MODEL TEST PAPER (SOLVED)
CLASS X
ARTIFICIAL INTELLIGENCE (CODE 417)

Time: 2 Hours

Maximum Marks: 50

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):
   (a) This section has 5 questions.
   (b) Marks allotted are mentioned against each question/part.
   (c) There is no negative marking.
   (d) Do as per the instructions given.
7. SECTION B—SUBJECTIVE TYPE QUESTIONS (26 MARKS):
   (a) This section has 16 questions.
   (b) A candidate has to do 10 questions.
   (c) Do as per the instructions given.
   (d) Marks allotted are mentioned against each question/part.

SECTION A: OBJECTIVE TYPE QUESTIONS

1. Answer any 4 out of the given 6 questions on Employability Skills (1 × 4 = 4 marks)

(i) Which of the following is a cause for hesitation in making eye contact while communicating?
   (a) Lack of confidence (b) Distraction (c) Shyness (d) All of these

Ans. (d) All of these

(ii) Who is the founder and CEO of OYO Rooms?
   (a) N.R. Narayana Murthy (b) Laxmi Mittal
   (c) Ritesh Agarwal (d) Kunal Bahl and Rohit Bansal

Ans. (c) Ritesh Agarwal

(iii) Which of the following is an example of Eustress?
   (a) Preparing for the first day of school (b) Winning a competition
   (c) Planning a picnic (d) All of these

Ans. (d) All of these

(iv) Which of the following shortcut key combinations is used to cut and paste data?
   (a) Ctrl + C, Ctrl + V (b) Ctrl + A, Ctrl + X (c) Ctrl + X, Ctrl + V (d) Ctrl + X, Ctrl + P

Ans. (c) Ctrl + X, Ctrl + V

(v) Which of the following is an advantage of working independently?
   (a) Can make your own decisions (b) Encourages continuous learning
   (c) Helps acquire new skills (d) All of these

Ans. (d) All of these

(vi) State True or False.
   If the slogan 'Say no to crackers' turns into action, it can prove to be a big step towards green economy.

Ans. True

2. Answer any 5 out of the given 6 questions. (1 × 5 = 5 marks)

(i) Which of the following is a disadvantage of AI?
   (a) Improved educational experiences (b) Improved healthcare outcomes
   (c) Diminished creativity and problem-solving skills (d) Access to advanced technology

**Ans.** (c) Diminished creativity and problem-solving skills

(ii) Dipa Karmakar is a well-known Indian gymnast who has won several medals. What kind of intelligence does she possess?

(a) Linguistic Intelligence   (b) Logical-Mathematical Intelligence

(c) Naturalistic Intelligence   (d) Kinesthetic Intelligence

Ans. (d) Kinesthetic Intelligence

(iii) Which of the following is not a domain of AI?

(a) Data Analytics   (b) Data Science

(c) Computer Vision   (d) Natural Language Processing

Ans. (a) Data Analytics

(iv) Which AI domain does the given app use?
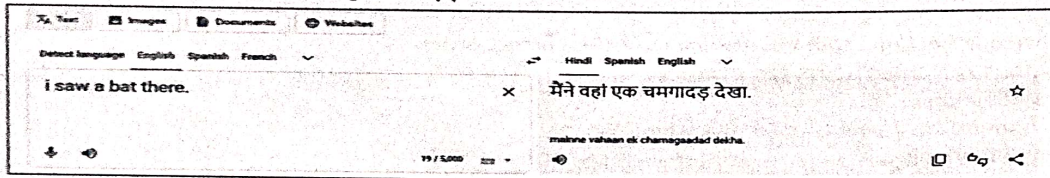
Ans. Natural Language Processing (NLP)

(v) Choose the correct Accuracy for the following Confusion Matrix.

Predicted	Actual	
	True Positives (20)	False Positives (8)
	False Negatives (2)	True Negatives (70)

(a) 80%   (b) 71%   (c) 90%   (d) 90.9%

Ans. (c) 90%
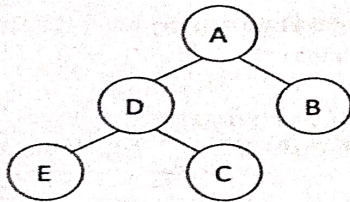
(vi) NLP stands for:

(a) Natural Language Processing   (b) Natural Language Processor

(c) Neural Language Processor   (d) Normal Language Processing

Ans. (a) Natural Language Processing

3. Answer any 5 out of the given 6 questions.   **(1 × 5 = 5 marks)**

(i) Label A, B, C and D in the given Decision Tree.

(a) A: Root Node, B: Interior Node, C: Leaf Node, D: Interior Node, E: Interior Node

(b) A: Root Node, B: Leaf Node, C: Leaf Node, D: Root Node, E: Leaf Node

(c) A: Interior Node, B: Leaf Node, C: Leaf Node, D: Interior Node, E: Interior Node

(d) A: Root Node, B: Leaf Node, C: Leaf Node/Child Node, D: Interior Node/Parent Node, E: Leaf Node

Ans. (d) A: Root Node, B: Leaf Node, C: Leaf Node/Child Node, D: Interior Node/Parent Node, E: Leaf Node

(ii) POS in NLP stands for ....

Ans. Parts of Speech

(iii) .... representation helps us convert text data into a numerical format that can be used in machine learning models.

(a) TF-IDF   (b) Stop Words   (c) BoW   (d) Document Vector

Ans. (c) BoW

(iv) Which of the following is not a part of NLP?
 (a) Image Processing
 (c) Text Generation
 (b) Conversational AI
 (d) Language Modelling

Ans. (a) Image Processing

(v) Which of the following is true about Script bots?
 (a) Script bots are based on NLP.
 (b) Script bots are flexible and powerful.
 (c) Script bots are difficult to make.
 (d) Script bots follow predefined rules to perform tasks.

Ans. (d) Script bots follow predefined rules to perform tasks.

(vi) A .... contains information that represents the color and intensity of a specific point in an image.

Ans. pixel

4. **Answer any 5 out of the 6 given questions.**   (1 × 5 = 5 marks)

(i) ...., ... and .... are the layers of Neural Networks.

Ans. Input, hidden, output

(ii) Read the following questions based on Assertion (A) and Reasoning (R). Mark the correct choice as:
 (a) Both A and R are true and R is the correct explanation for A.
 (b) Both A and R are true but R is not the correct explanation for A.
 (c) A is true but R is false.
 (d) A is false but R is true.

Assertion (A): If the feature is of continuous type, then the values of outliers can be replaced with the median of the data.

Reason (R): Median is the simple and robust approach to mitigate the impact of outliers.

Ans. (a)

(iii) Which of the following is an application of Computer Vision?
 (a) Sentiment Analysis (b) Machine Translation (c) Email Filtering (d) Virtual Reality

Ans. (d) Virtual Reality

(iv) Face Lock feature in smartphones is based on ....
 (a) Image Detection (b) Image Processing (b) Speech Recognition (d) Sentiment Analysis

Ans. (a) Image Detection

(v) K-Nearest Neighbor is often referred to as a .... learner because it doesn't learn a model during the training phase.

Ans. Lazy

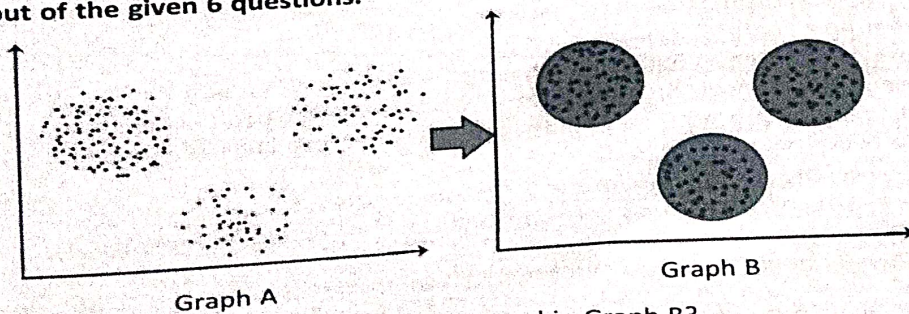(vi) State True or False.
  Classification and localization tasks are required for single object detection.

Ans. True

                                                                (1 × 5 = 5 marks)

5. **Answer any 5 out of the given 6 questions.**

Graph A

Graph B

(i) Which type of machine learning algorithm is depicted in Graph B?
 (a) Supervised Learning (b) Semi-Supervised Learning
 (c) Unsupervised Learning (d) Reinforcement Learning

Ans. (c) Unsupervised Learning

(ii) .... means the inability of the model to learn the training data effectively, resulting in poor performance both on the training and the testing data.

(a) Overfitting   (b) Underfitting   (c) Perfect fit   (d) None of these

Ans. (b) Underfitting

(iii) What is the purpose of a Box Plot?

(a) To display the distribution of data and visualize outliers

(b) To show the relationship between two variables

(c) To illustrate changes over time

(d) To compare categories in a bar chart

Ans. (a) To display the distribution of data and visualize outliers

(iv) .... is the number of True Positives divided by the sum of the number of True Positives and False Negatives.

(a) Precision   (b) Recall   (c) Accuracy   (d) F1 Score

Ans. (b) Recall

(v) .... involves understanding the reliability of any AI model based on outputs by feeding the test dataset to the model and comparing it with actual answers.

(a) Evaluation   (b) Problem Scoping   (c) Data Acquisition   (d) Data Exploration

Ans. (a) Evaluation

(vi) State True or False.

Deployment is a method of integrating a machine learning model into an existing production environment.

Ans. True

SECTION B – SUBJECTIVE TYPE QUESTIONS

Answer any 3 out of the given 5 questions on Employability Skills. Answer each question in 20-30 words.

(2 × 3 = 6 marks)

6. Is the statement 'All technical entrepreneurs are tech geniuses' a myth or a fact? Justify with an example.

Ans. It is a myth. Steve Jobs, Apple Inc. co-founder, was not a technology expert. He was known as an innovator, a product designer, a marketer and a business leader. He partnered with Steve Wozniak, who had the necessary technical skills.

7. What are the various ways to manage stress?

Ans. The following are the ways to manage stress:

(i) **Healthy Eating Habits:** Maintaining a balanced diet boosts energy levels.

(ii) **Adequate Amount of Sleep:** 8-9 hours of uninterrupted sleep keeps us fresh throughout the day.

8. Differentiate between Formal and Informal Communication.

Ans. Formal communication is a type of communication used for official or professional purposes. It has some predefined rules. Some examples include writing a letter to the manager, creating a job application, etc. On the other hand, informal communication is casual communication. It has no such predefined rules. Some examples include writing a letter to family and friends, journaling, etc.

9. What are some routine activities that harm nature?

Ans. Some activities that harm nature are:

(i) Wasting energy and contributing to carbon emissions.

(ii) Discarding electronic devices, toys and gadgets which release harmful chemicals.

(iii) Using products which are not eco-friendly, *e.g.*, cleaning products may contain harmful chemicals that contribute to pollution.

10. Define computer virus. Discuss any method of protection against it.

Ans. A computer virus is a type of malicious software (malware) designed to replicate itself and spread from one computer to another.

Installing an effective antivirus software and keeping it up to date is a method of protection against the virus.

Answer any 4 out of the given 6 questions in 20-30 words each.

(2 × 4 = 8 marks)

11. Who are the stakeholders?

Ans. A stakeholder is either an individual, group or organization that is impacted by the outcome of a project. Typically, stakeholders are investors, employees, customers, suppliers, communities or governments.

12. What are some ethical issues with self-driving cars?

Ans. Some ethical issues with self-driving cars are as follows:

(i) Vehicle malfunction can become a safety hazard for pedestrians.

(ii) Self-driving cars are vulnerable to cyberattacks as they are primarily software-driven products.

13. How does Data Visualization play an important role in data science?

Ans. Data visualization plays an important role in data science in the following ways:

(i) By getting insights from large datasets quickly, effectively and systematically.

(ii) Data visualization tools make it easier to identify patterns and outliers in the data. Without these tools, it is quite difficult to recognize the same by just looking into large and raw datasets.

14. Write the importance of the Evaluation process.

Ans. Evaluation is one of the important stages of the AI project cycle. It uses two types of data: validation data and test data. It is important because of the following reasons:

(i) It ensures the quality and reliability of AI models.

(ii) It helps to identify biases and discrimination.

(iii) It helps in the decision-making process.

15. Briefly explain Lemmatization and Stemming with the help of examples.

Ans. Lemmatization and Stemming are the techniques used in NLP to reduce words to their base or root forms.
Examples:

Word	Lemmatization Technique	Stemming Technique
Language	Language	Languag
Natural	Natural	Natur
Deals	Deal	Deal

Both techniques remove affixes. While lemmatization results in meaningful words, stemming may result in less accurate results.

16. Write any two applications of computer vision.

Ans. Two applications of computer vision are:

(i) Image and video analysis in healthcare

(ii) Object Recognition and Classification

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

17. Briefly explain all stages of the AI Project Cycle.

Ans. The AI Project Cycle can be described as a systematic and sequential process from the initial planning phase till the completion and review phase. There are 5 stages in AI Project Cycle.

(i) **Problem Scoping:** Problem scoping is the process of defining and understanding the specific boundaries and details of a problem before starting an AI project. It helps us clarify what needs to be solved and what is the best approach to solve our problem.

(ii) **Data Acquisition:** This stage involves gathering and collecting relevant data for an AI project. The sources of data are databases, web scraping, social media, sensors, surveys and APIs.

(iii) **Data Exploration:** Data exploration is a way to discover hidden patterns, interesting insights and useful information from the collected data. Data exploration helps us make important decisions and find insights that can be used to improve things.

(iv) **Modelling:** AI modelling refers to the process of creating a mathematical or statistical representation of a problem. The process of AI modelling has three essential components: data, algorithms and training.

(v) **Evaluation:** Evaluation helps us understand how well the model is performing and whether it meets the desired objectives with the help of metrics and evaluation techniques.

18. What do you understand by the term 'Term Frequency' (TF) – 'Inverse Document Frequency' (IDF)?

Ans. Term Frequency-Inverse Document Frequency (TF-IDF) is a technique used in Natural Language Processing to measure the importance of words in a collection of documents (corpus).
Term Frequency (TF) measures how frequently a term appears in a document relative to the total number of words in that document.

TF = Number of times a term appears in the document / Total number of words in the document

Inverse Document Frequency (IDF) is a metric that shows how many documents are there in the corpus that contain a particular term.

IDF = log (Total number of documents in the corpus / Number of documents in the corpus containing the term)

TF-IDF assigns a score to a word by multiplying its Term Frequency (TF) with the Inverse Document Frequency (IDF).

TF-IDF = TF * IDF

19. Consider the given image. Identify the phase of the AI Project Cycle which is the associated approach and describe the phase in detail.
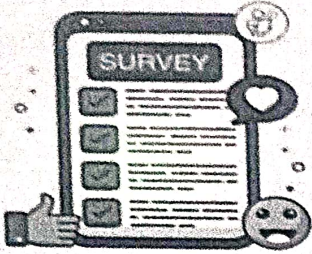
Ans. The image represents a survey being conducted on a mobile device. This activity is associated with the Data Acquisition phase of the AI Project Cycle. In this phase, the primary focus is on gathering relevant data that will be used to build, train and analyze an AI model.

Data Acquisition is a crucial step because the accuracy and effectiveness of any AI model depends largely on the quality of the data it is trained on. This phase involves collecting data from various sources such as surveys, sensors, databases or online platforms. In this case, the survey represents one method of gathering data. Surveys help in obtaining structured information from respondents, which can later be processed and analyzed by AI systems.

Once the data is collected, it must be ensured that it is clean, accurate and relevant. Any errors or inconsistencies in the data can negatively impact the AI model's performance. After collection, this data is stored in appropriate formats, such as databases or cloud storage, ensuring it is accessible for further analysis or model training.

20. Consider the following case study:

Scenario: A survey data of 100 people was collected from a Delhi Government hospital in the month of August.
Reality: It was found that out of 100 people, only 10 got infected with dengue and the remaining 90 were healthy.
Prediction: True Positives (TP): 8 patients are correctly diagnosed with the disease.
True Negatives (TN): 85 patients are correctly identified as healthy.
False Positives (FP): 5 healthy persons are incorrectly diagnosed as having the disease.
False Negatives (FN): 2 patients with the disease are incorrectly identified as healthy.
Create a Confusion Matrix from the above-mentioned details and calculate F1 Score.

Ans. The Confusion Matrix will be as follows:

	Actual	
Predicted	True Positives (8)	False Positives (5)
	False Negatives (2)	True Negatives (85)

F1 Score = 2(Precision × Recall) / (Precision + Recall)
To get F1 Score, we must first calculate Precision and Recall.
Precision = (TP) / (TP + FP) = 8 / 8 + 5 = 0.615
Recall = (TP) / (TP + FN) = 8 / 8 + 2 = 0.8
F1 score = 2 × 0.615 × 0.8/0.615 + 0.8 = 0.696 = 0.70

21. What do you mean by Artificial Intelligence? Write some applications of AI.

Ans. The term 'Artificial' refers to something created or made by humans, often with the help of technology. It represents our creativity and ability to invent things. On the other hand, 'Intelligence' is all about remarkable cognitive abilities possessed by humans such as learning, reasoning and problem-solving. So, AI means a machine with human-like intelligence. Some applications of AI are:

  (i) NLP-powered voice assistants, chatbots and sentiment analysis in customer service.
  (ii) AI-driven translation tools, like Google Translator, help users to communicate across different languages.
  (iii) AI-driven navigation apps use real-time data to provide optimal routes, traffic updates, etc.
  (iv) Facial recognition in smart phones.

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