Sequences and Series

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JEE ADVANCED/IIT-JEE

5) Sum of the n terms of the series $\frac{1}{2}+\frac{3}{4}+\frac{7}{8}+\frac{15}{16}+\ldots$ 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 in A·P
   c) a,b,c are in G·P
   d) a,b,c are in H·P
8) Let a_1,a_2,$a_3\ldots a_{10}$ be in A·P,and h_1,h_2,$h_3\ldots h_{10}$ 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 is 4 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 and γ,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 $2,5,8,\ldots$ 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
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,Δ=b^2-4ac and α+β,α^2+β^2,α^3+β^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 $a_1, a_2, a_3 \ldots$ 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

19) 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 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 $t=b_1+b_2+\ldots+b_{51}$ $s=a_1+a_2+\ldots a_{53}$, 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 $a_{101}<b_{101}$