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OR	iii.	How common factors extracted? Elaborate with some examples.	6	3	1-6, 9-11	3	1-4
Q.6		Attempt any two:					
	i.	Explain K-Means clustering with an example.	5	2	1-6, 9-11	4	1-4
	ii.	What is hierarchal clustering method? Explain with example.	5	2	1-6, 9-11	4	1-4
	iii.	What is similarity measure? What are the methods for measure of similarity?	5	2	1-6, 9-11	4	1-4

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering
End Sem Examination Dec 2024
EN3BS09 Computational Statistics

Programme: B.Tech.

Branch/Specialisation: CSBS

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

		Marks	BL	PO	CO	PSO
Q.1	i.	Which type of analysis involves three or more variables?	1	1	1-6, 8-11	1 1-4
		(a) Univariate statistical analysis				
		(b) Bivariate statistical analysis				
		(c) Multivariate statistical analysis				
		(d) All of these				
	ii.	Descriptive analysis gives-	1	1	1-6, 8-11	1 1-4
		(a) Measures of location				
		(b) Measures of spread				
		(c) Measures of variation				
		(d) All of these				
	iii.	Which analysis is portrayed by the equation: $Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_nX_n$?	1	1	1-6, 8-11	2 1-4
		(a) Simple regression				
		(b) Multiple regression				
		(c) Stepwise regression				
		(d) All of these				
	iv.	Residual is-	1	1	1-6, 8-11	2 1-4
		(a) Estimated error				
		(b) Difference of observed value and estimated value				
		(c) Both (a) and (b)				
		(d) None of these				

P.T.O.

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- v. Which of the following represent linear combinations of two random variables X_1 and X_2 ? **1** 1 1-6, 9-11 3 1-4
- (a) $Y = a_1X_1 + a_2X_2$
 (b) $Y = a_1X_1 * a_2X_2$
 (c) $Y = a_1X_1 / a_2X_2$
 (d) None of these
- vi. What is the primary goal of principal component analysis? **1** 1 1-6, 9-11 3 1-4
- (a) Classification
 (b) Clustering
 (c) Dimensionality reduction
 (d) Regression
- vii. Factor analysis is very useful when number of factors are relatively- **1** 1 1-6, 9-11 3 1-4
- (a) Higher than number of variables X
 (b) Equal to number of variables X
 (c) Zero
 (d) Less than number of variables X
- viii. Which of the following indicates how strongly a measured variable is correlated with a factor? **1** 1 1-6, 9-11 3 1-4
- (a) Factor β (b) Discriminator
 (c) Factor link (d) None of these
- ix. Which of the following is required by K-means clustering? **1** 1 1-6, 9-11 4 1-4
- (a) Defined distance metric
 (b) Number of clusters
 (c) Initial guess as to cluster centroids
 (d) All of these
- x. Which of the following is finally produced by Hierarchical Clustering? **1** 1 1-6, 9-11 4 1-4
- (a) Final estimate of cluster centroids
 (b) Tree showing how close things are to each other
 (c) Assignment of each point to clusters
 (d) All of these

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- Q.2 i. Explain following terms with examples- **4** 1 1-6, 8-11 1 1-4
 (a) Mean (b) Variance
- ii. Compute Mean vector and variance-covariance matrix of following set of data- **6** 2 1-6, 8-11 1 1-4
- | Price of Book (X) | No. of copies sold |
|-------------------|--------------------|
| 42 | 4 |
| 52 | 5 |
| 48 | 4 |
| 58 | 3 |
- OR iii. What kind of estimation of parameters needed in multivariate data? Explain with example. **6** 2 1-6, 8-11 1 1-4
- Q.3 i. What is the difference between the simple linear regression model and the multiple linear regression model? **4** 2 1-6, 8-11 2 1-4
- ii. Calculate the least square estimates and find best fitted equation of following data. Also calculate the residuals and residual sum of square. **6** 2 1-6, 8-11 2 1-4
- | Z | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| y | 1 | 4 | 3 | 8 | 9 |
- OR iii. Explain multivariate regression with example. **6** 2 1-6, 8-11 2 1-4
- Q.4 i. Explain discriminant analysis with an example. **4** 1 1-6, 9-11 3 1-4
- ii. What are objectives of principal component analysis and discriminant analysis? Give example for each. **6** 3 1-6, 9-11 3 1-4
- OR iii. Explain following in discriminant analysis- **6** 3 1-6, 9-11 3 1-4
- (a) Two group discriminant analysis
 (b) Discriminant function
- Q.5 i. What do you mean by factor loading? Explain with an example. **4** 1 1-6, 9-11 3 1-4
- ii. Explain following terms which are concerned with factor analysis. Give example for each- **6** 3 1-6, 9-11 3 1-4
- (a) Observable data
 (b) Unobservable data

Scheme of Marking

Computational Statistics-EN3BS09

Q.1	i)	Which type of analysis involves three or more variables? c) Multivariate statistical analysis	1
	ii)	Descriptive Analysis gives d) All of the above	1
	iii)	Which analysis is portrayed by the equation: $Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3... + b_nX_n$? b) Multiple regression	1
	iv)	Residual is c) Both a and b.	1
	v)	Which of the following represent linear combinations of two random variables X_1 and X_2 a) $Y = a_1X_1 + a_2X_2$	1
	vi)	c) Dimensionality reduction	1
	vii)	Factor analysis is very useful when number of factors are relatively d) Less than number of variables X.	1
	viii)	Which of the following indicates how strongly a measured variable is correlated with a factor? d) Factor loading	1
	ix)	Which of the following is required by K-means clustering? d) All of these	1
	x)	Which of the following is finally produced by Hierarchical Clustering? b) Tree showing how close things are to each other	1
Q.2	i.	Explain following terms with examples a. Mean b. Variance	4
	ii.	Compute Mean vector and variance-covariance matrix of following set of data. Price of Book ,X No of copies sold 42 4 52 5 48 4 58 3	6

OR	iii.	What kind of estimation of parameters needed in multivariate data? Explain with example. Explanation 4-Marks Example 2 Marks	6
Q.3	i.	What is the difference between the simple linear regression model and the multiple linear regression model ? At-least two difference 2 Marks each	4
	ii.	Calculate the least square estimates and find best fitted equation of following data. Also calculate the residuals and residual sum of square. Z : 0 1 2 3 4 y : 1 4 3 8 9 Least square estimates 3-Marks Best fitted equation 1-Marks Residuals and Residual sum of square 2-Marks each	6
OR	iii.	Explain multivariate regression with example. Explanation 4-Marks Example 2-Marks	6
Q.4	i.	Explain discriminant analysis with an example. Explanation 2-Marks Example 2-Marks	4
	ii.	What are objectives of Principal Component Analysis and Discriminant Analysis ? Give example for each. 3-Marks each	6
OR	iii.	Explain following in discriminant analysis a. Two group discriminant analysis 3-Marks b. Discriminant function 3-Marks	6
Q.5	i.	What do you mean by factor loading? Explain with an example. Explanation 2-Marks Example 2-Marks	4

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[3]

- ii. Explain following terms which are concerned with factor analysis. **6**
Give example for each
a. Observable data **3-Marks**
b. Unobservable data **3-Marks**
- OR iii. How common factors extracted? Elaborate with some examples. **6**
Explanation **4-Marks**
Example **2-Marks**
- Q.6 Attempt any two:
- i. Explain K-Means clustering with an example. **5**
Explanation **3-Marks**
Example **2-Marks**
- ii. What is hierarchal clustering method? Explain with example. **5**
Explanation **3-Marks**
Example **2-Marks**
- iii. What is similarity measure ? What are the methods for measure of similarity ? **5**
Similarity measure **3-Marks**
similarity measure methods **2-Marks**
