SINGLE CORRECT CHOICE QUESTIONS

LEVEL-I

A.P., G.P., H.P. and Mean

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

(A) 10 (B) 12
(C) 11 (D) 13

2. If S denotes the sum to infinity and S_n the sum of n terms of the series $1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+.....$, such that $S - S_n < \frac{1}{1000}$, then the least value of n is

(A) 8 (B) 9
(C) 10 (D) 11

3. If $a_1, a_2, a_3, ...$ is an A.P. such that

$a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$,

then $a_1 + a_2 + a_3 + ... + a_{23} + a_{24}$ is equal to

(A) 909 (B) 75
(C) 750 (D) 900

4. If the sum of first p terms, first q terms and first r terms of an A.P. be a, b and c respectively, then

$\frac{a}{p}(q-r)+\frac{b}{q}(r-p)+\frac{c}{r}(p-q)$ is equal to

(A) 0 (B) 2
(C) pqr (D) $\frac{8abc}{pqr}$

5. The numbers $3^{2\sin 2\theta - 1}$, 14, $3^{4-2\sin 2\theta}$ form first three terms of an A.P. Its fifth term is equal to

(A) –25 (B) –12
(C) 40 (D) 53

6. If sum of n terms of an A.P. is $3n^2 + 5n$ and $T_m = 164$, m = ?

(A) 26 (B) 27
(C) 28 (D) 25

7. If the sum of the series $2+\frac{5}{x}+\frac{25}{x^2}+\frac{125}{x^3}+.........$ is finite, then

(A) $|x| > 5$ (B) $-5 < x < 5$

(C) $|x| < 5/2$ (D) $|x| > 5/2$

8. If a, b, c, d are in H.P,, then ab + bc + cd is equal to

(A) 3 ad (B) (a + b) (c + d)

(C) ac (D) none of these

9. The sum of integers from 1 to 100 which are divisible by 2 or 5 is

(A) 300 (B) 3050

(C) 3200 (D) 3250

10. The interior angles of a polygon are in arithmetic progression. The smallest angle is 120^0 and the common difference is 5. The number of sides of the polygon is

(A) 7 (B) 9

(C) 11 (D) 16

11. If $a_1, a_2, a_3 ..... a_n$ are in H.P., then $\frac{a_1}{a_2+a_3+...a_n}, \frac{a_2}{a_1+a_3+...+a_n}, ... \frac{a_n}{a_1+a_2+...+a_{n-1}}$ are in

(A) A.P. (B) G.P.

(C) H.P. (D) none of these

12. If x > 0 and $\log_2 x+\log_2\left(\sqrt{x}\right)+\log_2\left(\sqrt[4]{x}\right)+\log_2\left(\sqrt[8]{x}\right)+\log_2\left(\sqrt[16]{x}\right)+........=4$ then x equals

(A) 2 (B) 3

(C) 4 (D) 5

13. If the ratio of sum of m terms and n terms of an A.P. be $m^2: n^2$, then the ratio of its m^{th} and n^{th} terms will be

(A) 2m –1 : 2n – 1 (B) m : n

(C) 2m + 1 : 2n + 1 (D) none

14. The ratio between the sum of n terms of two A.P.'s is 3n + 8 : 7 n + 15. Then the ratio between their 12^{th} terms is

(A) 5 : 7 (B) 7 : 16

(C) 12 : 11 (D) none

15. $\log_3 2, \log_6 2, \log_{12} 2$ are in

(A) A.P. (B) G.P.

(C) H.P. (D) none

16. In a G.P. if the $(m + n)^{th}$ term be p and $(m - n)^{th}$ term be q, then its m^{th} term is

(A) $\sqrt{(pq)}$ (B) $\sqrt{(p/q)}$

(C) $\sqrt{(q/p)}$ (D) p/q

17. Between 1 and 31 m arithmetic means are inserted so that the ratio of the 7^{th} and $(m-1)^{th}$ means is 5 : 9. Then the value of m is

(A) 12 (B) 13

(C) 14 (D) 15

A.G.P., V_n Medhod

18. If $1-\frac{1}{3}+\frac{1}{5}-\frac{1}{7}+\frac{1}{9}-\frac{1}{11}+.......=\frac{\pi}{4}$, then value of $\frac{1}{1.3}+\frac{1}{5.7}+\frac{1}{9.11}+..........$ is

(A) $\frac{\pi}{8}$ (B) $\frac{\pi}{6}$

(C) $\frac{\pi}{4}$ (D) $\frac{\pi}{36}$

19. Sum to n terms of the series $\frac{1}{(1+x)(1+2x)}+\frac{1}{(1+2x)(1+3x)}+\frac{1}{(1+3x)(1+4x)}+..........$ is

(A) $\frac{nx}{(1+x)(1+nx)}$ (B) $\frac{n}{(1+x)\left[1+(n+1)x\right]}$

(C) $\frac{x}{(1+x)(1+(n-1)x)}$ (D) $\frac{nx}{(1+x)[1+(n+1)x]}$

20. Sum of the series $S=1+\frac{1}{2}(1+2)+\frac{1}{3}(1+2+3)+\frac{1}{4}(1+2+3+4)+.........$ upto 20 terms is

(A) 110 (B) 111

(C) 115 (D) 116

21. If $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}+......\text{upto } \infty=\frac{\pi^2}{6}$, then value of $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+..........$ upto to ∞ is

(A) $\frac{\pi^2}{4}$ (B) $\frac{\pi^2}{6}$

(C) $\frac{\pi^2}{8}$ (D) $\frac{\pi^2}{12}$

22. Sum of the series $S = 1^2 - 2^2 + 3^2 - 4^2 + ... - 2002^2 + 2003^2$ is

(A) 2007006 (B) 1005004

(C) 2000506 (D) 1005040

Inequalities

23. If three positive real numbers a, b, c are in A.P., with abc = 4, then the minimum value of b is

(A) $4^{1/3}$ (B) 3

(C) 2 (D) 1/2

24. If x, y and z are positive real numbers such that x + y + z = a then

(A) $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\geq\frac{9}{a}$ (B) $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}<\frac{9}{a}$

(C) $(a-x)(a-y)(a-z)>\frac{8}{27}a^3$ (D) $(a-x)(a-y)(a-z)>a^3$

25. If a, b and c are distinct positive real numbers and $a^2 + b^2 + c^2 = 1$, then ab + bc + ca is

(A) less than 1 (B) equal to 1

(C) greater than 1 (D) any real number

LEVEL -II

Inequalities

26. The greatest value of $x^2y^3z^4$, (if x + y + z = 1, x, y, z > 0) is

(A) $\frac{2^9}{3^5}$ (B) $\frac{2^{10}}{3^{15}}$

(C) $\frac{2^{15}}{3^{10}}$ (D) $\frac{2^{10}}{3^{10}}$

27. If a, b and c are three positive real numbers, then the minimum value of the expression

$\frac{b+c}{a}+\frac{c+a}{b}+\frac{a+b}{c}$ is

(A) 1 (B) 2

(C) 3 (D) 6

A.P., G.P., H.P. & Mean

28. If S be the sum, P the product and R the sum of the reciprocals of n terms of a G.P., then

$\left(\frac{S}{R}\right)^n =$

(A) P
(B) P^2
(C) P^3
(D) $\sqrt{P}$

29. If x, y, z be respectively the pth, qth and rth terms of G.P., then

$(q-r)\log x + (r-p)\log y + (p-q)\log z =$

(A) 0
(B) 1
(C) –1
(D) 2

30. In a G.P., $T_2 + T_5 = 216$ and $T_4 : T_6 = 1:4$ and all terms are integers, then its first term is

(A) 16
(B) 14
(C) 12
(D) 15

31. If the roots of the equation $x^3 - 12x^2 + 39x - 28 = 0$ are in A.P., then their common difference will be

(A) ± 1
(B) ± 2
(C) ± 3
(D) ± 4

32. If a, b, c, d are nonzero real numbers such that

$(a^2 + b^2 + c^2)(b^2 + c^2 + d^2) \leq (ab + bc + cd)^2$, then a, b, c, d are in

(A) AP
(B) GP
(C) HP
(D) AGP

33. Let $a_1, a_2, a_3, \ldots$ be in AP and a_p, a_q, a_r be in GP. Then $a_q : a_p$ is equal to

(A) $\frac{r-p}{q-p}$
(B) $\frac{q-p}{r-q}$
(C) $\frac{r-q}{q-p}$
(D) 1

34. Three distinct real numbers a, b, c are in G.P. such that a + b + c = x b, then

(A) $0 < x < 1$
(B) $-1 < x < 3$
(C) $x < -1$ or $x > 3$
(D) $-1 < x < 2$

35. If x, y, z are in G.P., $a^x = b^y = c^z$, then

(A) $\log_c b = \log_a c$ (B) $\log_1 c = \log_b c$

(C) $\log_a b = \log_c b$ (D) $\log_b a = \log_c b$

36. The rth, sth and t^{th} terms of a certain G.P. are R, S and T respectively, then the value of $R^{s-t}.S^{t-r}.T^{r-s}$ is

(A) 0 (B) 1

(C) –1 (D) 2

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

(A) $2-\sqrt{3}$ (B) $2+\sqrt{3}$

(C) $\sqrt{3}-2$ (D) 2

38. If one geometric mean G and two arithemtic means p and q be inserted between two numbers, then G^2 is equal to:

(A) (3p – q) (3q – p) (B) (2p – q) (2q – p)

(C) (4p – q) (4q – p) (D) (4p + q) (4q + p)

39. If the first and (2n+ 1)th terms of an A.P.; G.P. and H.P. are equal and their(n+1)th terms are a, b and c respectively, then

(A) $a > b > c$ (B) $ac = b^2$

(C) $a + b = c$ (D) $a + c = b$

40. The sum of the two numbers is $2\frac{1}{6}$. An even numbers of arithmetic means are inserted between them and their sum exceeds their number by 1. Then the number of means inserted is

(A) 6 (B) 8

(C) 12 (D) 15

A.G.P., V_n Method

41. The sum upto (2n + 1) terms of the series $a^2 - (a + d)^2 + (a + 2d)^2 - (a + 3d)^2 + \dots\dots$ is

(A) $a^2 + 3nd^2$ (B) $a^2 + 2nad + n(n-1)d^2$

(C) $a^2 + 3nad + n(n-1)d^2$ (D) $a^2 + 2nad + n(2n+1)d^2$

42. $\sum_{n=1}^{\infty}\frac{1}{(n+1)(n+2)(n+3)....(n+k)}$ is equal to

(A) $\frac{1}{(k-1)\lfloor k-1}$ (B) $\frac{1}{k\lfloor k}$

(C) $\frac{1}{(k-1)\lfloor k}$ (D) $\frac{1}{\lfloor k}$

43. The sum of first n terms of the series $1^2 + 2 \times 2^2 + 3^2 + 2 \times 4^2 + 5^2 + 2 \times 6^2 + ...$ is n $(n + 1)^2/2$ when n is even. When n is odd the sum of the series is

(A) $n^2 (3n + 1)/4$

(B) $n^2 \frac{(n+1)}{2}$

(C) $n^3 (n - 1)/2$

(D) none of these

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

(A) $\frac{2n}{n+1}$

(B) $\frac{n-1}{(n+1)!}$

(C) $\frac{4n}{(n+1)}$

(D) $\frac{3n}{n+2}$

45. Sum to n terms of the series $\frac{1}{5!} + \frac{1!}{6!} + \frac{2!}{7!} + \frac{3!}{8!} + ...$ is

(A) $\frac{2}{5!} - \frac{1}{(n+1)!}$

(B) $\frac{1}{4}\left(\frac{1}{4!} - \frac{n!}{(n+4)!}\right)$

(C) $\frac{1}{4}\left(\frac{1}{3!} - \frac{3!}{(n+2)!}\right)$

(D) $\frac{1}{4}\left(\frac{1}{4!} + \frac{n!}{(n+4)!}\right)$

46. Sum to n terms of the series $\frac{1}{1.2.3} + \frac{3}{2.3.4} + \frac{5}{3.4.5} + \frac{7}{4.5.6} + ...$ is

(A) $\frac{n(n+1)}{2(n+2)(n+3)}$

(B) $\frac{n(3n+1)}{4(n+1)(n+2)}$

(C) $\frac{1}{6} - \frac{5}{(n+1)(n+4)}$

(D) $\frac{(3n+1)}{(n+1)(n+2)}$

47. Sum to n terms of the series $\frac{1^3}{1} + \frac{1^3 + 2^3}{1+3} + \frac{1^3 + 2^3 + 3^3}{1+3+5} + ...$ is

(A) $\frac{n}{24}(n^2 + 9n + 14)$

(B) $\frac{n}{24}(2n^2 + 7n + 15)$

(C) $\frac{n}{24}(2n^2 + 9n + 13)$

(D) $\frac{n}{24}(n^2 + 11n + 12)$

Inequalities

48. Let $p, q, r \in R^+$ and $27pqr \geq (p+q+r)^3$ and $3p+4q+5r=12$ then $p^3 + q^4 + r^5$ is equal to

(A) 3 (B) 6

(C) 2 (D) 1

49. If a, $a_1, a_2, a_3, \ldots a_{2n-1}$, b are in AP,a, $b_1, b_2, b_3 \ldots, b_{2n-1}$, b are in GP and a, $c_1, c_2, c_3, \ldots, c_{2n-1}$, b are in HP, where a, b are positive, then the equation $a_n x^2 - b_n x + c_n = 0$ has its roots

(A) real and unequal (B) real and equal

(C) imaginary (D) none of these

Objective questions (One correct Answer)

LEVEL -I

1. C	2. D	3. D	4. A	5. D	6. B	7. A
8. A	9. B	10. B	11. C	12. C	13. A	14. B
15. C	16. A	17. C	18. A	19. B	20. C	21. C
22. A	23. A	24. A	25. A			

LEVEL -II

26. B	27. D	28. B	29. A	30. C	31. C	32. B
33. C	34. C	35. D	36. B	37. B	38. B	39. B
40. C	41. D	42. C	43. B	44. C	45. B	46. B
47. C	48. A	49. C				