University of Kerala

Second Semester FYUGP Degree Examination, April 2025

Discipline Specific Core Course

STATISTICS

UK2DSCSTA109 - STANDARD DISTRIBUTIONS, CORRELATION AND REGRESSION

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	The formula for Karl Pearson coefficient of correlation coefficient between two variables X and Y is	RE	1
2	The cumulative distribution function F(x,y) lies between _____ and _____	RE	2
3	The variance of a uniform (discrete) distribution with pdf P(X=xi) =1/k ,for i=1,2,...,k is	UN	3
4	Which of the following values of k minimizes $E(X - k)^2$? Options : A)k < E(X) B)k > E(X) C)k = E(X) D)none of the above	UN	3
5	Let the coefficient of correlation be 0.7, then the coefficient of determination is ………	UN	1
6	The mean and variance of the distribution having mgf, $M_X(t) = (\frac{1}{3} + \frac{2}{3}e^t)^5$ is,____	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	"By expanding the moment generating function we can obtain the moments from it". Comment on the statement.	UN	3
8	A binomial distribution B (10,0.2) is approximated using a Poisson distribution. Find the Poisson parameter λ and hence compute P(X=3).	UN	4
9	Apply central moments to find the kurtosis for a given distribution. X: 1 2 3 4 P(x): 1/3 1/4 1/6 1/4	AP	3
10	Five competitors in a musical test were ranked by two judges A and B are given below. Rank by A : 1 , 4 ,5 , 3, 2 Rank by B : 2 , 3 , 4 , 5 , 1 Find rank correlation coefficient between judge A and judge B.	AP	1

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) Given the regression equations 2x - 3y = 10 and 3x - 4y = 15, apply the concept of regression analysis to determine which equation represents the regression of x on y. OR B) Fit a Poisson distribution to the following data and obtain the theoretical frequencies. x 0 1 | 2 3 4 5 f 8 32 | 18 4 2 1	AP	1, 4

Qn No.	Question	CL	CO
12	A) For the distribution with pdf f(x)= ¾(x(2-x)), 0<x<2 and 0 otherwise. Show that the second and third moments about zero are 6/5 and 8/5. Also comment on its skewness. OR B) Analyze the relationship between binomial and Poisson distributions. Under what conditions does a binomial distribution approximate a Poisson distribution?	AN	3, 4
13	A) The joint probability density function of X_1 and X_2 is $f(x_1, x_2) = 12x_1x_2(1 - x_2), 0 < x_1 < 1, 0 < x_2 < 1$. Check whether this is a probability density function? Find the marginal distribution of X_1 and X_2. Examine whether X_1 and X_2 are independent. OR B) Evaluate the mean and mgf of a Poisson-distributed random variable with parameter λ. Evaluate their values when λ=5. Comment on the additive property of Poisson distribution.	EV	2, 4
14	A) A girl tossed two unbiased coins. And she noted that X=0 if the second coin shows tail and X=1 if it shows head and let Y denote the number of tails thrown. Write down the joint probability density function along with the marginal density function. OR B) Define a Poisson distribution? Why is it called a distribution of rare events? Using a real-life situation as example, create a Poisson distribution to demonstrate the same?	CR	2, 4