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 α+β,α^2+β^2,α^3+β^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 $a_{101} < b_{101}$