5DALMIA HIGHER SECONDARY SCHOOL
DALMIAPURAM – 621651
Std : 12   MATHEMATICS   TIME: 1.50HRS

CHAPTER – 11   TEST -1   MARKS: 0
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2 MARKS: ANSWERS ANY 13 Q   13 X 2 = 26

1. Find the probability mass function f(x) of the discrete random variable X whose cumulative distribution function

F(x) is given by $F(x) = \begin{cases} 0 & -\infty < x < -2 \\ 0.25 & -2 < x < -1 \\ 0.60 & -1 \leq x < 0 \\ 0.90 & 0 \leq x < \infty \\ 1 & 1 \leq x < \infty \end{cases}$ Also find

(i) p(x< 0)

2. A random variable X has the following probability mass function.

x	1	2	3	4	5	6
f(x)	k	$2k$	$6k$	$5k$	6k	10k

Find (i)p(2<X<6)

3. Find the constant C such that the function
$f(x) = \begin{cases} Cx^2 & 1 < X < 4 \\ 0 & Otherwise \end{cases}$
is a density function, and compute p(1.5≤X<3.5)

4. Find the constant C such that the function
$f(x) = \begin{cases} Cx^2 & 1 < X < 4 \\ 0 & Otherwise \end{cases}$ is a density function, and compute p (X≤ 2)

5. Find the constant C such that the function
$f(x) = \begin{cases} Cx^2 & 1 < X < 4 \\ 0 & Otherwise \end{cases}$
is a density function, and compute   P(3<X)

6. Let X be a random variable denoting the life time of an electrical equipment having probability density function
$f(x) = \begin{cases} ke^{-2x} & for x > 0 \\ 0 & for x \leq 0 \end{cases}$ Find (i) the value of k

7. Let X be a random variable denoting the life time of an electrical equipment having probability density function
$f(x) = \begin{cases} ke^{-2x} & for x > 0 \\ 0 & for x \leq 0 \end{cases}$ Find Distribution function

8. Let X be a random variable denoting the life time of an electrical equipment having probability density function
$f(x) = \begin{cases} ke^{-2x} & for x > 0 \\ 0 & for x \leq 0 \end{cases}$ Find (X< 2)

9. Let X be a random variable denoting the life time of an electrical equipment having probability density function

$f(x) = \begin{cases} ke^{-2x} & for x > 0 \\ 0 & for x \leq 0 \end{cases}$ calculate the probability that X is at least for four unit of time

10. Let X be a random variable denoting the life time of an electrical equipment having probability density function
$f(x) = \begin{cases} ke^{-2x} & for x > 0 \\ 0 & for x \leq 0 \end{cases}$ Find P(X=3).

11. The mean and variance of a binomial variate X are respectively 2 and 1.5. Find P(X=0)

12. The mean and variance of a binomial variate X are respectively 2 and 1.5. Find p(X=1)

13. Suppose X is the number of tails occurred when three fair coins are tossed once simultaneously. Find the values of the random variable X and number of points in its inverse images

14. Three fair coins are tossed simultaneously. Find the probability mass function for number of heads occurred

15. A random variable X has the following probability mass function.

x	1	2	3	4	5
f(x)	k^2	$2k^2$	$3k^2$	2k	3k

Find (i) the value of k

16. A random variable X has the following probability mass function.

x	1	2	3	4	5
f(x)	k^2	$2k^2$	$3k^2$	2k	3k

Find P(2≤ x < 5)

17. A random variable X has the following probability

x	1	2	3	4	5
f(x)	k^2	$2k^2$	$3k^2$	2k	3k

mass function.

Find   p(3<X)

18. The probability density function of X is given by
$f(x) = \begin{cases} ke^{-\frac{x}{3}} & for x > 0 \\ 0 & for x \leq 0 \end{cases}$ Find (i) the value of k

19. Compute P(X = k) for the binomial distribution, B(n ,p) where n = 6 , p = $\frac{1}{3}$, k = 3

3 MARKS : ANSWERS ANY 8 Q   8 X 3 = 24

20. Two fair coins are tossed simultaneously (equivalent to a fair coin is tossed twice). Find the probability mass function for number of heads occurred.

21. Suppose that f(x) given below represents a probability mass function,

x	1	2	3	4	5	6
f(x)	c^2	$2c^2$	$3c^2$	$4c^2$	c	2c

Find (i) the value of c (ii) Mean and variance.

22. Find the mean and variance of a random variable X , whose probability density function is
$f(x) = \begin{cases} \lambda e^{-\lambda x} & for x \geq 0 \\ 0 & otherwise \end{cases}$

23. Two balls are chosen randomly from an urn containing 6 red and 8 black balls. Suppose that we win ₹15 for each red ball selected and we lose ₹10 for each black ball selected. If X denotes the winning amount, find the values of X and number of points in its inverse images.

24. Suppose a discrete random variable can only take the values 0, 1, and 2. The probability mass function is defined by $f(x) = \begin{cases} \frac{x^2+1}{k} & for x = 0,1,2 \\ 0 & otherwise \end{cases}$
Find (i) the value of k (ii) cumulative distribution function
(iii) P(X≥ 1).

25. The probability density function of X is given by
$f(x) = \begin{cases} kxe^{-2x} & for x > 0 \\ 0 & for x \leq 0 \end{cases}$. Find the value of k .

26. If μ and σ^2 ⋯are the mean and variance of the discrete random variable X , and E(X+3) = 10 and $E(X + 3)^2 = 116$,find μ and σ^2 .

27. The probability that Mr.Q hits a target at any trial is $\frac{1}{4}$. Suppose he tries at the target 10 times. Find the probability that he hits the target (i) exactly 4 times (ii) at least one time.

28. If X : B(n ,p) such that 4 P(X=4) = P(X=2) and n = 6 . Find the distribution, mean and standard deviation of X.

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Std: 12   **MATHEMATICS**   TIME: 1.50HRS

CHAPTER – 11   TEST -2   MARKS: 50

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5 MARKS: ANSWERS ANY 10 Q 10 X 5 =50

1. A six sided die is marked '1' on one face, '2' on two of its faces,and '3' on remaining three faces. The die is rolled twice. If X denotes the total score in two throws. (i) Find the probability mass function.(ii) Find the cumulative distribution function (iii) Find $P(3 \leq X < 6$ (iv) Find $P(X \geq 4)$.

2. A random variable X has the following probability mass function.

X	1	2	3	4	5	6
f(x)	k	2k	6k	5k	6k	10k

Find (i) $P(2 < X < 6)$ (ii) $P(2 \leq X < 5)$(iii) $P(X \leq 4)$ (iv) $P(3 < X)$

3. A random variable X has the following

X	1	2	3	4	5
f(x)	k^2	$2k^2$	$3k^2$	2k	3k

probability mass function.
Find (i) the value of k (ii) $P(2 \leq X < 5)$
(iii) $P(3 < X)$

4. The cumulative distribution function of a discrete random variable is given by

$$F(x) = \begin{cases} 0 & \text{for } -\infty < x < 0 \\ \frac{1}{2} & \text{for } 0 \leq x < 1 \\ \frac{3}{5} & \text{for } 1 \leq x < 2 \\ \frac{4}{5} & \text{for } 2 \leq x < 3 \\ \frac{9}{10} & \text{for } 3 \leq x < 4 \\ 1 & \text{for } 4 \leq x < \infty \end{cases}$$

Find (i) the probability mass function
(ii) $P(X < 3)$ and (iii) $P(X \geq 2)$

5. If X is the random variable with probability density function f (x) given

$$by, f(x) = \begin{cases} x - 1, & 1 \leq x < 2 \\ -x + 3, & 2 \leq x < 3 \\ 0 & \text{Otherwise} \end{cases}$$

find (i) the distribution function F(x)
(ii) $P(1.5 \leq X \leq 2.5)$

6. The probability density function of random variable X is given by $f(x) = \begin{cases} k & 1 \leq x \leq 5 \\ 0 & \text{Otherwise} \end{cases}$
Find (i) Distribution function (ii) $P(X < 3)$
(iii) $P(2 < X < 4)$ (iv) $P(3 \leq X)$

7. Let X be a random variable denoting the life time of an electrical equipment having probability density function
$f(x) = \begin{cases} ke^{-2x} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$ Find (i) the value of k
(ii) Distribution function (iii) $P(X < 2)$
(iv) calculate the probability that X is at least for four unit of time (v) $P(X = 3)$.

8. The probability density function of X is given by $f(x) = \begin{cases} ke^{\frac{-x}{3}} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$ Find (i) the value of k(ii) the distribution function
(iii) $P(X < 3)$(iv) $P(5 \leq X)$ (v) $P(X \leq 4)$.

9. Suppose that f (x) given below represents a probability mass function,

X	1	2	3	4	5	6
f(x)	c^2	$2c^2$	$3c^2$	$4c^2$	c	2c

Find (i) the value of c (ii) Mean and variance.

10. Two balls are chosen randomly from an urn containing 8 white and 4 black balls. Suppose that we win Rs 20 for each black ball selected and we lose Rs10 for each white ball selected. Find the expected winning amount and variance.

11. A multiple choice examination has ten questions, each question has four distractors with exactly one correct answer. Suppose a student answers by guessing and if X denotes the number of correct answers, find (i) binomial distribution (ii) probability that the student will get seven correct answers(iii) the probability of getting at least one correct answer.

12. The mean and variance of a binomial variate X are respectively 2 and 1.5.
Find (i) $P(X = 0)$ (ii) $P(X =1)$ (iii) $P(X \geq 1)$

13. On the average, 20% of the products manufactured by ABC Company are found to be defective. If we select 6 of these products at random and X denote the number of defective products find the probability that (i) two products are defective (ii) at most one product is defective (iii) at least two products are defective.

14. If the probability that a fluorescent light has a useful life of at least 600 hours is 0.9, find the probabilities that among 12 such lights
(i) exactly 10 will have a useful life of at least 600 hours;
(ii) at least 11 will have a useful life of at least 600 hours;
(iii) at least 2 will not have a useful life of at least 600 hours.

15. The mean and standard deviation of a binomial variate X are respectively 6 and 2.Find (i) the probability mass function (ii) $P(X = 3)$
(iii) $P(X \geq 2)$.