SUBJECT CODE : 15MT/AC/ST35

B. Sc. DEGREE EXAMINATION, NOVEMBER 2019
BRANCH I - MATHEMATICS
THIRD SEMESTER

COURSE   : ALLIED – CORE
PAPER   : MATHEMATICAL STATISTICS - I
TIME   : 3 HOURS   MAX. MARKS : 100

SECTION – A   **(10X2=20)**
ANSWER ALL THE QUESTIONS

1. Write the sample space in tossing two coins.
2. A single die is tossed once. Find the probability of a 2 or 5 turning up.
3. A coin is tossed twice. Let X represent the number of heads that come up. Find the probability function corresponding to X .
4. A continuous random variable x has the following pdf $f(x) = \begin{cases} 3x^2, & 0 < x < 1 \\ 0, & otherwise \end{cases}$.

    Verify that it is a pdf.
5. A random variable x has $E(x) = 2$ and $E(x^2) = 8$. Find $Var\ (x)$ and σ_x
6. A discrete random variable has the probability function given below. Find its characteristic function.

    x :   -1   1
    $p(x)$:   ½   ½
7. n a binomial distribution the mean and standard deviation are 12 and 2 respectively. Find n and p.
8. Give two examples of poisson distribution.
9. Under what conditions normal distribution is a limiting form of binomial distribution?
10. Find the area under the standard normal curve which lie to the right of $z = 0.27$.

SECTION – B   **(5X8=40)**
ANSWER ANY FIVE QUESTIONS

11. What is the probability that a leap year selected at random will contain either 53 Thursdays or 53 Fridays ?
12. Given that $P(A) = \dfrac{3}{8}, P(B) = \dfrac{5}{8}$ and $P(A \cup B) = \dfrac{3}{4}$. Find $P(A/B)$ and $P(B/A)$.

    Show whether A and B are independent.
13. For the probability distribution

    x 0   1   2   3
    $f(x)$ 1/8 3/8 3/8 1/8

    Find the distribution function $f(x)$ for the random variable X and graph this distribution.
14. The joint density function of the random variable X and Y is given by

    $f(x, y) = \begin{cases} 8xy & 0 \le x \le 1, 0 \le y \le x \\ 0 & otherwise \end{cases}$. Find (i) the marginal density of X (ii) the conditional density of X

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15. A continuous random variable X has probability density function
$f(x) = \begin{cases} 2e^{-2x}, & x > 0 \\ 0, & x \leq 0 \end{cases}$. Find $E(x)$ and $Var(x)$.

16. It is known from past experience that in a certain plant there are an average 4 industirial accidents per month. Find the probability that in a given year there will be (i)less than 4 accidents (ii) No accidents .Assume poisson distribution. (Given $e^{-4} = 0.0183$).

17. Assume the mean height of children to be 68.22 cm. with a variance of 10.8 cm. How many children would you expect to be over 72 cm tall?

SECTION – C (2X20=40)
ANSWER ANY TWO QUESTIONS

18. a) A card is drawn at random from an ordinary deck of 52 playing cards. Find the probability that it is (a) a ten or a spade   (b) neither a four nor a club
    b) Urn I has 2 white and 3 black balls, Urn II 4 white and 1 black and Urn III 3 white and 4 black. An urn is selected at random and a ball drawn at random is found to be white. Find the probability that Urn I was selected.

(10+10)

19. a) The joint density function of two continuous random variables X and Y is
    $f(x, y) = \begin{cases} cxy & 0 < x < 4, 1 < y < 5 \\ 0 & otherwise \end{cases}$.
    (i) Find the value of c
    (ii) Find $P(1 < X < 2, 2 < Y < 3)$

    (b) Find the moment generating function of the random variable X having density
    Function $f(x) = \begin{cases} x/2 & 0 \leq x \leq 2 \\ 0 & otherwise \end{cases}$ .Also find the first four moments about the
    Origin.

(10+10)

20. a) The sum of mean and variance of a binomial distribution is 4.8 for 5 trials. Find the distribution.
    b) A machine produces on an average 20% defective bolts . A batch is accepted if a sample of 5 bolts taken from that batch contains no defective and rejected if the sample contains 3 or more defectives. In other cases a second sample is taken. What is the probability that the second sample is required?
    c) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

(5+5+10)

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