



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – DATA SCIENCE

FIRST SEMESTER – NOVEMBER 2022

PDS1MC03 – STATISTICS AND PROBABILITY

Date: 28-11-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

SECTION A

Answer ALL the questions

1	Answer the following	(5 x 1 = 5)	
a)	Define dispersion	K1	CO1
b)	Write any two properties of regression coefficients.	K1	CO1
c)	Define Multiplication theorem of probability.	K1	CO1
d)	Write the statement of chebychev's inequality.	K1	CO1
e)	Define Uniform distribution.	K1	CO1
2	Fill in the Blanks	(5 x 1 = 5)	
a)	If 5 is subtracted from each observation of a set, then the mean of the observation is	K2	CO1
b)	If sd is 16 and mean is 20 then the coefficient of variation is	K2	CO1
c)	Multiplication theorem of probability is applicable only if the events are	K2	CO1
d)	Uniform distribution is also calleddistribution.	K2	CO1
e)	The mean and variance of Normal distribution are and	K2	CO1

SECTION B

	Answer any THREE of the following in 500 words	(3 x 10 = 30)																									
3	<p>Draw a pie chart and interpret it.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Food crop</th> <th>Rice</th> <th>Wheat</th> <th>Barley</th> <th>Jowar</th> <th>Bajra</th> <th>Maize</th> <th>Others</th> </tr> </thead> <tbody> <tr> <td>Area in (acres)</td> <td>8</td> <td>8</td> <td>4</td> <td>2</td> <td>2</td> <td>5</td> <td>11</td> </tr> </tbody> </table>	Food crop	Rice	Wheat	Barley	Jowar	Bajra	Maize	Others	Area in (acres)	8	8	4	2	2	5	11	K3	CO2								
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4	<p>Calculate Standard deviation for the following</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Wages</th> <th>70-80</th> <th>80-90</th> <th>90-100</th> <th>100-110</th> <th>110-120</th> <th>120-130</th> <th>130-140</th> <th>140-150</th> </tr> </thead> <tbody> <tr> <td>No.of persons</td> <td>12</td> <td>18</td> <td>35</td> <td>42</td> <td>50</td> <td>45</td> <td>20</td> <td>8</td> </tr> </tbody> </table>	Wages	70-80	80-90	90-100	100-110	110-120	120-130	130-140	140-150	No.of persons	12	18	35	42	50	45	20	8	K3	CO2						
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5	<p>The records of 400 examinees are given below.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Score</th> <th colspan="4">Educational qualification</th> </tr> <tr> <th>BA</th> <th>B.Sc</th> <th>B.Com</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td><50</td> <td>90</td> <td>30</td> <td>60</td> <td>180</td> </tr> <tr> <td>50-60</td> <td>20</td> <td>70</td> <td>70</td> <td>160</td> </tr> <tr> <td>>60</td> <td>10</td> <td>30</td> <td>20</td> <td>60</td> </tr> </tbody> </table> <p>If an examinee is selected from this group find (i) the probability that he is a commerce graduate (ii) the probability that he is a science graduate given that his score is above 60 (iii) the probability that his score is below 50 given that he is a BA graduate.</p>	Score	Educational qualification				BA	B.Sc	B.Com	Total	<50	90	30	60	180	50-60	20	70	70	160	>60	10	30	20	60	K3	CO2
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6	<p>Given the joint pdf of (X,Y) as ,</p> $f(x,y) = \frac{2}{3}(x+y), \text{ for } 0 < x < 1, 0 < y < 1$ <p>find (i) the marginal pdf of X and Y (ii) $P(X/Y = \frac{1}{2})$</p>	K3	CO2																								
7	Discuss the significance of Binomial. Poisson and Normal distributions.	K3	CO2																								

SECTION C

Answer any TWO of the following in 500 words

(2 x 12.5 = 25)

8	Calculate Pearson's coefficient of skewness.										K4	CO3
	Annual Sales(Rs)	0-20	20-40	40-60	60-80	80-100	100-120					
	Number of items	20	50	59	30	25	16					
9	Fit two regression equations for the following										K4	CO3
	X	25	28	35	32	36	36	29	38	34		
	Y	43	46	49	41	36	32	31	30	33	39	
10	If X and Y are two random variables having the joint density function $f(x,y) = \frac{9}{4} - x - y, \quad 0 < x < 2, \quad 0 < y < 2$ Obtain the marginal and conditional distributions of X and Y.										K4	CO3
11	Determine the binomial distribution for which the mean is 4 and variance 3. Also find P(X=15).										K4	CO3

SECTION D

Answer any ONE of the following

(1 x 15 = 15)

12	A company has three machines A, B and C which produces 20%, 30% and 50% of the products respectively. Their respective defective percentages are 7,3 and 5. From these products one is chosen and is found to be defective. What is the probability that it is from machine C?										K5	CO4
13	Calculate the rank correlation coefficient for the following										K5	CO4
	X	92	89	87	86	86	77	71	63	53		
	Y	86	83	91	77	68	85	52	82	37	57	

SECTION E

Answer any ONE of the following

(1 x 20 = 20)

14	Fit a Poisson distribution using recurrence relation given the record of the mistakes made per day by a typist during 300 working days in a year.										K6	CO5
	Mistakes per day	0	1	2	3	4	5	6				
	No. of days	143	90	42	12	9	3	1				
15	Students of a class were given aptitude test. Their marks were found to be normally distributed with mean 60 and sd 5. What percent of student scored: (i) More than 60 marks (ii) Less than 56 marks (iii) Between 45 and 65 marks.										K6	CO5

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