

**INDIAN STATISTICAL INSTITUTE**

**(MS-QMS)\_2026**

**MID-SEMESTER EXAMINATION**

**(Pattern Recognition)**

**Duration: 90 minutes**

**Maximum Marks: 30**

**Note: Answer any FIVE**

1.
  - a. What are the motivations for adaptive machines and intelligent machines? Provide appropriate supporting discussions to your answer. [2]
  - b. Broadly, what are the three ways to make intelligent decisions [2]
  - c. Differentiate between traditional programming and machine learning with illustrative examples [2]
  
2.
  - a. Make an illustrative and brief description of the components of the principles of the pattern recognition systems in a decision-making process. [4]
  - b. Provide a Venn diagram of AI and its components, including agentic AI and NLP. [2]
  
3. Discuss the Bayes Decision Rule for classification. Describe the merits and demerits of this classification rule. [6]
  
4. In a database of 20 samples, 8 samples belong to DOG category and 12 samples belong to CAT category. The model  $M$  classifies 6 DOGs and 6 CATs correctly. Develop the confusion matrix and find the *F-measure* of the model. [6]
  
5. Describe the process of Semisupervised, semisupervised and Reinforcement learning algorithms. Also mention the motivations for the need for these algorithms. [3+3]
  
6. State and describe the working steps of a linear classifier, starting from the given data set to the performance analysis of the model. [6]

=====End of the Question paper=====