Exercise 11C

Question 21:
Here a = 64, d = 60 - 64 = - 4
Let the sum of n terms be 544, then

$$S_n = 544 \Rightarrow \frac{n}{2}\left[2a+(n-1)d\right] = 544$$

$$\Rightarrow \frac{n}{2}\left[2\times 64+(n-1)(-4)\right] = 544$$

$$\Rightarrow \frac{n}{2}\left[132-4n\right] = 544$$

$$\Rightarrow n(66-2n) = 544 \Rightarrow 2n^2 - 66n + 544 = 0$$

$$\Rightarrow n^2 - 33n + 272 = 0$$

$$\Rightarrow n^2 - 17n - 16n + 272 = 0$$

$$\Rightarrow n(n-17) - 16(n-17) = 0$$

$$\Rightarrow (n-17)(n-16) = 0$$

$$\Rightarrow n = 17 \text{ or } n = 16$$

Sum of first 16 terms = sum of first 17 terms = 544
This means that 17^{th} term is zero.

Question 22:
Here a = 18, d = 15 - 18 = -3
Let the sum if n terms be 45, then

$$S_n = 45$$

$$\Rightarrow \frac{n}{2}\left[2a+(n-1)d\right] = 45$$

$$\Rightarrow \frac{n}{2}\left[2\times 18+(n-1)(-3)\right] = 45$$

$$\Rightarrow \frac{n}{2}\left[36-3n+3\right] = 45$$

$$\Rightarrow n(39-3n) = 90 \Rightarrow n(13-n) = 30$$

$$\Rightarrow n^2 - 13n + 30 = 0 \quad \Rightarrow n^2 - 10n - 3n + 30 = 0$$

$$\Rightarrow n(n-10) - 3(n-10) = 0$$

$$\Rightarrow (n-10)(n-3) = 0$$

$$\Rightarrow n = 10 \text{ or } n = 3$$

Sum of first three terms = sum of first 10 terms = 45

This means the sum of all terms from 4^{th} to 10^{th} is zero.

Question 23:
nth term = (4n + 1) ----(1)
putting n = 1 in (1), we get

$$T_1 = (4 \times 1 + 1) = 5$$

$\therefore$ first term = 5

putting n = 2 in (1), we get $T_2 = (4 \times 2 + 1)$

$$T_2 = 9$$

$$\therefore \quad d = T_2 - T_1 \Rightarrow 9 - 5 = 4$$

$$a = 5,\ d = 4$$

$$\text{Sum of first 15 terms} = \frac{n}{2}[2a + (n-1)d] \text{ where } n = 15$$

$$= \frac{15}{2}[2 \times 5 + (15-1) \times 4]$$

$$= \frac{15}{2}[10 + 14 \times 4] \Rightarrow 15 \times 33 = 495$$

$$\text{Sum of n terms} = \frac{n}{2}[2a + (n-1)d] \text{ where } a = 5, d = 4$$

$$= \frac{n}{2}[2 \times 5 + (n-1) \times 4]$$

$$= \frac{n}{2}[10 + 4n - 4] = \frac{n}{2}(6 + 4n)$$

$$= n(3 + 2n) = 2n^2 + 3n$$

Hence the sum of 15 and n terms of AP are 495, ($2n^2$ + 3n) respectively.

Question 24:

$$S_n = (2n^2 + 5n) \quad (\text{given})$$

$$\therefore S_{n-1} = \left[2(n-1)^2 + 5(n-1)\right] = (2n^2 + n - 3)$$

the nth term is given by

$$T_n = (S_n - S_{n-1})$$

$$= (2n^2 + 5n) - (2n^2 + n - 3)$$

$$T_n = 4n + 3$$

$$\therefore n^{th} \text{ term} = 4n + 3$$

Question 25:

$$S_n = \left(3n^2 - n\right) \text{ (given)}$$

$$\therefore S_{n-1} = \left[3(n-1)^2 - (n-1)\right]$$

$$= [3n^2 + 3 - 6n - n + 1]$$

$$= \left[3n^2 - 7n + 4\right]$$

(i) The nth term is given by

$$T_n = (S_n - S_{n-1})$$

$$= \left[\left(3n^2 - n\right) - \left(3n^2 - 7n + 4\right)\right]$$

$$= 6n - 4$$

$$\therefore n^{th} \text{ term} = 6n - 4$$

(ii) Putting n = 1 in (1) , we get

$T_1 = (6 \times 1 - 4) = 2$

∴ First term = 2

(iii) Putting n = 2 in (1), we get $T_2 = (6 \times 2 - 4) = 8$

∴ $d = (T_2 - T_1) = 8 - 2 = 6$

*********** END **********