics. Computer languages provide fine control over program and system behavior.

Applications: NLP is commonly used for user-facing applications and communication, whereas computer languages are employed for software development and system-level tasks.

Q.29 Is the used of Grammarly AI tool a perfect replacement of manual proofreading? 09510040

Ans. It is not a perfect tool as it has some inaccuracy issues. It does not catch every mistake and some suggestions it gives may not be correct. Since it is not 100% accurate, it is not a replacement of manual proofreading.

Q.30 What is the historical context and evolution of AI? 09510041

Ans. Historical Context of Artifical Intelligence:

The term AI was first invented by John Mc Carthy in 1956 druing the Darthmouth conference. The jouney of AI has seen several key milestones:

1950s-1960s: Early AI research focused on problem-solving and symbolic methods.

1970s-1980s: The development of expert systems that mimicked human decision-making.

1990s: The rise of machine learning, where computers began to learn from data.

2023s—present: ChatGPT was introduced that is an AI-based model which is designed to understand human-like text based input.

Q.31 Provide two examples of AI applicationns in healthcare. 09510042

Ans: Firstly, AI is used for diagnosing diseases personalizing treatment plans and secondly predicting patient outcomes.

Q.32 Explain the role of AI techniques in advancing machine learning models. 09510043

Ans: Machine learning is a type of artificial intelligence where computers learn from experience and improve over time without being explicity programmed. It's like teaching a computer by showing it lots of examples,and it figure ourt how to do things ontis own.

Q.33 Define the internet of Things (loT). 09510044

Definition: IoT is a network of physical objects, or things,that are equipped with sensors, software, and other technologies to facilitate the exchange of data with other device and systems over the internet.

Q.34 Describe the significance of loT in connecting devices and systems. 09510045

Ans: IoT is significant because it allows for the seamless integration of the physical and digital worlds. This connection enables device to collect and share data, which can be analysed to improve efficiency, provide better services, and create new opportunities in various fields such as healthcare, agriculture, and smart homes.

Q.35 What are the potential risk associated with AI and loT? 0951004

Ans: Following are the potential risks of AI and IoT:

- **Algorithmic Bias**
- **Policy and Regulatory Frameworks**
- **Data Protection Laws**
- **Ethical Guidelines**
- **Bias Mitigation Standards**
- **Security Standards**

Q.36 Discuss the societal impact of AI and loT on daily life. 0951004

Ans: AI and loT have the potential to address large-scale societal challenges such as climate change, healthcare accessibility, and urbanization. For example, smart cities leverage loT to manage resources efficiently, reduce traffic congestion, and improve public services.

Q.37 Explain the concept of algorithmic bias. 0951004

Ans: Training of AI systems is conducted on large datasets, and if these datasets comprise biases, the AI models can in advertently perpetuate or even amplify these biases. This can lead to unfair outcomes in various applications, such as hiring processes, law enforcement, and lending practices.

Q.38 Outline the importance of ethical considerations in AI and loT. 0951004

Ans: Establishing ethical guidelines for the development and deployment of AI systems to ensure fairness, transparency, and accountability. Organizations like the IEEE have developed guidelines for ethical AI.

Topic Wise Multiple Choice Questions (Additional)

Choose the correction option.

AI & Its Branches/Applications

1. **What is a potential disadvantage of AI according to the information provided?** 09510050

(a) Creativity limitations
(b) Reduced job loss
(c) Lowered costs
(d) Enhanced emotional capabilities

2. **How does AI contribute to improving healthcare, as mentioned in the information?** 0951005

(a) AI prevents doctors from making any errors during surgeries.
(b) AI helps in making new discoveries such as detecting breast cancer earlier.

(c) AI has no influence on healthcare advancement.
(d) AI is used solely for automating repetitive tasks in healthcare.

3. **What is the significant concern regarding the usage of AI in relation to privacy?** 09510052
(a) AI has no access to personal data
(b) AI systems are always transparent about data usage
(c) AI might access private information, causing worries about who can use it and how.
(d) AI cannot be used for surveillance purpose.

4. **Which principle is suggested for the ethical design of AI algorithm to ensure trust in technology?** 09510053
(a) Maintain secrecy and non-disclosure.
(b) Prioritize user control and customization.
(c) Avoid providing transparency in algorithm operations.
(d) Disregard fairness and bias mitigation

5. **What potential problem arises due to the lack of transparency in AI decision making?** 09510054
(a) Enhance user trust in AI
(b) Difficulty in understanding why certain choices are made.
(c) Increased efficiency in healthcare and law enforcement
(d) Clear understanding of the AI decision making process

6. **What is the major ethical concern associated with the use of deep fakes?** 09510055
(a) Enhancing security measures.
(b) Improving information accuracy
(c) Creating realistic and factual videos
(d) Deceiving people, especially in politics or finance.

7. **In what scenario is AI most likely to contribute to spreading misinformation?** 09510056
(a) AI used for secure data storage
(b) AI incorporated in healthcare systems
(c) AI aiding law enforcement agencies
(d) AI used on social media platforms

8. **In which area of AI is facial recognition technology commonly used?** 09510057
(a) Speech recognition
(b) Computer vision
(c) Natural language processing
(d) Expert system

9. **What is the role of AI in drug discovery in the healthcare industry:** 09510058
(a) AI assists in remote patients monitoring
(b) AI streamlines medical billing processes
(c) AI accelerates drug discovery through predictive modeling
(d) AI enhance medical imaging for diagnoses

10. **What is the primary goal of natural language processing in the field of AI?** 09510059
(a) Identifying patterns in visual data
(b) Understanding and generating human language
(c) Recognizing facial expressions
(d) Analyzing sensor data

11. **In computer vision, which task involves identifying and locating objects within an image?** 09510060
(a) Speech recognition
(b) Object detection
(c) Image classification
(d) Language translation

12. **How does AI contribute to the gaming industry? Which aspect of AI is responsible for customizing the gaming experience for players?** 09510061
(a) AI generate lifelike NPCs and deep learning is responsible for customization
(b) AI generate graphics quality, and supervised learning customizes the gaming experience

(c) AI creates in game content, and reinforcement learning customizes the gaming experience.
(d) AI improves game physics, and natural language processing customizes the gaming experience.

13. Which of the following describes a common application of AI in customer service? 09510062
(a) AI predicting financial trends
(b) AI generating automated responses through chatbots
(c) AI analyzing satellite images
(d) AI creating personalized advertisements

14. In what way can AI be used to improve manufacturing processes? 09510063
(a) AI generating design patterns
(b) AI automating assembly lines and quality control
(c) AI translating technical documents
(d) AI creating marketing strategies

15. What is a key concern about using AI for hiring and recruitment? 09510064
(a) AI might reduce job loss
(b) AI might introduce or amplify biases in hiring decisions
(c) AI could lower the cost of recruitment
(d) AI could improve workplace diversity

16. How does AI contribute to the field of cybersecurity? 09510065
(a) AI automates repetitive administrative tasks
(b) AI enhances threat detection and response
(c) AI manages customer interactions
(d) AI monitors physical security systems

17. In what way does AI help e-commerce companies? 09510066
(a) AI improves website load times
(b) AI creates personalized product recommendations
(c) AI manages inventory in physical stores
(d) AI develops new manufacturing techniques

18. What is a primary feature of Infrastructure as a Service (IaaS) in cloud computing? 09510067
(a) Providing a complete software solution for customers
(b) Offering virtualized hardware resources like servers and storage
(c) Managing all aspects of a company's IT infrastructure
(d) Delivering specific applications over the internet

19. Which of the following describes a benefit of using Software as a Service (SaaS)? 09510068
(a) Users need to maintain their own software installations
(b) Software is hosted and managed by a third party
(c) Complete control over server configurations
(d) Ability to customize underlying infrastructure

20. Instant answers to website visitors' questions through text or voice interaction are provided by: 09510069
(a) Robot
(b) Chatbot
(c) Cloud computing
(d) Expert system

21. The AI tool used for correcting spelling and grammar mistakes is: 09510070
(a) ChatGPT (b) Lovo ai
(c) Grammarly (d) Virtual assistant

22. Virtual assistant that belong to Apple Inc. is: 09510071
(a) Siri (b) Alexa
(c) Google assistant
(d) Cortana

23. The AI tool that converts text to speech is: 09510072
(a) ChatGPT (b) Grammarly
(c) Alexa (d) Lovo ai

24. The technology used in self-driving cars is called; 09510073
(a) Natural language processing
(b) Chatbot

(c) Computer vision
(d) Virtual assistant

25. **The technology concerned with training the computer to understand spoken and written words and to take action is known as:** 09510074
(a) Virtual Assistant
(b) Natural language processing
(c) Language analysis
(d) Virtual training

26. **The technology concerned with performing specific tasks with little or no human intervention using computer controlled machine is called:** 09510075
(a) Computer vision
(b) Computer intelligence
(c) Robotics
(d) Virtual technology

Answer Key

1	a	2	b	3	c	4	b	5	b	6	d	7	d	8	b	9	c	10	b
11	b	12	c	13	b	14	b	15	b	16	b	17	b	18	b	19	b	20	b
21	c	22	a	23	d	24	c	25	b	26	c								

Solved Exercise

Choose the correct option.

1. **Which of the following is not a subfield of Al?** 09510076
(a) Machine Learning
(b) Natural Language Processing
(c) Computer Vision
(d) Robotics

2. **Which of these Al algorithms is considered an "explainable" model?** 09510077
(a) Neural Networks
(b) Decision Trees
(c) Random Forests
(d) Convolutional Neural Networks

3. **Which of these is a security concern in IoT deployments?** 09510078
(a) Device vulnerability
(b) Data privacy
(c) Lack of standardization
(d) All of the above

4. **Which of the following is an application of AI in healthcare?** 09510079
(a) Personalized drug development
(b) Automated diagnosis
(c) Remote patient monitoring
(d) All of the above

5. **What is the primary purpose of using Al techniques in machine learning models?** 09510080
(a) To improve accuracy
(b) To enhance interpretability
(c) To reduce computational complexity
(d) All of the above

6. **What is the key difference between explainable (whitebox) and unexplainable (blackbox) Al models?** 09510081
(a) The complexity of the model
(b) The ability to understand the decision-making process
(c) The performance of the model
(d) The training data used

7. **Which of the follow following is an application of IoT in the transportation domain?** 09510082
(a) Smart traffic management
(b) Vehicle-to-Vehicle (V2V) communication
(c) Predictive maintenance of vehicles
d) All of the above

8. **Which of these is a potential impact of Al and loT on the job market?** 09510083

(a) Job displacement due to automation
(b) Increased demand for specialized skills
(c) Transformation of job roles and responsibilities
(d) All of the above

9. What is the key concern associated with algorithmic bias in AI-powered decision-making processes? 09510084
(a) Lack of transparency
(b) Perpetuation of existing societal biases
(c) Reduced accuracy of the model
(d) All of the above

10. Which of the following is an ethical principle that should be considered in the development and deployment of AI and IoT technologies? 09510085
(a) Transparency and accountability
(b) Respect for privacy and data rights
(c) Fairness and non-discrimination
(d) All of the above

Answer Key

1	d	2	b	3	d	4	d	5	d	6	b	7	d	8	d	9	d	10	d

Short Questions

1. **Define Artificial Intelligence (AI).** 09510086
   Ans: See Short Question No.1
2. **What is the historical context and evolution of AI?** 09510087
   Ans: See Short Question No.30
3. **Provide two examples of AI applicationns in healthcare.** 09510088
   Ans: See Short Question No.31
4. **Explain the role of AI techniques in advancing machine learning models.** 09510089
   Ans: See Short Question No.32
5. **Define the internet of Things (IoT).**
   See Short Question No.33 09510090
6. **Describe the significance of IoT in connecting devices and systems.** 09510091
   Ans: See Short Question No.34
7. **What are the potential risks associated with AI and IoT?** 09510092
   Ans: See Short Question No.35
8. **Discuss the societal impact of AI and IoT on daily life.** 09510093
   Ans: See Short Question No.36
9. **Explain the concept of algorithmic bias.** 09510094
   Ans: See Short Question No.37
10. **Outline the importance of ethical considerations in AI and IoT.** 09510095
    Ans: See Short Question No.38

Long Questions

1. **Discuss the various applications of AI in the field of education. Provide specfic examples and explain how AI can enhance the educational experience.** 09510096
   Ans. See Long Question No. 7
2. **Differentiate between explainable (witebox) and unexplainable (blackbox) AI models.** 09510097
   Ans. See Long Question No. 3
3. **Describe the components of an IoT systems. Explain how these components work together to enable IoT applications.** 09510098
   Ans. See Long Question No. 4
4. **Explore the applications of IoT in the transportation domain.** 09510099
   Ans. See Long Question No. 5 (Point Number 2)

5. **Analyze the potential privacy concerns associated with IoT deployments.** 09510100
   Ans. See Long Question No. 6
6. **Evaluate the impact of AI and IoT on the job market and work environment.** 09510101
   Ans. See Long Question No. 11
7. **Explain the role of policy and regulatory frameworks in addressing the challenges of AI and IoT. Provide examples of existing frameworks and discuss their effectivencess.** 09510102
   Ans. See Long Question No. 10
8. **Describe the concept of algorithmic bias and its implications in AI-powered decision-making processes. Suggestion strategies to mitigate the risks of algorithmic bias.** 09510103
   Ans. See Long Question No. 8
9. **Develop a set of ethical principle and guidelines for the responsible development and deployment of AI and IoT technologies.** 09510104
   Ans. See Long Question No. 9

Activities

Activity 1

09510105

Research and present a real-world application of AI in one of the domains already mentioned. Explain how AI is used and what benefits it brings.

Ans. Class Work/ Lab Work / Practical Work

Activity 2

09510106

These are devices that convert energy into motion. In IoT, an actuator can act on data to generate output.

Ans. Class Work/ Lab Work / Practical Work

Activity 3

09510107

Think about your own home. What everyday devices could be connected to the internet to make your home smarter? Discuss with your classmates and draw a simple diagram showing how these devices could be connected in an IoT system.

Ans. Class Work/ Lab Work / Practical Work