R22 Regulation *Subject code: 4B3AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech III Semester Supplementary Examinations, July 2024

PROBABILITY AND STATISTICS

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

Maximum Marks: 60 Date:18.07.2024 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.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

ALLOW STASTICAL TABLE

	Part-A All the following questions carry equal marks (10X1M=10 Marks)	CO	Bloom Tx
1.a)	The expected value of a discrete random variable 'x' is ____	CO1	L1
b)	A probability density function f(x) for the continuous random variable X is denoted as ____	CO1	L1
c)	In a Binomial distribution, if 'n' is the number of trials and 'p' is the probability of success, then its mean value is ____	CO2	L1
d)	Variance of Poisson distribution is ____	CO2	L1
e)	The range of rank correlation is ____	CO3	L1
f)	What is the primary objective of minimizing the sum of squared residuals in the method of least squares?	CO3	L1
g)	What is one tailed test?	CO4	L1
h)	What is Type I error?	CO4	L1
i)	If $n \leq 30$ then the sample is said to be ____	CO5	L1
j)	What is ANOVA?	CO5	L1

<table>
<tr><th colspan="4">Part-B</th></tr>
<tr><th colspan="2">Answer All the following questions. (5X10M=50Marks)</th><th></th><th>Bloom Tx level</th></tr>
<tr><td>2</td><td>A random variable X has the following probability distribution. [10M]
<table>
<tr><td>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></tr>
<tr><td>P(x)</td><td>0</td><td>k</td><td>2k</td><td>2k</td><td>3k</td><td>k^2</td><td>$2k^2$</td><td>$7k^2+k$</td></tr>
</table>
Find (i) the value of k (ii) $P(x < 5)$
(iii) the distribution function of X .
(iv) mean and variance of X.</td><td>CO1</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>3</td><td>The cumulative distribution function of a random variable$X$ is $F(x) = 1-(1+x)e^{-x}, x > 0$. Find the probability density function of X and also find the mean and variance of X. [10M]</td><td>CO1</td><td>L2</td></tr>
<tr><td>4</td><td>Find mean and variance of binomial distribution. [10M]</td><td>CO2</td><td>L2</td></tr>
</table>

<table>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>5</td><td>The number of monthly breakdown of a computer is a random variable having a Poisson distribution with mean equal to 1.8. Find the probability that this computer will function for a month, (i) without a breakdown (ii)with two breakdowns and (iii) with at least one breakdown. [10M]</td><td>CO2</td><td>L2</td></tr>
<tr><td>6</td><td>Fit a straight line to the following data. [10M]
<table>
<tr><td>Year x</td><td>1951</td><td>1961</td><td>1971</td><td>1981</td><td>1997</td></tr>
<tr><td>Production y (in tons) :</td><td>10</td><td>12</td><td>8</td><td>10</td><td>15</td></tr>
</table>
Also estimate the production in 1987.</td><td>CO3</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>7</td><td>Marks in the two subjects X and Y of eight applicants are shown below. Calculate rank coefficient of correlation. [10M]
<table>
<tr><th>Applicants</th><th>Subject X</th><th>Subject Y</th></tr>
<tr><td>A</td><td>15</td><td>40</td></tr>
<tr><td>B</td><td>20</td><td>30</td></tr>
<tr><td>C</td><td>28</td><td>50</td></tr>
<tr><td>D</td><td>12</td><td>30</td></tr>
<tr><td>E</td><td>40</td><td>20</td></tr>
<tr><td>F</td><td>60</td><td>10</td></tr>
<tr><td>G</td><td>20</td><td>30</td></tr>
<tr><td>H</td><td>80</td><td>60</td></tr>
</table></td><td>CO3</td><td>L2</td></tr>
<tr><td>8</td><td>Let X_1, X_2, X_3 are independent random variable having Poisson distribution with parameter λ. Show that $\frac{X_1+X_2+X_3}{3}$ and $\frac{5X_1+3X_2+X_3}{9}$ are also unbiased estimator of λ. [10M]</td><td>CO4</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>9</td><td>A population consists of six numbers 4,8,12,16,20and 24.Consider all possible samples of size two Which can be drawn with out replacement from this population. Find i) The population mean. ii) The standard deviation of the population.iii) The mean of the sampling distribution of means. iv) standard deviation of the sampling distribution of means. [10M]</td><td>CO4</td><td>L2</td></tr>
</table>

<table>
<tr><td></td><td></td><td></td><td></td></tr>
<tr><td>10</td><td>Two independent samples are chosen from two schools A and B and a common test is given in a subject. The scores of the students are given. Can we conclude that students of school A performed better than students of School B? [10M]
<table>
<tr><td>School A</td><td>76</td><td>68</td><td>70</td><td>43</td><td>94</td><td>68</td><td>33</td><td></td></tr>
<tr><td>School B</td><td>40</td><td>48</td><td>92</td><td>85</td><td>70</td><td>76</td><td>68</td><td>22</td></tr>
</table></td><td>CO5</td><td>L2</td></tr>
<tr><td></td><td>OR</td><td></td><td></td></tr>
<tr><td>11</td><td>The following table gives the number of aircraft accident that occurred during the various days of the week. Test whether the accidents are uniformly distributed over the week. [10M]
<table>
<tr><td>Days</td><td>Mon</td><td>Tue</td><td>Wed</td><td>Thurs</td><td>Fri</td><td>Sat</td><td>Total</td></tr>
<tr><td>No. of accidents</td><td>14</td><td>18</td><td>12</td><td>11</td><td>15</td><td>14</td><td>84</td></tr>
</table></td><td>CO5</td><td>L2</td></tr>
</table>