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Course Code: 2030004 Roll No: **MLRS- R20**

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
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II B.Tech I Sem Regular End Examination, February 2022

Probability and Statistics

(CE, CSC, CSD, CSE, CSI, CSM, IT)

Time: 3 Hours. **Max. Marks: 70**

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

(10*2 Marks = 20 Marks)

1.	a)	State Baye's Theorem.	2M	CO1	BL1
	b)	If $P(A) = P(B) = P(A \cap B)$, prove that $P(A \cap \bar{B}) + P(\bar{A} \cap B) = 0$.	2M	CO1	BL5
	c)	Define probability density function of Uniform distribution.	2M	CO2	BL1
	d)	Why are interval estimates in most cases more useful than point estimates?	2M	CO2	BL2
	e)	Define sampling distribution.	2M	CO3	BL1
	f)	State Central limit theorem.	2M	CO3	BL1
	g)	Discuss various types of alternative hypothesis with suitable example.	2M	CO4	BL2
	h)	Define stochastic matrix.	2M	CO4	BL1
	i)	Write the normal equations for the straight line $y = a + bx$ by least squares.	2M	CO5	BL2
	j)	Write the Rank correlation formula for repeated ranks.	2M	CO5	BL1

PART- B

(10*5 Marks = 50 Marks)

2	a)	Two persons A and B toss a dice. The person who first throws 4 or 5 wins. A starts the game. Show that the probabilities of A's and B's winning are in the ratio 3:2.	5M	CO1	BL5
	b)	Two digits are selected at random from the digits 1 through 9.If the sum is odd, what is the probability that 2 is one of the digit selected.	5M	CO1	BL3

OR

3		Three machines produces 70%, 20% and 10% of the total number of a factory. The percentage of defective output of these machines are respectively 4%, 3% and 2%. An item is selected at random and found defective. Find the probability that it is from the machine-I.	10M	CO1	BL5

4	a)	Prove that Poisson distribution is the limiting case of Binomial distribution.	5M	CO2	BL5
	b)	Construct 95% confidence interval for the true proportion of computer literates if 47 out of 150 persons from rural areas are computer literates.	5M	CO2	BL3

OR

5 The marks obtained in Statistics by 1000 students are normally distributed with mean 78% and standard deviation 11%. Determine 10M CO2 BL3

i) How many students got marks above 90%?

ii) How many students got marks between 75% and 85%?

6 a) 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. 5M CO3 BL3

b) Determine the expected number of random samples having their means between 22.39 and 22.41 for the sampling distribution of means of 300 random samples each of size n= 36 are drawn from the population of N=1500 which is normally distributed with mean $\mu = 1500$ and $\sigma=0.048$. 5M CO3 BL3

OR

7 Construct sampling distribution of means for the population 3, 7, 11, 15 by drawing samples of size two with replacement. Determine 10M CO3 BL3

i) Population mean ii) Population standard deviation

iii) $\mu_{\bar{x}}$ (mean of the SDM) $iv)$ $\sigma_{\bar{x}}$(std. deviation of SDM)

8 In a certain city 125 men in a sample of 500 were found to be smokers. In another city, the number of smokers was 375 in a random sample of 1000. Does this indicate that there is a greater population of smokers in the second city than in the first? 10M CO4 BL3

OR

9 A random sample of 40 geysers produced by company A have a mean life time of 647 hours of continuous use with a standard deviation of 27 hours, while a sample 40 produced by another company B have mean life time of 638 hours with standard deviation 31 hours. Does this substantiate the claim of company A that their geysers are superior to those produced by company B at 0.01 level of significance? 10M CO4 BL3

10 a) Find the parabola of the form $y = a + bx + cx^2$which fits most closely with the observations 5M CO5 BL3

x	2	4	6	8	10
y	3.07	12.85	31.47	57.38	91.29

b) Determine the constants a and b by the method of least squares such that $y = ae^{bx}$ 5M CO5 BL3

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

OR

11 Find the lines of regression for the following marks obtained by 12 students in Mathematics and Statistics 10M CO5 BL3

Mathematics	78	56	36	66	25	75	82	62
Statistics	84	44	57	58	60	68	62	58

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