Assignment-5

EE22BTECH11012-A.Chhatrapati

Question 12.13.3.50) The probability distribution of a discrete random variable X is given as under:

X	1	2	4	2A	3A	5A
$\Pr(X)$	$\frac{1}{2}$	$\frac{1}{5}$	$\frac{3}{25}$	$\frac{1}{10}$	$\frac{1}{25}$	$\frac{1}{25}$

Calculate:

(i) The value of A if E(X) = 2.94

(ii) Variance of X.

Solution:

(i) Since,

$$E(X) = \sum k p_X(k) \tag{1}$$

$$2.94 = \frac{1}{2} + \frac{2}{5} + \frac{12}{25} + \frac{2A}{10} + \frac{3A}{25} + \frac{5A}{25} \tag{2}$$

$$\implies A = \frac{78}{26} = 3 \tag{3}$$

(ii) We know that,

$$Var(X) = E\left(k^2\right) - [E(X)]^2 \tag{4}$$

$$= \sum k^2 p_X(k) - [E(X)]^2 \tag{5}$$

$$= \frac{1}{2} + \frac{4}{5} + \frac{48}{25} + \frac{4A^2}{10} + \frac{9A^2}{25} + \frac{25A^2}{25} - [2.94]^2 \tag{6}$$

$$= \frac{161 + 88A^2}{50} - [2.94]^2 \tag{7}$$

$$= \frac{953}{50} - [2.94]^2 \tag{8}$$

$$= 10.4164 \tag{9}$$