UNIT – I PROBABILITY AND RANDOM VARIABLES

PART – A

1.A random variable 'X' has the following probability function:

x	-2	-1	0	1
P(x)	0.4	K	0.2	0.3

Find K and cumulative distribution function of 'X'.

2.A random variable 'X' has the following probability function:

x	0	1	2
P(x)	1/4	2/4	1/4

Find distribution function of 'X' and Find third moment of 'X'.

3. A continuous random variable 'X' has a pdf $f(x) = kx, 0 \le x \le 1$. Find K and $P(X > 0.5)$.

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

$$F(x) = \begin{cases} 0 & , & x < 0 \\ kx & , & 0 \le x < 1 \\ 1 & , & x \ge 1 \end{cases}$$. Find value of ' k '.

5.The mean and variance of a Binomial variate are 8 and 6. Find $P(X \ge 2)$.

6.Write the limiting case of Poisson distribution.

7.A normal distribution has mean $\mu = 20$ and S.D. $\sigma = 10$. Find $P(15 \le X \le 40)$.

PART – B

1. A random variable 'X' has the following probability function:

X	0	1	2	3	4	5	6	7	8
Y	a	3a	5a	7a	9a	11a	13a	15a	17a

(i) Find 'a'

(ii) Distribution function of 'X'

(iii) Mean and Variance of 'X'

(iv) Find the smallest value of x if $P(X \le x) > \dfrac{1}{2}$

(v) $P\left(\dfrac{\frac{1}{2} < x < \frac{5}{2}}{x > 1} \right)$

UNIT – I PROBABILITY AND RANDOM VARIABLES

2. A random variable 'X' has the following probability function:

x	0	1	2	3	4	5	6	7
P(x)	0	k	2k	2k	3k	k²	2k²	7k² +k

(i) Find 'k'

(ii) Distribution function of 'X'

(iii) Mean and Variance of 'X'

(iv) Find the smallest value of x if $P(X \le x) > \dfrac{1}{2}$

(v) $P\left(\dfrac{\frac{1}{2} < x < \frac{5}{2}}{x > 1}\right)$

3. The density function of a random variable 'X' is given by $f(x) = kx(2-x), 0 \le x \le 2$. Find K and the variance of 'X'.

4. The density function of a random variable 'X' is given by $f(x) = c(x-x^2), 0 < x < 1$. Find 'c' and the variance of 'X'.

5. The cumulative distribution function of a random variable 'X' is given by

$$F(x) = \begin{cases} 0 & , & x < 1 \\ k(x-1)^4 & , & 1 \le x \le 3 \\ 1 & , & x > 3 \end{cases}$$

Find value of k and P(X< 2).

6. Derive Moment generating function, Mean and Variance of Binomial distribution.

7. In a large consignment of electric bulbs 10% are defective. A random sample of 20 is taken for inspection. Find the probability that

   (i)   All are good bulbs

   (ii)   Atmost there are 3 defective bulbs

   (iii)   Atleast there are 3 defective bulbs.

8. Derive Moment generating function, Mean and Variance of Poisson distribution.

UNIT – I PROBABILITY AND RANDOM VARIABLES

9. A car hire firm has two cars which it hires out day by day. The number of demands for a car on each day is distributed as Poisson variate with mean 1.5. Calculate the proportion of days on which (i) Neither car is used (ii) some demand is refused.

10. State and prove Memory less property of Exponential distribution.

11. The time in hours required to repair a machine is exponentially distributed with parameter $\lambda = 1/2$, what is the probability that the required time (i) exceeds 2 hours (ii) less than 5 hours.

12. In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hours and S.D. of 60 hours. Estimate the number of bulbs likely to burn for (i) more than 2150 hours, (ii) less than 1950 hours.