



B.K. BIRLA CENTRE FOR EDUCATION

SARALA BIRLA GROUP OF SCHOOLS
A CBSE DAY-CUM-BOYS' RESIDENTIAL SCHOOL



MID-APRIL TEST 2025-26
ARTIFICIAL INTELLIGENCE (417)

Class: X

Date: 19-04-2025

Admission No.

Time : 1 hr.

Max Marks: 25

Roll No. :

General Instructions:

1. Please read the instructions carefully.
2. This Question Paper contain two sections: Section A & Section B.
3. Section A has Objective type questions whereas Section B contains Subjective type questions.
4. All questions of a particular section must be attempted in the correct order.
5. **SECTION A - OBJECTIVE TYPE QUESTIONS (07 MARKS):**
 - i. This section has 01 question.
 - ii. Marks allotted are mentioned against question/part.
 - iii. There is no negative marking.
 - iv. Do as per the instructions given.
6. **SECTION B – SUBJECTIVE TYPE QUESTIONS (18 MARKS):**
 - i. This section has 12 questions.
 - ii. A candidate has to do 8 questions.
 - iii. Do as per the instructions given.
 - iv. Marks allotted are mentioned against each question/part.

MARKING SCHEME

SECTION A: OBJECTIVE TYPE QUESTIONS

Q.(1) Answer any 7 out of the given 10 questions :

(7 x 1 = 7)

- (i) What is the primary purpose of AI project cycle ?
 - (a) To provide a set of random steps for AI development
 - (b) To systematically plan, develop and deploy AI solutions**
 - (c) To focus only on the final implementation of AI systems
 - (d) To perform data analysis without a structured plan
- (ii) What is the main goal of the data acquisition stage in AI project ?
 - (a) To collect raw data for analysis and reference**
 - (b) To visualise data using statistical methods
 - (c) To test the AI model
 - (d) To deploy the model into production
- (iii) Which of the following is NOT a real-time application of NLP ?
 - (a) Image recognition**
 - (b) Chatbots
 - (c) Plagiarism checker
 - (d) Sentiment analysis

- (iv) Which ethical framework emphasises good character traits such as kindness and compassion?
 (a) Value based ethical framework (b) **Virtue based ethical framework**
 (c) Right based ethical framework (d) Utility based ethical framework
- (v) Which W in 4W canvas explores the reason behind solving the problem ?
 (a) What (b) **Why** (c) Where (d) Who
- (vi) Machine Learning focuses on
 (a) Building Circuits (b) **Learning from data**
 (c) Simulating Emotions (d) Physical Robots
- (vii) Which of these is an application of Machine Learning ?
 (a) Building databases (b) Writing programming code
 (c) Manual data processing (d) **Recommendation systems**
- (viii) Which of the following is labelled data ?
 (a) Unmarked data (b) **Marked or tagged data**
 (c) Raw data (d) Unusable data
- (ix) Which Machine Learning techniques is best for grouping customers based on their shopping behaviours ?
 (a) Regression (b) Classification
 (c) Association (d) **Clustering**
- (x) An AI agent playing a game and learning from its rewards and penalties is an example of :
 (a) Supervised Learning (b) Unsupervised Learning
 (c) **Reinforcement Learning** (d) Evolutionary Learning

SECTION B: SUBJECTIVE TYPE QUESTIONS

Answer any 6 out of the given 8 questions:

(6 x 2 = 12)

Q. (2) What is the AI project cycle ? Name all and explain any two.

Ans. : The AI project cycle consists of a series of stages that guide the development of an AI system from inception to deployment and beyond. Here are the key stages of the AI project cycle:

1. Problem Scoping
2. Data Acquisition
3. Data Exploration
4. Modelling
5. Evaluation
6. Deployment

Q. (3) “Google Lens is an application of Google that can be used to identify any image by clicking a picture from the real world.” Explain this statement.

Ans. : Google Lens is a visual search and recognition tool that uses the power of AI and machine learning to analyze real-world images, identify objects, extract text, translate languages, and provide information about what you see, all by simply clicking a picture with your smartphone camera.

The statement refers to Google Lens, a powerful visual recognition tool developed by Google. Google Lens uses Artificial Intelligence (AI) and Machine Learning (ML) to analyze and interpret images. Here's how it works:

1. Image Recognition: Google Lens allows users to point their smartphone camera at an object, text, or image from the real world. Once the image is captured, Google Lens processes it using AI and ML algorithms to identify the object or scene in the image.
2. Real-World Interaction: Google Lens isn't limited to recognizing static images from your phone gallery. It can interact with the real world by recognizing live scenes and objects around you. For example, it can recognize a flower, a book, a landmark, or even a piece of text, and provide relevant information or suggestions.

Q. (4) How is the application of computer vision in agricultural monitoring ? Explain.

Ans. : Computer Vision in Agricultural Monitoring refers to the use of computer vision technologies and artificial intelligence (AI) to analyze and interpret visual data (such as images or videos) from the agricultural environment. It plays a significant role in improving productivity, sustainability, and precision in agriculture. Here's an explanation of how computer vision is applied in agricultural monitoring:

1. Crop Health Monitoring and Disease Detection:
 2. Weed Detection and Management:
 3. Yield Estimation:
 4. Precision Irrigation:
 5. Harvest Monitoring and Automation:
 6. Soil Health Monitoring:
 7. Field Monitoring and Field Mapping:
- Increased Efficiency: Automation through computer vision systems allows for more precise monitoring, faster analysis, and quicker decision-making.
 - Sustainability: By optimizing resource usage (water, fertilizers, pesticides), computer vision promotes more sustainable farming practices and reduces environmental impact.
 - Cost Reduction: By reducing the need for manual labor and improving efficiency in operations, farmers can lower costs.
 - Improved Yield and Quality: Real-time insights allow farmers to take proactive actions to boost crop yield and quality, ultimately leading to better harvests and increased profits.
 - Real-Time Insights: Continuous monitoring using computer vision provides real-time information, allowing farmers to make timely decisions that can significantly impact the health of their crops and livestock.

Q. (5) What is Natural Language Processing ? Explain any two real life applications of NLP.

Ans. : Natural Language Processing (NLP) is a field of Artificial Intelligence (AI) focused on enabling machines to understand, interpret, and generate human language. It combines linguistics and computer science to analyze, manipulate, and comprehend text or speech in a way that mimics human communication. NLP allows computers to process and interact with text and spoken words, bridging the gap between human language and machine understanding.

NLP tasks include things like:

- Text classification
- Named Entity Recognition (NER)
- Sentiment analysis
- Machine translation
- Speech recognition
- Text generation

NLP is essential in applications like chatbots, voice assistants, machine translation, and more.

1. Voice Assistants (e.g., Siri, Alexa, Google Assistant):
2. Sentiment Analysis in Social Media and Customer Feedback

Q. (6) Define modelling. Write two examples of Machine Learning.

Ans. : Modeling in machine learning refers to the process of creating a mathematical model that can make predictions or decisions based on input data. This involves selecting a suitable algorithm, training it with a dataset, and then using the trained model to make predictions or classify new, unseen data. The model is trained by adjusting its parameters based on the patterns and relationships it learns from the training data.

Modeling is the process of designing and developing a machine learning model that can learn from historical data and generalize to make predictions or decisions when exposed to new data.

Two Examples of Machine Learning:

Linear Regression: Linear regression is a statistical technique used to model the relationship between a dependent variable (target) and one or more independent variables (features) by fitting a linear equation to observed data. It's commonly used for predicting continuous numerical values.

Random Forest: Random Forest is an ensemble learning algorithm that constructs a multitude of decision trees during training and outputs the mode (classification) or mean (regression) of the predictions from all the individual trees. It's robust to overfitting and works well for both classification and regression tasks.

Image classification, fraud detection, or medical diagnosis.

Modeling in machine learning is the process of developing a mathematical representation of data, enabling predictions or classifications. **Linear Regression** and **Random Forest** are two popular machine learning algorithms, with the former used for predicting continuous values and the latter used for both classification and regression tasks.

Q. (7) What do you mean by a testing data set and training data set ? Explain.

Ans. : In machine learning, training data and testing data are two essential subsets of the data used to train and evaluate a model. They serve different purposes in the model-building process.

1. Training Data Set: The training data set is the subset of the data that is used to train a machine learning model. It contains both the input features (independent variables) and the corresponding output labels (dependent variables) that the model needs to learn from.

- The model uses this data to learn patterns, relationships, and features that allow it to make accurate predictions or classifications. During training, the model adjusts its parameters based on the training data to minimize the error between its predictions and the actual outcomes.

Example: If you are building a model to predict house prices, the training data would consist of features like the square footage, number of rooms, location, etc., along with the actual house prices as the output.

2. Testing Data Set: The testing data set is the subset of the data that is used to evaluate the performance of the trained machine learning model. It is a separate set that is not used during the training phase, allowing for an unbiased assessment of how well the model generalizes to new, unseen data.

The testing data serves as a proxy for real-world data that the model will encounter after deployment. By evaluating the model's performance on this data, we can understand how well it is likely to perform on new data and check if it has overfitted or underfitted the training data.

Example: After training the house price prediction model with the training data, the testing data would be another set of houses (with features like size, number of rooms, etc.) for which the actual prices are known. The model will predict the prices, and these predictions are compared to the actual prices to assess performance.

Q. (8) Differentiate between labelled and unlabelled dataset.

Ans. : In machine learning, datasets are typically classified as labelled or unlabelled based on the presence or absence of labels (target values) for the data points. Here's a detailed explanation of both types:

1. Labelled Dataset:

- **Definition:** A labelled dataset is one where each data point (or example) comes with a corresponding label or target value. The label is the outcome that the model is trying to predict or classify, and it serves as the ground truth for training the machine learning model.
- **Purpose:** Labelled data is primarily used in supervised learning where the model learns the relationship between the input features and the corresponding labels. The goal is to map input data (features) to the correct output (label).
- **Structure:** Each data point consists of input features (independent variables) along with the output label (dependent variable).
- **Example:** In a dataset used to predict house prices, the input features might include the size of the house, number of rooms, and location, while the label would be the actual price of the house.

2. Unlabelled Dataset:

- **Definition:** An unlabelled dataset is a collection of data where the data points do not have corresponding labels or target values. In other words, the outcomes (labels) are not provided, and the model must try to find patterns and structures in the data without explicit guidance.
- **Purpose:** Unlabelled data is used primarily in unsupervised learning, where the model tries to understand the underlying structure or patterns in the data, such as grouping similar data points (clustering) or reducing the data's dimensionality (dimensionality reduction).
- **Structure:** The data consists only of input features (independent variables) without any associated labels (dependent variables).
- **Example:** In a dataset of customer information, the input features might include age, gender, and location, but there are no labels indicating the customer's purchasing behavior or preferences. The model might try to cluster customers into groups based on similarities.

Q. (9) Explain supervised and unsupervised learning approach with an example.

Ans. :

1. Supervised Learning: In supervised learning, the model is trained on a labeled dataset, where each input data point is paired with a correct output label (target). The goal of supervised learning is for the model to learn the relationship between the inputs and their corresponding outputs so that it can predict the output for new, unseen data.

- Type of Data: The data consists of input features (independent variables) and the corresponding labels (dependent variable or target).
- Learning Process: The model is trained by using the known labels to learn the patterns and relationships in the data. The model then makes predictions, and the predicted values are compared to the actual labels to improve its accuracy over time.

Types of Supervised Learning:

- Classification: Predicting a categorical label. (e.g., spam or not spam)
- Regression: Predicting a continuous value. (e.g., predicting house prices)

Example: Predicting House Prices

- Dataset: The dataset includes features such as size of the house, number of rooms, location, etc., and the price of the house as the target label.
- Process: In supervised learning, the model will learn from this dataset by mapping the input features (size, rooms, location) to the target label (price). Once trained, the model can predict the price of a new house based on its features.

Common Algorithms:

- Linear Regression
- Logistic Regression
- Decision Trees
- Random Forest

2. Unsupervised Learning: In unsupervised learning, the model is trained on data that has no labels. The goal of unsupervised learning is for the model to find hidden patterns, structures, or groupings within the data without any explicit guidance on what the output should be.

- Type of Data: The data consists only of input features (independent variables) without any target labels.
- Learning Process: The model tries to identify inherent structures in the data, such as clusters or patterns, without being given specific outcomes.

Types of Unsupervised Learning:

- Clustering: Grouping similar data points together. (e.g., customer segmentation)
- Dimensionality Reduction: Reducing the number of features while retaining important information. (e.g., Principal Component Analysis - PCA)

Example: Customer Segmentation

- Dataset: The dataset contains customer information such as age, income, purchase history, but no predefined labels (e.g., no target for "customer type").

- Process: The model will analyze the data and group similar customers together. For instance, it may identify clusters of customers who are similar in terms of income and spending behavior. These clusters can be used to create targeted marketing strategies.

Answer any 2 out of the given 4 questions :

(2 x 3 = 6)

Q.(10) What is the need of ethical frameworks for AI ? Explain any three points.

Ans. : The rise of Artificial Intelligence (AI) has brought about remarkable advancements in technology and has significantly impacted industries such as healthcare, finance, education, and more. However, as AI continues to develop and become more integrated into various aspects of society, there is an increasing need for ethical frameworks to guide its use. Ethical frameworks in AI are essential to ensure that AI systems are designed, deployed, and used in ways that are fair, transparent, and responsible.

Here are three key reasons why ethical frameworks for AI are needed:

1. Ensuring Fairness and Preventing Bias:

AI systems often learn from historical data, and if this data reflects societal biases (e.g., racial, gender, or socioeconomic biases), the AI system may perpetuate or even amplify these biases. This can lead to unfair outcomes, such as biased hiring decisions, discriminatory loan approvals, or biased criminal justice predictions.

- Ethical Frameworks: These frameworks provide guidelines to ensure AI systems are designed to be fair and free from bias. They help developers identify and mitigate biases in data, algorithms, and decision-making processes.
- Example: In AI-driven recruitment, an algorithm trained on biased data may favor male candidates over female candidates, especially in traditionally male-dominated industries. Ethical guidelines can help ensure that the data used to train AI models is diverse and free from discriminatory patterns.

2. Protecting Privacy and Ensuring Data Security:

AI systems often require large amounts of data to function effectively, and this data may include sensitive personal information. The ethical handling of this data is crucial to ensure individuals' privacy rights are respected and that their data is not misused or exposed.

- Ethical Frameworks: These frameworks establish principles for data privacy, consent, and security. They ensure that AI developers follow best practices for handling personal data, such as obtaining explicit consent from individuals before collecting their data and using it for specific purposes. Frameworks also promote transparency, so individuals understand how their data is being used.
- Example: In healthcare, AI applications that analyze medical records must adhere to privacy regulations (like HIPAA in the U.S.) to protect patient confidentiality and ensure that sensitive health data is not exposed or misused.

3. Accountability and Transparency:

As AI systems become more complex and autonomous, it can become difficult to understand how they make decisions (often referred to as the "black-box" problem). If AI systems make mistakes or cause harm, it's essential to determine who is responsible for those decisions and ensure transparency in how those decisions were made.

- **Ethical Frameworks:** These frameworks provide guidelines on making AI systems accountable and transparent. They advocate for clear documentation of how decisions are made, who is responsible for outcomes, and how systems can be audited for fairness and accuracy.
- **Example:** In autonomous vehicles, if a self-driving car is involved in an accident, ethical frameworks would ensure that the developers and manufacturers are held accountable for the design, testing, and deployment of the AI system. They would also ensure transparency in how the car made decisions leading up to the accident.

Q.(11) Samarth attended a workshop on Artificial Intelligence but found the technical jargon challenging. He understood that AI is used in various everyday applications, but struggled to identify its core areas. Can you help Samarth list the three main domains of AI and explain with examples ?

Ans. : Artificial Intelligence (AI) can be divided into three main domains that focus on different aspects of how machines learn and perform tasks. These domains represent the core areas of AI and help us understand how AI is applied to solve real-world problems.

1. **Machine Learning (ML) :** Machine Learning is a core part of AI where computers learn from data to make decisions or predictions without being explicitly programmed. The idea is to allow the machine to "learn" patterns from the data and improve its performance over time.

Recommendation Systems

Spam Filters:

2. **Natural Language Processing (NLP) :** NLP is the AI domain that focuses on enabling computers to understand, interpret, and generate human language (both written and spoken). It helps machines process language in a way that is meaningful and useful.

Voice Assistants

Language Translation

3. **Computer Vision :** Computer Vision is a branch of AI that enables computers to understand and interpret visual information from the world, such as images and videos. It's about teaching machines to "see" and process visual data.

Facial Recognition

Self-Driving Cars

Q.(12) Differentiate between Machine Learning and Deep Learning.

Ans. :

Parameters	ML	DL
Data Dependency	It can work with smaller dataset	It needs large amounts of data to understand perfectly
Hardware Dependency	It can work on low end machines as well	Heavily dependent on high end machines
Problem Solving approach	When we are solving a problem using a ML , it is generally recommended that we first break down the problem into different sub parts and solve them individually.	It solves the problem end to end
Execution Time	It takes much less time to train	It takes a long time to train because there are many parameters making the training longer than usual.

Q.(13) How does Neural Network work ? Explain.

Ans. :

A neural network is a computational model inspired by the way biological neural networks in the human brain work. It is a fundamental component in deep learning and is used for a variety of tasks such as image recognition, speech recognition, and even natural language processing.

A neural network consists of several key components:

- **Neurons (Nodes):** These are the basic units of a neural network, and each one performs a simple calculation. They are inspired by biological neurons in the brain.
- **Layers:** A neural network typically has three types of layers:
 1. **Input Layer:** The first layer, which receives the raw data (features) of the input.
 2. **Hidden Layers:** Layers that process the input data. There can be multiple hidden layers, each performing different computations.
 3. **Output Layer:** The last layer, which produces the final result or prediction (e.g., classification or regression).

***** ALL THE BEST *****