

# 10.05.2

EE23BTECH11053-R.Rahul\*

## QUESTION:

1. In the following APs, find the missing terms in the boxes:

(i) 2,  $\square$ , 26

(ii)  $\square$ , 13,  $\square$ , 3

(iii) 5,  $\square$ ,  $\square$ ,  $9\frac{1}{2}$

(iv) -4,  $\square$ ,  $\square$ ,  $\square$ ,  $\square$ , 6

(v)  $\square$ , 38,  $\square$ ,  $\square$ ,  $\square$ , -22

## Solution:

$n$	$x_1(n)$	$x_2(n)$	$x_3(n)$	$x_4(n)$	$x_5(n)$
0	2	18	5	-4	53
1	14	13	$6\frac{1}{2}$	-2	38
2	26	8	8	0	23
3	38	3	$9\frac{1}{2}$	2	8
4	50	-2	11	4	-7
5	62	-7	$12\frac{1}{2}$	6	-22

TABLE I

FIRST THREE TERMS OF AP SERIES

(i)  $x(0)=2$ ,  $x(2)=26$ ,  $x(2)=x(0) + 2d$

$$26 = 2 + 2d \quad (1)$$

$$24 = 2d \quad (2)$$

$$\therefore d = 12 \quad (3)$$

$$x(1) = 14 \quad (4)$$

(ii)  $x(1) = 13$ ,  $x(3) = 3$ ,  $x(1) = x(0) + d$ ,  $x(4) = x(0) + 3d$

$$3 - 13 = 2d \quad (5)$$

$$-10 = 2d \quad (6)$$

$$\therefore d = -5 \quad (7)$$

$$x(1) = 18 \quad (8)$$

$$x(2) = 8 \quad (9)$$

(iii)  $x(0)=5$ ,  $x(3)=9\frac{1}{2}$ ,  $x(3) = x(0) + 3d$

$$9\frac{1}{2} = 5 + 3d \quad (10)$$

$$3d = 4\frac{1}{2} \quad (11)$$

$$\therefore d = 1\frac{1}{2} \quad (12)$$

$$x(1) = 6\frac{1}{2} \quad (13)$$

$$x(2) = 8 \quad (14)$$

(iv)  $x(0)=-4$ ,  $x(5)=6$ ,  $x(5)=x(0)+5d$

$$6 = -4 + 5d \quad (15)$$

$$10 = 5d \quad (16)$$

$$\therefore d = 2 \quad (17)$$

$$x(1) = -2 \quad (18)$$

$$x(2) = 0 \quad (19)$$

$$x(3) = 2 \quad (20)$$

$$x(4) = 4 \quad (21)$$

(v)  $x(1)=38$ ,  $x(5)=-22$

$$-22 - 38 = 4d \quad (22)$$

$$-60 = 4d \quad (23)$$

$$\therefore d = -15 \quad (24)$$

$$x(0) = 53 \quad (25)$$

$$x(2) = 23 \quad (26)$$

$$x(3) = 8 \quad (27)$$

$$x(4) = -7 \quad (28)$$

$$(29)$$

1) The Z-transform of  $x(n) = 2 + 12n$  is given by:

$$X(z) = \frac{2 + 10z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (30)$$

(31)

2) The Z-transform of  $x(n) = 18 - 5n$  is given by:

$$X(z) = \frac{18 - 23z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (32)$$

(33)

3) Z-transform of  $x(n) = 5 + \frac{3}{2}n$  is given by:

$$X(z) = \frac{5 - \frac{7}{2}z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (34)$$

(35)

4) Z-transform of  $x(n) = -4 + 2n$  is given by:

$$X(z) = \frac{-4 + 6z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (36)$$

(37)

5) Z-transform of  $x(n) = 53 - 15n$  is given by:

$$X(z) = \frac{53 - 68z^{-1}}{(1 - z^{-1})^2} \quad |z| > 1 \quad (38)$$

(39)

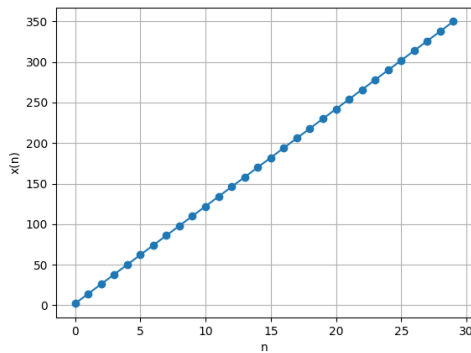


Fig. 1.

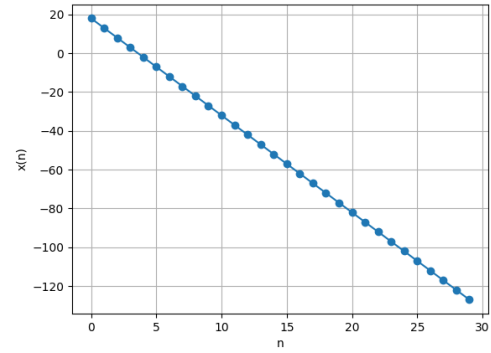


Fig. 2.

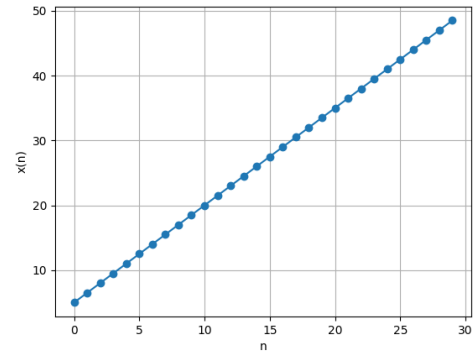


Fig. 3.

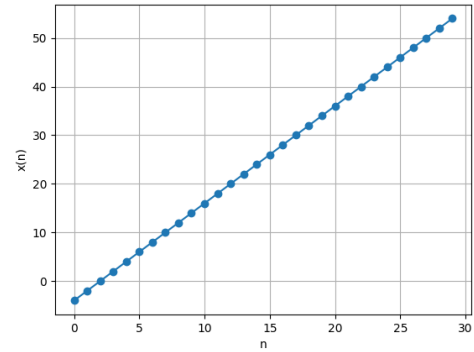


Fig. 4.

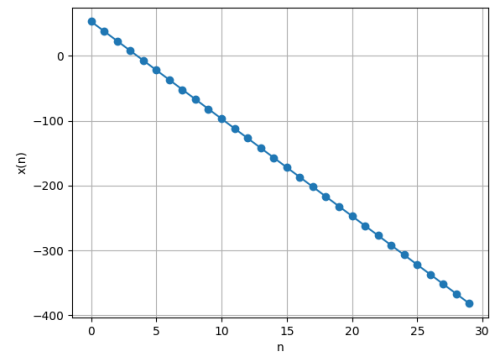


Fig. 5.