

Code: 23BS1402

II B.Tech - II Semester – Regular Examinations - MAY 2025

PROBABILITY AND STATISTICS
(Common for ME, CSE, IT, AIML, DS)

Duration: 3 hours**Max. Marks: 70**

- Note: 1. This question paper contains two Parts A and B.
 2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
 3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
 4. All parts of Question paper must be answered in one place.

BL – Blooms Level**CO – Course Outcome****PART – A**

		BL	CO
1.a)	Define conditional probability.	L2	CO1
1.b)	What is the probability of getting an even prime number on throwing a die?	L2	CO1
1.c)	A binomial distribution has mean 3 and variance 2 then find number of trials.	L3	CO2
1.d)	Define probability density function.	L2	CO2
1.e)	Define coefficient of correlation.	L2	CO1
1.f)	Write the normal equations of parabola.	L2	CO2
1.g)	Define Type-I and Type-II error.	L2	CO1
1.h)	Write the formula of Test for single proportion.	L2	CO3
1.i)	Write the application of Chi-square test.	L2	CO3
1.j)	Write the properties of t - distribution.	L2	CO2

PART – B

			BL	CO	Max. Marks
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UNIT-I

2	The following table gives the daily income of 150 workers of a factory. Find mean and mode.	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Class Interval</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><td>60-70</td></tr> <tr> <td>Frequency</td><td>8</td><td>12</td><td>20</td><td>30</td><td>15</td><td>10</td><td>5</td></tr> </table>	Class Interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70	Frequency	8	12	20	30	15	10	5	L3	CO2	10 M
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OR

3	a) In a bolt factory machines A_1 , A_2 , A_3 manufacture respectively 25%, 35% and 40% of the total output. Of these 5, 4, and 2 percent 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 A_2 and A_3 .	L3	CO2	5 M
	b) Find the probability of drawing 2 red balls in succession from a bag containing 4 red and 5 blue balls when the ball that is drawn first is not replaced.	L3	CO2	5 M

UNIT-II

4	The probability density $f(x)$ of a continuous random variable is given by $f(x) = ce^{- x }, -\infty < x < \infty.$ Show that $c = \frac{1}{2}$ and find the mean and variance of the distribution.	L3	CO2	10 M
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OR

5	a) If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3kgs. How many students have masses.	L4	CO4	5 M
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	i) greater than 72kgs. ii) less than or equal to 64 kgs iii) between 65 and 71 kgs inclusive.			
b)	Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) Either 2 or 3 boys (iii) at least one boy? Assume equal probability for boys and girls.	L4	CO4	5 M

UNIT-III

6	a)	Find the coefficient of correlation for the following data.	L3	CO2	5 M														
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>X</td><td>65</td><td>66</td><td>67</td><td>67</td><td>68</td><td>69</td><td>70</td><td>72</td></tr> <tr> <td>Y</td><td>67</td><td>68</td><td>65</td><td>68</td><td>72</td><td>72</td><td>69</td><td>71</td></tr> </table>				X	65	66	67	67	68	69	70	72	Y	67	68	65	68
X	65	66	67	67	68	69	70	72											
Y	67	68	65	68	72	72	69	71											
	b)	Find the mean values of the variables X and Y and correlation coefficient from the following regression equations $2Y-X-50=0$ and $3Y-2X-10=0$.	L4	CO4	5 M														

OR

7	Fit an exponential curve $Y=ae^{bx}$ for the given data		L3	CO2	10 M																	
	<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>X</td><td>40</td><td>65</td><td>90</td><td>5</td><td>30</td><td>10</td><td>80</td><td>85</td><td>70</td><td>25</td></tr> <tr> <td>Y</td><td>30</td><td>20</td><td>10</td><td>80</td><td>40</td><td>65</td><td>15</td><td>15</td><td>20</td><td>50</td></tr> </table>	X				40	65	90	5	30	10	80	85	70	25	Y	30	20	10	80	40	65
X	40	65	90	5	30	10	80	85	70	25												
Y	30	20	10	80	40	65	15	15	20	50												

UNIT-IV

8	a)	A Sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and standard deviation 25 kgs.	L3	CO3	5 M
	b)	Write the steps involved in test of significance for single sample proportion and population proportion.			

OR

9	a)	In two large populations, there are 30%, and 25% respectively of fair haired people. Is this difference likely to be hidden in samples of 1200 and 900 respectively from the two populations.	L4	CO5	5 M
	b)	The mean and standard deviation of a population are 11795 and 14054 respectively. If $n=50$ find a 95% confidence interval for the mean.	L3	CO3	5 M

UNIT-V

10	a)	Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins, show the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test the hypothesis that the true variance are equal.	L3	CO3	5 M
	b)	In one sample of 8 observations from a normal population, the sum of the squares of deviations of the sample values from the sample mean is 84.4 and in another sample of 10 observations it was 102.6. Test at 5% level whether the populations have the same variance.	L3	CO3	5 M

OR

11	Given the following contingency table for hair colour and eye colour. Find the value of chi square. Is there good association between the two?	L4	CO5	10 M																		
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th></th> <th>Fair</th> <th>Brown</th> <th>Black</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Eye Colour</td> <td>Blue</td> <td>15</td> <td>5</td> <td>20</td> </tr> <tr> <td>Grey</td> <td>20</td> <td>10</td> <td>20</td> </tr> <tr> <td>Brown</td> <td>25</td> <td>15</td> <td>20</td> </tr> </tbody> </table>			Fair	Brown	Black	Eye Colour	Blue	15	5	20	Grey	20	10	20	Brown	25	15	20			
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