

Total No. of Questions : 8]

SEAT No. :

PB-3860

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[6262]-123

T.E. (IT)

MACHINE LEARNING

(2019 Pattern) (Semester - I) (314443)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.
- 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) State and explain need of Regression analysis. [4]  
b) How gradient descent does helps to optimize linear regression model?[6]  
c) What are the different ways to prevent overfitting and underfitting. [8]

OR

- Q2)** a) What are different cost functions to access the performance of linear Regression model? In the given Dataset the outliers represent anomalies. Which cost function will be more suitable and why? [5]  
b) Define of Multivariate Regression and State advantages and disadvantages of Multivariate Regression. [5]  
c) Consider the following data : [8]

	Prize in Rs	Amount Demanded
1	10	40
2	11	38
3	16	48
4	18	40
5	20	60

- i) Find values of  $\beta_0$  and  $\beta_1$  w.r.t. linear regression model which best fits given data.
- ii) Interpret and explain equation of regression line.
- iii) Estimate the likely demand when the price is Rs.15.

P.T.O.

- Q3) a)** Consider following data. Which feature will be selected as a root node? Use Information Gain. Played football is dependent feature. **[10]**

Outlook	Temperature	Humidity	Wind	Played football (Yes/No)
Sunny	Hot	High	Weak	No
Sunny	Hot	High	Strong	No
Overcast	Hot	High	Weak	Yes
Rain	Mild	High	Weak	Yes
Rain	Cool	Normal	Weak	Yes
Rain	Cool	Normal	Strong	No
Overcast	Cool	Normal	Strong	Yes
Sunny	Mild	High	Weak	No
Sunny	Cool	Normal	Weak	Yes
Rain	Mild	Normal	Weak	Yes
Sunny	Mild	Normal	Strong	Yes
Overcast	Mild	High	Strong	Yes
Overcast	Hot	Normal	Weak	Yes
Rain	Mild	High	Strong	No

- b)** Define and Explain following terms **[7]**

- Bayesian Network
- Advantages and disadvantages of Naïve Bayes Classifier

OR

- Q4) a)** For the given data set apply Naive Bayes Classifier and predict the Class for Type of family structure=Single Parent, Age group=Young, and Income status=Low **[10]**

Type of family structure	Age group	Income status	Will they buy a car
Nuclear	Young	Low	Yes
Extended	Old	Low	No
Childless	Middle-aged	Low	No
Childless	Young	Medium	Yes
Single Parent	Middle-aged	Medium	Yes
Childless	Young	Low	No
Nuclear	Old	High	Yes
Nuclear	Middle-aged	Medium	Yes
Extended	Middle-aged	High	Yes
Single Parent	Old	Low	No

- b) Define and explain following terms [7]
- Minority Class
  - Gini Index
  - Entropy
  - Information Gain

**Q5) a)** Find all association rules in the following database in the following database with minimum support = 2 and minimum confidence = 75%. [10]

Transactions	Data Items
1	Bread, Milk, Diaper
2	Bread, Milk, Diaper, Coke
3	Diaper, Beer, Eggs
4	Bread, Milk, Coke

- b) State & explain with appropriate example different types of linkage use in clustering. [8]

OR

**Q6) a)** Explain following Terms [8]

- Rule
- Support
- Lift
- Confidence

- b) Apply KNN on the Following data. Find class of person whose height is 170 cm and weight is 57 kg. Consider value  $K = 5$  and use Euclidian distance formula. [10]

Height (CM)	Weight (KG)	Class
167	51	Underweight
182	62	Normal
176	69	Normal
173	64	Normal
172	65	Normal
174	56	Underweight
169	58	Normal
173	57	Normal
170	55	Normal

- Q7)** a) With the help of suitable diagram explain Biological Neuron. [5]  
b) Explain the architecture of feed forward neural network. State its limitations. [7]  
c) What is deep learning? Explain different applications of deep learning. [5]

OR

- Q8)** a) What is perceptron? Explain multilayer perceptron in detail. [5]  
b) Explain why we use non-linearity function? State and explain three types of neurons that add non-linearity in their computations. [7]  
c) What is ANN? Explain McCulloch Pitts Neuron. [5]

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