



**B.Tech III Semester Supplementary Examinations, December 2024**

**PROBABILITY & STATISTICS**

(Common to CE, MECH, CSE & IT)

**Maximum Marks: 70**

**Date: 02.12.2024**

**Duration: 3 hours**

- Note:**
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

**Allow the statistical table**

**Part-A**

All the following questions carry equal marks (10X2M=20) Marks		CO	Bloom Tx
1	Define a Random Variable.	1	L1
2	List the properties of probability distribution function.	1	L1
3	Define binomial distribution.	2	L1
4	If X is a poisson variate such that $p(x=0) = p(x=1) = K$ . Determine K.	2	L1
5	Define correlation and write the types of correlation.	3	L1
6	Test whether the equations $2x + 3y = 4$ , and $x-y=5$ represent valued regression lines.	3	L1
7	Define (i) Left tailed test (ii) Right tailed test.	4	L1
8	Write about Critical region?	4	L1
9	Write the formulae for significance of single mean & two means in t-test?	5	L1
10	Write the applications of chi-square distribution?	5	L1

**Part-B**

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx																
11	The probability density function of a variable 'x' is [10M] <table border="1" style="margin: 5px auto; border-collapse: collapse;"> <tr> <td style="padding: 2px;">x</td> <td style="padding: 2px;">0</td> <td style="padding: 2px;">1</td> <td style="padding: 2px;">2</td> <td style="padding: 2px;">3</td> <td style="padding: 2px;">4</td> <td style="padding: 2px;">5</td> <td style="padding: 2px;">6</td> </tr> <tr> <td style="padding: 2px;">P(x)</td> <td style="padding: 2px;">k</td> <td style="padding: 2px;">3k</td> <td style="padding: 2px;">5k</td> <td style="padding: 2px;">7k</td> <td style="padding: 2px;">9k</td> <td style="padding: 2px;">11k</td> <td style="padding: 2px;">13k</td> </tr> </table> i) Find 'k' ii) Find $p(x < 4)$ , $p(3 < x \leq 6)$ iii) What will be the minimum value of 'M' so that $p(x \leq M) > 0.3$ ?	x	0	1	2	3	4	5	6	P(x)	k	3k	5k	7k	9k	11k	13k	1	L2
x	0	1	2	3	4	5	6												
P(x)	k	3k	5k	7k	9k	11k	13k												
OR																			
12	A continuous random variable has the probability function [10M] $f(x) = \begin{cases} K x e^{-\lambda x} & \text{for } x \geq 0, \lambda > 0 \\ 0 & \text{otherwise} \end{cases}$ Determine (i) k (ii) Mean (iii) Variance	1	L2																

13	Show that for a Normal distribution mean=median. [10M]	2	L2																								
OR																											
14	If mean = 70, standard deviation is 16. Find (i) $p(38 \leq x \leq 46)$ , (ii) $p(62 \leq x \leq 86)$ , (iii) $p(82 \leq x \leq 94)$ [10M]	2	L2																								
15	From the following data calculate the rank correlation coefficient after making adjustment for tied ranks. [10M]	3	L2																								
	<table border="1"> <tr> <td>X</td> <td>48</td> <td>33</td> <td>40</td> <td>9</td> <td>16</td> <td>16</td> <td>65</td> <td>24</td> <td>16</td> <td>57</td> </tr> <tr> <td>y</td> <td>13</td> <td>13</td> <td>24</td> <td>6</td> <td>15</td> <td>64</td> <td>20</td> <td>9</td> <td>16</td> <td>19</td> </tr> </table>	X	48	33	40	9	16	16	65	24	16	57	y	13	13	24	6	15	64	20	9	16	19				
X	48	33	40	9	16	16	65	24	16	57																	
y	13	13	24	6	15	64	20	9	16	19																	
OR																											
16	A panel of two judges P & Q graded seven dramatic performance by independently awarding marks as follows. [10M]	3	L2																								
	<table border="1"> <tr> <td>Performance</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>Marks by P</td> <td>46</td> <td>42</td> <td>44</td> <td>40</td> <td>43</td> <td>41</td> <td>45</td> </tr> <tr> <td>Marks by Q</td> <td>40</td> <td>38</td> <td>36</td> <td>35</td> <td>39</td> <td>37</td> <td>41</td> </tr> </table> <p>The eight performance, which judge Q would not attend, was awarded 37 marks by judge p, if judge Q has also been present, how many marks would be expected to have been awarded by him to the eight performance.</p>	Performance	1	2	3	4	5	6	7	Marks by P	46	42	44	40	43	41	45	Marks by Q	40	38	36	35	39	37	41		
Performance	1	2	3	4	5	6	7																				
Marks by P	46	42	44	40	43	41	45																				
Marks by Q	40	38	36	35	39	37	41																				
17	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. [10M]	4	L2																								
OR																											
18	Random samples of 400 men and 600 women were asked whether they would like to have a flyover near the residence, 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same, at 5% level. [10M]	4	L2																								
19	To compare two kinds of bumper guards 6 of each kind were mounted on a car and then the car was run in to a concrete wall the following are the costs of repairs. [10M]	5	L2																								
	<table border="1"> <tr> <td>Guard1</td> <td>107</td> <td>148</td> <td>123</td> <td>165</td> <td>102</td> <td>119</td> </tr> <tr> <td>Gaurd2</td> <td>134</td> <td>115</td> <td>112</td> <td>151</td> <td>133</td> <td>129</td> </tr> </table> <p>Use the 0.01 level of significance to test whether the difference between two sample means is significant.</p>	Guard1	107	148	123	165	102	119	Gaurd2	134	115	112	151	133	129												
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Gaurd2	134	115	112	151	133	129																					
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20	The number of automobile accidents per week in a certain community are as follows: 12,8,20,2,14,10,15,6,9,4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period. [10M]	5	L2																								