

Reg. No.:



Name:

University of Kerala

U9159

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

STATISTICS

UK2DSCSTA108 - INTRODUCTION TO LINEAR MODELS AND COMBINATORIAL ANALYSIS

Academic Level: 100-199

Time: 1 Hour 30 Minutes(90 Mins.)

Max. Marks: 42

Part A. 6 Marks.Time:6 Minutes.(Cognitive Level:Remember(RE)/Understand(UN)) Objective Type. 1 Mark Each.Answer all questions

Qn No.	Question	CL	CO
1	Define runs with example.	RE	4
2	Write down the moment-generating function (MGF) of a binomial distribution?	RE	3
3	What will be the value of Correlation Coefficient r , if $b_{xy} = 0.48$ and $b_{yx} = 0.6$?	UN	2
4	Write down normal equations for fitting a straight line	UN	1
5	State the relationship between mean, median and mode of a normal distribution?	UN	3
6	Maxwell-Boltzmann statistics cannot be applied to	UN	4

Part B.8 Marks.Time:24 Minutes.(Cognitive Level:Understand(UN)/Apply(AP))Short Answer. 2 marks each.Answer all questions

Qn No.	Question	CL	CO
7	How does taking logarithms simplify the process of fitting certain curves like $y = ax^b$?	UN	1
8	Illustrate a scatter diagram with an example.	UN	2
9	The normal equations for fitting a straight line of the form $y = a + b x$ are: $5a + 20b = 50$ and $20a + 90b = 170$. Using these equations, find the values of a and b .	AP	1
10	Given a normal distribution with mean = 50 and standard deviation = 10, find the probability that a randomly selected value is between 40 and 60?	AP	3

Part C. 28 Marks.Time:60 Minutes (Cognitive Level:Apply(AP)/Analyse(AN)/Evaluate(EV)/Create(CR)) Long Answer.7 marks each.Answer all 4 Questions choosing among options * within each question

Qn No.	Question	CL	CO
11	A) The two lines of regression are $x + 2y - 5 = 0$ and $2x + 3y - 8 = 0$ and the variance of X is 12. Compute the variance of Y and the correlation coefficient. OR B) Fit Appropriate distribution for the following data X: 0 , 1 , 2 , 3 , 4 , 5 , 6 , 7 f : 626 , 285 , 65 , 15 , 6 , 2 , 1 , 0.	AP	2, 3
12	A)	AN	3, 2

Qn No.	Question	CL	CO																								
	A call center receives an average of 5 calls per minute. Analyse the probability of receiving 8 calls in a given minute using appropriate distribution? OR B) A researcher claims that, at a river bend, the water gradually gets deeper as the distance from the inner bank increases. He measures the distance from the inner bank, b cm, and the depth of a river, s cm, at seven positions. The results are shown in the table below. Analyse the linear relationship between b and s. <table><tr><th>Position</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th></tr><tr><th>Distance from inner bank b cm</th><td>100</td><td>200</td><td>300</td><td>400</td><td>500</td><td>600</td><td>700</td></tr><tr><th>Depth s cm</th><td>60</td><td>75</td><td>85</td><td>76</td><td>110</td><td>120</td><td>104</td></tr></table>	Position	A	B	C	D	E	F	G	Distance from inner bank b cm	100	200	300	400	500	600	700	Depth s cm	60	75	85	76	110	120	104		
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Depth s cm	60	75	85	76	110	120	104																				
13	A) For a normal distribution, the first moment about 10 is 40 and the fourth moment about 50 is 48. what is the mean and variance of the distribution? OR B) Analyse the given regression equations, $3x - 2y = 5$ and $x - 4y = 7$, to determine which equation represents the regression of Y on X and which represents the regression of X on Y. Identify the corresponding regression coefficients and evaluate the correlation coefficient based on the computed values.	EV	3, 2																								
14	A) Construct your own data relating number of training sessions (x) and employee performance score (y).Fit a straight line $y=ax+ b$ and explain how this model can help in workforce planning. OR B) Design a simple game involving tossing a biased coin 5 times, where the probability of heads is 'p'. Create a basic payoff structure for the game, rewarding players for getting a certain number of heads. Use the binomial distribution to explain the probabilities of different outcomes in your game?	CR	1, 3																								