Sequences and Series

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JEE ADVANCED/IIT-JEE

5) Sum of the n terms of the series $\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+$..... is equal to (1988-2 Marks)
   a) $2^n - n - 1$
   b) $1 - 2^{-}2$
   c) $n + 2^{-}2 - 1$
   d) $2^n + 1$

6) The number $\log_2 7$ is (1990- 2 Marks)
   a) an integer
   b) a rational number
   c) an irrational number
   d) a prime number

7) If $\ln(a + c)$,$\ln(a + c)$,$\ln(2b + c)$ are in A.P,then (1994)
   a) a,b,c are in A,P
   b) a^2, b^2, c^2 are im A.P
   c) a,b,c are in G.P
   d) a,b,c are in H.P

8) Let a_1,a_2,a_3....a_{10} be in A.P,and h_1,h_2,h_3.....h_{10} be in H.P.If a_1=h_1=2 and a_{10}=h_{10}=3,then a_7h_7 is (1999 - 2 Marks)
   a) 2
   b) 3
   c) 5
   d) 6

9) The harmonic mean of the roots of the equation $\left(5+\sqrt{2}\right)x^2-\left(4+\sqrt{5}\right)x+8+2\sqrt{5}=0$ is (1999 -2 Marks)
   a) 2
   b) 4
   c) 6
   d) 6

10) Consider an infinite geometric series with first term a and common ratio r.If its sum is4 and the second term is $\frac{3}{4}$ (2000S)
   a) $a = \frac{4}{7}, r = \frac{3}{7}$
   b) $a = 2, r = \frac{3}{8}$
   c) $a = \frac{3}{2}, r = \frac{1}{2}$
   d) $a = 3, r = \frac{1}{4}$

11) Let α,β be the roots of $x^2-x+p=0$ andγ,δ be the roots of $x^2 - 4x + q=0$.Ifα,β,γ,δ are in G.P,then the integral values of p and q respectively are (2001S)
   a) $-2, -32$
   b) $-2, 3$
   c) $-6, 3$
   d) $6, -32$

12) 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

13) If the sum of the first $2n$ terms of the A.P $2, 5, 8, ...$ is equal to the sum of the first n terms of the A.P,$57, 59, 61, ...$then n equals (2001S)
   a) 10
   b) 12
   c) 11
   d) 13

14) 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=$\frac{3}{2}$, 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) $\frac{1}{2} - \frac{2}{\sqrt{2}}$

15) 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>0

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

17) 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) $\frac{n(4n^2+1)c^2}{6}$

18) Let $a_1, a_2, a_3, ...$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

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