

**Question 2:** The coefficients of three consecutive terms of  $(1+x)^{n+5}$  are in the ratio 5: 10: 14. Then  $n =$

**Solution:**

$$T_{r+1} = {}^{n+5}C_r x^r$$

$$\text{Given } {}^{n+5}C_{r-1} : {}^{n+5}C_r : {}^{n+5}C_{r+1} = 5: 10: 14$$

$${}^{n+5}C_r / {}^{n+5}C_{r-1} = 10/5$$

$$\Rightarrow (n+5-r+1)/r = 2$$

$$\Rightarrow (n+6-r)/r = 2$$

$$\Rightarrow n+6-r = 2r$$

$$n = 3r-6 \text{ ..(i)}$$

$${}^{n+5}C_{r+1} / {}^{n+5}C_r = 14/10$$

$$\Rightarrow ((n+5)-(r+1)+1)/(r+1) = 7/5$$

$$\Rightarrow (n+5-r)/(r+1) = 7/5$$

$$\Rightarrow 5n+25-5r = 7r+7$$

$$\Rightarrow 5n - 12r + 18 = 0 \text{ ..(ii)}$$

Put (i) in (ii)

$$5(3r-6) - 12r + 18 = 0$$

$$\Rightarrow 15r - 30 - 12r + 18 = 0$$

$$\Rightarrow 3r - 12 = 0$$

$$\Rightarrow r = 4$$

$$\text{So } n = 3r - 6$$

$$= 12 - 6$$

$$= 6$$

Hence the value of  $n$  is 6.