II Year B.Tech, Semester-II   PROBABILITY & STATISTICS
Code: 9HC15

UNIT-I: Random Variables and Probability Distributions:
Random variables – Discrete and Continuous, Probability Mass and Density functions, Expectation and Variance. Probability Distributions: Binomial, Poisson and Normal Distributions.

<u>Assignment Questions</u>

1. Find the expected value and variance of the following probability distribution.

X:	-10	-20	30	75	80
P(x) :	1/5	3/20	½	1/10	1/20

2. A random variable X has the following probability function (i) find the value of K
(ii) Mean (iii) Variance

X	0	1	2	3	4	5	6	7
P(X)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

[Answers: (i) K=1/10=0.1, (ii) mean=3.66 (iii) variance=3.4044]

3. A continuous random variable has the probability density function

$$f(x) = \begin{cases} k\,x\,e^{-\lambda x} & for\ x \geq 0, \lambda > 0 \\ 0 & otherwise \end{cases}$$. Determine (i) K (ii) Mean (iii) Variance.

4. The trouble shooting capacity of an IC chip in a circuit is a random variable X whose cumulative

distribution function is given by $$F(x) = \begin{cases} 0, & for\ x \leq 3 \\ 1 - \frac{9}{x^2}, & for\ x > 3 \end{cases}$$ where x denotes the number of years. Find

the probability that the IC chip will work properly
(i) Less than 8 years   (ii) Beyond 8 years   (iii) Between 5 to 7 years
    [Answers: (i) 0.8594 (ii)$^{0.1406}$ (iii) 0.1763 (iv) 0.64]

5. If X is a Poisson variate such that 3P(X = 4) = ½ P(X = 2) + P (X = 0), find
   (a) The mean of X   (b) P (X ≤ 2)

6. If X is a normal variable with mean 30 and standard deviation 5. Find the probability that (i) 26≤X≤40 and (ii) X≥45.

7. In a certain examination 10% of the students appeared for an exam and got less than 30 marks and 97% of students got less than 62. Assuming the distribution to be normal then find Mean (μ), Standard deviation (σ).

8. The marks obtained in Mathematics by 1000 students are normally distributed with mean 78% and standard deviation 11%. Determine how many students got marks above 90%?