R22 Regulation *Subject code: 4B3AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B. Tech III Semester Regular/Supplementary Examinations, December 2025

PROBABILITY AND STATISTICS

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

Maximum Marks: 60 Date:15.12.2025 ***Duration: 3 hours***

Note: **1. This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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.

Statistical tables are allowed

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a)	Define the continuous random variable.	1M	1	L1
b)	If X is a random variable, then Prove E[X+K] = E[X] + K, where 'K' constant.	1M	1	L1
c)	What is the recurrence relation for binomial distribution?	1M	2	L1
d)	If a bank received on the average 6 bad cheques per day, find the probability that it will receive 4 bad cheques on any given day.	1M	2	L1
e)	What are normal equations for straight lines?	1M	3	L1
f)	If X and Y are independent, then find the Cov (X, Y).	1M	3	L1
g)	How many different samples of size n=2 can be chosen from a finite population of size 25.	1M	4	L1
h)	Define Type-I and Type-II error.	1M	4	L1
i)	Define t-test.	1M	5	L1
j)	When we apply F-test of significance.	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	A random variable X has the following probability function: x: 0 1 2 3 4 5 6 7 P(x): 0 K 2K 2K 3K K^2 $2K^2$ $7K^2+K$ (i) Determine K (ii) If P ($X \leq K$) > (1/2) find the minimum value of K (iii) Determine the distribution function of X (iv) Mean and (v) Variance	10M	1	L3

	OR			
3	Probability density function of a random variable X is $f(x) = \begin{cases} \frac{1}{2} sinx, for\ 0 \le x \le \pi \\ 0, elsewhere \end{cases}$ Find the mean, mode and median of the distribution and also find the probability between 0 and $\pi/2$.	10M	1	L3
4	Out of 800 families with 5 children each, how many would you expect to have (i)3 boys (ii)5girls (iii)either 2 or 3 boys? Assume equal probabilities for boys and girls.	10M	2	L5
	OR			
5	In a normal distribution, 7% of the item are under 35 and 89% are under 63. Find the mean and standard deviation of the distribution.	10M	2	L5
6	From the following data, Find (a) The two regression equations (b) The coefficient of correlation between the marks in Economics and Statistics (c) The most likely marks in Statistics when marks in Economic are 30.	10M	3	L4
	OR			
7	Fit an exponential curve of the form $Y = ab^x$ to the following data.	10M	3	L3
8	A population consists of five numbers 2,3,6,8,11. Consider all possible samples of size two which can be drawn with replacement from the population. Find (a) The mean of the population (b) The standard deviation of the population (c) The mean of the sampling distribution of means (d) The standard deviation of sampling distribution of means	10M	4	L3
	OR			
9	In a sample of 600 students of a certain college 400 are found to use ball pens. In another college from a sample of 900students 450 were found to use ball pens. Test whether 2 colleges are significantly different with respect to the habit of using ball pens.	10M	4	L3

Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

X	1	2	3	4	5	6	7	8
Y	1.0	1.2	1.8	2.5	3.6	4.7	6.6	9.1

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<tr><td>10</td><td>Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results.
<table><tr><td>Horse A</td><td>28</td><td>30</td><td>32</td><td>33</td><td>33</td><td>29</td><td>34</td></tr><tr><td>Horse B</td><td>29</td><td>30</td><td>30</td><td>24</td><td>27</td><td>29</td><td>-</td></tr></table>Test whether the two horses have the same running capacity.</td><td>10M</td><td>5</td><td>L3</td></tr>
<tr><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>11</td><td>Time taken by the workers in performing a job by method I and method II is given below:
<table><tr><td>Method I</td><td>20</td><td>16</td><td>26</td><td>27</td><td>23</td><td>22</td><td>-</td></tr><tr><td>Method II</td><td>27</td><td>33</td><td>42</td><td>35</td><td>32</td><td>34</td><td>38</td></tr></table>Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly?</td><td>10M</td><td>5</td><td>L3</td></tr>
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