PROBABILITY DISTRIBUTION
Section – A (Question – Answers)

S.No	Questions	Answer
1.	If $f(x)=\begin{cases} kx^2, 0<x<3 \\ 0, elsewhere \end{cases}$ is a probability density function then the value of k is	$\frac{1}{9}$
2.	If $f(x)=\frac{A}{\pi}\frac{1}{16+x^2}$, $-\infty<x<\infty$ is a p.d.f of a continuous random variable X, then the value of A is	4
3.	A Random variable X has the following probability distribution X: 0, 1, 2, 3, 4, 5 P(X=x): 1/4, 2a, 3a, 4a, 5a, 1/4 Then $P(1\le x\le 4)$ is	$\frac{1}{2}$
4.	A random variable X has the following probability mass function as follows: X: -2, 3, 1 P(X=x): $\frac{\lambda}{6}$, $\frac{\lambda}{4}$, $\frac{\lambda}{12}$ Then the value of λ	2
5.	Let X is a discrete random variable which takes the values of 0, 1, 2 and P(X = 0) = $\frac{144}{169}$, P(X =1) = $\frac{1}{169}$, then the value of P(X = 2) is	$\frac{24}{169}$
6.	A random variable X has the following p.d.f X: 0, 1, 2, 3, 4, 5, 6, 7 P(X=x): 0, k, 2k, 2k, 3k, K^2, $2K^2$, $7K^2+k$ The value of k is	$\frac{1}{10}$
7.	Given E(X + C) = 8 and E(X - C) = 12 , then the value of C is	-2
8.	X is a random variable taking the values 3, 4,and 12 with probabilities $\frac{1}{3}, \frac{1}{4}$ and $\frac{5}{12}$. Then E(X) is	7
9.	Variance of the random variable X is 4. Its mean is 2. Then $E(X^2)$ is	8
10.	$\mu_2 = 20$, $\mu_2' = 276$ for a discrete random variable X. Then the mean of the random variable X is	16
11.	Var (4X + 3) is	16 Var (X)
12.	In 5 throws of a die, getting 1 or 2 is a success. The mean number of successes is	$\frac{5}{3}$
13.	The mean of a Binomial Distribution is 5 and its Standard Deviation is 2. The value of n and p are	$(25, \frac{1}{5})$
14.	If the mean and standard deviation of a Binomial Distribution are 12 and 2 respectively. Then the value of its parameters p is	$\frac{2}{3}$
15.	In 16 throws of a die getting an even number is considered a success. Then the variance of the successes is	4
16.	A box contains 6 red and 4 white balls. If 3 balls are drawn at random , the probability of getting 2 white balls without replacement is	$\frac{3}{10}$

17.	If 2 cards are drawn from a well shuffled pack of 52 cards, the probability that the are of the same color without replacement is	$\frac{25}{51}$
18.	In a Poisson Distribution P(X=0) = k , then the variance is	$\log \frac{1}{k}$
19.	If a random variable X follows Poisson Distribution such that $E(X^2) = 30$ then the variance of the distribution is	5
20.	The distribution function F(X) of a random variable X is	A non-decreasing function
21.	For a Poisson distribution with parameter λ = 0.25 the value of the 2nd moments about the origin is	0.3125
22.	In a Poisson Distribution if P(X = 2) = P(X = 3) then the value of its parameter λ is	3
23.	If f(x) is a p.d.f of a normal distribution with mean μ then $\int_{-\infty}^{\infty} f(x)dx$ is	1
24	The random variable X follows normal distribution $f(x) = ce^{\frac{-\frac{1}{2}(x-100)^2}{25}}$. Then the value of C is	$\frac{1}{5\sqrt{2\pi}}$
25.	If f(x) is a p.d.f of a normal variate X and $X \sim N(\mu, \sigma^2)$ then $\int_{-\infty}^{\mu} f(x)dx$ is	0.5
26.	The marks secured by 400 students in a Mathematics test were normally distributed with mean 65. If 120 students got more marks above 85, then number of students securing marks between 45 and 65 is	80

Section – B

1. A random variable has the following Probability density function

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

(i) Find the value of 'a'
(ii) Find P(X < 3) and (iii) P(3 < X < 7)

2. For the following distribution find mean and variance $f(x) = \begin{cases} \alpha e^{-\alpha x}, x > 0 \\ 0 \quad , elsewhere \end{cases}$

3. For the following distribution find mean and variance $f(x) = \begin{cases} \frac{1}{24}, -12 < x < 12 \\ 0 \quad , elsewhere \end{cases}$

4. Four coins are tossed simultaneously. What is the probability of getting (a) exactly 2 heads (b) atleast two heads (c) at most two heads.

5. The life of army shoes is normally distributed with mean 8 months and standard deviation 2 months. If 500 pairs are issued, how many pairs would be expected to need replacement within 12 months.
$[P(0 < z < 2) = 0.4772]$

6. Marks in an aptitude test given to 800 students of a school was found to be normally distributed. 10% of

the students scored below 40 marks and and 10% of the students scored above 90 marks. Find the number of students scored between 40 and 90.

Section – C

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

X	0	1	2	3	4	5	6
P(X = x)	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

(i) Find k.

(ii) Evaluate P(X < 4), P(X $\geq$ 5) and P (3 < X $\leq$ 6)

(iii) What is the smallest value of x for which $P(X \leq x) > \frac{1}{2}$

2.A urn contains 4 white and 3 red balls. Find the probability distribution of the number of red balls in three draws when a ball is drawn at random with replacement. Also find its mean and variance.

3.The probability density function of a random variable x is $f(x) = \begin{cases} kx^{\alpha-1}e^{-\beta x} & ,x,\alpha,\beta > 0 \\ 0 \end{cases}$.

Find (i) k (ii) P (X > 10)

4.The total life time (in year) of 5 years old dog of a certain breed is a random variable whose distribution Function is given by $f(x) = \begin{cases} 0 & , for\ x \leq 5 \\ 1 - \frac{25}{x^2}, & for\ x > 5 \end{cases}$. Find the probability that such a five year old dog will live

(i) beyond 10 years (ii) less than 8 years (iii) any where between 12 to 15 years.

5. The number of accidents in a year involving taxi drivers in a city follows a Poisson distribution with Mean equal to 3. out of 1000 taxi drivers find approximately the number of drivers with

(i) no accident in a year (ii) more than 3 accidents in a year $[e^{-3} = 0.0498]$.

6. If the number of incoming buses per minute at a bus terminus is a random variable having a poison distribution with $\lambda = 0.9$. Find the probability that there will be

(i) Exactly 9 incoming buses during a period of 5 minutes

(ii) Fewer than 10 incoming buses daring a period of 8 minutes

(iii) At least 14 incoming buses during a period of 11 minutes.

7. The mean weight of 500 male students in a certain college in 151 pounds and the standard deviation is 15 pounds. Assuming the weights are normally distributed, find how many students weight (i) between 120 and 155 pounds (ii) more than 185 pounds.

Table value	Z	2.067	0.2667	2.2667
	Area	0.4803	0.1026	0.4881

8. Find $c, \mu\ and\ \sigma^2$ of the normal distribution whose probability function is given by

$f(x)=ce^{-x^2+3x}, -\infty < X < \infty.$

9. Find $k, \mu \text{ and } \sigma^2$ of the normal distribution whose probability function is given by $f(x)=ke^{-2x^2+4x}, -\infty < X < \infty.$