Chapter 6
Sequence and Series

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1) Sum of the first n terms of the series $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} + \frac{15}{16} + \ldots$ is equal to (1998-2 Marks)

a) $2^n - n - 1$ b) $1 - 2^{-n}$ c) $n + 2^{-n} - 1$ d) $2^n + 1$

2) The number $\log_2 7$ is (1990-2 Marks)

a) an integer
b) a rational number
c) an irrational number
d) a prime number

3) If $\log_e(a+c), \log_e(a-c), \log_e(a-2b+c)$ are in A.P.,then (1994)

a) a, b, c are in A.P.
b) a^2, b^2, c^2 are in A.P.
c) a, b, c are in G.P.
d) a, b, c are in H.P.

4) Let $a_1, a_2, \ldots a_{10}$ be in A.P. and $h_1, h_2, \ldots h_{10}$ be in H.P. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$, then $a_4 h_7$ is (1992 - 2 Marks)

a) 2 b) 3 c) 5 d) 6

5) The harmonic mean of the roots of the equation $(5+\sqrt{2})x^2 - (4+\sqrt{5})x + 8 + 2\sqrt{5} = 0$ is (1999 - 2 Marks)

a) 2 b) 4 c) 6 d) 8

6) Consider an infinite geometric series with first term a and common ratio r. If its sum is 4 and the second term is 3/4, then (2000S)

a) $a = 4/7, r = 3/7$
b) $a = 2, r = 3/8$
c) $a = 3/2, r = 1/2$
d) $a = 3, r = 1/4$

7) Let α,β be the roots of $x^2 - x + p = 0$ and γ,δ be the roots of $x^2 - 4x + q = 0$.If α,β,γ,δ are in G.P. ,then the integral values of of p and q respectively are (2001S)

a) $-2, -32$ b) $-2, 3$ c) $-6, 3$ d) $6, -32$

8) Let the positive numbers a, b, c, d be in A.P. Then abc, abd, acd, bcd are (2001S)

a) NOT in A.P./G.P./H.P
b) in A.P.
c) in G.P.
d) in H.P.

9) If the sum of the first $2n$ terms of the A.P. $2, 5, 8, \ldots$, is equal to the sum of the first n terms of the A.P. $57, 59, 61, \ldots$, then n equals (2001S)

a) 10 b) 12 c) 11 d) 13

10) Suppose a, b, c are in A.P. and a^2, b^2, c^2 are in G.P. if $a < b < c$ and $a + b + c = 3/2$, then the value of a is (2002S)

a) $\frac{1}{2\sqrt{2}}$ b) $\frac{1}{2\sqrt{3}}$ c) $\frac{1}{2} - \frac{1}{\sqrt{3}}$ d) $\frac{1}{2} - \frac{1}{\sqrt{2}}$

11) An infinite G.P. has first term $'x'$ and sum $'5'$ then x belongs to (2004S)

a) $x < -10$ b) $-10 < x < 0$ c) $0 < x < 10$ d) $x > 10$

12) In the quadratic equation $ax^2 + bx + c = 0, \triangle = b^2 - 4ac$ and $\alpha+\beta, \alpha^2+\beta^2, \alpha^3+\beta^3$ are in G.P. where α, β are root of $ax^2 + bx + c = 0$,then (2005S)

a) $\triangle \neq 0$ b) $b\triangle = 0$ c) $c\triangle = 0$ d) $\triangle = 0$

13) In the sum of first n terms of an A.P. is cn^2, then the sum of squares of these n terms is (2009)

a) $\frac{n(4n^2-1)c^2}{6}$ b) $\frac{n(4n^2+1)c^2}{3}$ c) $\frac{n(4n^2-1)c^2}{3}$ d) $\frac{n(4n^2+1)c^2}{6}$

14) Let $a_1, a_2, a_3, \ldots$ be in harmonic progression with $a_1 = 5$ and $a_{20} = 25$. The least positive integer n for which $a_n < 0$ is (2012)

a) 22 b) 23 c) 24 d) 25

15) Let $b_i > 1$ for $i = 1, 2, \ldots, 101$. Suppose $\log_e b_1, \log_e b_2, \ldots, \log_e b_{101}$ are in Arithmetic Progression (A.P.) with the common difference $\log_e 2$. Suppose $a_1, a_2, \ldots, a_{101}$ are in A.P. such that $a_1 = b_1$ and $a_{51} = b_{51}$. If $t = b_1 + b_2 + \cdots + b_{51}$ and $s = a_1 + a_2 + \cdots + a_{53}$, then (JEE Adv. 2016)

a) $s > t$ and $a_{101} > b_{101}$
b) $s > t$ and $a_{101} < b_{101}$
c) $s < t$ and $a_{101} > b_{101}$
d) $s < t$ and $a_{101} < b_{101}$