Book 9) Sequences & Series

Another Important Topic from Advanced Maths !

More series to be studied later: Taylor, Maclaurin, Fourier, Laurent etc.

1. Three numbers form an increasing G.P. If the middle number is doubled, then the new numbers are in A.P. Then the common ratio of the GP is

(a) $2-\sqrt{3}$ (b) $2+\sqrt{3}$ (c) $\sqrt{3}-2$ (d) $3+\sqrt{2}$

2. If G_1 and G_1 are two geometric means and A is the arithmetic mean inserted between two positive numbers, then the value of $\frac{G_1^2}{G_2}+\frac{G_2^2}{G_1}$ is

(a) $A/2$ (b) A
(c) $2A$ (d) none of these

3. If x, y, z are three real numbers of the same sign, then the value of $\frac{x}{y}+\frac{y}{z}+\frac{z}{x}$ lies in the interval

(a) $[2,+\infty)$ (b) $[3,+\infty)$ (c) $(3,+\infty)$ (d) $(-\infty,3)$

4. If $\{a_n\}$ and $\{b_n\}$ are two sequences given by

$$a_n=(x)^{1/2^n}+(y)^{1/2^n}$$

and $$b_n=(x)^{1/2^n}-(y)^{1/2^n}$$

for all $n \in N$, then the value of $a_1a_2a_3\dots a_n$ is equal to

(a) $x-y$ (b) $\frac{x+y}{b_n}$
(c) $\frac{x-y}{b_n}$ (d) $\frac{xy}{b_n}$

5. If $a^2+9b^2+16c^2=2(3ab+6bc+4ca)$, where a, b, c are non-zero numbers, then a, b, c are in

(a) A.P. (b) G.P.
(c) H.P. (d) none of these

6. Let $a_1,a_2,\dots,a_{10}$ be in A.P. and $h_1,h_2,\dots,h_{10}$ be in H.P. If $a_1=h_1=2$ and $a_{10}=h_{10}=3$, then a_4h_2 is

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

7. If the sum of n terms of an A.P. is $nA+n^2B$, where A and B are constants, then its common difference will be

(a) $A-B$ (b) $A+B$
(c) $2A$ (d) $2B$

8. The positive integer n for which $2\times2^2+3\times2^3+4\times2^4+\dots+n\times2^n=2^{n+10}$ is

(a) 510 (b) 511
(c) 512 (d) 513

9. Let a, b, $c>0$ and $4a^2+9b^2+16c^2-6ab-12bc-8ac=0$, then b is

(a) $\le\sqrt{ac}$ (b) $\ge\sqrt{ab}$
(c) $\ge\frac{a+c}{2}$ (d) $\ge\sqrt{ac}$

10. If $\sum_{r=1}^{n}t_r=\frac{1}{12}n(n+1)(n+2)$, the value of $\sum_{r=1}^{n}\frac{1}{t_r}$ is

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

11. The sum of all two-digit numbers which, when divided by 4, yields unity as a remainder is

(a) 1190 (b) 1197
(c) 1210 (d) none of these

12. If a, b, c are in A.P., p, q, r are in H.P. and ap, bq, cr are in G.P., then $\frac{p}{r}+\frac{r}{p}$ is equal to

(a) $\frac{a}{c}+\frac{c}{a}$ (b) $\frac{a}{c}-\frac{c}{a}$
(c) $\frac{b}{q}-\frac{q}{b}$ (d) $\frac{b}{q}-\frac{a}{p}$

13. The sides of a triangle ABC (a, b, c) are in G.P. If r is the common ratio of this G.P. then

(a) $r \in \left(\frac{\sqrt{5}-1}{2}, \infty\right)$ (b) $r \in \left(\frac{\sqrt{5}+1}{2}, \infty\right)$

(c) $r \in \left(\frac{\sqrt{5}-1}{2}, \frac{\sqrt{5}+1}{2}\right)$ (d) $r \in \left(\frac{\sqrt{5}+1}{2}, \frac{\sqrt{5}+3}{2}\right)$

14. 150 workers were engaged to finish a piece of work in a certain number of days. Four workers left the second day, 4 more workers left the third day and so on. It then took eight more days to finish the work. The number of days in which the work was completed is

(a) 15 (b) 20

(c) 25 (d) 30

15. The common difference of the A.P. in which $t_7 = 9$ and $t_1t_2t_7$ is least is

(a) $\frac{33}{2}$ (b) $\frac{5}{4}$

(c) $\frac{33}{20}$ (d) none of these

16. The H.M. between two numbers is 16/5, their A.M. is A and G.M. is G. If $2A + G^2 = 26$, then the numbers are

(a) 6, 8 (b) 4, 8

(c) 2, 8 (d) 1, 8

17. If $1^2 + 2^2 + \cdots + n^2 = 1015$, then the value of n is

(a) 15 (b) 14

(c) 13 (d) none of these

18. If $a, b, c \in \mathbb{R}^+$, then the minimum value of $a(b^2+c^2)+b(c^2+a^2)+c(a^2+b^2) =$

(a) abc (b) $2abc$

(c) $3abc$ (d) $6abc$

19. The total number of positive real values of x such that x, $[x]$, $\{x\}$ are in H.P., where [.] denotes the greatest integer function and {.} the fraction part, is equal to

(a) 0 (b) 1

(c) 2 (d) none of these

20. The sum of those integers from 1 to 100 which are not divisible by 3 or 5 is

(a) 2489 (b) 4735

(c) 2317 (d) 2632

ANSWERS

1. (b)	**2.** (c)	**3.** (d)	**4.** (c)	**5.** (c)	**6.** (d)	**7.** (b)	**8.** (d)	**9.** (a)	**10.** (c)
11. (c)	**12.** (a)	**13.** (b)	**14.** (d)	**15.** (c)	**16.** (c)	**17.** (b)	**18.** (d)	**19.** (b)	**20.** (d)