SEQUENCES AND SERIES

ARITHMETIC PROGRESSION

EXERCISE

Q.1 Which statement among the ones provided above is/are correct?

1. If (a_n) represents the nth term of an arithmetic progression (AP), then
$$a_n = \frac{a_{n+k}+a_{n-k}}{3}$$
2. In an arithmetic progression (AP), if the sum of m terms is equal to the sum of n terms, then the sum of (m + n) terms is always zero.
3. The sum to infinity of the series $\frac{1}{3}+\frac{1}{15}+\frac{1}{35}+\cdots$ is $\frac{1}{2}$.

(a) (1) and (2) (b) (2) and (3)

(b) (3) and (1) (d) All (1), (2) and (3)

Q.2 If x, y, z are in arithmetic progression (AP), then the terms $1\frac{1}{\sqrt{x}+\sqrt{y}}, \frac{1}{\sqrt{z}+\sqrt{x}}, \frac{1}{\sqrt{y}+\sqrt{z}}$ are also in

(a)AP (b) GP (c)HP (d)AP and HP

Q.3 If $1, \log_3\sqrt{(3^{1-x}+2)}, \log_3(4.3^x-1)$ are in AP, then x equals

(a)$\log_3 4$ (b)$1 - \log_3 4$

(c)$1-\log_4 3$ (d)$\log_4 3$

Q.4 If $a_1, a_2, \ldots, a_n$ are in AP with common difference d, then the sum of the series
Sin d $(\operatorname{cosec} a_1 \operatorname{cosec} a_2 + \operatorname{cosec} a_2 \operatorname{cosec} a_3 + \cdots + \operatorname{cosec} a_{n-1} \operatorname{cosec} a_n)$ is

(a) sec a_1 - sec a_n (b) cot a_1 - cot a_n

(c) tan a_1 –tan a_n (d) cosec a_1 =cosec a_n

Q.5 If (S_1), (S_2), and (S_3) represent the sums of the first (n_1), (n_2), and (n_3) terms, respectively, of an arithmetic progression (A.P.), then
$$\frac{S_1}{n_1}(n_2-n_3)+\frac{S_2}{n_2}(n_3-n_1)+\frac{S_3}{n_3}(n_1-n_2)=$$

(a)0 (b)1

(c) $1-\left(\frac{1}{10}\right)^{106}$ (d)None of these

Q.6 If $a_1, a_2, a_3, \ldots, a_{24}$ are in arithmetic progression and $a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$, then $a_1 + a_2 + a_3 + \cdots + a_{23} + a_{24}$ is equal to

(a)909 (b)75 (c)750 (d)900

Q.7 Let the sequence, $a_1, a_2, a_3, \ldots, a_{2n}$ form an AP, then $a_1^2 - a_2^2 + a_3^2 - \cdots + a_{2n-1}^2 - a_{2n}^2$ is equal to

(a) $\frac{n}{2n-1}(a_1^2 - a_{2n}^2)$ (b) $\frac{2n}{n-1}(a_{2n}^2 - a_1^2)$

(c) $\frac{n}{n+1}(a_1^2 + a_{2n}^2)$ (d)None of these

Q.8 How many terms of the A.P. $-6, -\frac{11}{2}, -5 \ldots$ are needed to give the sum -25?

(a) n=5 (b)n=20

(c)Both (a) and (b) (d)None of these

Q.9 In an A.P., if p^{th} term is $\frac{1}{q}$ and q^{th} term is $\frac{1}{p}$, the sum of first pq terms is

(a) $\frac{1}{2}(pq + 1)$ (b) $\frac{1}{3}(pq + 1)$

(c) $\frac{2}{3}(pq + 1)$ (d) $\frac{2}{3}(pq + 1)$

Q.10 If $\frac{a^n + b^n}{a^{n-1} + b^{n-1}}$ is the A.M. between a and b, then find the value of n.

(a)n = 1 (b)n = 5 (c)n = 6 (d)n = 5

Q.11 Between 1 and 31, (m) numbers have been inserted in such a manner that the resulting sequence forms an arithmetic progression (A.P.), and the ratio of the 7^{th} and $(m-1)^{th}$ numbers is 5:9. Determine the value of (m).

(a)m = 14 (b) m = 21 (c) m = 10 (d) m = 29

Q.12 Determine the sum of all natural numbers between 100 and 1000 that are multiples of 5.

(a)98450 (b)10454 (c)95412 (d)56523

ANSWER

1. (d)

2. (a)

3. (b)

4. (b)

5. (a)

6. (d)

7. (a)

8. (c)

9. (a)

10. (a)

11. (a)

12. (a)