

CLASS : CC (Advanced)

Sequence and Progression

TEST-24

M.M.: 61

Time: 60 Min

PART-A**[SINGLE CORRECT CHOICE TYPE]**Q.1 to Q.7 has four choices (A), (B), (C), (D) out of which **ONLY ONE** is correct.

[7 × 3 = 21]

Q.1 If $\sum_{r=1}^n T_r = n(n^2 - 1)$ then $\sum_{n=2}^{\infty} \frac{1}{T_n}$ is equal to

- (A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{2}{3}$ (D) 1

Q.2 Let $a_1, a_2, a_3, \dots, a_n$ be a sequence such that $a_1 = 2$ and $a_n - a_{n-1} = n^2 \forall n \geq 2$. If $a_k = 205$ then k is equal to

- (A) 7 (B) 8 (C) 11 (D) 15

Q.3 If a, b, c and d are distinct positive numbers which are in H.P. then the equation

$$x^2 - kx + (b + c - \sqrt{ac} - \sqrt{bd}) = 0, k \in \mathbb{R} \text{ has}$$

- (A) both roots imaginary (B) both roots real and positive
(C) both roots equal (D) one positive and one negative real root

Q.4 If the equation $x - \sqrt{x} (a^2 - 3a + 2) + a^2 - 3a + 5 = 0$ has real roots greater than 1 then true set of real values of 'a' is

- (A) (1, 2) (B) $(-\infty, 1) \cup (2, \infty)$ (C) $(-\infty, -1] \cup [4, \infty)$ (D) [-1, 4]

Q.5 If sum of first n terms of an A.P. is $S_n = 3n^2 - 2n$, then the value of

$$\sum_{n=1}^{\infty} \left(\frac{21}{(S_n S_{n+2} + S_{n-1} \cdot S_{n+1}) - (S_n S_{n+1} + S_{n-1} S_{n+2})} \right) \text{ is equal to}$$

- (A) 2 (B) 12 (C) 21 (D) 36

Q.6 Let α and $\frac{1}{\beta}$ are respectively the first term and common ratio of an infinite G.P where α and β are

the largest and the smallest integral values of x in the domain of the function $f(x) = \ln \sqrt{\sin^{-1}\left(\frac{x-1}{8}\right)}$

for which $g(x) = \frac{5x^2 - 10x + 8}{x - 2}$ is an integer. The sum of the G.P is equal to

- (A) 6 (B) 9 (C) 12 (D) 15

Q.7 The first term of an A.P. is 1 and the sum of first nine terms equal to 369. The first and the ninth term of a G.P. coincide with the first and the ninth term of the A.P. If the seventh term of the G.P. is T_7 then

the value of $\frac{T_7}{3}$ is equal to

- (A) 27 (B) 81 (C) 9 (D) 36

[PARAGRAPH TYPE]

Q.8 to Q.10 has four choices (A), (B), (C), (D) out of which **ONLY ONE** is correct. **[3 × 3 = 9]**

Paragraph for question no. 8 to 10

Let x , $\frac{[x]}{2}$ and $\{x\}$, ($x > 0$) are the first three terms of a G.P.

[Note : $[k]$ and $\{k\}$ denote greatest integer and fractional part functions of k respectively.]

Q.8 Common ratio of the G.P. is

- (A) $\tan\left(\frac{\pi}{12}\right)$ (B) $\tan\left(\frac{\pi}{6}\right)$ (C) $\tan\left(\frac{\pi}{8}\right)$ (D) $\tan\left(\frac{3\pi}{8}\right)$

Q.9 If $1 < x < 2$ then product of first three term of the G.P. is

- (A) $\frac{1}{8}$ (B) $(\sqrt{2} - 1)^3$ (C) $\frac{1}{4}(\sqrt{2} - 1)^2$ (D) $\frac{1}{4}$

Q.10 If $2 < x < 3$ then 20 term of the G.P. is

- (A) $\left(\tan \frac{\pi}{8}\right)^{18}$ (B) $\left(\tan \frac{\pi}{8}\right)^{19}$ (C) $\left(\tan \frac{3\pi}{5}\right)^{19}$ (D) $\left(\tan \frac{3\pi}{5}\right)^{18}$

PART-D
[INTEGER TYPE]

Q.1 to Q.3 are "Integer Type" questions. (The answer to each of the questions are upto **4 digits**) **[3 × 5 = 15]**

Q.1 Let a_1, a_2, a_3, \dots be in A.P. and $a_1 = 1, a_{102} = 405$. If $\left| a_1^2 - a_2^2 + a_3^2 - a_4^2 + \dots + a_{101}^2 - a_{102}^2 \right| = \prod_{i=1}^5 p_i^{b_i}$

where p_i are prime number and $b_i \in \mathbb{N} \forall i = 1, 2, \dots, 5$, then find the value of $\sum_{i=1}^5 p_i + \sum_{i=1}^5 b_i$.

Q.2 Let a, b, c, d be four distinct natural number in which first three are in HP and last three are in G.P. If

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 1 \text{ then find the sum } (a + b + c + d).$$

Q.3 Let T_r be the r^{th} term of an A.P. whose first term is $\frac{-1}{2}$ and common difference is 1, then find the

$$\text{value of } \sum_{r=2}^{101} \left\{ \sqrt{1 + T_r \cdot T_{r+1} \cdot T_{r+2} \cdot T_{r+3}} \right\}.$$

[Note : $\{y\}$ denotes the fraction part function of y]

CLASS : CC (Advanced)

Sequence and Progression

TEST-24

ANSWER KEY

PART-A

Q.1	B	Q.2	B	Q.3	D	Q.4	C	Q.5	A
Q.6	B	Q.7	C	Q.8	C	Q.9	A	Q.10	A
Q.11	ACD	Q.12	ABD	Q.13	ABCD	Q.14	BCD		

PART-D

Q.1	0065	Q.2	0023	Q.3	0075
-----	------	-----	------	-----	------