

K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

August-2023

B.Tech Program: Computer Engineering Scheme I/II:II

Examination: TY Semester: VI

Course Code: CEDLC6051 and Course Name: Quantitative Analysis

Date of Exam: 09/7/2023

Duration: 2.5 Hours

Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q.1	Solve any six questions out of eight:	12		
i)	What are the limitations of statistics?	2	1	R
ii)	Explain quantitative data with example	2	2	R
iii)	Define Mean Square error(MSE) and Root mean squared log error (RMSLE)	2	3	R
iv)	If $r_{12} = 0.70$, $r_{23} = 0.40$, and $r_{13} = 0.61$ Calculate $r_{23.1}$	2	3	Ap
v)	Define the term multicollinearity?	2	4	U
vi)	Define statistical inferences with real time example.	2	5	U
vii)	A stenographer claims that she can take dictation at the rate of 120 words per minute. Can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words with standard deviation of 15 words at 0.05 LOS? <i>For the given problem, formulate H_0 and H_1 only.</i>	2	6	An
viii)	Explain in brief the concept of one tailed test and two tailed test	2	6	R
Q.2	Solve any four questions out of six.	16		
i)	In 1995, out of total 2000 workers in a factory, 1550 were members at a trade union. The number of women workers employed was 250, out of which 200 did not belong to any trade union. In 2000, the number of union workers was 1725 of which 1600 were men. The number of non-union, workers was 380 among which 155 were women. Present the data into a suitable tabular format.	4	1	An
ii)	What is sampling? List and explain several methods under probability sampling	4	2	U

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iii)	From the following given data, i) find the two regression equations ii) estimate the value of X when Y=75	4	3	Ap												
	<table border="1"> <thead> <tr> <th></th> <th>X</th> <th>Y</th> </tr> </thead> <tbody> <tr> <td>Mean</td> <td>36</td> <td>85</td> </tr> <tr> <td>SD</td> <td>11</td> <td>08</td> </tr> <tr> <td>Coefficient of Correlation</td> <td colspan="2">0.66</td> </tr> </tbody> </table>		X	Y	Mean	36	85	SD	11	08	Coefficient of Correlation	0.66				
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Mean	36	85														
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iv)	In a trivariate distribution: $\sigma_1 = 3$ $\sigma_2 = 4$ $\sigma_3 = 5$ $r_{13} = 0.7$ $r_{23} = 0.4$ $r_{31} = 0.6$ Determine the regression equation of X_1 on X_2 and X_3 if the variates are measured from their means.	4	4	Ap												
V	Explain the properties of Point estimator	4	5	U												
vi)	A machine runs on an average of 125 hours/year. A random sample of 49 machines has an annual average of 126.9 hours with standard deviation 8.4 hours. Does this suggest to believe that machines are used on the average more than 125 hours annually at 0.05 level of significance. (Note: tabulated value $Z_\alpha = 1.64$)	4	6	An												
Q.3	Solve any two questions out of three.	16														
i)	The following table shows the area in millions of sq. km. of oceans of the world. Represent the data in angular pie diagram. <table border="1"> <thead> <tr> <th>Ocean</th> <th>Area (Millions sq. km.)</th> </tr> </thead> <tbody> <tr> <td>Pacific</td> <td>70.8</td> </tr> <tr> <td>Atlantic</td> <td>41.2</td> </tr> <tr> <td>Indian</td> <td>28.5</td> </tr> <tr> <td>Antarctic</td> <td>7.6</td> </tr> <tr> <td>Arctic</td> <td>4.8</td> </tr> </tbody> </table>	Ocean	Area (Millions sq. km.)	Pacific	70.8	Atlantic	41.2	Indian	28.5	Antarctic	7.6	Arctic	4.8	8	1	An
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ii)	Fit a regression line $Y=a+bX$ by the method of least squares <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="text-align: center;">Income(X)</td> <td style="text-align: center;">41</td> <td style="text-align: center;">65</td> <td style="text-align: center;">50</td> <td style="text-align: center;">57</td> <td style="text-align: center;">96</td> <td style="text-align: center;">94</td> <td style="text-align: center;">110</td> <td style="text-align: center;">30</td> <td style="text-align: center;">79</td> <td style="text-align: center;">65</td> </tr> <tr> <td style="text-align: center;">Expenditure (Y)</td> <td style="text-align: center;">44</td> <td style="text-align: center;">60</td> <td style="text-align: center;">39</td> <td style="text-align: center;">51</td> <td style="text-align: center;">80</td> <td style="text-align: center;">68</td> <td style="text-align: center;">84</td> <td style="text-align: center;">34</td> <td style="text-align: center;">55</td> <td style="text-align: center;">48</td> </tr> </tbody> </table>	Income(X)	41	65	50	57	96	94	110	30	79	65	Expenditure (Y)	44	60	39	51	80	68	84	34	55	48	8	3	Ap
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Expenditure (Y)	44	60	39	51	80	68	84	34	55	48																
iii)	Describe and derive the maximum likelihood equation for estimating the parameters.	8	5	U																						
Q.4	Solve any two questions out of three.	16																								
i)	Describe types of Probability and types of Non Probability sampling.	8	2	U																						
ii)	From heights (X_1) in inches, weights (X_2) in kg., and ages (X_3) in years of a group of students, the following means, variances and correlation coefficients were obtained $\bar{X}_1=40$ $\bar{X}_2=50$ $\bar{X}_3=20$ $S_1=3$ $S_2=4$ $S_3=2$ $r_{12}=0.4$ $r_{23}=0.5$ $r_{13}=0.25$ Find the multiple regression equation of X_3 on X_1 and X_2 Estimate the value of X_3 when $X_1=43$ inches, $X_2= 54$ kg	8	4	Ap																						
iii)	A shop manufacturing company was distributed a particular brand through a large number of retail shops, Before a healthy advertising campaign, the mean sales per week, per shop was 140 dozen. After the campaign samples of 26 shops was taken and mean sales were found to be 147 dozens with std. deviation 10. Can you consider the advertisement effective? (tabulated value $t_\alpha = 1.708$ at 0.05 level of significance)	8	6	An																						