

Total No. of Questions : 10]

SEAT No. :

**P3994**

**[5561]-701**

[Total No. of Pages : 3

**B.E. (IT)**

**MACHINE LEARNING AND APPLICATIONS**

**(2015 Course) (414454) (Semester - I)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Assume suitable data if necessary.*

**Q1) a)** What is the need if dimensionality reduction? Explain subset selection. **[6]**

b) Write short note on PCA. **[4]**

OR

**Q2) a)** Compare Supervised, Unsupervised, Semi-Supervised Learning with examples. **[6]**

b) What is training, testing and cross validation of machine learning models. **[4]**

**Q3) a)** What are the support vectors and margins? Explain soft SVM and hard SVM. **[6]**

b) What is overfitting and underfitting? What are the catalysts of overfitting? **[4]**

OR

**Q4) a)** Elaborate Bias Variance dilemma. **[6]**

b) How the performance of regression is assessed? Write various performance metrics used for it. **[4]**

**Q5) a)** Consider following 8 points  $P_1 = [0.1, 0.6]$ ,  $P_2 = [0.15, 0.71]$ ,  $P_3 = [0.08, 0.9]$ ,  $P_4 = [0.16, 0.85]$ ,  $P_5 = [0.2, 0.3]$ ,  $P_6 = [0.25, 0.5]$ ,  $P_7 = [0.24, 0.1]$ ,  $P_8 = [0.3, 0.2]$ .

Apply K-Means clustering with initial centroids  $m_1$  &  $m_2$  where  $m_1 = P_1$ ,  $m_2 = P_8$  and clusters are  $C_1$  &  $C_2$ . Which cluster point  $P_6$  belongs to? What is updated value of  $m_1$  &  $m_2$ . **[10]**

b) Write short note on feature tree & write best split algorithm. **[6]**

OR

**P.T.O.**

- Q6) a)** Apply apriori algorithm for following set of transactions and find all the association rules with min support = 1 and min confidence = 60%. **[10]**

Tr. ID	Transactions
1	1,3,4
2	2,3,5
3	1,2,3,5
4	2,5

- b)** Explain following impurity measures of classifiers. **[6]**

- Gini Index.
- Entropy.

- Q7) a)** Consider following dataset and predict the class of new instance X using Navie Bayes Classification algorithm. **[10]**

Tid	Refund	Marital Status	Taxable Amount	Evade
1	Yes	Single	125K	No
2	No	Married	100K	No
3	No	Single	70K	No
4	Yes	Married	120K	No
5	No	Divorced	95K	Yes
6	No	Married	60K	No
7	Yes	Divorced	220K	No
8	No	Single	85K	Yes
9	No	Married	75K	No
10	No	Single	90K	Yes

X = (Refund = No, Marital Status = Married, Income = 120K).

- b)** Explain Expectation - maximization algorithm. **[8]**

OR

- Q8) a)** Consider following dataset and predict the class of new instance X using Navie Bayes. **[10]**

Day	Outlook	Temperatuer	Humidity	Wind	Play Tennis
D1	Sunny	Hot	High	Weak	No
D2	Sunny	Hot	High	Strong	No
D3	Overcast	Hot	High	Weak	Yes
D4	Rain	Mild	High	Weak	Yes
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Classification algorithm.

X = (Outlook = Sunny, Temp = Cool, Humidity = High, Wind = Strong).

- b) Explain one dimensional and N-dimensional Gaussian Mixture. **[8]**

- Q9) a)** Implement AND function using perceptron network using following bipolar inputs and target. **[8]**

X1	X2	T
1	1	1
1	-1	-1
-1	1	-1
-1	-1	-1

- b) Explain deep learning with applications. **[8]**

OR

- Q10)a)** What is ensemble learning? Explain bagging and boosting, stacking in brief. **[8]**

- b) Explain the architecture of feed forward neural network. Give its limitations. **[8]**

