Total No. of Questions : 8]

SEAT No. : ____

PC-5122

[Total No. of Pages : 2

[6353]-290
T.E. (Honours in Artificial Intelligence and Machine Learning)
COMPUTATIONAL STATISTICS
(2019 Pattern) (Semester - I) (310301)

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.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Make suitable assumptions whenever necessary.***

Q1) a) What are the different types of data? Explain Categorical and Numerical data with examples. **[9]**

b) What is data visualization? Explain Line,Scatter, and Box plots with examples. **[9]**

OR

Q2) a) Consider the following dataset: 10,12,15,18,20. Calculate the Mean,Median, and Mode. **[9]**

b) Write a short note on: **[9]**

i) Mean,Median, and Mode

ii) Standard Deviation

Q3) a) What is the Hypothesis Concept? Explain the null hypothesis and alternative hypothesis with an example. **[9]**

b) Describe the distribution of a sample mean. What are the key assumptions for this distribution? **[8]**

OR

Q4) a) What are Cross-Validation Techniques? Explain K-fold, LOOCV, and Stratified K-fold. **[9]**

b) What is normalization? Explain Feature Sealing and Min-Max scaling with examples. **[8]**

P.T.O.

Q5) a) What is the Bias-Variance Tradeoff in machine learning? Explain its significance in model performance. **[9]**

b) Define and explain the following dimensionality reduction techniques. **[9]**

i) Principal Component Analysis (PCA)

ii) Linear Discriminant Analysis (LDA)

iii) Features Selection

iv) Factor Analysis

OR

Q6) a) Define and explain the following regularization techniques used in regression: **[9]**

i) Ridge Regression

ii) Lasso Regression

iii) Elastic Net

iv) Regularization Parameter (Lambda)

b) What is Feature Selection? Explain Chi 2 square method for feature selection. **[9]**

Q7) a) What is Linear Regression? Explain the concept of Correlation Coefficient and Rank Correlation. **[9]**

b) What is Logistic Regression? Describe its use in binary classification problems and explain how the logistic function (sigmoid) is applied. **[8]**

OR

Q8) a) What is the Monte Carlo Method? Explain its use in statistical simulations and provide an example of its application in a real-world problem. **[9]**

b) Define Bayes' Theorem and describe its significance in updating the probability of an event based on new evidence. Provide a real-life example where Bayes' Theorem is used. **[8]**

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