

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(MID SEMESTER EXAMINATION)

CLASS: IMSc.  
BRANCH: QEDS

SEMESTER: III  
SESSION: MO/2022

SUBJECT: ED211 LINEAR STATISTICAL MODEL AND REGRESSION ANALYSIS

TIME: 2 HOURS

FULL MARKS: 25

**INSTRUCTIONS:**

1. The total marks of the questions are 25.
  2. Candidates attempt for all 25 marks.
  3. Before attempting the question paper, be sure that you have got the correct question paper.
  4. The missing data, if any, may be assumed suitably.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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			CO	BL
Q1	(a) Consider the linear model $Y = X B + \epsilon$ , with $\text{Cov}(Y) = \sigma^2 I_n$ . Let $\lambda^T B$ be an estimable function. Find the least square estimator of it.	[2]	CO1	
Q1	(b) Also, find the variance of the least square estimator.	[3]	CO1	
Q2	(a) Consider the linear model $y_i = \mu + \epsilon_i$ , where $\epsilon_i$ 's are uncorrelated with zero mean and variance $\sigma^2$ . Find the least square estimator of $\mu$ .	[2]	CO1	
Q2	(b) Find an unbiased estimator of $\sigma^2$ .	[3]	CO1	
Q3	Find the 95% confidence interval for the least square estimator of $B$ in the linear regression model $y_i = B x_i + \epsilon_i$ , $i = 1, \dots, n$ assuming $\epsilon_i$ 's are iid normal with mean 0 and variance $\sigma^2$ .	[5]	CO2	
Q4	Find the 95% confidence interval for the response of $Y$ when $x = x^0$ in case of simple linear regression	[5]	CO2	
Q5	Derive any test for $H_0: K^T B = m$ versus $H_1: K^T B \neq m$ , where $K$ is a $p \times s$ matrix.	[5]	CO2	

:::::: 01/10/2022 :::::M