ARITHMETIC PROGRESSIONS

ASSIGNMENT NO. 2

1. If the numbers a, b, c, d, e form an A.P., then find the value of
   $a - 4b + 6c - 4d + e$.

2. If $\dfrac{a^{n+1}+b^{n+1}}{a^n+b^n}$ is the A.M. between a and b, then find the value of n.

3. If S_n, the sum of first n terms of an A.P., is given by $S_n = 5n^2 + 3n$, then find its nth term.

4. If an A.P., the sum of first n terms is $\dfrac{3n^2}{2} + \dfrac{5n}{2}$, find its 25$^{\text{th}}$ term.

5. If the mth term of an A.P. is $\dfrac{1}{n}$ and the nth term is $\dfrac{1}{m}$, show that the sum of mn terms is $\dfrac{1}{2}(mn + 1)$.

6. The sum of $n, 2n, 3n$ terms of an A.P. are S_1, S_2, S_3 respectively, prove that $S_3 = 3(S_2 - S_1)$.

7. The sums of n terms of three arithmetical progressions are S_1, S_2 and S_3. The first term of each is unity and the common differences are 1, 2 and 3 respectively, prove that $S_1 + S_3 = 2S_2$.

8. If in an A.P., the sum of m terms is equal to n and the sum of n terms is equal to m, then prove that the sum of $(m + n)$ terms is $-(m + n)$.

9. If the sum of m terms of an A.P. is the same as the sum of its n terms, show that the sum of its $(m + n)$ terms is zero.

10. The sum of the first p, q, r terms of an A.P. are a, b, c respectively, show that
    $\dfrac{a}{p}(q - r) + \dfrac{b}{q}(r - p) + \dfrac{c}{r}(p - q) = 0$.