Progression and Series

JEE-MAINS (PREVIOUS YEAR)

MCQ-Single Correct

1. For any three positive real numbers a, b and c, $9(25a^2+b^2)+25(c^2-3ac)=15b(3a+c)$. Then :

(1) b, c and a are in G.P. (2) b, c and a are in A.P.

(3) a, b and c are in A.P. (4) a, b and c are in G.P. **[2017]**

2. If the 2nd, 5th and 9th terms of a non-constant A.P. are in G.P., then the common ratio of this G.P. is:

(1) $\frac{4}{3}$ (2) 1

(3) $\frac{7}{4}$ (4) $\frac{8}{5}$ **[2016]**

3. If the sum of first ten terms of the series $\left(1\frac{3}{5}\right)^2+\left(2\frac{2}{5}\right)^2+\left(3\frac{1}{5}\right)^2+4^2+\left(4\frac{4}{5}\right)^2+......$ is $\frac{16}{5}m$, then m is equal to :

(1) 101 (2) 100

(3) 99 (4) 102 **[2016]**

4. The sum of first 9 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 :

(1) 96 (2) 142

(3) 192 (4) 71 **[2015]**

5. If m is the A.M. of two distinct real numbers l and n $(l, n>1)$ and G_1, G_2 and G_3 are three geometric means between l and n, then $G_1^4+2G_2^4+G_3^4$ equals

(1) $4lm^2n$ (2) $4lmn^2$

(3) $4l^2m^2n^2$ (4) $4l^2mn$ **[2015]**

6. Three positive numbers from an increasing G.P. If the middle term in this G.P. is doubled, the new numbers are in A.P. Then the common ratio of the G.P. is

(1) $\sqrt{2}+\sqrt{3}$ (2) $3+\sqrt{2}$

(3) $2-\sqrt{3}$ (4) $2+\sqrt{3}$ **[2014]**

7. If $(10)^9 + 2(11)^1(10)^8 + 3(11)^2(10)^7 + ... + 10(11)^9 = k(10)^9$, then k is equal to

(1) $\frac{121}{10}$ (2) $\frac{441}{100}$

(3) 100 (4) 110 **[2014]**

8. The sum of first 20 terms of the sequence 0.7, 0.77, 0.777, ... , is

(1) $\frac{7}{9}(99-10^{-20})$ (2) $\frac{7}{81}(179+10^{-20})$

(3) $\frac{7}{9}(99+10^{-20})$ (4) $\frac{7}{81}(179-10^{-20})$ **[2013]**

9. If 100 times the 100th term of an AP with non-zero common difference equals the 50 times its 50th term, then the 150th term of this AP is

(1) 150 (2) Zero

(3) -150 (4) 150 times its 50th term. **[2012]**

10. Let a_n be the n^{th} term of an AP . If $\sum_{r=1}^{100} a_{2r} = \alpha$ and $\sum_{r=1}^{100} a_{2r-1} = \beta$, then the common difference of the A.P. is

(1) $\beta - \alpha$ (2) $\frac{\alpha - \beta}{200}$

(3) $\alpha - \beta$ (4) $\frac{\alpha - \beta}{100}$ **[2011]**

11. A person is to count 4500 currency notes. Let a_n denote the number of notes he counts in the n^{th} minute. If $a_1 = a_2 = ... = a_{10} = 150$ and $a_{10,} a_{11}, ...$ are in A.P. with common difference -2, then the time taken by him to count all notes is

(1) 34 minutes (2) 125 minutes

(3) 135 minutes (4) 24 minutes **[2010]**

12. The sum to the infinity of the series $1 + \frac{2}{3} + \frac{6}{3^2} + \frac{10}{3^3} + \frac{14}{3^4} + ...$ is

(1) 2 (2) 3

(3) 4 (4) 6 **[2009]**

13. The first two terms of a geometric progression add up to 12. The sum of the third and the fourth terms is 48. If the terms of the geometric progression are alternately positive and negative, then the first term is

(1) -4 (2) -12

(3) 12 (4) 4 **[2008]**

14. In a geometric progression consisting of positive terms, each term equals the sum of the next two terms. Then the common ratio of this progression equals

(1) $\frac{1}{2}\left(1-\sqrt{5}\right)$ (2) $\frac{1}{2}\sqrt{5}$

(3) $\sqrt{5}$ (4) $\frac{1}{2}\left(\sqrt{5}-1\right)$ **[2007]**

15. If p and q are positive real numbers such that $p^2+q^2=1$, then the maximum value of $(p+q)$ is

(1) 2 (2) ½

(3) $\frac{1}{\sqrt{2}}$ (4) $\sqrt{2}$ **[2007]**

16. Let $a_1, a_2, a_3, ...$ be terms of an A.P. If $\frac{a_1+a_2+......+a_p}{a_1+a_2+......+a_q}=\frac{p^2}{q^2}$, $p \neq q$, then $\frac{a_6}{a_{21}}$ equals

(1) $\frac{41}{11}$ (2) $\frac{7}{2}$

(3) $\frac{2}{7}$ (4) $\frac{11}{41}$ **[2006]**

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

(1) $n\left(a_1-a_n\right)$ (2) $(n-1)\left(a_1-a_n\right)$

(3) $n\,a_1a_n$ (3) $(n-1)a_1a_n$ **[2006]**

18. If the coefficients of r^{th}, $(r+1)^{th}$ and $(r+2)^{th}$ terms in the binomial expansion of $(1+y)^m$ are in A.P. , then m and r satisfy the equation

(1) $m^2-m(4r-1)+4r^2-2=0$ (2) $m^2-m(4r+1)+4r^2+2=0$

(3) $m^2-m(4r+1)+4r^2-2=0$ (4) $m^2-m(4r-1)+4r^2+2=0$ **[2005]**

19. 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

(1) G.P. (2) A.P.

(3) Arithmatic-Geometric Progression (4) H.P. **[2005]**

20. If in a triangle ABC, the altitudes from the vertices A,B,C on opposite sides are in H.P., then sin A, sin B, sin C are in

(1) G.P. (2) A.P.

(3) Arithmatic-Geometric Progression (4) H.P. **[2005]**

21. Let two numbers have arithmetic mean 9 and geometric mean 4. Then these numbers are the roots of the quadratic equation

(1) $x^2+18x+16=0$ (2) $x^2-18x-16=0$

(3) $x^2+18x-16=0$ (4) $x^2-18x+16=0$ **[2004]**

22. 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 – d equals

(1) 0 (2) 1

(3) $\frac{1}{mn}$ (4) $\frac{1}{m}+\frac{1}{n}$ **[2004]**

23. The sum of the first n terms of the series $1^2+2.2^2+3^2+2.4^2+5^2+2.6^2+...$ is $\frac{n(n+1)^2}{2}$ when n is even. When n is odd the sum is

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

(3) $\frac{n(n+1)^2}{4}$ (4) $\left[\frac{n(n+1)}{2}\right]^2$ **[2004]**

24. Let f(x) be a polynomial function of second degree. If f(1)=f(-1) and a,b,c are in A.P., then f'(a), f'(b) and f'(c) are in

(1) A.P. (2) G.P.

(3) H.P. (4) Arithmatic-Geometric Progression **[2003]**

25. If x_1,x_2,x_3 and y_1,y_2,y_3 are both in G.P. with the same common ratio, then the points (x_1,y_1), (x_2,y_2) and (x_3,y_3)

(1) lie on a straight line (2) lie on an ellipse

(3) lie on a circle (4) are vertices of a triangle **[2003]**

26. The real number x when added to its inverse gives the minimum value of the sum of x equal to

(1) 2 (2) 1

(3) -1 (4) -2 **[2003]**

27. Let R_1 and R_2 respectively be the maximum ranges up and down an inclined plane and R be the maximum range on the horizontal plane. Then R_1,R,R_2 are in

(1) arithmetic-geometric progression (2) A.P.

(3) G.P. (4) H.P. **[2003]**

28. If 1, $\log_9\left(3^{1-x}+2\right)$, $\log_3\left[4.3^x-1\right]$ are in A.P. , then x equals

(1) $\log_3 4$ (2) $1-\log_3 4$

(3) $1-\log_4 3$ (4) $\log_4 3$ **[2002]**

29. $1^3 - 2^3 + 3^3 - 4^3 + ... + 9^3$ is equal to

(1) 425 (2) -425

(3) 475 (4) -475 **[2002]**

30. Sum of infinite number of terms in G.P. is 20 and sum of their squares is 100. The common ratio of G.P. is

(1) 5 (2) $\frac{3}{5}$

(3) $\frac{8}{5}$ (4) $\frac{1}{5}$ **[2002]**

31. The value of $2^{1/4}.4^{1/n}.8^{1/6}.....\infty$ is

(1) 1 (2) 2

(3) 3/2 (4) 4 **[2002]**

32. Fifth term of a G.P. is 2, then the product of its 9 terms is

(1) 256 (2) 512

(3) 1024 (4) none of these **[2002]**

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

(1) less than 1 (2) equal to 1

(3) greater than 1 (4) any real number **[2002]**

Assertion-Reason Type

(1) Statement-I is True; Statement-II is true; Statement-II is **not** a correct explaination of Statement-I.
(2) Statement-I is True; Statement-II is False.
(3) Statement-I is False; Statement-II is true
(4) Statement-I is True; Statement-II is true; Statement-II is a **correct** explaination of Statement-I.

1. **Statement-I** : The sum of the series 1+ (1 +2 +4) + (4 + 6 + 9) + (9 + 12 + 16) + …… + (361 + 380 + 400) is 8000.

Statement-II : $\sum_{k=1}^{n}\left(k^3-(k-1)^3\right)=n^3$ for any natural number n. **[2012]**