# Quadrant II - Notes

## Paper Code : CAC101

Module Name: Introduction to Progressions, Definition of Arithmetic

Progression (A.P.), n<sup>th</sup> term of an A.P. and related examples

#### **Progression:**

It is a sequence of numbers in which the terms of the sequence follow a certain pattern.

#### **Examples:**

i) 3, 7, 11, 15, ... ii) 1, 3, 9, 27, ...

## n<sup>th</sup> term of a sequence:

 $\mathbf{n^{th}}$  term of a sequence is denoted by  $\mathbf{t_n}$ . Example:  $\mathbf{t_1}$  - First term  $\mathbf{t_2}$  - Second term  $\mathbf{t_3}$  - Third term and so on.

#### Arithmetic Progression (A.P.):

If the difference between any two consecutive terms of the sequence remains constant, then the terms of the sequence are said to be in **Arithmetic Progression (A.P.)**.

#### **Examples:**

9, 13, 17, 21, ...
 90, 80, 70, 60, ...

#### Formula for n<sup>th</sup> term of an Arithmetic Progression:

If 'a' is the first term of an Arithmetic Progression and 'd' is the common difference between any two consecutive terms of A.P., then the  $n^{th}$  term of an A.P. is given by  $t_n = a + (n-1) d$  for all  $n \ge 1$ 

where a is the first term and d=  $t_n - t_{n-1}$  for all  $n \ge 2$ .

For example:

 $t_1 = a$   $t_2 = a + (2-1) d = a+d$  $t_3 = a + (3-1) d = a+2d$  and so on.

### Problems based on n<sup>th</sup> term of an Arithmetic Progression:

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1) Find t_{21} for the following Arithmetic Progression:

16, 20, 24, 28, ...

Solution:

a = 16 and d = 20-16 = 4

t_{21} = a+(21-1) d

= a+20d

= 16 + 20 \times 4

= 16 + 80

= 96
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2) Which term of the A.P. 200, 196, 192, 188, ... is 124?

#### Solution:

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a = 200 \qquad d = 196 - 200 = -4

t_n = a + (n-1) d

\therefore 124 = 200 + (n-1) \times -4

\therefore 124 = 200 - 4n + 4

\therefore 124 = 204 - 4n

\therefore 4n = 204 - 124

\therefore n = 20
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Therefore 20<sup>th</sup> term of the given A.P. is 124.

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3) If for an A.P., t_{32} = 272 and t_9 = 88, then find t_4.

Solution:

t_{32} = 272

\therefore a + 31d = 272

t_9 = 88

\therefore a + 8d = 88

a + 31d = 272

a + 8d = 88

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23d = 184
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d = 8Substituting d=8 in a + 31d = 272 we get,  $a + 31 \times 8 = 272$  a + 248 = 272  $\begin{array}{ll} \therefore & a = 272 - 248 \\ \therefore & a = 24 \end{array}$ 

$$t_4 = a+3d$$
  
= 24 + 3× 8  
= 24 + 24  
∴  $t_4 = 48$ 

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