VIT | Vidyalankar Institute of Technology
Accredited A+ by NAAC

# EM-III- Tutorial-6

**Dr. Uday Kashid**

## Module-6- Probability and Statistics

1. A factory production line is manufacturing bolts using three machines, A, B and C. Of the total output, machine A is responsible for 25%, machine B for 35% and machine C for the rest. It is known from previous experience with the machines that 5% of the output from machine A is defective, 4% from machine B and 2% from machine C. A bolt is chosen at random from the production line then i) what is the probability selected bolt found to be defective. ii) What is the probability that is bolt is defective then it came from Machine A?

2. A new constructed flyover is likely to be collapsed. The chance that the design of flyover is faulty is 0.5 and the chance that the flyover will collapse if the design is faulty is 0.95, otherwise it is 0.30. If flyover collapsed, then what is the probability that it collapsed because of faulty design? (Ans- 0.76)

3. A random variable X has following PDF. Then find i) $k$ ii) $V(X)$ iii) $P(X < 5)$

| $X$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| $P(X = x)$ | $k$ | $2k$ | $3k$ | $k^2$ | $k^2 + k$ | $2k^2$ | $4k^2$ |

4. A random variable X has following PDF. Then find i) $k$ ii) $V(X)$ iii) $P(X \geq 3)$

| $X$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| $P(X = x)$ | 0 | $k$ | $2k$ | $2k$ | $3k$ | $k^2$ | $2k^2$ | $7k^2 + k$ |

5. The daily consumption of electric power( in million kwh) in Diwali period is a random variable with PDF $f(X = x) = \begin{cases} kx(2 - x^2), & 0 \leq x \leq 2, \ k > 0 \\ 0 & , \quad otherwise \end{cases}$
Then find i) $k$ ii) $V(X)$ iii) $P(1 \leq X \leq 2)$

6. A random variable X has following PDF. Then find moment generating function and hence find mean and variance by MGF method.

| $X$ | 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| $P(X = x)$ | $1/6$ | $1/3$ | $1/3$ | $1/6$ |

7. A random variable X has following PDF $P(X = x) = \frac{1}{2^x}$ , $x = 1,2,3 \ldots \ldots \ldots$ Then find moment generating function and hence find mean and variance by MGF method.