

(1) 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 A.P. and  $|a| < 1$ ,  $|b| < 1$ ,  $|c| < 1$ , then  $x, y, z$  are in

- (a) G.P. (b) A.P. (c) Arithmetic-Geometric Progression (d) H.P. [ AIEEE 2005 ]

(2) The sum of the series  $1 + \frac{1}{4 \cdot 2!} + \frac{1}{16 \cdot 4!} + \frac{1}{64 \cdot 6!} + \dots$  ad inf. is

- (a)  $\frac{e-1}{\sqrt{e}}$  (b)  $\frac{e+1}{\sqrt{e}}$  (c)  $\frac{e-1}{2\sqrt{e}}$  (d)  $\frac{e+1}{2\sqrt{e}}$  [ AIEEE 2005 ]

(3) If  $S_n = \sum_{r=0}^n \frac{1}{{}^n C_r}$  and  $t_n = \sum_{r=0}^n \frac{r}{{}^n C_r}$ , then  $\frac{t_n}{S_n} =$

- (a)  $\frac{1}{2}n$  (b)  $\frac{1}{2}n - 1$  (c)  $n - 1$  (d)  $\frac{2n-1}{2}$  [ AIEEE 2004 ]

(4) Let  $T_r$  be the  $r$ th term of an A.P. whose first term is  $a$  and common difference is  $d$ . If for some positive integers  $m, n$ ,  $m \neq n$ ,  $T_m = \frac{1}{n}$  and  $T_n = \frac{1}{m}$ , then

- (a) 0 (b) 1 (c)  $\frac{1}{mn}$  (d)  $\frac{1}{m} + \frac{1}{n}$  [ AIEEE 2004 ]

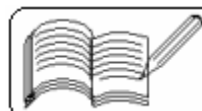
(5) The sum of the first  $n$  terms of he series

$1^2 + 2 \cdot 2^2 + 3^2 + 2 \cdot 4^2 + 5^2 + 2 \cdot 6^2 + \dots$  is  $\frac{n(n+1)^2}{2}$  when  $n$  is even. When  $n$  is odd, the sum is

- (a)  $\frac{3n(n+1)}{2}$  (b)  $\frac{n^2(n+1)}{2}$   
(c)  $\frac{n(n+1)^2}{4}$  (d)  $\left[ \frac{n(n+1)}{2} \right]^2$  [ AIEEE 2004 ]

(6) The sum of the series  $\frac{1}{2!} + \frac{1}{4!} + \frac{1}{6!} + \dots$  is

- (a)  $\frac{e^2-1}{2}$  (b)  $\frac{(e-1)^2}{2e}$  (c)  $\frac{e^2-1}{2e}$  (d)  $\frac{e^2-2}{e}$  [ AIEEE 2004 ]



(7) The sum of the series  $\frac{1}{1 \cdot 2} + \frac{1}{2 \cdot 3} + \frac{1}{3 \cdot 4} + \dots + \infty$  is

- (a)  $\log_e 2$     (b)  $2 \log_e 2$     (c)  $\log_e 2 - 1$     (d)  $\log_e \frac{4}{e}$     [ AIEEE 2003 ]

(8) If the sum of the roots of the quadratic equation  $ax^2 + bx + c = 0$  is equal to the sum of the squares of their reciprocals, then  $\frac{a}{c}, \frac{b}{a}, \frac{c}{b}$  are in

- (a) A. P.    (b) G. P.    (c) H. P.    (d) A. G. P.    [ AIEEE 2003 ]

(9) The value of  $1 \cdot 2 \cdot 3 + 2 \cdot 3 \cdot 4 + 3 \cdot 4 \cdot 5 + \dots + n$  terms is

- (a)  $\frac{n(n+1)(n+2)(n+3)}{12}$     (b)  $\frac{n(n+1)(n+2)(n+3)}{3}$   
(c)  $\frac{n(n+1)(n+2)(n+3)}{4}$     (d)  $\frac{(n+2)(n+3)(n+4)}{6}$     [ AIEEE 2002 ]

(10) If the third term of an A. P. is 7 and its 7th term is 2 more than three times of its third term, then the sum of its first 20 terms is

- (a) 228    (b) 74    (c) 740    (d) 1090    [ AIEEE 2002 ]

(11) An infinite G. P. has first term 'x' and sum 5, then

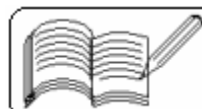
- (a)  $x \geq 10$     (b)  $0 < x < 10$     (c)  $x < -10$     (d)  $-10 < x < 0$     { IIT 2004 }

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

- (a)  $n(2c)^{1/n}$     (b)  $(n+1)c^{1/n}$     (c)  $2nc^{1/n}$     (d)  $(n+1)(2c)^{1/n}$     [ IIT 2002 ]

(13) Suppose a, b, c are in A. P. and  $a^2, b^2, c^2$ , are in G. P. If  $a < b < c$  and  $a + b + c = \frac{3}{2}$ , then the value of a is

- (a)  $\frac{1}{2\sqrt{2}}$     (b)  $\frac{1}{2\sqrt{3}}$     (c)  $\frac{1}{2} - \frac{1}{\sqrt{3}}$     (d)  $\frac{1}{2} - \frac{1}{\sqrt{2}}$     [ IIT 2002 ]



( 14 ) If the sum of the first  $2n$  terms of the A. P.  $2, 5, 8, \dots$ , is equal to the sum of the first  $n$  terms of the A. P.  $57, 59, 61, \dots$ , then  $n$  equals

- ( a ) 10      ( b ) 12      ( c ) 11      ( d ) 13      [ IIT 2001 ]

( 15 ) If the positive numbers  $a, b, c, d$  are in A. P., then  $abc, abd, acd, bcd$  are

- ( a ) not in A. P. / G. P. / H. P.      ( b ) in A. P.      ( c ) in G. P.      ( d ) in H. P.      [ IIT 2001 ]

( 16 ) If  $a, b, c, d$  are positive real numbers such that  $a + b + c + d = 2$ , then  $M = (a + b)(c + d)$  satisfies the relation

- ( a )  $0 \leq M \leq 1$       ( b )  $1 \leq M \leq 2$       ( c )  $2 \leq M \leq 3$       ( d )  $3 \leq M \leq 4$       [ IIT 2000 ]

( 17 ) Consider an infinite geometric series with first term  $a$  and common ratio  $r$ . If its sum is 4 and the second term is  $\frac{3}{4}$ , then  $a$  and  $r$  are

- ( a )  $\frac{4}{7}, \frac{3}{7}$       ( b )  $2, \frac{3}{8}$       ( c )  $\frac{3}{2}, \frac{1}{2}$       ( d )  $3, \frac{1}{4}$       [ IIT 2000 ]

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

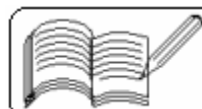
- ( a ) 2      ( b ) 3      ( c ) 5      ( d ) 6      [ IIT 1999 ]

( 19 ) If for a positive integer  $n$ ,  $a(n) = 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \dots + \frac{1}{2^n - 1}$ , then

- ( a )  $a(100) \leq 100$       ( b )  $a(100) > 100$   
( c )  $a(200) \leq 100$       ( d )  $a(200) > 100$       [ IIT 1999 ]

( 20 ) Let  $T_r$  be the  $r$ th term of an A. P., for  $r = 1, 2, 3, \dots$ . If for some positive integers  $m, n$ , we have  $T_m = \frac{1}{n}$  and  $T_n = \frac{1}{m}$ , then  $T_{mn}$  equals

- ( a )  $\frac{1}{mn}$       ( b )  $\frac{1}{m} + \frac{1}{n}$       ( c ) 1      ( d ) 0      [ IIT 1998 ]



(21) If  $x > 1$ ,  $y > 1$ ,  $z > 1$  are in G. P., then  $\frac{1}{1 + \ln x}$ ,  $\frac{1}{1 + \ln y}$ ,  $\frac{1}{1 + \ln z}$  are in  
(a) A. P. (b) H. P. (c) G. P. (d) None of these [ IIT 1998 ]

(22) If  $n > 1$  is a positive integer, then the largest integer  $m$  such that  $(n^m + 1)$  divides  $(1 + n + n^2 + \dots + n^{127})$  is  
(a) 127 (b) 63 (c) 64 (d) 32 [ IIT 1995 ]

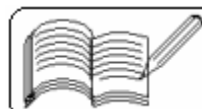
(23) The product of  $n$  positive numbers is unity. Then their sum is  
(a) a positive integer (b) divisible by  $n$   
(c) equal to  $n + \frac{1}{n}$  (d) never less than  $n$  [ IIT 1991 ]

(24) The sum of  $n$  terms of the series  $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} + \frac{15}{16} + \dots$  is equal to  
(a)  $2^n - n - 1$  (b)  $1 - 2^{-n}$  (c)  $n + 2^{-n} + 1$  (d)  $2^n - 1$  [ IIT 1988 ]

(25) If the first and the  $(2n - 1)$ th terms of an A. P., G. P. and H. P. are equal and their  $n$ th terms are  $a$ ,  $b$ ,  $c$  respectively, then  
(a)  $a = b = c$  (b)  $a \geq b \geq c$  (c)  $a + c = b$  (d)  $ac - b^2 = 0$  [ IIT 1988 ]

(26) If  $a$ ,  $b$ ,  $c$ ,  $d$  and  $p$  are distinct real numbers such that  $(a^2 + b^2 + c^2)p^2 - 2(ab + bc + cd)p + (b^2 + c^2 + d^2) \leq 0$ , then  $a$ ,  $b$ ,  $c$  and  $d$   
(a) are in A. P. (b) are in G. P. (c) are in H. P. (d) satisfy  $ab = cd$  [ IIT 1987 ]

(27) If  $a$ ,  $b$ ,  $c$  are in G. P., then the equations  $ax^2 + 2bx + c = 0$  and  $dx^2 + 2ex + f = 0$  have a common root if  $\frac{d}{a}$ ,  $\frac{e}{b}$ ,  $\frac{f}{c}$  are in  
(a) AP (b) GP (c) HP (d) none of these [ IIT 1985 ]



- (28) The third term of a geometric progression is 4. The product of the first five terms is  
(a)  $4^3$       (b)  $4^5$       (c)  $4^4$       (d) none of these [ IIT 1982 ]

- (29) If  $x_1, x_2, \dots, x_n$  are any real numbers and  $n$  is any positive integer, then

(a)  $n \sum_{i=1}^n x_i^2 < \left( \sum_{i=1}^n x_i \right)^2$       (b)  $n \sum_{i=1}^n x_i^2 \geq \left( \sum_{i=1}^n x_i \right)^2$   
(c)  $\sum_{i=1}^n x_i^2 \geq n \left( \sum_{i=1}^n x_i \right)^2$       (d) none of these [ IIT 1982 ]

- (30) If  $x, y$  and  $z$  are the  $p$ th,  $q$ th and  $r$ th terms respectively of an A.P. and also of a G.P., then  $x^{y-z} y^{z-x} z^{x-y}$  is equal to

(a)  $xyz$       (b) 0      (c) 1      (d) none of these [ IIT 1979 ]

- (31)  $\frac{1}{1 + \sqrt{x}}, \frac{1}{1 - x}$  and  $\frac{1}{1 - \sqrt{x}}$  are consecutive terms of a series in

(a) H. P.      (b) G. P.      (c) A. P.      (d) A. P., G. P.

- (32) If  $S_n = nP + \frac{1}{2}n(n-1)Q$ , where  $S_n$  denotes the sum of the first  $n$  terms of an A. P., then the common difference is

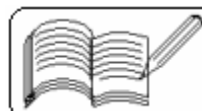
(a)  $P + Q$       (b)  $2P + 3Q$       (c)  $2Q$       (d)  $Q$

- (33) If  $S_n = n^3 + n^2 + n + 1$ , where  $S_n$  denotes the sum of the first  $n$  terms of a series and  $t_m = 291$ , then  $m =$

(a) 10      (b) 11      (c) 12      (d) 13

- (34) If the first term minus third term of a G.P. = 768 and the third term minus seventh term of the same G.P. = 240, then the product of first 21 terms =

(a) 1      (b) 2      (c) 3      (d) 4



(35) If the sequence  $a_1, a_2, a_3, \dots, a_n$  form an A. P., then  $a_1^2 - a_2^2 + a_3^2 - \dots + a_{2n-1}^2 - a_{2n}^2 =$

- (a)  $\frac{n}{2n-1} (a_1^2 - a_{2n}^2)$       (b)  $\frac{2n}{n-1} (a_{2n}^2 - a_1^2)$   
 (c)  $\frac{n}{n+1} (a_1^2 + a_{2n}^2)$       (d) None of these

(36) If  $T_r$  denotes  $r$ th term of an H. P. and  $\frac{T_1 - T_4}{T_6 - T_9} = 7$ , then  $\frac{T_2 - T_5}{T_{11} - T_8} =$

- (a) 5      (b) 6      (c) 7      (d) 8

(37) The sum of any ten positive real numbers multiplied by the sum of their reciprocals is

- (a)  $\geq 10$       (b)  $\geq 50$       (c)  $\geq 100$       (d)  $\geq 200$

(38) If  $S_n$  denotes the sum of first  $n$  terms of an A. P. and  $S_{2n} = 3S_n$ , then the ratio  $\frac{S_{3n}}{S_n}$  is equal to

- (a) 4      (b) 6      (c) 8      (d) 10

(39) If  $a, b, c$  are three unequal positive quantities in H. P., then

- (a)  $a^{10} + c^{10} < 2b^{10}$       (b)  $a^{20} + c^{20} < 2b^{20}$   
 (c)  $a^3 + c^3 < 2b^3$       (d) none of these

**Answers**

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
d	d	a	a	b	b	d	c	c	c	b	a	d	c	d	a	d	d	a,d	c
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
b	c	d	c	b,d	b	a	b	d	c	c	d	a	a	a	b	c	b	d	

