EXERCISE – I SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. The first term of an A.P. of consecutive integer is $p^2 + 1$. The sum of $(2p + 1)$ terms of this series can be expressed as

(A) $(p + 1)^2$ (B) $(2p + 1)(p + 1)^2$
(C) $(p + 1)^3$ (D) $p^3 + (p + 1)^3$

2. If $a_1, a_2, a_3, \ldots\ldots$ are in A.P. such that
$a_1 + a_5 + a_{10} + a_{15} + a_{20} + a_{24} = 225$, then
$a_1 + a_2 + a_3 + \ldots\ldots + a_{23} + a_{24}$ is equal to

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

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

(A) 2550 (B) 1050 (C) 3050 (D) None of these

4. Consider an A.P. with first term 'a' and the common difference 'd'. Let S_k denote the sum of its first K terms. If $\frac{S_{kx}}{S_x}$ is independent of x, then

(A) a = d/2 (B) a = d
(C) a = 2d (D) None of these

5. If $x \in R$, the numbers $5^{1 + x} + 5^{1 - x}$, a/2, $25^x + 25^{-x}$ form an A.P. then 'a' must lie in the interval;

(A) [1, 5] (B) [2, 5] (C) [5, 12] (D) $[12, \infty)$

6. There are n A.M's between 3 and 54, such that the 8th mean : $(n - 2)^{th}$ mean : : 3 : 5. The value of n is.

(A) 12 (B) 16 (C) 18 (D) 20

7. The third term of a G.P. is 4. The product of the first five terms is

(A) 4^3 (B) 4^5 (C) 4^4 (D) None of these

8. If S is the sum of infinity of a G.P. whose first term is 'a', then the sum of the first n terms is

(A) $S\left(1-\frac{a}{S}\right)^n$ (B) $S\left[1-\left(1-\frac{a}{S}\right)^n\right]$

(C) $a\left[1-\left(1-\frac{a}{S}\right)^n\right]$ (D) None of these

9. The sum of the series

$$\frac{1}{\log_2 4} + \frac{1}{\log_4 4} + \frac{1}{\log_8 4} + \ldots\ldots + \frac{1}{\log_{2^n} 4} \text{ is}$$

(A) $\frac{1}{2}n(n + 1)$ (B) $\frac{1}{12}n(n + 1)(2n + 1)$

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

10. For a sequence $\{a_n\}$, $a_1 = 2$ and $\frac{a_{n+1}}{a_n} = \frac{1}{3}$.
Then $\sum_{r=1}^{20} a_r$ is

(A) $\frac{20}{2}[4 + 19 \times 3]$ (B) $3\left(1-\frac{1}{3^{20}}\right)$

(C) $2(1 - 3^{20})$ (D) None of these

11. α, β be the roots of the equation $x^2 - 3x + a = 0$ and γ, δ the roots of $x^2 - 12x + b = 0$ and numbers $\alpha, \beta, \gamma, \delta$ (in this order) form an increasing G.P., then

(A) a = 3, b = 12 (B) a = 12, b = 3
(C) a = 2, b = 32 (D) a = 4, b = 16

12. If $3 + \frac{1}{4}(3 + d) + \frac{1}{4^2}(3 + 2d) + \ldots. + \text{upto } \infty = 8$, then the value of d is

(A) 9 (B) 5 (C) 1 (D) None of these

13. If A, G & H are respectively te A.M., G.M. & H.M. of three positive numbers a, b, & c then the equation whose roots are a, b & c is given by

(A) $x^3 - 3Ax^2 + 3G^3x - G^3 = 0$
(B) $x^3 - 3Ax^2 + 3(G^3/H)x - G^3 = 0$
(C) $x^3 + 3Ax^2 + 3(G^3/H)x - G^3 = 0$
(D) $x^3 - 3Ax^2 - 3(G^3/H)x + G^3 = 0$

14. If $a^x = b^y = c^z = d^t$ and a, b, c, d are in G.P., then x, y, z, t are in

(A) A.P. (B) G.P. (C) H.P. (D) None of these

15. The sum $\sum_{r=2}^{\infty}\frac{1}{r^2-1}$ is equal to

(A) 1 (B) 3/4 (C) 4/3 (D) None of these

16. If $x_i > 0$, i = 1, 2,....,50 ans $x_1 + x_2 + ...+x_{50} = 50$, then the minimum value of

$\frac{1}{x_1} + \frac{1}{x_2} + ...+ \frac{1}{x_{50}}$ equal to

(A) 50 (B) $(50)^2$ (C) $(50)^3$ (D) $(50)^4$

17. If a, a_1, a_2, a_3, ... , a_{2n}, b are in A.P. and a, g_1, g_2, g_3,.....g_{2n}, b are in G.P. and h is the harmonic mean of a and b, then $\frac{a_1+a_{2n}}{g_1g_{2n}} + \frac{a_2+a_{2n-1}}{g_2g_{2n-1}}$+........ .....+ $\frac{a_n+a_{n+1}}{g_ng_{n+1}}$, is equal to

(A) $\frac{2n}{h}$ (B) 2nh (C) nh (D) $\frac{n}{h}$

18. One side of an equilateral triangle is 24 cm. The mid–points of its sides are joined to form another triangle whose mid–points are in turn joined to form still another triangle. This process continues indefinitely. Then the sum of the perimeters of all the trianlges is

(A) 144 cm (B) 212 cm

(C) 288 cm (D) None of these

19. In a G.P. of positive terms, any term is equal to the sum of the next two terms. The common ratio of the G.P. is

(A) 2 cos 18º (B) sin 18º

(C) cos 18º (D) 2 sin 18º

20. If $\frac{1}{1^2}+\frac{1}{2^2}+\frac{1}{3^2}$ + ... upto $\infty = \frac{\pi^2}{6}$,

then $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}$ + ... =

(A) $\pi^2/12$ (B) $\pi^2/24$ (C) $\pi^2/8$ (D) None of these

21. If a_1, a_2....a_n are in A.P. with common difference $d \neq 0$, then the sum of the series

(sin d) [cosec a_1 cosec a_2 + cosec a_2 cosec a_3 +..... ......+ cosec a_{n-1} cosec a_n]

(A) sec a_1 – sec a_n (B) cosec a_1 – cosec a_n

(C) cot a_1 – cot a_n (D) tan a_1 – tan a_n

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) None of these

23. If $H_n = 1 + \frac{1}{2} + \frac{1}{3} + ... + \frac{1}{n}$, then value of

$1 + \frac{3}{2} + \frac{5}{3} + ... + \frac{2n-1}{n}$ is

(A) 2n – H_n (B) 2n + H_n (C) H_n – 2n (D) H_n + n

24. If S_1, S_2, S_3 are the sums of first n natural numbers, their squares, their cubes respectively, then $\frac{S_3(1+8S_1)}{S_2^2}$ is equal to

(A) 1 (B) 3 (C) 9 (D) 10

25. If a_1, a_2, ..., a_n are in HP, then the expression $a_1a_2 + a_2a_3 + ...+ a_{n-1}a_n$ is equal to

(A) (n – 1) (a_1 – a_n) (B) na_1a_n

(C) (n – 1)a_1a_n (D) n(a_1 – a_n)

26. If $x = \sum_{n=0}^{\infty} a^n$, $y = \sum_{n=0}^{\infty} b^n$, $z = \sum_{n=0}^{\infty} c^n$ where a, b, c are in AP and |a| < 1, |b| < 1, |c| < 1, then x, y, z are in

(A) HP (B) Arithmetic-Geometric Progression

(C) AP (D) GP

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

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

28. The sum to n term of the series

1(1!) + 2(2!) + 3(3!) + ...

(A) (n + 1) ! – 1 (B) (n – 1) ! – 1

(C) (n – 1) ! + 1 (D) (n + 1) ! + 1

29. The sum of all possible products of first n natural numbers taken two by two is

(A) $\frac{1}{24}$ n (n+1) (n–1) (3n+2) (B) $\frac{n(n+1)(2n+1)}{6}$

(C) $\frac{n(n+1)(2n-1)(n+3)}{24}$ (D) None of these

30. The sum to 10 terms of the series $\sqrt{2}+\sqrt{6}+\sqrt{18}+\sqrt{54}+\ldots$ is

(A) 121 $(\sqrt{6}+\sqrt{2})$ (B) $\frac{121}{2}(\sqrt{3}+1)$

(C) 243$(\sqrt{3}+1)$ (D) 243$(\sqrt{3}-1)$

31. If p is positive, then the sum to infinity of the series, $\frac{1}{1+p}-\frac{1-p}{(1+p)^2}+\frac{(1-p)^2}{(1+p)^3}-\ldots\ldots$ is

(A) 1/2 (B) 3/4 (C) 1 (D) None of these

32. If G_1 and G_2 and two geometric means and A is the arithmetic means inserted between two positive numbers then the value of $\frac{G_1^2}{G_2}+\frac{G_2^2}{G_1}$ is

(A) A/2 (B) A (C) 2A (D) None of these

33. $\{a_n\}$ and $\{b_n\}$ are two sequences given by

$a_n = (x)^{1/2^n}+(y)^{1/2^n}$ and $b_n = (x)^{1/2^n}-(y)^{1/2^n}$

for all $n \in N$. The value of $a_1\, a_2\, a_3 \ldots\ldots a_n$ is equal to

(A) x – y (B) $\frac{x+y}{b_n}$ (C) $\frac{x-y}{b_n}$ (D) $\frac{xy}{b_n}$

34. The positive integer n for which

$2 \times 2^2 + 3 \times 2^3 + 4 \times 2^4 + \ldots.. + n \times 2^n = 2^{n+10}$ is

(A) 510 (B) 511 (C) 512 (D) 513

35. If $1^2 + 2^2 + 3^2 + \ldots.. + 2003^2 = (2003)\,(4007)\,(334)$ and (1) (2003) + (2) (2002) + (3) (2001) +.... ....+ (2003) (1) = (2003) (334) (x)., then x equals

(A) 2005 (B) 2004 (C) 2003 (D) 2001

36. If x > 0, and $\log_2 x + \log_2(\sqrt{x}) + \log_2(\sqrt[4]{x}) + \log_2(\sqrt[8]{x}) + \log_2(\sqrt[16]{x}) + \ldots. = 4$, then x equals

(A) 2 (B) 3 (C) 4 (D) 5

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

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

38. If a, b, c are in A.P. p, q, r are in H.P. and ap, bq, cr are in G.P., then $\frac{p}{r}+\frac{r}{p}$ is equal to

(A) $\frac{a}{c}+\frac{c}{a}$ (B) $\frac{a}{c}-\frac{c}{a}$ (C) $\frac{b}{q}+\frac{q}{b}$ (D) $\frac{b}{q}-\frac{a}{p}$

39. The common difference d of the A.P. in which $T_7 = 9$ and $T_1T_2T_7$ is least is

(A) $\frac{33}{2}$ (B) $\frac{5}{4}$ (C) $\frac{33}{20}$ (D) None of these

40. The H.M. between two numbers is $\frac{16}{5}$, their A.M. is A and G.M. is G. If $2A + G^2 = 26$, then the numbers are

(A) 6, 8 (B) 4, 8 (C) 2, 8 (D) 1, 8

41. $1^2 + 2^2 + \ldots\ldots + n^2 = 1015$, then value of n is

(A) 15 (B) 14 (C) 13 (D) None of these

42. If 1, 2, 3.... are first terms; 1, 3, 5..... are common differences and S_1, S_2, S_3.... are sums of n terms of given p AP's; then $S_1 + S_2 + S_3 + \ldots. + S_p$ is equal to

(A) $\frac{np(np+1)}{2}$ (B) $\frac{n(np+1)}{2}$ (C) $\frac{np(p+1)}{2}$ (D) $\frac{np(np-1)}{2}$

43. If a and b are p^{th} and q^{th} terms of an AP, then the sum of its (p + q) terms is

(A) $\frac{p+q}{2}\left[a-b+\frac{a+b}{p-q}\right]$ (B) $\frac{p+q}{2}\left[a+b+\frac{a-b}{p-q}\right]$

(C) $\frac{p-q}{2}\left[a+b+\frac{a+b}{p+q}\right]$ (D) None of these

44. The sum of those integers from 1 to 100 which are not divisible by 3 or 5 is

(A) 2489 (B) 4735 (C) 2317 (D) 2632