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EE23BTECH11052

ASSIGNMENT 1

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Question 11.9.2.10

If the sum of first p terms of an A.P. is equal to the sum of the first q terms, then find the sum of the first $(p+q)$ terms?

Solution:

The sum of first p terms of an arithmetic progression (A.P) is given by
Let a_1 be the first term which is a_0+d

$$s_p = \frac{q}{2}[2a_1 + (q-1)d]$$

$$s_p = \frac{q}{2}[2a_0 + (q+1)d]$$

If s_p=s_q,then:

$$\frac{p}{2}[2a_0 + (p+1)d] = \frac{q}{2}[2a_0 + (q+1)d]$$

simplifying the equation we get:

$$(p) * (2a_0 + pd + d) = (q) * (2a_0 + qd + d) \tag{1}$$

$$2a_0p + (p^2) * d + pd = 2a_0q + (q^2) * d + qd \tag{2}$$

$$2a_0(p-q) + (p-q)(p+q) * d + (p-q) * d = 0 \tag{3}$$

$$(p-q)[2a_0 + (p+q) * d + d] = 0 \tag{4}$$

since p and q are not equal.We can eliminate the term $(p-q)$

$$2a_0 + (p+q) * d + d = 0 \tag{5}$$

Sum of the first $p+q$

$$S_{p+q} = \frac{p+q}{2}[2a_0 + (p+q+1) * d]$$

As we have seen in the equation (5) $2a_0 + (p+q) * d + d = 0$ is 0. Therefore S_{p+q} is 0.