FACULTY OF ENGINEERING

B.E. IV - Semester (EE/Inst/CSE) (AICTE) (Main&Backlog) Examination,
October 2021

Subject: Mathematics – III (Probability and Statistics)

Time: 2 Hours

Max. Marks: 70

(Missing data, If any, may be suitably assumed)

PART – A

Note: Answer any five questions.

(5x2 = 10 Marks)

1 State Baye's theorem.

2 A random variable X has the following probability distribution:

X:	1	2	3	4
P(X):	1/10	1/5	3/10	2/5

Find the mean of the distribution.

3 Average number of accidents on any day on a national highway is 1.8. Find the probability that the number of accidents is at least one.

4 Define Skewness of a distribution.

5 Write any two properties of the normal probability curve.

6 Find the variance of the uniform distribution.

7 Two lines of regression are $7x - 16y + 9 = 0$, $5y - 4x - 3 = 0$. Find $\bar{x}$ and $\bar{y}$.

8 Define type I and type II errors.

9 Write the assumptions for conducting t-test.

10 Explain briefly F-test.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

11 (a) State and prove theorem of total probability.

(b) A continuous random variable X has the pdf $f(x) = \begin{cases} ax^3, & 0 \le x \le 1 \\ 0 & \text{elsewhere} \end{cases}$

Find (i) a (ii) $P\left(X < \frac{1}{4}\right)$ and (iii) $P\left(X > \frac{1}{2}\right)$.

12 (a) Fit a binomial distribution to the following data:

x:	0	1	2	3	4	5
f:	2	14	20	34	22	8

(b) Calculate the first four moments about the mean for the following data:

x:	1	2	3	4	5	6	7	8	9
f:	1	6	13	25	30	22	9	5	2

13 (a) The marks obtained in Mathematics by the students in a class are approximately normally distributed with mean 62 and variance 36. If 3 students are selected at random, find the probability that at least one of them would score more than 80 marks.

(b) Find the mean and moment generating function of exponential distribution.

14 (a) Find the least square line $y = a + bx$ for the following data:

$x:$	-2	-1	0	1	2
$f:$	1	2	3	3	4

(b) Intelligence test of two groups of boys and girls gave the following results.

Girls: $\bar{x}_1 = 84$, S.D. = 10, $n_1 = 121$

Boys: $\bar{x}_2 = 80$, S.D. = 14, $n_2 = 81$.

Is the difference between the standard deviations significant? Test at 5% level of significance.

15 The values of two random samples are given below.

Sample A 15 25 16 20 22 24 21 17 19 23

Sample B 35 31 25 38 26 29 32 34 33 27 29 31

Can we conclude that the two samples are drawn from the same population? Test at 5% level of significance.

16 (a) A dice is thrown twice and the sum of the numbers appearing is noted to be 8. Find the probability that the number 5 has appeared at least once.

(b) Find the variance of the normal distribution.

17 From the following data, calculate coefficient of correlation between X and Y and the two lines of regression equations.

X:	1	2	3	4	5	6	7	8	9
Y:	12	11	13	15	14	17	16	19	10

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