1. The first term of an infinite geometric progression is x and its sum is 5. Then

(a) $0 \le x \le 10$ (b) $0 < x < 10$

(c) $-10 < x < 0$ (d) $x > 10$

2. If positive numbers a^{-1}, b^{-1}, c^{-1} are in A.P., then product of roots equation $x^2 - kx + 2b^{101} - a^{101} - c^{101} = 0$ ($k \in R$), has

(a) +ve sign (b) -ve sign (c) 0 (d) None of these

3. If a, b, c are real numbers forming an A.P. and 3 + a, 2 + b, 3 + c are in G.P., then minimum value of ac is -

(a) -4 (b) -6 (c) 3 (d) None

4. Sum of the series $1 + 2.2 + 3.2^2 + 4.2^3 + ... + 100.2^{99}$ is

(a) $100.2^{100} + 1$ (b) $99.2^{100} + 1$

(c) $99.2^{100} - 1$ (d) $100.2^{100} - 1$

5. For $0 < \theta < \pi/2$, if x =

$$\sum_{n=0}^{\infty} \cos^{2n}\theta,\quad y = \sum_{n=0}^{\infty} \sin^{2n}\theta,\quad z = \sum_{n=0}^{\infty} \cos^{2n}\theta \sin^{2n}\theta, \text{ then}$$

(a) xyz = xz + y (b) xyz = xy + z

C) xyz = yz + x (d) None of these

6. If $a_1, a_2, a_3, ...$ are in A.P. and $a_i > 0$ for each i, then

$$\sum_{i=1}^{n} \frac{n}{a_{i+1}^{2/3} + a_{i+1}^{1/3} a_i^{1/3} + a_i^{2/3}}$$ is equal to -

(a) $\dfrac{n}{a_n^{2/3} + a_n^{1/3} + a_1^{2/3}}$ (b) $\dfrac{n+1}{a_n^{2/3} + a_n^{1/3} + a_1^{2/3}}$

(c) $\dfrac{n-1}{a_n^{2/3} + a_n^{1/3}.a_1^{1/3} + a_1^{2/3}}$ (d) None of these

7. If $a_1, a_2 .... a_n$ are positive real numbers whose product is a fixed number c, then the minimum value of $a_1 + a_2 + ... a_{n-1} + 2a_n$ is -

(a) $n(2c)^{1/n}$ (b) $(n + 1) c^{1/n}$

(c) $2 nc^{1/n}$ (d) $(n + 1)(2c)^{1/n}$

8. If a, b, c, d are distinct integers in A.P. such that $d = a^2 + b^2 + c^2$ then a + b + c + d is -

(a) 0 (b) 1 (c) 2 (d) None of these

9. If a, b, c be the p^{th}, q^{th} and r^{th} terms respectively of an AP and GP both, then the product of the roots of the equation $a^b b^c c^a x^2 - abcx + a^c b^a c^b = 0$ is equal to-

(a) -1 (b) 1 (c) 2 (d) (b - c) (c - a) (a - b)

10. 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 = 3/2, then the value of a is -

(a) $\dfrac{1}{2\sqrt{2}}$ (b) $\dfrac{1}{2\sqrt{3}}$ (c) $\dfrac{1}{2} - \dfrac{1}{\sqrt{3}}$ (d) $\dfrac{1}{2} - \dfrac{1}{\sqrt{2}}$

11. If $a_1, a_2, a_3, ..., a_{4001}$ are terms of an AP such that $\dfrac{1}{a_1a_2} + \dfrac{1}{a_2a_3} + ... + \dfrac{1}{a_{4000}a_{4001}} = 10$ and $a_2 + a_{4000} = 50$, then $|a_1 - a_{4001}|$ is equal to -

(a) 20 (b) 30 (c) 40 (d) None of these

12. Let $f(x)$ be polynomial function of second degree. If $f(1) = f(-1)$ and a, b, c are in AP, then $f'(a)$, $f'(b)$ and $f'(c)$ are in -

(a) AP (b) GP

(c) HP (d) Arithmetico-geometric progression

13. If $\dfrac{3 + 5 + 7 .....n \text{ terms}}{5 + 8 + 11 .... + 10\text{terms}} = 7$; Then value of n is-

(a) 35 (b) 36 (c) 37 (d) None

14. Let a,b,c (a < b < c) be in AP ; a^2, b^2, c^2 are in GP and a + b + c = 3/2 ; then a =

(a) $\dfrac{\sqrt{3}+1}{2\sqrt{3}}$ (b) $\dfrac{\sqrt{3}-1}{2\sqrt{3}}$ (c) $\dfrac{\sqrt{2}-2}{2\sqrt{2}}$ (d) None

15. The harmonic mean of the roots of the equation $(5 + \sqrt{2})x^2 - (4 + \sqrt{5})x + 8 + 2\sqrt{5} = 0$ is -

(a) 2 (b) 4 (c) 6 (d) 8

16. If $x^2 + 9y^2 + 25z^2 = xyz\left(\dfrac{15}{x} + \dfrac{5}{y} + \dfrac{3}{z}\right)$ then x, y, z are in :

(a) AP (b) GP (c) HP (d) None

17. If a, b, c are in H.P., then the straight line $\dfrac{x}{a} + \dfrac{y}{b} + \dfrac{1}{c} = 0$ always passes through a fixed point and that point is

(a) (-1, -2) (b) (-1, 2) (c) (1, -2) (d) $\left(1, \dfrac{1}{2}\right)$

18. If a, b, c, d, e are in A.P., then value of a - 4b + 6c - 4d + e =

(a) 1 (b) 2 (c) 0 (d) 4

19. If a, b, c are in G.P. then the equations $ax^2 + 2bx + c = 0$, $dx^2 + 2ex + f = 0$ have a common roots if $\dfrac{d}{a}, \dfrac{e}{b}, \dfrac{f}{c}$ are in

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

20. $\dfrac{\frac{1}{2}.\frac{2}{2}}{1^3} + \dfrac{\frac{2}{2}.\frac{3}{2}}{1^3 + 2^3} + \dfrac{\frac{3}{2}.\frac{4}{2}}{1^3 + 2^3 + 3^3} + ...\text{upto n terms} =$

(a) $\dfrac{n-1}{2}$ (b) $\dfrac{n}{n+1}$ (c) $\dfrac{n+1}{n+2}$ (d) $\dfrac{n+1}{n}$

MATCH THE COLUMN TYPE QUESTIONS

21. Match the following columns:

Column-I	Column-II
(i) If $\log_5 2$, $\log_5(2^x - 5)$ and $\log_5(2^x - 7/2)$ are in A.P., then value of 2x is equal to	[A] 6
(ii) Let S_n denote sum of first n terms of an A.P. If $S_{2n} = 3S_n$, then $\dfrac{S_{3n}}{S_n}$ is	[B] 9
(iii) Sum of infinite series $4 + \dfrac{8}{3} + \dfrac{12}{3^2} + \dfrac{16}{3^3} + ...$ is	[C] 3
(iv) The length, breadth, height of a rectangular box are in G.P. , The volume is 27, the total surface area is 78. Then the length is	[D] 1

22. Match the following:

Column-I	Column-II
(i) Suppose that F(n + 1) =	[A] 42

$\frac{2F(n)+1}{2}$ for n = 1, 2, 3,…and F(1) = 2. Then F(101) equals	
(ii) If $a_1, a_2, a_3, \ldots a_{21}$ are in A.P. and $a_3 + a_5 + a_{11} + a_{17} + a_{19} = 10$ then the value of $\sum_{i=1}^{21} a_i$ is	[B] 1620
(iii) 10^{th} term of the sequence S = 1 + 5 + 13 + 29+….., is	[C] 52
(iv) The sum of all two digit numbers which are not divisible by 2 or 3 is	[D] 2045

23. Match the following:

Column-I	Column-II
(i) 10^{th} term of sequence S = 1 + 5 + 13 + 29 + …..is	[A] 1620
(ii) The sum of all two digit numbers which are not divisible by 2 or 3 is	[B] 1/3
(iii) The sum of $\frac{5}{1^2.4^2} + \frac{11}{4^2.7^2} + \frac{17}{7^2.10^2} + \ldots$..is	[C] 2045
(iv) If first two terms of H.P. is $\frac{1}{2}$ & $\frac{1}{3}$ then the harmonic mean of first four terms is	[D] $\frac{240}{77}$

24. Match the column :

Column-I	Column-II
(i) If x > 1, y > 1, z > 1 are in G.P. then $\log_{ex} e, \log_{ey} e, \log_{ez} e$ are in	[A] A.P.
(ii) If a, b, c are three consecutive terms of a progression such that $\left(\frac{a-b}{b-c}\right) = \frac{a}{c}$, then a, b, c, are in	[B] G.P.
(iii) If a, b, c are in A.P., then $2^{ax+1}, 2^{bx+1}, 2^{cx+1}$ $(x \neq 0)$ are in	[C] H.P.
(iv) If – 1 < a, b, c < 1 and a, b, c are in A.P. and $x = \left(\sum_{n=1}^{\infty} a^n\right)+1,\ y = \left(\sum_{n=1}^{\infty} b^n\right)+1,\ z = \left(\sum_{n=1}^{\infty} c^n\right)+1$ then $\frac{1}{x}, \frac{1}{y}, \frac{1}{z}$ are in	[D] Not in any progression