Q1. 21 January Shift 1

Let $a_1, a_2, a_3, \ldots$ be G.P. of increasing positive terms such that $a_2 \cdot a_3 \cdot a_4 = 64$ and $a_1 + a_3 + a_5 = \frac{813}{7}$. Then $a_3 + a_5 + a_7$ is equal to :

(1) 3244 (2) 3248 (3) 3252 (4) 3256

Q2. 21 January Shift 1

Let $a_1 = 1$ and for $n \geqslant 1, a_{n+1} = \frac{1}{2}a_n + \frac{n^2-2n-1}{n^2(n+1)^2}$. Then $\left|\sum_{n=1}^{\infty}\left(a_n - \frac{2}{n^2}\right)\right|$ is equal to _____.

Q3. 21 January Shift 2

The positive integer n, for which the solutions of the equation $x(x+2)+(x+2)(x+4)+\cdots+(x+2n-2)(x+2n) = \frac{8n}{3}$ are two consecutive even integers, is :

(1) 3 (2) 12 (3) 9 (4) 6

Q4. 21 January Shift 2

Let $a_1, \frac{a_2}{2}, \frac{a_3}{2^2}, \ldots, \frac{a_{10}}{2^9}$ be a G.P. of common ratio $\frac{1}{\sqrt{2}}$. If $a_1 + a_2 + \ldots + a_{10} = 62$, then a_1 is equal to :

(1) $2-\sqrt{2}$ (2) $2(2-\sqrt{2})$ (3) $\sqrt{2}-1$ (4) $2(\sqrt{2}-1)$

Q5. 22 January Shift 1

If the sum of the first four terms of an A.P. is 6 and the sum of its first six terms is 4, then the sum of its first twelve terms is

(1) -22 (2) -24 (3) -20 (4) -26

Q6. 22 January Shift 2

Suppose $\mathrm{a}, \mathrm{b}, \mathrm{c}$ are in A.P. and $\mathrm{a}^2, 2\,\mathrm{b}^2, \mathrm{c}^2$ are in G.P. If $\mathrm{a} < \mathrm{b} < \mathrm{c}$ and $\mathrm{a}+\mathrm{b}+\mathrm{c} = 1$, then $9\left(\mathrm{a}^2+\mathrm{b}^2+\mathrm{c}^2\right)$ is equal to _____ .

Q7. 23 January Shift 2

Let $\sum_{k=1}^{n} a_k = \alpha n^2 + \beta n$. If $a_{10} = 59$ and $a_6 = 7a_1$, then $\alpha + \beta$ is equal to

(1) 3 (2) 12 (3) 7 (4) 5

Q8. 24 January Shift 1

Consider an A.P.: $a_1, a_2, \ldots, a_{\mathrm{n}}; a_1 > 0$. If $a_2 - a_1 = \frac{-3}{4}, a_n = \frac{1}{4}a_1$, and $\sum_{\mathrm{i}=1}^{\mathrm{n}} a_{\mathrm{i}} = \frac{525}{2}$, then $\sum_{\mathrm{i}=1}^{17} a_{\mathrm{i}}$ is equal to

(1) 136 (2) 476 (3) 238 (4) 952

Q9. 24 January Shift 1

Let $729, 81, 9, 1, \ldots$ be a sequence and P_n denote the product of the first n terms of this sequence.
If $2\sum_{n=1}^{40}(\mathrm{P}_n)^{\frac{1}{n}} = \frac{3^{\alpha}-1}{3^{\beta}}$ and $\gcd(\alpha, \beta) = 1$,
then $\alpha + \beta$ is equal to

(1) 74 (2) 76 (3) 73 (4) 75

Q10. 24 January Shift 2

Let a_1, a_2, a_3, a_4 be an A.P. of four terms such that each term of the A.P. and its common difference l are integers. If $a_1 + a_2 + a_3 + a_4 = 48$ and $a_1 a_2 a_3 a_4 + l^4 = 361$, then the largest term of the A.P. is equal to

(1) 23 (2) 21 (3) 27 (4) 24

Q11. 24 January Shift 2

$\left(\frac{1}{3}+\frac{4}{7}\right)+\left(\frac{1}{3^2}+\frac{1}{3}\times\frac{4}{7}+\frac{4^2}{7^2}\right)+\left(\frac{1}{3^3}+\frac{1}{3^2}\times\frac{4}{7}+\frac{1}{3}\times\frac{4^2}{7^2}+\frac{4^3}{7^3}\right)+\ldots$ upto infinite terms, is equal to

(1) $\frac{4}{3}$ (2) $\frac{6}{5}$ (3) $\frac{5}{2}$ (4) $\frac{7}{4}$

Q12. 28 January Shift 1

The common difference of the A.P.: $a_1, a_2, \ldots, a_{\mathrm{m}}$ is 13 more than the common difference of the A.P.: $b_1, b_2, \ldots, b_n$. If $b_{31} = -277, b_{43} = -385$ and $a_{78} = 327$, then a_1 is equal to

(1) 16 (2) 21 (3) 19 (4) 24

Q13. 28 January Shift 1

The value of $\sum_{k=1}^{\infty}(-1)^{k+1}\left(\frac{k(k+1)}{k!}\right)$ is

(1) 2/e (2) 1/e (3) e/2 (4) $\sqrt{e}$

Q14. 28 January Shift 1

In a G.P., if the product of the first three terms is 27 and the set of all possible values for the sum of its first three terms is $\mathbb{R}-(a, b)$, then a^2+b^2 is equal to ____.

Q15. 28 January Shift 2

Let the arithmetic mean of $\frac{1}{\mathrm{a}}$ and $\frac{1}{\mathrm{b}}$ be $\frac{5}{16}$, $\mathrm{a} > 2$. If α is such that a, 4, α, b are in A.P., then the equation $\alpha x^2 - ax + 2(\alpha - 2b) = 0$ has:

(1) one root in $(0, 2)$ and another in $(-4, -2)$ (2) one root in (1,4) and another in (-2,0)
(3) both roots in the interval $(-2, 0)$ (4) complex roots of magnitude less than 2

Q16. 28 January Shift 2

$\frac{6}{3^{26}}+\frac{10\cdot 1}{3^{25}}+\frac{10\cdot 2}{3^{24}}+\frac{10\cdot 2^2}{3^{23}}+\ldots+\frac{10\cdot 2^{24}}{3}$ is equal to :

(1) 2^{26} (2) 3^{25} (3) 3^{26} (4) 2^{25}

Q17. 28 January Shift 2

If $\sum_{r=1}^{25}\left(\frac{r}{r^4+r^2+1}\right)=\frac{p}{q}$, where p and q are positive integers such that $\gcd(p,q)=1$, then $p+q$ is equal to _____。

ANSWER KEYS

1. (3)	**2.** 2	**3.** (1)	**4.** (4)	**5.** (1)	**6.** 9	**7.** (4)	**8.** (3)
9. (3)	**10.** (3)	**11.** (3)	**12.** (3)	**13.** (2)	**14.** 90	**15.** (2)	**16.** (1)
17. 976							