PRACTICE PAPER–2

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)**

(a) Which type of non-verbal communication is reflected in actions like raising a hand to greet or pointing a finger at someone?

(i) Facial Expression (ii) Posture
(iii) Gesture (iv) Eye Contact

(b) Your teacher tells you that your assignment needs improvement. Instead of getting upset, you stay calm and decide to work on it to make it better next time. Which Self-Management skill is being displayed here?

(i) Adaptability (ii) Confidence
(iii) Problem Solving (iv) Self-Control

(c) Which of the following is ***not*** considered a strategic approach to self-motivation?

(i) Breaking long tasks into smaller, achievable milestones
(ii) Rewarding yourself after completing a challenging task
(iii) Comparing your progress constantly with others to push yourself
(iv) Focussing on internal reasons and personal purpose for performing a task

(d) Which action is used to open a file or folder in File Explorer?

(i) Double-click (ii) Hover
(iii) Scroll (iv) Right-click

(e) A business leader sets a 10-year vision, develops pioneering products and builds a reputation for anticipating industry changes. However, she rarely conducts short-term analysis of shifting customer preferences and hardly reviews competitor responses to major regulatory changes in real time. What limitation does this strategy pose in sustaining long-term success?

(i) Overconfidence in initial vision
(ii) Inability to pivot according to emergent market forces
(iii) Lack of innovative ideas
(iv) Excessive focus on customer feedback

(f) Planting more trees, protecting forests and reducing paper waste can be linked to which Sustainable Development Goal?

(i) SDG 6 – Clean Water and Sanitation (ii) SDG 13 – Climate Action

(iii) SDG 8 – Decent Work and Economic Growth (iv) SDG 2 – Zero Hunger

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

(a) The AI domain that enables computers to understand and interpret human language is called ..... .

(b) **Assertion (A):** Utility-based ethical framework focuses on choosing actions that produce the greatest benefit for the largest number of people.

Reason (R): This framework emphasizes maximizing overall happiness or well-being, even if some individuals are negatively affected.

(i) Both A and R are correct and R is the correct explanation of A.

(ii) Both A and R are correct but R is not the correct explanation of A.

(iii) A is correct but R is incorrect.

(iv) A is incorrect but R is correct.

(c) A learning-based AI system, designed to filter email spam, is continuously fed new emails. Over time, it starts correctly identifying new types of phishing attempts that were not present in its initial training data. What characteristic of this learning-based AI is demonstrated by its improving performance against new, unseen spam tactics?

(i) It uses a fixed set of simple 'if-then' commands.

(ii) Its accuracy remains the same regardless of new input.

(iii) It can adapt and generalize its understanding from new data.

(iv) It requires a programmer to manually add every new spam rule.

(d) During the AI Project Cycle, ... involves selecting the right model, tuning parameters and comparing performance metrics to ensure the model fits the problem requirements effectively.

(e) ..... divides an image into regions so that each pixel is associated with a particular object or background. It is considered a more detailed form of ..... .

(i) Object Detection; Image Segmentation (ii) Image Classification; Object Detection

(iii) Image Segmentation; Object Detection (iv) Image Segmentation; Image Classification

(f) In NLP, simply converting text into numbers is enough for a model to understand human language accurately, as numerical representation alone captures the meaning of words. (True/False)

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

(a) A parking management system uses CCTV cameras to detect empty parking spots and displays the number of available spots on a digital board. The system only identifies the status (empty/occupied) and does not understand vehicle details or text.

Which AI domain is primarily used here?

(i) Natural Language Processing (ii) Statistical Data Domain

(iii) Computer Vision (iv) Speech Recognition

(b)

Fruit	Color	Price
Apple	Red	INR 10
Orange	Orange	INR 10
Banana	Yellow	INR 15
Grape	Purple	INR 30
Kiwi	Green	INR 20

Which of the following is a feature in the given fruit dataset?

(i) Fruit (ii) Green

(iii) Label (iv) Tag

(c) A medical test is used to detect a certain infection.
Out of 200 truly infected patients, the model correctly identifies 160 of them as infected.
However, it fails to detect 40 infected patients.
What is the Recall of the test?

(i) 0.60 (ii) 0.75
(iii) 0.80 (iv) 0.85

(d) **Assertion (A):** Accuracy alone is not a reliable metric when dealing with highly imbalanced datasets.
Reason (R): Accuracy focuses mainly on the majority class and may ignore how well the model performs on the minority class.

(i) Both A and R are correct and R is the correct explanation of A.
(ii) Both A and R are correct but R is not the correct explanation of A.
(iii) A is correct but R is incorrect.
(iv) A is incorrect but R is correct.

(e) Identify the application of Computer Vision from the given picture:

(i) Facial Recognition (ii) CV in Retail
(iii) Medical Imaging (iv) Face Filters

(f) Read the sentence given below and count the number of stopwords present:
Many people enjoy travelling during holidays but the cost of flights and hotels can make it difficult.

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

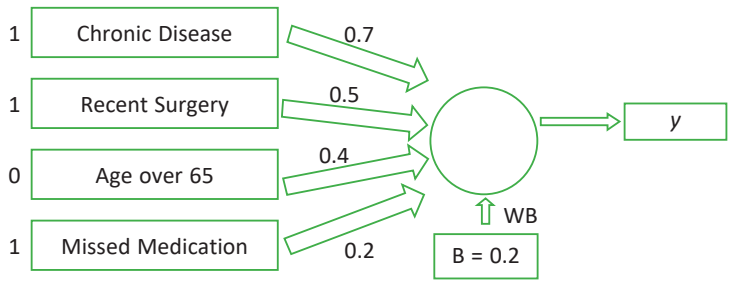
(a) What is one main benefit of using an ethical framework in problem-solving?

(i) It guarantees profits. (ii) It removes the need for data.
(iii) It helps maintain fairness and reduces bias. (iv) It allows unlimited automation without rules.

(b) **Statement 1:** Increasing the size of the training dataset generally helps improve model performance because the model learns more patterns.
Statement 2: Increasing the size of the testing dataset improves the learning capability of the model.
Which option is correct?

(i) Both Statement 1 and Statement 2 are correct.
(ii) Both Statement 1 and Statement 2 are incorrect.
(iii) Only Statement 1 is correct.
(iv) Only Statement 2 is correct.

(c) A hospital uses an AI model to predict the likelihood of a patient being readmitted soon. It considers four attributes, with each assigned a weight:
Has a chronic disease (1), w=0.7
Recent surgery (1), w=0.5
Age over 65 (0), w=0.4
Missed medications (1), w=0.2
A bias value of 0.2 is added.
The formula used is: y=w1x1+w2x2+w3x3+w4x4+(1×b)



What will be the value of *y* for the given scenario?

(i) 1.1 (ii) 1.4

(iii) 1.6 (iv) 2.0

(d) Which of the following is a sign that the model may be underfitting?

(i) Low training accuracy and low testing accuracy

(ii) High training accuracy and low testing accuracy

(iii) Low training accuracy but high testing accuracy

(iv) High training accuracy and high testing accuracy

(e) In an 8-bit grayscale image, each pixel is represented by a value ranging from 0 to 255. Why is the maximum value 255?

(i) Because there are only 255 shades in the color spectrum

(ii) Because 8 bits can store values from 0 to 255, providing 256 possible values

(iii) Because pixel values must end at 255 by convention

(iv) Because 255 is the highest even number in binary

(f) Identify the application of NLP shown in the given picture:

"Hey Cortana" "Hey Alexa" "Hey Siri" "Hey Google"

(i) Autogenerated captions (ii) Sentiment Analysis

(iii) Voice Assistant (iv) Keyword Extraction

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

(a) You are choosing which online article to read first. Two articles have similar content, but one is written by an author you recognize from social media.

Which factor is most likely influencing your decision?

(i) Familiarity with the author

(ii) Length of the article

(iii) Color of the webpage

(iv) Time of the day

(b) A spam email detection system analyzed 500 emails.

It correctly identified 320 spam emails and correctly marked 120 legitimate emails as not spam.

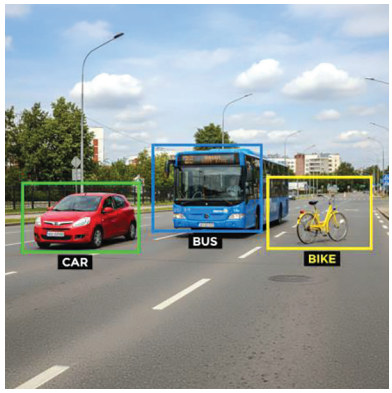
The system misclassified the remaining emails.

What is the accuracy of the system?

(i) 0.78 (ii) 0.82

(iii) 0.88 (iv) 0.91

(c) A system highlights regions of an image with colored boxes, labelling each detected item as 'CAR', 'BUS' and 'BIKE'. What is the term for the process shown here?



(i) Image Classification
(ii) Object Detection
(iii) Image Segmentation
(iv) Feature Extraction

(d) ..... is the outcome of the model wrongly predicting the positive class as negative class.

(e) Which type of chatbot follows a fixed set of predefined responses and conversation paths?

(i) Smart chatbot
(ii) Script-based chatbot
(iii) Cleaning bot
(iv) Talbot

(f) What are the stemmed and lemmatized forms of the word 'running'?

(i) Stemmed: runn, Lemmatized: runs
(ii) Stemmed: run, Lemmatized: run
(iii) Stemmed: running, Lemmatized: run
(iv) Stemmed: runn, Lemmatized: running

SECTION B – SUBJECTIVE TYPE QUESTIONS

Answer any 3 out of the given 5 questions on Employability Skills in 20–30 words each. (2 × 3 = 6 marks)

6. Explain the difference between adjectives and adverbs with the help of suitable examples.

7. What is self-motivation? Explain why it is important for working independently.

8. 'Modern operating systems provide advanced file management capabilities to ensure efficient data handling.' Describe any two such operations and explain how they help in organizing and maintaining files within the system.

9. Consider someone who starts a new business but gives up after the first failure. Which characteristics could help them persevere and eventually succeed? Support your answer.

10. Suggest any two measures to reduce plastic usage for promoting a green environment at school.

Answer any 4 out of the given 6 questions in 20–30 words each. (2 × 4 = 8 marks)

11. What do you do in the third and fourth stages of an AI Project Cycle?

12. Identify the type of deep learning model.

(a) This model is commonly used for processing images. It can detect features like edges, textures and shapes and assign weights and biases to recognize different objects in an image.

(b) This model consists of an input layer, multiple hidden layers and an output layer, where each node functions like a small machine learning algorithm and helps in processing large datasets automatically.

13. Differentiate between Supervised Learning and Unsupervised Learning with one example of each.

14. What is a confusion matrix in AI evaluation and how does it help in understanding the performance of a classification model?

15. What is a pixel in the context of digital images? Explain its significance.

16. Identify the NLP stage and explain:
Input sentence:
He eating is apple the.
Corrected sentence:
He is eating the apple.

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

17. A hospital implements an AI tool to predict which patients need urgent care. The model is trained mostly on data from urban hospitals. When used in rural clinics, the system often fails to correctly identify patients with serious conditions because their symptoms and medical profiles differ from the training data.
(a) Identify two reasons why the AI model made inaccurate or biased decisions.
(b) State two bioethics principles that should be followed to ensure fairness and explain how each principle applies.

18. (a) What is the name of the learning model in which the machine is provided both the input data and their correct output labels during training?
(b) Name two commonly used algorithms under this learning model.
(c) Explain how this learning model works and give one real-world application.

19. Identify the Machine Learning (ML) or Deep Learning (DL) application used in each scenario:
(a) An e-commerce website suggests products by studying your browsing history, previous purchases and items you clicked on.
(b) A smartphone camera automatically detects the scene (like food, beach, night mode) and adjusts its settings to capture a clearer image.
(c) A language translation app can listen to a sentence spoken in Spanish and instantly convert it into English text.
(d) A system in a manufacturing factory checks every product on the assembly line and flags the defective ones by comparing them with images of ideal products.

20. Read the following paragraph and answer the questions that follow:

A company developed an AI model to identify whether or not emails are spam. Out of 200 emails, the model correctly identified 90 emails as spam. It also correctly identified 70 emails as not spam. However, it predicted 25 emails as spam, but in reality they were not spam. Additionally, it predicted 15 emails as not spam, but in reality, they were spam.
(a) Draw the confusion matrix for this model.
(b) Calculate the accuracy of this classification model.
(c) Mention the total number of wrong predictions.

21. Read the following three documents and answer the questions that follow:
- Document 1: 'Robots assist humans in factories.'
- Document 2: 'Humans and robots work together.'
- Document 3: 'Factories are using AI-powered robots.'

After text pre-processing:
- Document 1: [robots, assist, humans, in, factories]
- Document 2: [humans, and, robots, work, together]
- Document 3: [factories, are, using, ai-powered, robots]

Questions:
(a) Form the vocabulary of unique words from all three documents.
(b) Write the formula for calculating TF-IDF of a term and explain each component.
(c) Calculate the IDF value of the term 'robots' if it appears in all three documents. (Show working).
(d) Explain one advantage of TF-IDF over the Bag-of-Words model.
$\log_{10}(1)=0$
$\log_{10}(2)=0.301$
$\log_{10}(10)=1$