TOTAL PAGES: 2

**22CMP212AN**

**PSG COLLEGE OF ARTS & SCIENCE**
(AUTONOMOUS)

**MSc DEGREE EXAMINATION MAY 2025**
(Second Semester)

Branch – **COMPUTER SCIENCE**

**MAJOR ELECTIVE COURSE – I MACHINE LEARNING AND APPLICATIONS**

Time: Three Hours Maximum: 75 Marks

**SECTION-A (10 Marks)**
Answer **ALL** questions
**ALL** questions carry **EQUAL** marks (10 × 1 = 10)

| Module No. | Question No. | Question | K Level | CO |
|---|---|---|---|---|
| 1 | 1 | An algorithm is a sequence of _____ that should be carried out to trans form the input to output.<br>a) steps b) command c) instruction d) operation | K1 | CO1 |
| | 2 | Machine learning uses the theory of_____ in building mathematical models.<br>a) Probability b) Evolution c) Statistics d) Relativity | K2 | CO2 |
| 2 | 3 | The Vapnik-Chervonenkis (VC) dimension is used to measure:<br>a) The number of layers in a neural network<br>b) The capacity of a model to shatter data points<br>c) The speed of convergence in training<br>d) The size of the dataset used for training | K1 | CO1 |
| | 4 | Using Bayes' rule, how can the posterior probability P(C\|x)P(C\|x)P(C\|x) be expressed?<br>a) P(C\|x)=P(C)p(x\|C)p(x)P(C\|x) = \frac{P(C)}{p(x\|C)p(x)}P(C\|x)=p(x\|C)p(x)P(C<br>b) P(C\|x)=P(C)p(x)P(C\|x) = (C)p(x)P(C\|x)=P(C)p(x)<br>c) P(C\|x)=P(C)p(x\|C)p(x)P(C\|x) = \frac{P(C)p(x\|C)}{p(x)}P(C\|x)=p(x)P(C)p(x\|C)<br>d) P(C\|x)=p(x\|C)p(C\|x)P(C\|x) = p(x\|C)p(C\|x)P(C\|x)=p(x\|C)p(C\|x) | K2 | CO1 |
| 3 | 5 | What happens at each decision node in a decision tree?<br>a) A random guess is made about the output<br>b) A test function is applied to the input, and a branch is selected based on the outcome<br>c) The final output is immediately produced<br>d) All branches are explored simultaneously | K1 | CO1 |
| | 6 | What is postpruning in decision trees?<br>a) Stopping tree construction early before it becomes full<br>b) Pruning subtrees while growing the tree to reduce training error<br>c) Growing the tree fully, then eradicating subtrees that cause overfitting<br>d) Randomly removing nodes from the tree to simplify it | K2 | CO2 |
| 4 | 7 | What is the purpose of bootstrapping in machine learning?<br>a) To reduce the number of features in a dataset<br>b) To improve model accuracy by generating multiple training datasets through sampling with replacement<br>c) To randomly discard some data points to prevent overfitting<br>d) To test models on unseen data using k-fold cross-validation | K1 | CO1 |
| | 8 | In the context of combining multiple classifiers using voting, what does the weighted sum rule involve?<br>a) Taking the median of the classifier outputs<br>b) Calculating the average of the classifier outputs<br>c) Taking a linear combination of the outputs, where each classifier is assigned a weight<br>d) Selecting the output with the highest frequency among classifiers | K2 | CO2 |

**Cont...**

| | | | | |
|---|---|---|---|---|
| 5 | 9 | What is the main purpose of using bootstrap sampling in the bagging method?<br>a) To create a single large training set for better model accuracy<br>b) To generate slightly different training sets for training multiple base-learners<br>c) To reduce the size of the original dataset by discarding some instances<br>d) To ensure that each instance in the training set is used exactly once | K1 | CO1 |
| | 10 | In a Hidden Markov Model (HMM), what does the emission probability bj(m)b_j(m)bj(m) represent?<br>a) The probability of transitioning from one state to another<br>b) The probability of observing a symbol given a specific state<br>c) The probability of being in a particular state at a given time<br>d) The probability of the entire sequence of observations | K2 | CO2 |

## SECTION - B (35 Marks)

Answer **ALL** questions

**ALL** questions carry **EQUAL** Marks (5 × 7 = 35)

| Module No. | Question No. | Question | K Level | CO |
|---|---|---|---|---|
| 1 | 11.a. | What is Machine Learning? Give some examples of machine learning applications. | K3 | CO1 |
| | | (OR) | | |
| | 11.b. | Outline about the dimensions of supervised machine learning algorithm with example. | | |
| 2 | 12.a. | Discuss Association Rules in machine learning. | K3 | CO1 |
| | | (OR) | | |
| | 12.b. | Describe Regression Trees in Machine Learning. | | |
| 3 | 13.a. | Explain K-Means clustering in detail. | K3 | CO3 |
| | | (OR) | | |
| | 13.b. | Explain Model selection in Hidden Markov Model. | | |
| 4 | 14.a. | List out and explain the Elements of Reinforcement Learning. | K3 | CO2 |
| | | (OR) | | |
| | 14.b. | Examine the basic routing processes involved in IP Packet Routing. | | |
| 5 | 15.a. | Narrate the WAN properties in brief. | K3 | CO3 |
| | | (OR) | | |
| | 15.b. | List and explain the WAN components in detail. | | |

## SECTION -C (30 Marks)

Answer **ANY THREE** questions

**ALL** questions carry **EQUAL** Marks (3 × 10 = 30)

| Module No. | Question No. | Question | K Level | CO |
|---|---|---|---|---|
| 1 | 16 | Explain about the OSI Reference Model in networks. | K6 | CO4 |
| 2 | 17 | Elaborate on Network infrastructure devices. | K6 | CO4 |
| 3 | 18 | Describe on the Ethernet Technology in detail. | K6 | CO5 |
| 4 | 19 | Explain the multicast routing in detail. | K6 | CO5 |
| 5 | 20 | Discuss about deploying Wireless LAN in detail. | K6 | CO5 |

Z-Z-Z END