6E7102

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# 6E7102

## B.Tech. VI-Sem. ( Main/Back ) Exam., May-2025

## ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

## 6AID4-02 Machine Learning

## CS, IT, AID, CAI, CDS, CCS, CIT, CSD

**Time : 3 Hours** **Maximum Marks : 70**

***Instructions to Candidates :***

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in Form No. 205)*

1. ..... 2. .....



**PART-A** [10x2=20]

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

Q.1. What is the significance of standard deviation in Machine Learning?

Q.2. Differentiate between overfitting and underfitting.

Q.3. What is Confusion matrix?

Q.4. What are the applications of Support Vector Machine (SVM)?

Q.5. What is the working principle of Naive Bayes Classifier?

Q.6. What are the advantages and disadvantages of hierarchical clustering?

Q.7. What is a dendrogram in hierarchical clustering?

Q.8. Calculate the variance and standard deviation of the following data :

4, 2, 5, 8, 6

Q.9. What does Mean Squared Error (MSE) tell you?

Q.10. Explain the straight line equation $y = mx + c$ with respect to Machine learning.

## PART-B

[5x4=20]

### (Analytical/Problem-solving Questions)

### Attempt any five questions

Q.1. Explain the concept of deep learning in detail.

Q.2 What do you mean by reinforcement learning? Also explain the model based reinforcement learning.

Q.3. Explain Markov Decision Process (MDP) also explain policy iteration and value iteration.

Q.4. Explain the concept of feature selection used in Machine Learning.

Q 5. How the decision tree algorithm works? Explain it with the help of an example. What is the role of entropy and information gain in Decision tree?

Q.6. Explain the working principle of Probabilistic clustering in Machine Learning with example.

Q.7. What is the use of PCA in Machine Learning? Give the steps of PCA algorithm.

**PART-C** [3x10=30]

**(Descriptive/Analytical/Problem-Solving/Design Question)**

**Attempt any three questions**

Q1. Write short notes on the following :

(a) Perceptions

(b) Multilayer Network

(c) Back Propagation

(d) Artificial Neutral Network

Q.2 What is the role of State-Action-Reward-State-Action (SARSA) in machine learning? Differentiate between SARSA and Q-learning.

Q.3 Explain Principal Component Analysis (PCA) in machine learning? How to evaluate machine learning algorithm?

Q.4 Consider an example where five weeks sales data (in thousand) is given as shown in table :

| $x_i$ (Weeks) | $y_i$(Sales in thousand) |
|---|---|
| 1 | 1.2 |
| 2 | 1.8 |
| 3 | 2.6 |
| 4 | 3.2 |
| 5 | 3.8 |

Apply linear regression algorithm to predit 7th and 12th week sales.

Q. 5. Consider the following dataset which shows BMI, Age, and Sugar level (0 represent "No Sugar", 1 represent "Sugar"). Assume k = 3, apply k-nearest neighbor classifier to predict the diabetic patient with the given feature BMI, Age.

Test example of BMI = 43.6, Age = 40, predict the patient has sugar or no sugar:

| BMI | AGE | SUGAR |
|---|---|---|
| 33.6 | 50 | 1 |
| 26.6 | 30 | 0 |
| 23.4 | 40 | 0 |
| 43.1 | 67 | 0 |
| 35.3 | 23 | 1 |
| 35.9 | 67 | 1 |
| 36.7 | 45 | 1 |
| 25.7 | 46 | 0 |
| 23.3 | 29 | 0 |
| 31 | 56 | 1 |

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