B.K. BIRLA CENTRE FOR EDUCATION

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

PRE BOARD 1 EXAM : 2025-26
ARTIFICIAL INTELLIGENCE (417)

Class: X **Time : 2 Hrs.**
Date: 04-11-2025 **Max Marks: 50**
Admission No. : …..…… **Roll No. :**

General Instructions:

1. *Please read the instructions carefully.*
2. *This Question Paper consists of 21 questions in two sections : Section A & Section B.*
3. *Section A has Objective type questions whereas Section B contains Subjective type questions.*
4. *Out of the given (5 + 16 =) 21 questions, a candidate has to answer (5 + 10 =) 15 questions in the allotted (maximum) time of 2 hours.*
5. *All questions of a particular section must be attempted in the correct order.*
6. ***SECTION A - OBJECTIVE TYPE QUESTIONS (24 MARKS):***
   - i. *This section has 05 question.*
   - ii. *Marks allotted are mentioned against question/part.*
   - iii. *There is no negative marking.*
   - iv. *Do as per the instructions given.*
7. ***SECTION B – SUBJECTIVE TYPE QUESTIONS (26 MARKS):***
   - i. *This section has 16 questions.*
   - ii. *A candidate has to do 10 questions.*
   - iii. *Do as per the instructions given.*
   - iv. *Marks allotted are mentioned against each question/part.*

MARKING SCHEME

SECTION A: OBJECTIVE TYPE QUESTIONS (24 Marks)

Q1. Employability Skills (Any 4 × 1 = 4 Marks)

1. (c) Feedback
2. (d) Both (a) and (c)
3. (c) Self motivation
4. (a) Spam
5. (a) Takes responsibility for her mistakes
6. (a) United Nations

Q2. **(Any 5 × 1 = 5 Marks)**

1. (d) Selecting and evaluating the best algorithm to build the model
2. (b) Why

3. (c) Linguistics and Computer Science
4. (a) Right-based ethical framework
5. (b) Learning from data
6. (b) Receive data

Q3. **(Any 5 × 1 = 5 Marks)**

1. (c) Reinforcement Learning
2. (c) Determining if an email is spam
3. (d) To assess how well the model performs on unseen data
4. (b) To measure the model's performance and ensure it generalizes well
5. (b) Precision
6. (c) Directly proportional

Q4. **(Any 5 × 1 = 5 Marks)**

1. (b) Playlists
2. (c) Click Through Rate
3. (a) To understand and interpret visual information from the world
4. (b) Zero value of pixel
5. 0–255
6. (b) Image classification and object recognition

Q5. **(Any 5 × 1 = 5 Marks)**

1. (b) To help machines understand and use human language
2. (b) Natural Language Processing (NLP)
3. (b) Syntactic Analysis
4. (c) Semantic Analysis
5. (c) #
6. (d) Jupyter

SECTION B: SUBJECTIVE TYPE QUESTIONS (26 Marks)

Answer any 3 out of the given 5 questions on Employability Skills. **(3 x 2 = 6)**
Answer each question in 20-30 words.

Q6. **(2 Marks)**

- **Eye contact** to show confidence
- **Body posture** to appear enthusiastic
- **Gestures and facial expressions** to convey interest and energy

Q7. **(2 Marks)**

- Practice **deep breathing and meditation**
- Maintain a **balanced study schedule**
- Get **adequate sleep and nutrition**
- Engage in **physical activities or hobbies**

Q8. **(2 Marks)**

Possible reason: **Computer virus or malware**

- Install and run **antivirus software**
- **Delete suspicious files**
- **Update OS and applications** regularly

Q9. **(2 Marks)**

Any four:

- Entrepreneurs are born, not made.
- You need a lot of money to start a business.
- Entrepreneurs take huge risks.
- Success comes overnight.

Q10. **(2 Marks)**

Suggestions:

- **Separate dry and wet waste**
- Use **recyclable materials**
- **Compost organic waste**
- Spread **awareness about waste segregation**

Answer any 4 out of the given 6 questions in 20-30 words each. **(4 x 2 = 8)**

Q11. **(2 Marks)**

- To ensure **fairness** and avoid bias.
- To maintain **transparency and accountability**.
- To **protect human rights and privacy**.
- To prevent **misuse of AI technologies**.

Q12. ML vs DL (2 Marks)

Basis	Machine Learning	Deep Learning
Definition	AI that enables systems to learn from data	Subset of ML using neural networks
Data	Works on smaller data	Needs large datasets
Algorithms	Uses decision trees, regression, etc.	Uses artificial neural networks
Hardware	Works on traditional systems	Needs high computing power (GPUs)

Q13. Evaluation & Overfitting (2 Marks)

- **Evaluation:** Measuring how well an AI model performs using metrics like accuracy or precision.
- **Overfitting:** When a model performs well on training data but poorly on new data due to memorization.

Q14. Disadvantages of No-Code Tools (2 Marks)

- Limited **customization and control**.
- **Scalability issues** for complex projects.

Q15. Grayscale vs RGB (2 Marks)

Feature	Grayscale	RGB
Colors	Shades of gray	Red, Green, Blue
Pixel values	0–255	3 values per pixel
File size	Smaller	Larger
Use	Simpler models	Colored images

Q16. Script Bots vs Smart Bots (2 Marks)

Script Bots	Smart Bots
Rule-based	AI-based
Follow fixed commands	Learn and adapt
No NLP	Use NLP
Limited capability	Can handle complex tasks

Answer any 3 out of the given 5 questions in 50-80 words each. (3 x 4 = 12)

Q17.
Akhil can understand the process of problem scoping using two key tools – the 4W Problem Canvas and the Problem Statement Template. These tools help in defining the boundaries, purpose, and clarity of an AI project.

(a) 4W Problem Canvas
The 4W Problem Canvas is a framework used to scope and define the problem clearly before starting an AI project. It helps understand what the problem is, why it exists, who is affected, and where it occurs.

1. What – Defines the exact nature of the problem. It answers the question: What issue are we solving? Example: Lack of transport facility in school areas.

2. Why – Explains the need and importance of solving the problem. It helps understand the benefits and potential outcomes. Example: Solving it can improve attendance and punctuality of students.

3. Where – Identifies the location or context in which the problem exists. Example: Schools in urban or rural areas without sufficient bus routes.

4. Who – Refers to the people or groups affected by the problem. Example: Students, parents, and school administrators.

Thus, the 4W Problem Canvas helps break down the issue systematically and ensures the project team fully understands the problem before moving to the data collection stage.

(b) Problem Statement Template
Once the 4W Canvas is complete, the next step is to create a Problem Statement Template that summarizes the findings. It gives a concise definition of the problem and desired outcome.

Format:

The problem of [issue] affects [target group] and impacts [result]. A successful solution would [desired outcome].

Example:

The problem of irregular school transport affects students in suburban areas, impacting their attendance and academic performance. A successful AI-based solution would predict transport availability and ensure timely travel planning.

This structured statement provides a clear direction to the AI development process and helps align goals and data requirements.

Q18.
Neural networks are a core component of Artificial Intelligence and Machine Learning. They are inspired by the structure and function of the human brain, consisting of interconnected nodes (neurons) that process data and make predictions.

Each neuron receives input, applies a mathematical function, and passes the result to the next layer. Neural networks are widely used in image recognition, speech processing, and autonomous systems.

Layers of a Neural Network
1. Input Layer – This is the first layer of the neural network that receives the raw data. Each neuron represents one attribute or feature from the dataset. For example, in an image recognition model, each input neuron could represent a pixel value.

2. Hidden Layers – These layers perform computations on the input data using weights and activation functions. They extract patterns, relationships, and meaningful features. The deeper the hidden layers, the more complex patterns the model can learn. Example: recognizing edges, colors, or shapes in images.

3. Output Layer – This layer produces the final result or prediction of the model. For example, in a classification problem, the output layer might give probabilities that an image belongs to a specific category.

Neural networks learn by adjusting the weights between neurons using optimization techniques such as backpropagation. With sufficient data and training, they can achieve high accuracy in pattern recognition tasks.

Q19. Confusion Matrix Calculations
Given the following confusion matrix for an AI model predicting school transport availability:

Actual/Predicted	Yes	No
Yes	22 (TP)	47 (FN)
No	12 (FP)	18 (TN)

We will calculate the key evaluation metrics as follows:

1. **Accuracy** = (TP + TN) / (TP + TN + FP + FN)
   = (22 + 18) / (22 + 47 + 12 + 18)
   = 40 / 99 = 0.404 → **40.4%**

2. **Precision** = TP / (TP + FP)
= 22 / (22 + 12)
= 22 / 34 = 0.647 → **64.7%**

3. **Recall** = TP / (TP + FN)
= 22 / (22 + 47)
= 22 / 69 = 0.319 → **31.9%**

4. **F1 Score** = 2 × (Precision × Recall) / (Precision + Recall)
= 2 × (0.647 × 0.319) / (0.647 + 0.319)
= 0.427 → **42.7%**

Hence, while precision is relatively good, the recall is low, suggesting the model fails to identify many actual 'Yes' cases. Model improvement can be achieved through more balanced data or better feature selection.

Q20. Role of Computer Vision in Self-Driving Cars
Computer Vision plays a vital role in the development of self-driving cars. It enables vehicles to interpret their surroundings through cameras and sensors, ensuring safety, navigation, and decision-making in real time. The following points explain its significance:

1. Object and Obstacle Detection – The system identifies obstacles like pedestrians, vehicles, and roadblocks using real-time image analysis. This prevents accidents and improves driving safety.

2. Lane Detection – Computer Vision algorithms detect lane boundaries and guide the car to stay centered, ensuring smooth driving and accurate turns.

3. Traffic Sign Recognition – The car recognizes traffic lights, stop signs, and speed limits to follow road rules automatically without human intervention.

4. Parking Assistance and Navigation – CV assists in automated parking and path planning using sensors and cameras that analyze surroundings for safe movement.

Overall, Computer Vision allows self-driving cars to act like human drivers—seeing, understanding, and reacting to their environment autonomously.

Q21. Bag of Words (BoW) Model Implementation
The Bag of Words model is a technique used in Natural Language Processing (NLP) to convert text documents into numerical feature vectors. It ignores grammar and word order but keeps track of word frequency. Below are the four main steps to implement BoW for the given documents:

Document 1: ML and DL are part of AI.
Document 2: DL is a subset of ML.

Step 1: Collect the Documents
The first step is to gather all the text documents that need to be analyzed. Here, we have two short sentences (documents).

Step 2: Tokenization
Tokenization means splitting the text into individual words (tokens). After tokenization, we get the following set of words:

Doc1 → {ML, and, DL, are, part, of, AI}
Doc2 → {DL, is, a, subset, of, ML}

Step 3: Removing Stop Words
Stop words are common words (like 'and', 'is', 'of', 'a') that do not add meaning to the analysis. After removing them, we have:

Doc1 → {ML, DL, part, AI}
Doc2 → {DL, subset, ML}

Step 4: Creating the Document Vector Table
Now, a combined list of unique words from both documents is created: {ML, DL, part, AI, subset}. A vector table is formed showing the occurrence (1) or absence (0) of each word in each document.

The resulting table is as follows:

Word	Doc1	Doc2
ML	1	1
DL	1	1
part	1	0
AI	1	0
subset	0	1

This table represents the document-term matrix used in NLP models. It helps convert text into numerical form for machine learning algorithms.

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