**B.A 2nd Semester, 2024**

**Multidisciplinary Course, FYUGP**

**Sub: Foundation of Mathematical Science-II**

**Topic: Arithmetic (A.P) & Geometric (G.P) series**

**………………………………………………………………………………………………………………………………………………**

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

A.P is a series of quantities, when the algebraic difference between any term and the proceeding one is constant. This algebraic difference is known as Common Difference (C.D). Thus the series-

1. 2, 4, 6, 8,……………..are in A.P

 Here Common Difference, d = 4-2= 2

**The nth term of an A.P series:**

**tn = a + (n-1) d,** where a = first term

 d = Common Difference

 n = Number of terms

**The Sum of first nth term of an A.P Series:**

**Sn =** $\frac{n}{2}$**{2a + (n-1) d}** where a = first term

 d = Common Difference

 n = Number of terms

Question: **Find the 20th term of the series 2, 6, 10, ……………**

Solution: Here the first term, a = 2

 Common Difference, d = 6-2 = 4

We have,

 tn = a + (n-1) d

 or t20 = 2 + (20-1) 4

 or t20 = 2 + 19X4

 0r t20 = 78

Therefore, the required 20th term is 78

Question: **Find the 13th term of the series 7, 10, 13, …………….**

Solution: Here the first term, a = 7

 Common Difference, d = 10-7 = 3

We have,

 tn  = a + (n-1) d

 or t13 = 7 + (13-1) 3

 or t13 = 7 + 12X3

 0r t20 = 43

Therefore, the required 13th term is 43

Question: **Find the sum of the series 2 + 6 + 10+ …………… upto 50th term**

Solution: Here the first term is, a = 2

 Common Difference , d = 6-2 = 4

Number of terms, n = 50

We have,

 Sn = $\frac{n}{2}${2a + (n-1) d}

 Or S50 = $\frac{50}{2}${ 2 X2 + (50-1) X 4}

 Or S50 = 25 ( 4 + 196)

 Or S50 = 25 X 200

 Or S50 = 5000

Therefore, the required sum of 50th term is = 5000

Question: **Find the sum of the series 1 + 3 + 5+ 7…………… upto 30th term**

Solution: Here the first term is, a = 1

 Common Difference , d = 3-1 = 2

Number of terms, n = 30

We have,

 Sn = $\frac{n}{2}${2a + (n-1) d}

 Or S30 = $\frac{30}{2}${ 2 X1 + (30-1) X 2}

 Or S30 = 15 ( 2 + 58)

 Or S30 = 15 X 60

 Or S30 = 900

Therefore, the required sum of 30th term is = 900

Question: A man borrows Rs. 1000 and agrees to repay with a total interest of Rs. 140 in 12 installments, each installment being less than the immediately preceding one by Rs. 10. What should be his first installment?

Solutions: Let the first instalment be = a

 The 2nd inslatment will be = a-10

 Therefore, Common Difference, d = a-10-a = -10

Number of instalments, n =12

We have,

 S = $\frac{n}{2}${2a + (n-1) d}

 Or (1000+ 140) = $\frac{12}{2}${ 2a + (12-1)X (-10)}

 Or 1140 = 6 (2a -110)

 Or 1140 = 12a -660

 Or 1140 + 660 = 12a

 Or 1800 = 12a

 Or a = $\frac{1800}{12}$

 Or a = 150

Therefore, the first instalment is= Rs. 150

Question: A man saved Rs. 16500 in 10 years. In each year after the first he saved Rs. 100 more than he did in the preceding year. How much did he save in the first year?

Solutions: Let the first instalment be = a

 The 2nd inslatment will be = a+ 100

 Therefore, Common Difference, d = a +100-a = 100

Number of instalments, n =10

We have,

 S = $\frac{n}{2}${2a + (n-1) d}

 Or 16500 = $\frac{10}{2}${ 2a + (10-1)X 100}

 Or 16500 = 5 (2a + 900)

 Or 16500 = 10a + 4500

 Or 16500 - 4500 = 10a

 Or 12000 = 10a

 Or a = $\frac{12000}{10}$

 Or a = 1200

Therefore, the first instalment is= Rs. 1200