



R22 Regulation

Subject code: 4B3AD

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech III Semester Regular Examinations, February 2024

PROBABILITY AND STATISTICS
(Common to CE,CSE,IT,CSE(AI&ML) & CSE(DS))

Maximum Marks: 60

Date:16.02.2024 Duration: 3 hours

Note: Statistical tables are allowed.

Part-A		CO	Bloom Tx																				
All the following questions carry equal marks (10x1M=10 Marks)																							
1.a)	The value of $E(ax + b) =$ _____	CO1	L2																				
b)	A continuous random variable X that can assume any value between $X = 2$ and $X = 5$ has a density function given by $f(x) = k(1 + x)$. Find the value of 'k'.	CO1	L2																				
c)	In Normal distribution, $P(Z > a) =$ _____	CO2	L2																				
d)	Poisson distribution is a limiting case of _____ distribution.	CO2	L1																				
e)	The formula for rank correlation is _____	CO3	L1																				
f)	In a linear regression $\alpha_0 + \alpha_1 X + \epsilon$, the coefficient α_1 represent _____	CO3	L1																				
g)	What is two tailed test?	CO4	L1																				
h)	What is Type II error?	CO4	L2																				
i)	If $n \geq 30$ then such sample is said to be _____	CO5	L1																				
j)	Write down the formula for difference of two means in t-test.	CO5	L1																				
Part-B																							
Answer All the following questions. (5X10M=50Marks)			Bloom Tx level																				
2	A random variable X has the following probability distribution. [10M] <table><tr><td>$X=x$</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>$P(x)$</td><td>a</td><td>$3a$</td><td>$5a$</td><td>$7a$</td><td>$9a$</td><td>$11a$</td><td>$13a$</td><td>$15a$</td><td>$17a$</td></tr></table> (i) Find the value of a (ii) Evaluate $P(X < 4)$ (iii) Find the distribution function of X . (iv) Find mean and variance of X .	$X=x$	0	1	2	3	4	5	6	7	8	$P(x)$	a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$	CO1	L5
$X=x$	0	1	2	3	4	5	6	7	8														
$P(x)$	a	$3a$	$5a$	$7a$	$9a$	$11a$	$13a$	$15a$	$17a$														
OR																							
3	Given the probability density function of a continuous random variable X follows $f(x) = \begin{cases} 6x(1-x), & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$ Evaluate Mean and Variance of distribution function of X . [10M]	CO1	L5																				
4	Evaluate mean and variance of Poisson distribution. [10M]	CO2	L5																				
OR																							
5	An electrical firm manufactures light bulbs that have a life, before burn out, that is normally distributed with mean equal to 800 hours and a standard deviation of 40 hours. Find (i) the probability that a bulb burns more than 834 hours (ii) the probability that bulb burns between 778 and 834 hours. [10M]	CO2	L3																				

6	Apply the method of least squares to fit a straight line for the following data: [10M]	CO3	L3																																				
<table><tr><td>X</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Y</td><td>6</td><td>5</td><td>3</td><td>5</td><td>4</td><td>2</td></tr></table>				X	1	2	3	4	5	6	Y	6	5	3	5	4	2																						
X	1	2	3	4	5	6																																	
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OR																																							
7	Apply the rank correlation coefficient method for the following marks of two Subjects A and B. [10M]	CO3	L3																																				
<table><tr><td>Marks in subject A</td><td>92</td><td>89</td><td>87</td><td>86</td><td>83</td><td>77</td><td>71</td><td>63</td><td>53</td><td>50</td></tr><tr><td>Marks in subject B</td><td>86</td><td>83</td><td>91</td><td>77</td><td>68</td><td>85</td><td>52</td><td>82</td><td>37</td><td>57</td></tr></table>				Marks in subject A	92	89	87	86	83	77	71	63	53	50	Marks in subject B	86	83	91	77	68	85	52	82	37	57														
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8	If T is an unbiased estimator of θ show that T^2 is not an unbiased estimator of θ . [10M]	CO4	L2																																				
OR																																							
9	A sample of 100 measurements at breaking strength of cotton thread gave a mean of 7.4 and a standard deviation of 1.2 gms. Construct 95% confidence limits for the mean breaking strength of cotton thread. [10M]	CO4	L3																																				
10	Eleven school boys were given a test in painting. They were given a month's further tuition and a second test of equal difficulty was held at the end of the month. Do the marks give evidence that the students have benefit by extra coaching? [10M]	CO5	L3																																				
<table><tr><td>Boys</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><td>9</td><td>10</td><td>11</td></tr><tr><td>Before Test (marks)</td><td>25</td><td>23</td><td>19</td><td>22</td><td>21</td><td>19</td><td>22</td><td>21</td><td>25</td><td>18</td><td>20</td></tr><tr><td>After Test (marks)</td><td>26</td><td>22</td><td>22</td><td>19</td><td>23</td><td>21</td><td>24</td><td>24</td><td>25</td><td>22</td><td>18</td></tr></table>				Boys	1	2	3	4	5	6	7	8	9	10	11	Before Test (marks)	25	23	19	22	21	19	22	21	25	18	20	After Test (marks)	26	22	22	19	23	21	24	24	25	22	18
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11	<table><tr><td>Detergent A</td><td>45</td><td>43</td><td>51</td></tr><tr><td>Detergent B</td><td>47</td><td>46</td><td>52</td></tr><tr><td>Detergent C</td><td>48</td><td>50</td><td>55</td></tr><tr><td>Detergent D</td><td>42</td><td>37</td><td>49</td></tr></table> Use Chi-square to test whether there are differences in the detergents or in the engines. (1% L.O.S). [10M]	Detergent A	45	43	51	Detergent B	47	46	52	Detergent C	48	50	55	Detergent D	42	37	49	CO5	L3																				
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