FACULTY OF ENGINEERING
B.E. III - Semester (IT) (AICTE) (Main & Backlog) Examination, July 2021

Subject: Mathematics – III (P & S)

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. Let A and B two events such that P(A)=0.5, P(B)=0.6 and P(A∪B)=0.8. Find P(A/B).

2. If $f(x) = \begin{cases} \frac{x}{6} + k, & 0 \leq x \leq 3 \\ 0 & otherwise \end{cases}$ is a probability density function of a random variable, find k.

3. Find the moment generating function of binomial distribution.
4. A Poisson variant X satisfies $P(X=1) = \frac{1}{2} P(X=2)$. Find the variance of X.
5. Find the mean of uniform distribution.
6. Write any two properties of normal curve.
7. If $x =4y+5$ and $y=k_x +4$ are two regression lines, show that $0 \leq k \leq \frac{1}{4}$.

8. Define level of significance.
9. Write the test statistic t to test of significance for difference of means of two small samples.
10. Write any two uses of F-test.

PART – B

Note: Answer any four questions.

(4x15 = 60 Marks)

11. (a) State and prove Baye's theorem.
    (b) A bag A contains 2 white and 3 red balls and a bag B contains 4 white and 5 red balls. One ball is drawn from one of the bags and is found to be red. Find the probability that it was drawn from bag B.

12. (a) If the sum of the mean and variance of a binomial distribution of 5 trials is 9/5, find the binomial distribution.
    (b) Find the mean and variance of Poisson distribution.

13. (a) If a random variable X is uniformly distributed over (-a, a), find 'a' such that P(X>1) =1/3.
    (b) A continuous random variable X is normally distributed with mean 25 and standard deviation 8. Find the probability that (i) $20 \leq X \leq 40$ and (ii) $|x - 25| \leq 5$.

14. (a) Fit a least square curve of the form $y=a_x{}^b$ for the following data:

x:	61	26	7	26
y:	350	400	500	600

    (b) A random sample of 900 members has a mean 3.4 cms. Can it be reasonably regarded as a sample from a large population of mean 3.2 cms and standard deviation 2.3 cms? Test at 5% level of significance.

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15 The values in two random samples are given below.
Sample I: 15 25 16 20 22 24 21 17 19 23
Sample II: 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 random variable X has the following probability distribution.

x:	1	2	3	4	5
$P(x)$:	c	c	3c	c^2+c	$6c^2$

Find (i) the value of c   (ii) E(4X+1)   (iii) Var (4X+1)   (iv) P(X<3) and (v) P(1< X <4).

17 Find the correlation coefficient and the equations of regression lines from the following data:

X:	1	2	3	4	5	6	7	8	9	10
Y:	10	12	16	28	25	36	41	49	40	50

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