

Name:

Enrolment No:



UPES

End Semester Examination, Dec 2024

Course: Applied Statistics and Probability

Program: Bachelor of Computer Application

Course Code: MATH2058

Instructions: Attempt all the questions. All questions are compulsory.

Semester: III

Time : 03 hrs.

Max. Marks: 100

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO														
Q 1	Discuss the qualitative and quantitative data with examples.	4	CO1														
Q 2	The mean of 200 items was 50. Later, it was found that two items were misread as 92 and 8 instead of 192 and 88. Determine the correct mean.	4	CO2														
Q 3	Comment on the statement, "The mean and the variance for the Binomial distribution are 3 and 4, respectively".	4	CO3														
Q 4	A random variable has X has the following probability distribution: <table border="1"><tr><td>$X = x$</td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>$P(X = x)$</td><td>0.1</td><td>k</td><td>0.2</td><td>$2k$</td><td>0.3</td><td>k</td></tr></table> Determine, (i) the value of k , and (ii) mean.	$X = x$	-2	-1	0	1	2	3	$P(X = x)$	0.1	k	0.2	$2k$	0.3	k	4	CO3
$X = x$	-2	-1	0	1	2	3											
$P(X = x)$	0.1	k	0.2	$2k$	0.3	k											
Q 5	Define the correlation. What is the difference between positive and negative correlation?	4	CO4														

SECTION B
(4Qx10M= 40 Marks)

Q 6	The data on number of patients attending a hospital in a month are given below: <table border="1"><tr><td>No. of patients</td><td>0 - 10</td><td>10 - 20</td><td>20 - 30</td><td>30 - 40</td><td>40 - 50</td><td>50 - 60</td></tr><tr><td>No. of days attending the hospital</td><td>2</td><td>6</td><td>9</td><td>7</td><td>4</td><td>2</td></tr></table> Determine the average number of patients attending the hospital in a day.	No. of patients	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	No. of days attending the hospital	2	6	9	7	4	2	10	CO1
No. of patients	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60											
No. of days attending the hospital	2	6	9	7	4	2											
Q 7	Draw a pie diagram to represent the following data of proposed expenditure by a state Government for the year 2001-2002. <table border="1"><tr><td>Items</td><td>Agri. & Rural Development</td><td>Indus.& Urban Development</td><td>Health & Education</td><td>Miscellaneous</td></tr><tr><td>Proposed Expend. (in million Rs.)</td><td>4200</td><td>1500</td><td>1000</td><td>500</td></tr></table>	Items	Agri. & Rural Development	Indus.& Urban Development	Health & Education	Miscellaneous	Proposed Expend. (in million Rs.)	4200	1500	1000	500	10	CO1				
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Proposed Expend. (in million Rs.)	4200	1500	1000	500													

Q 8	In a bolt factory machines <i>A</i> , <i>B</i> and <i>C</i> manufacture respectively 20%, 30% and 50% of the total of its output. Of them 5, 4 and 2 per cent respectively are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machine <i>B</i> ?	10	CO3
Q 9	In a certain factory turning razor blades, there is a small chance, $\frac{1}{500}$ for any blade to be defective. The blades are in packets of 10. Use Poisson distribution to calculate the approximate number of packets containing (i) no defective (ii) one defective (iii) two defective blades respectively in one consignment of 10000 packets.	10	CO3

SECTION-C
(2Qx20M=40 Marks)

Q 10 A	Determine the mean deviation from the median of the following frequency distribution:	10	CO2												
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Marks</td> <td>0-10</td> <td>10-20</td> <td>20-30</td> <td>30-40</td> <td>40-50</td> </tr> <tr> <td>No. of students</td> <td>5</td> <td>8</td> <td>15</td> <td>16</td> <td>6</td> </tr> </table>				Marks	0-10	10-20	20-30	30-40	40-50	No. of students	5	8	15	16	6
Marks	0-10			10-20	20-30	30-40	40-50								
No. of students	5	8	15	16	6										

Q 10 B	Calculate the first four moments of the following distribution about mean and hence determine the value of β_1 and β_2 :	10	CO2																				
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td><i>x</i></td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> <td>8</td> </tr> <tr> <td><i>f</i></td> <td>1</td> <td>8</td> <td>28</td> <td>56</td> <td>70</td> <td>56</td> <td>28</td> <td>8</td> <td>1</td> </tr> </table>				<i>x</i>	0	1	2	3	4	5	6	7	8	<i>f</i>	1	8	28	56	70	56	28	8	1
<i>x</i>	0			1	2	3	4	5	6	7	8												
<i>f</i>	1	8	28	56	70	56	28	8	1														

Q 11 A	Determine the Spearman's rank correlation coefficient between the expenditure on advertising and sales from the data given below:	10	CO4																						
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Advertising expenses ('000 Rs.)</td> <td>39</td> <td>65</td> <td>62</td> <td>90</td> <td>82</td> <td>75</td> <td>25</td> <td>98</td> <td>36</td> <td>78</td> </tr> <tr> <td>Sales (lakh Rs.)</td> <td>47</td> <td>53</td> <td>58</td> <td>86</td> <td>62</td> <td>68</td> <td>60</td> <td>91</td> <td>51</td> <td>84</td> </tr> </table>				Advertising expenses ('000 Rs.)	39	65	62	90	82	75	25	98	36	78	Sales (lakh Rs.)	47	53	58	86	62	68	60	91	51	84
Advertising expenses ('000 Rs.)	39			65	62	90	82	75	25	98	36	78													
Sales (lakh Rs.)	47	53	58	86	62	68	60	91	51	84															
OR																									
Determine the Karl Pearson's correlation coefficient from the following data:																									
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td><i>X</i></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td><i>Y</i></td> <td>12</td> <td>9</td> <td>6</td> <td>10</td> <td>3</td> </tr> </table>		<i>X</i>	1	2	3	4	5	<i>Y</i>	12	9	6	10	3												
<i>X</i>	1	2	3	4	5																				
<i>Y</i>	12	9	6	10	3																				
The arithmetic means of <i>X</i> and <i>Y</i> are 6 and 8, respectively.																									

Q 11 B	From the following results, obtain the two regression equations and estimate the yield, when the rainfall is 29 <i>cms</i> . And the rainfall when the yield is 600 <i>kg</i> .:	10	CO4									
<table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">Yield in <i>kg</i>.</td> <td style="text-align: center;">Rainfall in <i>cms</i>.</td> </tr> <tr> <td>Mean</td> <td style="text-align: center;">508.4</td> <td style="text-align: center;">26.7</td> </tr> <tr> <td>S.D.</td> <td style="text-align: center;">36.8</td> <td style="text-align: center;">4.6</td> </tr> </table>					Yield in <i>kg</i> .	Rainfall in <i>cms</i> .	Mean	508.4	26.7	S.D.	36.8	4.6
	Yield in <i>kg</i> .			Rainfall in <i>cms</i> .								
Mean	508.4	26.7										
S.D.	36.8	4.6										
The coefficient of correlation between yield and rainfall is + 0.52.												
OR												
Given the regression lines as $3x + 2y = 26$ and $6x + y = 31$. Determine their point of interaction and interpret it. Also, find the correlation coefficient between <i>x</i> and <i>y</i> .												