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II/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2024

First Semester

AM / CSE / CYS / DS

MATHEMATICS - III

PROBABILITY & STATISTICS

Time : **Three Hours** Maximum : **70** Marks

Answer ONE Question from each Unit. 5x14=70 M

All Questions carry equal marks.

UNIT - I

1. a) Explain importance of the Data Science in Engineering.

   b) Calculate the median from the following data :

Marks	10-25	25-40	40-55	55-70	70-85	85-100
Frequency	6	20	44	26	3	1

(OR)

2. a) Calculate the correlation coefficient for the following data.

x	65	66	67	67	68	69	70	72
y	67	68	65	68	72	72	69	71

   b) By the method of least squares fit a second degree parabola to the following data :

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

UNIT - II

3. a) State and Prove addition theorem on Probability.

   b) Out of 15 items 4 are not good condition 4 are selected at random.

   Find the probability that (i) All are good (ii) Two are not good.

(OR)

4. a) For the discrete probability distribution.

x	0	1	2	3	4	5	6
P(x)	0	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

Find (i) k (ii) Mean (iii) Variance.

b) A businessman goes to hotels X, Y, Z is 20%, 50%, 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbing. What is the probability man's room having faulty plumbing is assigned to hotel Z ?

UNIT - III

5. a) Derive the mean and variance of Binomial distribution.

b) It has been found that 2% of the tools produced by a certain machine are defective. What is the probability that in a shipment of 400 such tools 3% or more.

(OR)

6. a) If X is a normal variate with mean 30 and standard deviation 5. Find (i) P(26<X<40) (ii) P(X>45).

b) It has been claimed that in 60% of all solar heat installations the utility bill is reduced by atleast one - third. Accordingly, what are the probabilities that the utility bill will be reduced by at least one - third in (i) four of five installations (ii) at least four of five installations.

UNIT - IV

7. a) Write a procedure for testing of hypothesis.

b) A sample of 400 items is taken from a population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38.

(OR)

8. a) A simple sample of the height of 6400 Englishmen has a mean of 67.85 inches and S.D. of 2.56 inches while a simple sample of height of 1600 Australians has a mean of 68.55 inches and S.D. of 2.52 inches. Do the data indicate the Australians are on the taller than the Englishmen. (Use at 0.01 level).

b) A die was thrown 9000 times and of these 3220 yielded a 3 or 4. Is this consistent with the hypothesis that the die was unbiased ?

UNIT - V

9. To examine the hypothesis that the husbands are more intelligent than the wives, an investigator took a sample of 10 couples and administered them a test which measures the I.Q. The results are as follows :

Husbands	117	105	97	105	123	109	86	78	103	107
Wives	106	98	87	104	116	95	90	69	108	85

Test the hypothesis with a reasonable test at the level of significance of 0.05.

(OR)

10. From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees.

	Employees		
Soft Drinks	Clerks	Teachers	Officers
Pepsi	10	25	62
Thumsup	15	30	65
Fanta	50	60	30