Sequences and Series

EE24BTECH11060-Sruthi Bijili

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 $a_7 h_7$ 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 $ax^2+bx+c=0$,$\Delta=b^2-4ac$ 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 $a_1, a_2, a_3 \ldots$ 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<and $a_{101}<b_{101}$