ME 211 (R-22)

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

First Semester

MECHANICAL ENGINEERING

ENGINEERING 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) Calculate the correlation coefficient for the following data :

x	28	41	40	38	35	33	40	32	36	33
y	23	34	33	34	30	26	28	31	36	38

b) Write a merit and demerits of mean and median.

(OR)

2. a) Find the mean of the following data by using step deviation method.

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No. of Students	6	5	8	15	7	6	3

b) Fit a straight line to the following data.

x	1	3	5	7	9
y	1.5	2.8	4.0	4.7	6.0

UNIT - II

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

b) Two dice are thrown. Let A be the event that the sum of the points on the face is 9. Let B be the event that at least one number is 6. Find

(i) $P(A \cap B)$ (ii) $P(A \cup B)$ (iii) $P(A^C \cup B^C)$

(OR)

P.T.O.

4. a) For the continuous random variable X whose probability density function is given by $f(x) = \begin{cases} cx(2-x), & 0 \le x \le 2 \\ 0 & otherwise \end{cases}$. Find c, mean and variance.

   b) In a bolt factory machines A, B, C manufacture 20%, 30% and 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective. Find the probability that it is manufactured by machine B ?

UNIT - III

5. a) If 2% of light bulbs are defective, find the probability if (i) At least one is defective (ii) Exactly 7 are defective in a sample of 100.

   b) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random (i) none is defective (ii) one is defective.

(OR)

6. a) Derive the mean and variance of Binomial Distribution.

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

UNIT - IV

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

   b) In a random sample of 60 workers, the average time taken by them to get to work is 33.8 minutes with a standard deviation of 6.1 minutes. Can we reject the null hypothesis $\mu = 32.6$ minutes in favour of alternative hypothesis $\mu > 32.6$ at 0.01 level of significance.

(OR)

8. a) In a sample of 600 students of certain college 400 are found to use ball pens. In another college from a sample of 900 students 450 were found to use ball pens. Test whether 2 colleges are significantly different with respect to the habit of using ball pens.

   b) A random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad. Find the percentage of bad pineapples in the consignment.

UNIT - V

9. a) A sample of 26 bulbs gives a mean life of 990 hours with a S.D. of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not upto the standard.

   b) 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 population have the same variance.

(OR)

10. Fit Binomial distribution to the following data and test the goodness of fit at 0.05 level of significance.

No. of Heads	0	1	2	3	4	5
Frequency	38	144	342	287	164	25