(1) If $x=\sum_{n=0}^{\infty} a^{n}, y=\sum_{n=0}^{\infty} b^{n}, \quad z=\sum_{n=0}^{\infty} c^{n}$, 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.
(2) The sum of the series $1+\frac{1}{4 \cdot 2!}+\frac{1}{16 \cdot 4!}+\frac{1}{64 \cdot 6!}+$
(a) $\frac{e-1}{\sqrt{e}}$
(b) $\frac{e+1}{\sqrt{e}}$
(c) $\frac{e-1}{2 \sqrt{e}}$
(d)

[ AIEEE 2005]
(3) If $S_{n}=\sum_{r=0}^{n} \frac{1}{{ }^{n} C_{r}}$ and $t_{n}=\sum_{r=0}^{n} \frac{r}{n^{n}}$, then $\frac{T_{n}}{S_{n}}=$
(a) $\frac{1}{2} n$
(b) $\frac{1}{2} n-1$
(c) 解
d) $\frac{2 n-1}{2}$
[ AIEEE 2004]
(4) Let $T_{r}$ be the rth term whose first term is a and common difference is d. If for some positive inteq irs $m, n, m \neq n, T_{m}=\frac{1}{n}$ and $T_{n}=\frac{1}{m}$, then
(a) 0
(b) $1 \rightarrow \frac{1}{m n}$
(d ) $\frac{1}{m}+\frac{1}{n}$
[ AIEEE 2004]
(5) The sup oi the rist $n$ terms of he series
$1^{2} 2^{2}+3^{2}+2 \cdot 4^{2}+5^{2}+2 \cdot 6^{2}+\ldots \ldots$ is $\frac{n(n+1)^{2}}{2}$ when $n$ is
When $n$ is odd, the sum is
(a) $\frac{3 n(n+1)}{2}$
(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 $\frac{1}{2!}+\frac{1}{4!}+\frac{1}{6!}+\ldots .$. is
(a) $\frac{e^{2}-1}{2}$
(b) $\frac{(e-1)^{2}}{2 e}$
(c) $\frac{e^{2}-1}{2 e}$
(d) $\frac{e^{2}-2}{e}$
[ AIEEE 2004]
(7) The sum of the series $\frac{1}{1 \cdot 2}-\frac{1}{2 \cdot 3}+\frac{1}{3 \cdot 4}-\ldots \ldots \infty$ is
(a) $\log _{e} 2$
(b) $2 \log _{e} 2$
(c) $\log _{e} 2-1$
(d) $\log _{e} \frac{4}{e}$

2003 ]
(8) If the sum of the roots of the quadratic equation $a x^{2}+b x+c=d$ is $e$ ual 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
1.2.3 + 2. $3.4+$
3. 4.5
(b)

[ AIEEE 2002]
(10) If the third term of an third term, then the sum
(a) 228
(b) 7 (c) 40
(a) $\frac{n(n+1)(n+2)(n+3)}{12}$
(c) $\frac{n(n+1)(n+2)(n+3)}{4}$
(11) An infinite
G. P. irst term ' $x$ ' and sum 5, then
(a) $x$
(b) $0<x<10$
(c) $x<-10$
(d) $-10<x<0$
\{ IIT 2004 \}
and its 7 th term is 2 more than three times of its 20 terms is
(4) 1090
[ AIEEE 2002]
the minnum value of $a_{1}+a_{2}+\ldots+a_{n-1}+2 a_{n}$ is
(a) $n(2 c)^{1 / n}$
(b) $(n+1) c^{1 / n}$
(c) $2 n^{1 / n}$
(d) $(n+1)(2 c)^{1 / n}$
[ 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 $2 n$ terms of the A. P. $2,5,8, \ldots \ldots$, 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
(15) If the positive numbers $a, b, c, d$ are in A. P., then abc, abd, acd (a) not in A. P./G. P./H. P. (b) in A. P. (c) in G. P.
(d) $P$.
(16) If $a, b, c, d$ are positive real numbers sucb ct $+b+c+d=2$, then $M=(a+b)(c+d)$ satisfies the relation
(a) $0 \leq M \leq 1$
(b) $\mathbf{1} \leq \mathrm{M} \leq 2$
(c) $2 \leq M$
3 (a) $3 \leq M \leq 4$
[ IIT 2000]
(17) Consider an infinite geometric series hat ficm a and common ratio r. If its sum is 4 and the second term is $\frac{3}{4}$, $a$ nd $r$ are
(a) $\frac{4}{7}, \frac{3}{7}$
(b)
2,8
(c) $\frac{3}{2}, \frac{1}{2}$
(d) $3, \frac{1}{4}$
[ IIT 2000]
(18)

A. P. and $h_{1}, h_{2}, \ldots, h_{10}$ be in H. P. If $a_{1}=h_{1}=2$ and
(a) 2
(b) ${ }^{3}$
(c) 5
(d) 6
[ IIT 1999]
(19) ${ }^{\text {a }}$ positive integer $n, a(n)=1+\frac{1}{2}+\frac{1}{3}+\frac{1}{4}+\ldots . .+\frac{1}{2^{n}-1}$, 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 $r=1,2,3, \ldots$ If for some positive integers $m, n$, we have $T_{m}=\frac{1}{n}$ and $T_{n}=\frac{1}{m}$, then $T_{m n}$ equals
(a) $\frac{1}{m n}$
(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

1998 ]
(22) If $n>1$ is a positive integer, then the largest integer $m$ such that ( $n$ $\left(1+n+n^{2}+\cdots+n^{127}\right)$ is
(a) 127
(b) 63
(c) 64
(d) 32
[ IIT 1995]
(23) The product of $n$ positive numbers is unity. Then sur en is
(a) a positive integer
(b) divisible by
(c) equal to $n+\frac{1}{n}$
(d) never
[ IIT 1991]
(24) The sum of $n$ terms of the st $\frac{3}{2}+\frac{7}{8}+\frac{15}{16}+\ldots .$. is equal to
(a) $2^{n}-n-1$
(b)
(c) $n+2^{-n}+1$ (d) $2^{n}-1$
[ IIT 1988]
(25) If the first and (h) 1 )th terms of an A.P., G. P. and H. P. are equal and their nth terms are a, respectively, then
(a) a ${ }^{\circ}$
(b) $\mathrm{a} \geq \mathrm{b} \geq \mathrm{c}$
(c) $a+c=b$
(d) ac- $b^{2}=0$
[ IIT 1988]
( $2 \mathrm{~A}, \mathrm{a}, \mathrm{c}, \mathrm{d}$ and p are distinct real numbers such that
$\left.+b^{2}+c^{2}\right) p^{2}-2(a b+b c+c d) p+\left(b^{2}+c^{2}+d^{2}\right) \leq 0$, 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 $a x^{2}+2 b x+c=0$ and $d x^{2}+2 e x+f=0$ 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 $x_{1}, x_{2}, \ldots ., x_{n}$ are any real numbers and $n$ is any positive integer,
(a) $n \sum_{i=1}^{n} x_{i}^{2}<\left(\sum_{i=1}^{n} x_{i}\right)^{2}$
(b) $\sum_{i=1}^{n} x_{i}^{2} \geq\left(\sum_{i=1}^{n} x_{i}\right)^{2}$
(c) $\sum_{i=1}^{n} x_{i}{ }^{2} \geq n\left(\sum_{i=1}^{n} x_{i}\right)^{2}$
(d) none of these
(30) If $x, y$ and $z$ are the $p$ th, $q$ th and $r$ th erf repectively of an A.P. and also of a
[ IIT 1982] G. P., then $x^{y-z} y^{z-x} z^{x-y}$ is equal
(a) $x y z$
(b) 0
(c) 1
ne of these
[ IIT 1979]
(31) $\frac{1}{1+\sqrt{x}}, \frac{1}{1-x}$ and are consecutive terms of a series in
(a) H.P.
(b) G. $\quad(c)$
A. P.
(d)
A. P., G. P.

(32)

If $S_{n} n^{n}+\frac{1}{2} n(n-1) Q$, where $S_{n}$ denotes the sum of the first $n$ terms of an $A$, th $n$ we common difference is
(b) $2 P+3 Q$
(c) $2 Q$
(d) Q

If $S_{n}=n^{3}+n^{2}+n+1$, where $S_{n}$ denotes the sum of the first $n$ terms of a series and $\mathbf{t}_{\mathrm{m}}=291$, then $\mathrm{m}=$
(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 $a_{1}, a_{2}, a_{3}, \ldots a_{n}$ form an A. P., then $a_{1}{ }^{2}-a_{2}{ }^{2}+a_{3}{ }^{2}-\ldots+a_{2 n-1}{ }^{2}-a_{2 n}{ }^{2}=$
(a) $\frac{n}{2 n-1}\left(a_{1}{ }^{2}-a_{2 n}{ }^{2}\right)$
(b) $\frac{2 n}{n-1}\left(a_{2 n}{ }^{2}-a_{1}{ }^{2}\right)$
(c) $\frac{n}{n+1}\left(a_{1}{ }^{2}+a_{2 n}{ }^{2}\right)$
(d) None of these
(36) If $T_{r}$ denotes rth term of an H.P. and $\frac{T_{1}-T_{4}}{T_{6}-T_{9}}=$
(a) 5
(b) 6
(c) 7
(d) 8
(37) The sum of any ten positive real numind $n$ (lti/lied by the sum of their reciprocals is
(a) $\geq 10$
(b) $\geq 50$
(c
(d) $\geq 200$
(38) If $S_{n}$ denotes the sum of ${ }^{\text {(1)t, }}$ terms of an A.P. and $S_{2 n}=3 S_{n}$, then the ratio $\frac{S_{3 n}}{S_{n}}$ is equal to
(a) 4

(d) 10
(39) If $a, b,+1$ three unequal positive quantities in H. P., then

$$
\begin{array}{ll}
a^{10}+c^{10}<2 b^{10} & \text { (b) } a^{20}+c^{20}<2 b^{20} \\
3^{3}+c^{3}<2 b^{3} & \text { (d) none of these }
\end{array}
$$

## 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 |  |

