

(6)

Question → The first three moments of a distribution, about the value '2' of the Variable are 1, 16 and -40.

Show that the mean is 3, Variance is 15 and  $\mu_3 = -86$ . also find first three moments about the origin.

Sol. we have  $A = 2$ ,  $\mu_1' = 1$ ,  $\mu_2' = 16$  and  $\mu_3' = -40$

We know that  $\mu_1' = \bar{x} - A \Rightarrow \bar{x} = \mu_1' + A$

$$\bar{x} = 1 + 2 = 3$$

$$\text{Variance} = \mu_2 = \mu_2' - \mu_1'^2 = 16 - (1)^2 = 15$$

$$\begin{aligned} \mu_3 &= \mu_3' - 3\mu_2'\mu_1' + 2\mu_1'^3 = -40 - 3(16)(1) + 2(1)^3 \\ &= -40 - 48 + 2 = \boxed{-86} \end{aligned}$$

Question → Now First three moments about the origin.  $\mu_3 = -86$

We have  $A = 2$ ,  $\mu_1' = 1$ ,  $\mu_2' = 16$   
 $\mu_3' = -40$

$$V_1 = \bar{x} = A + \mu_1' = 2 + 1 = 3 \quad \boxed{V_1 = 3}$$

$$V_2 = \mu_2 + \bar{x}^2 = 15 + 3^2 = 24$$

$$\boxed{V_2 = 24}$$

$$\begin{aligned} V_3 &= \mu_3 + 3\mu_2\bar{x} + \bar{x}^3 = -86 + 3(15)(3) + 3^3 \\ &= -86 + 135 + 9 = 76 \end{aligned}$$

$$\boxed{V_3 = 76}$$