SECTION - I
Straight Objective Type

This section contains multiple choice questions. Each question has 4 choices (A), (B), (C), (D), out of which ONLY ONE is correct. Choose the correct option.

1. If $x>1, y>1, z>1$ are in G.P. then $\frac{1}{1+\log x}, \frac{1}{1+\log y}, \frac{1}{1+\log z}$ are in

(a) A.P. (b) H.P.

(c) G.P. (d) None of these

2. Let $a_1, a_2, ...a_{10}$ be in A.P. and $h_1, h_2, ...h_{10}$ be in H.P. If $a_1 = h_1 = 2$ and $a_{10} = h_{10} = 3$ and $a_4 h_7$ is

(a) 2 (b) 3

(c) 5 (d) 6

3. If $(1.05)^{50} = 11.658$ then $\sum_{n=1}^{49} (1.05)^n$ equal

(a) 208.34 (b) 212.12

(c) 212.16 (d) 213.16

4. Let $\alpha + \beta$ be the roots of $x^2 - x + P = 0$ and λ, δ be the roots of $x^2 - 4x + q = 0$. If $\alpha, \beta, \lambda, \delta$ are in G.P. then the integral values of p and q respectively are

(a) – 2, – 32 (b) – 2, 3

(c) – 6, 3 (d) – 6, – 32

5. If the sum of the first 2n terms of the A.P. 2, 5, 8,……… is equal to the sum of first n temrs of the A.P. 57, 59, 61,……… then n equals

(a) 10 (b) 12

(c) 11 (d) 13

6. For a positive integer n, let $a_n = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + ... + \frac{1}{2^n - 1}$ then

(a) $a_{100} \le 100$ (b) $a_{200} \le 100$

(c) $a_{200} > 100$ (d) None of these

7. An infinite G.P. has the first term x and sum '5' then x belong to

(a) x < - 10 (b) -10 < x < 10

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

8. If $1, \frac{1}{2}\log_3 3^1 + 2, \log\left(4.3^x - 1\right)$ are in A.P. then x equals

(a) $\log_3^4$ (b) $1 - \log_3^4$

(c) $1 - \log_4^3$ (d) $\log_4^3$

9. The value of the sum $\sum_{n=1}^{13}\left(i^n + i^{n-1}\right)$ where $i = \sqrt{-1}$ equals

(a) i (b) i – 1

(c) – i (d) 0

10. The Harmonic Mean of the roots of the equation $\left(5+\sqrt{2}\right)x^2 - \left(4+\sqrt{5}\right)x + \left(8+2\sqrt{5}\right) = 0$ then

(a) 2 (b) 4

(c) 6 (d) 8

SECTION - II

Assertion - Reason Questions

This section contains certain number of questions. Each question contains STATEMENT-1 (Assertion) and STATEMENT - 2 (Reason). Each question has 4 choices (a), (b), (c) and (d) out of which ONLY ONE is correct. Choose the correct option.

11. Let $S_n = 1 + \frac{1}{1+2} + \frac{1}{1+2+3} + \dots\dots + \frac{1}{1+2+3+\dots\dots+2007}$ then

STATEMENT-1: $S_n = \frac{4014}{2007}$

because

STATEMENT-2: $t_n = 2\left[\frac{1}{n} - \frac{1}{n+1}\right]$ and $S_n = \sum tn$

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

12. Let in an A.P. a = 2 and the sum of the first five terms in one – fourth, the sum of the next five terms

STATEMENT-1: $t_{20} = -112$

because

STATEMENT-2: The sum of n – terms of an A.P. is $S_n = \frac{n}{2}\left[2a + (n-1)d\right]$

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

13. The sum of the first 'n' natural numbers is S_1 and that of their squares S_2 and cubes S_3 then

STATEMENT-1: $9S_2^2 = S_3(1+8S_1)$

because

STATEMENT-2: $\sum n = \frac{n(n+1)}{2}, \sum n^2 = \frac{n(n+1)(2n+1)}{6},$ $\sum n^3 = \frac{n^2(n+1)^2}{4}$

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for statement - 1

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(c) Statement-1 is True, Statement-2 is False

(d) Statement-1 is False, Statement-2 is True

14. The first term of a G.P. is 50 and 4^{th} term is 1350. Then

STATEMENT-1: 5^{th} term is 1350

because

STATEMENT - 2: n^{th} term $t_n = a.r^{n-1}$

(a) Statement - 1 is True, Statement - 2 is True; Statement - 2 is a correct explanation for statement - 1

(b) Statement - 1 is True, Statement - 2 is True; Statement - 2 is NOT a correct explanation for Statement - 1

(c) Statement - 1 is True, Statement - 2 is False

(d) Statement - 1 is False, Statement - 2 is True

SECTION - III

Linked Comprehension Type

This section contains paragraphs. Based upon each paragraph multiple choice questions have to be answered. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE is correct. Choose the correct option.

If a and be are positive integers, their Arithmetic mean, Geometric mean and Harmonic mean are in Geometric Progression.

15. The relation between A.M., G.M. and H.M. is

(a) $A^2 = GH$ (b) $G^2 = AH$

(c) $H^2 = AG$ (d) $AG = H$

16. There are n – arithmetic means between a and b. The common difference d is

(a) $\frac{b+a}{n+1}$ (b) $\frac{n+a}{b+1}$

(c) $\frac{b-a}{n+1}$ (d) $\frac{ab}{n+1}$

17. The A.M., G.M., and H.M. of two numbers are A, G, H respectively then

(a) $A \geq G \geq H$ (b) $A = G = H$

(c) $A \geq G$ and $G \geq H$ (d) None

The sum of first n natural numbers is $\frac{n(n+1)}{2}$, the sum if squares of first n natural numbers is $\frac{n(n+1)(2n+1)}{6}$ and the sum of cubes of first n natural numbers is $\frac{n^2(n+1)^2}{4}$ then

18. ΔDEF If the sum of first n natural numbers is S_1 and that of their squares S_2 and cubes S_3 then

(a) $S_3 = S_1 S_2$ (b) $9S_2^2 = S_3(1+8S_1)$

(c) $S_3 = S_1 + S_2 = S_3$ (d) None

19. Find the value of $1^2 - 2^2 + 3^2 - 4^2 + \dots\dots\dots - 1999^2$

(a) 0 (b) 19,99,000

(c) 10^6 (d) 1

20. Find the value of $\left[1-\frac{1}{2^2}\right]\left[1-\frac{1}{3^2}\right]\left[1-\frac{1}{4^2}\right]\dots\dots\left[1-\frac{1}{2006^2}\right]$

(a) $\frac{2007}{4012}$ (b) $\frac{1}{2006}$

(c) 1 (d) $\frac{423}{325}$

21. Find the sum of first 100 natural numbers

(a) 5050 (b) 1000

(c) 500 (d) 10,000

22. How many of an A.P. 1, 4, 7 ……… are needed to male the sum 715?

(a) 20 (b) 22

(c) 18 (d) 15

23. Find the sum of all natural numbers between 1 and 100 which are multiples of 3?

(a) 1683 (b) 1600

(c) 1540 (d) 815

G.P. is series in which the ratio of each term C except the first to the preceeding term is a constant. The n^{th} term of a G.P. is $t_n = a^{n-1}$ where a is the first term, r is the common ratio.

The sum of n terms of a G.P. is $s_n = \frac{1\left(r^n - 1\right)}{r-1}$

24. Which term of the G.P. $2, 2\sqrt{2}, 4$........... is 64?

(a) 7 (b) 10

(c) 11 (d) 12

25. The first term of a G.P. is 50 and the 4^{th} term is 1350. Then its 5^{th} term is

(a) 4050 (b) 1350

(c) 450 (d) 370

26. The 6^{th} and 13^{th} terms of a G.P. respectively equal to 24 and $\frac{3}{16}$. Then 25^{th} term is

(a) 3×2^{-15} (b) 3×2^{-16}

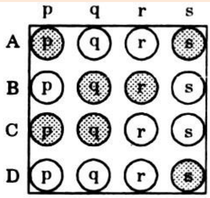
(c) 3×2^{-17} (d) 3×2^{-18}

SECTION - IV

Matrix - Match Type

This section contains Matrix-Match type questions. Each question contains statements given in two columns which have to be matched. Statements

(a, b, c, d) in Column I have to be matched with statements (p, q, r, s) in Column II. The answers to these questions have to be appropriately bubbled as illustrated in the following example.
If the correct matches are a-p, a-s, b-q, b-r, c-p, c-q and d-s, then the correctly bubbled 4 x 4 matrix should be as follows:



27. **Column I** | **Column II**

Column I	Column II
(a) n^{th} term of an A.P.	(p) $a+(n-1)d$
(b) n^{th} term of an G.P.	(q) $a.r^{n-1}$
(c) n^{th} term of an H.P.	(r) $\frac{1}{a+(n-1)d}$
(d) n^{th} term of the series 1,2, 3……	(s) 2n – 1

28. **Column I** | **Column II**

Column I	Column II
(a) Sum of n terms of an A.P.	(p) $\frac{n(n+1)(2n+1)}{6}$
(b) Sum of n terms of an G.P	(q) $S_n=\frac{n}{2}\left[2a+(n-1)d\right]$
(c) Sum of the terms of an infinite A.P	(r) $\frac{1(r^n-1)}{r-1}$
(d) $1^2+2^2+3^2+\ldots\ldots.+n^2$	(s) $\frac{a}{1-r}$

29. **If c, b are two numbers then**

Column I | **Column II**

(a) A.M.	(p) $\dfrac{a+b}{2}$
(b) G.M.	(q) $\sqrt{ab}$
(c) H.M.	(r) $\dfrac{2ab}{a+b}$
(d) Relation between A, G, H	(s) $G^2 = AH$

30.

Column I	**Column II**
(a) 1+ 2+ 3+ …..+n terms	(p) $\dfrac{n(n+1)}{2}$
(b) $1^3 + 2^3 + 3^3 + \ldots\ldots.. n$ terms	(q) $\dfrac{n^2(n+1)^2}{4}$
(c) $\left(1-\dfrac{1}{2}\right)\left(1-\dfrac{1}{3}\right)\ldots\ldots\ldots\ldots\left(1-\dfrac{1}{n}\right)$	(r) $\dfrac{1}{n}$
(d) $\left(1+\dfrac{1}{2}\right)\left(1+\dfrac{1}{3}\right)\ldots\ldots\ldots\ldots\left(1+\dfrac{1}{n}\right)$	(s) $\dfrac{n+1}{2}$