doubtnut
India's Number 1 Education App

MATHS

BOOKS - KC SINHA MATHS (HINGLISH)

ALGEBRA - JEE MAINS AND ADVANCED QUESTIONS - FOR COMPETITION

Exercise

1. If ω is an imaginary cube root of unity, then $(1+\omega-\omega^2)^7$ is equal to

128ω (b) -128ω $128\omega^2$ (d) $-128\omega^2$

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2. Let z_1 and z_2 be theroots of the equation $z^2+az+b=0$ z being complex. Further, assume that the origin z_1 and z_2 form an equilateral triangle then (A) $a^2 = 4b$ (B) $a^2 = b$ (C) $a^2 = 2b$ (D) $a^2 = 3b$

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3. If z and ω are two non-zero complex numbers such that $|z\omega| = 1$ and $arg(z) - arg(\omega) = \frac{\pi}{2}$, then $\bar{z}\omega$ is equal to

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4. If $\left(\frac{1+i}{1-i}\right)^x = 1$ then (A) $x = 2n + 1$, where n is any positive ineger (B) $x = 4n$, where n is any positive integer (C) $x = 2n$ where n is any positive integer (D) $x = 4n + 1$ where n is any positive integer

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5. Let z, w be complex numbers such that $\bar{z} + i\overline{w} = 0$ and $argzw = \pi$ Then $argz$ equals

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6. If $z = x - iy$ and $z'^{\frac{1}{3}} = p + iq$, then $\dfrac{1}{p^2 + q^2}\left(\dfrac{x}{p} + \dfrac{y}{q}\right)$ is equal to

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7. If $\left|z^2 - 1\right| = |z|^2 + 1$, then z lies on (a) a circle (b) the imaginary axis (c) the real axis (d) an ellipse

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8. If the cube roots of unity are $1, \omega, \omega^2$, then the roots of the equation $(x-1)^3 + 8 = 0$ are : (a) $-1, 1 + 2w, 1 + 2w^2$ (b) $-1, 1 - 2w, 1 - 2w^2$ (c) $-1, -1, -1$ (d) $1, w, w^2$

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9. If z_1 and z_2 are two non zero complex number such that $|z_1 + z_2| = |z_1| + |z_2|$ then $arg z_1 - arg z_2$ is equal to (A) $-\frac{\pi}{2}$ (B) 0 (C) $-\pi$ (D) $\frac{\pi}{2}$

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10. If $w = \frac{z}{z - \frac{1}{3}i}$ and |w| =1, then z lies on

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11. $\sum_{k=1}^{10} \left(\frac{\sin(2k\pi)}{11} + i \frac{\cos(2k\pi)}{11} \right)$

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12. If $z^2 + z + 1 = 0$ where z is a complex number, then the value of $\left(z + \frac{1}{z}\right)^2 + \left(z^2 + \frac{1}{z^2}\right)^2 + \ldots. + \left(z^6 + \frac{1}{z^6}\right)^2$ is

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13. If $|z+4| \leq 3$, then the maximum value of $|z+1|$ is (1) 4 (B) 10 (3) 6 (4) 0

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14. The conjugate of a complex number is $\frac{1}{i-1}$. Then the complex number is (1) $\frac{-1}{i-1}$ (2) $\frac{1}{i+1}$ (3) $\frac{-1}{i+1}$ (4) $\frac{1}{i-1}$

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15. If the roots of the equation $bx^2+cx+a=0$ be imaginary, then for all real values of x, the expression $3b^2x^2+6bcx+2c^2$ is (1) greater than 4ab (2) less than 4ab (3) greater than $4ab$ (4) less than $4ab$

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16. If $\left|z-\frac{4}{z}\right|=2$, then the maximum value of $|Z|$ is equal to (1) $\sqrt{3}+1$ (2) $\sqrt{5}+1$ (3) 2 (4) $2+\sqrt{2}$

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17. If α and β are the roots of the equation $x^2-x+1=0$, then $\alpha^{2009}+\beta^{2009}=\ -1$ (b) 1 (c) 2 (d) -2

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18. The number of complex numbers z such that $|z-1|=|z+1|=|z-i|$ is

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19. Let α, β be real and z be a complex number. If $z^2+\alpha z+\beta=0$ has two distinct roots on the line Re $z=1$, then it is necessary that : (1)

$b \in (0, 1)$ (2) $b \in (-1, 0)$ (3) $|b| = 1$ (4) $b \in (1, \infty)$

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20. If $\omega(\neq 1)$ is a cube root of unity, and $(1+\omega)^7 = A + B\omega$. Then (A, B) equals (1) (0, 1) (2) (1, 1) (3) (1, 0) (4) $(-1, 1)$

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21. If $z \neq 1$ and $\dfrac{z^2}{z-1}$ is real, then the point represented by the complex number z lies (1) either on the real axis or on a circle passing through the origin (2) on a circle with centre at the origin (3) either on the real axis or on a circle not passing through the origin (4) on the imaginary axis

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22. If z is a complex number of unit modulus and argument q, then $arg\left(\dfrac{1+z}{1+\bar{z}}\right)$ equal (1) $\dfrac{\pi}{2} - \theta$ (2) θ (3) $\pi - \theta$ (4) $-\theta$

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23. If z is a complex number such that $|z| \geq 2$, then the minimum value of $\left|z + \frac{1}{2}\right|$ (1) is equal to $\frac{5}{2}$ (2) lies in the interval (1, 2) (3) is strictly greater than $\frac{5}{2}$ (4) is strictly greater than $\frac{3}{2}$ but less than $\frac{5}{2}$

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24. A complex number z is said to be unimodular if . Suppose z_1 and z_2 are complex numbers such that $\frac{z_1 - 2z_2}{2 - z_1 z_2}$ is unimodular and z_2 is not unimodular. Then the point z_1 lies on a : (1) straight line parallel to x-axis (2) straight line parallel to y-axis (3) circle of radius 2 (4) circle of radius $\sqrt{2}$

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25. A value of for which $\frac{2+3i\sin\theta}{1-2i\sin\theta}$ purely imaginary, is : (1) $\frac{\pi}{3}$ (2) $\frac{\pi}{6}$ (3) $\sin^{-1}\left(\frac{\sqrt{3}}{4}\right)$ (4) $\sin^{-1}\left(\frac{1}{\sqrt{3}}\right)$

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26. Let ω be a complex number such that $2\omega+1=z$ where $z=\sqrt{-3.}$ $If\left|1111-\omega^2-1\omega^2 1\omega^2\omega^7\right|=3k,$ then$k$ is equal to : -1 (2) 1 (3) $-z$ (4) z

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27. If ω is a non-real complex cube root of unity and $\left(5+3\omega^2-5\omega\right)^{4n+3}+\left(5\omega+3-5\omega^2\right)^{4n+3}+\left(5\omega^2+3\omega-5\right)^{4n+3}=0,$ then possible value of n is

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28. let

$z = \frac{-1+\sqrt{3i}}{2}, where i = \sqrt{-1}$ and $r, s \varepsilon P 1, 2, 3 \Big\}. Let P = \begin{bmatrix} (-z)^r & z \\ z^{2s} & z \end{bmatrix}$

and I be the idenfity matrix or order 2. Then the total number of ordered pairs (r,s) or which $P^2 = -I$ is

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29. Let $a, b, x and y$ be real numbers such that $a - b = 1 and y \neq 0$. If the complex number $z = x + iy$ satisfies $Im\left(\frac{az+b}{z+1}\right) = y$, then which of the following is (are) possible value9s) of x?| $-1 - \sqrt{1-y^2}$ (b) $1 + \sqrt{1+y^2}$ $-1 + \sqrt{1-y^2}$ (d) $-1 - \sqrt{1+y^2}$

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30. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3, \beta^2 = 5\beta - 3,$ then find the equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$.

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31. The number of real roots of $3^{2}x^{2} - 7x + 7 = 9$ is (A) 0 (B) 2 (C) 1 (D) 4

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32. If the sum of the roots of the quadratic equation $ax^{2} + bx + c = 0$ is equl to the sum of the squares of their reciprocals, then prove that $\frac{a}{c}, \frac{b}{a} and \frac{c}{b}$ are in H.P.

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33. If $a \neq b$ and differences between the roots of the equations $x^{2} + ax + b = 0$ and $x^{2} + bx + a = 0$ is the same then (A) $a + b + 4 = 0$ (B) $a + b - 4 = 0$ (C) $a - b + 4 = 0$ (D) $a - b - 4 = 0$

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34. If $2a+3b+6c=0,$ then prove that at least one root of the equation $ax^2+bx+c=0$ lies in the interval (0,1).

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35. Product of real roots of the equation $t^2x^2+|x|+9=0$ a. is always +ve b. is always-ve c. does not exist d. none of these

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36. The number of real solutions of the equation $|x|^2-3|x|+2=0$ is (1982, 1M) 4 (b) 1 (c) 3 (d) 2

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37. The value of a for which one root of the quadratic equation $(a^2-5a+3)x^2+(3a-1)x+2=0$ is twice the other is (A) $-\frac{1}{3}$ (B)

$\frac{2}{3}$ (C) $\frac{2}{3}$ (D) $\frac{1}{3}$

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38. If $(1-p)$ is a root of quadratic equation $x^2 + px + (1-p) = 0$, then find its roots.

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39. If one root of the equation $x^2 + px + 12 = 0$ is 4. while the equation $x^3 + px + q = 0$has equal roots, then the value of q is

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40. Let two numbers have arithmetic mean 9 and geometric mean 4. Then these numbers are theroots o the equation (A) $x^2 + 18x + 16 = 0$ (B) $x^2 - 18x + 16 = 0$ (C) $x^2 + 18x - 16 = 0$ (D) $x^2 - 18x - 16 = 0$

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41. If $2a+3b+6c=0,$ then prove that at least one root of the equation $ax^2+bx+c=0$ lies in the interval (0,1).

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42. A triangle $PQR, \angle R=90^\circ$ and $\tan\left(\frac{P}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ roots of the $ax^2+bx+c=0$ then prove that $a+b=c$

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43. If the roots of $x^2-bx+c=0$ are two consecutive integers, then b^2-4c is 0 (b) 1 (c) 2 (d) none of these

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44. If both the roots of the quadratic equa,tion $x^2 - 2kx + k^2 + k - 5 = 0$ are less than 5 then k lies i the interval (A) $[4, 5]$ (B) $9 - \infty, 4)$ (C) $6, \infty)$ (D) $95, 6]$

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45. Find the value of a for which the sum of the squares of the roots of the equation $x^2 - (a - 2)x - a - 1 = 0$ assumes the least value.

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46. All the values of m for whilch both the roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ are greater than -2 but less than 4 lie in the interval `-23c. -1

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47. If the roots of the equation $x^2 + px - q = 0$ are $\tan 30^\circ$ and $\tan 15^\circ$ then the value of 2-q-p is

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48. If the difference between the roots of the equation $x^2 + ax + 1 = 0$ is less than $\sqrt{5}$, then the set of possible values of a is (1) $(-3, 3)$ (2) $(-3, \infty)$ (3) $(3, \infty)$ (4) $(-\infty, -3)$

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49. The quadratic equations $x^2 6x + a = 0 and x^2 cx + 6 = 0$ have one root in common. The other roots of the first and second equations are integers in the ratio 4 : 3. Then the common root is (1) 1 (2) 4 (3) 3 (4) 2

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50. Let for a a! 0, f(x)-ax2 + bx + c, g(x) = aix? + bix + c, and p(x)-f(x)-g(x). If p(x) = 0 only for x =-1 and p(-2) = 2, then the value of p(2) is: (1) 18 (2) 3 AIEEE-2011] (3) 9 (4) 6

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51. 8. Sachin and Rahul attempted to solve a quadratic equation. Sachin made a mistake in writing down the constant term and ended up in roots (4,3). Rahul made a mistake in writing down coefficient of x to get roots (3, 2). The correct roots of equation are:

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52. The real number k for which the equation, $2x^3 + 3x + k = 0$ has two distinct real roots in [0, 1] (1) lies between 2 and 3 (2) lies between -1 and 0 (3) does not exist (4) lies between 1 and 2

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53. If the equations $x^2 + 2x + 3 = 0$ and $ax^2 + bx + c = 0, a, b, c \in R$, have a common root, then $a : b : c$ is (1) 3 : 2 : 1 (2) 1 : 3 : 2 (3) 3 : 1 : 2 (4) 1 : 2 : 3

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54. Let α and β be the roots of equation $px^2 + qx + r = 0, p \neq 0.$ If p, q, r are in A.P and $\frac{1}{\alpha} + \frac{1}{\beta} = 4$ then the value of $|\alpha - \beta|$ is (a) $\frac{\sqrt{34}}{9}$ (b) $\frac{2\sqrt{13}}{9}$ (c) $\frac{\sqrt{16}}{9}$ (d) $\frac{2\sqrt{17}}{9}$

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55. Let α and β be the roots of equation $x^2 - 6x - 2 = 0$. If $a_n = \alpha^n - \beta^n, f \text{ or } n \geq 1$, then the value of $\frac{a_{10} - 2a_8}{2a_9}$ is equal to: (1) 6 (2)-6 (3) 3 (4) -3

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56. The sum of all real values of x satisfying the equation $\left(x^2 - 5x + 5\right)^{x^2 + 4x - 60} = 1$ is: (A) 5 (B) 3 (C) -4 (D) 6

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57. Late $a \in R$ and let $f: R^{\rightarrow}$ be given by $f(x) = x^5 - 5x + a,$ then $f(x)$ has three real roots if $a > 4$ $f(x)$ has only one real roots if $a > 4$ $f(x)$ has three real roots if $a < -4$ $f(x)$ has three real roots if `-4

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58. The quadratic equation $p(x) = 0$ with real coefficients has purely imaginary roots. Then the equation $p(p(x)) = 0$ has only purely imaginary roots at real roots two real and purely imaginary roots neither real nor purely imaginary roots

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59. Let S be the set of all non-zero real numbers such that the quadratic equation $\alpha x^2 - x + \alpha = 0$ has two distinct real roots $x_1 and x_2$ satisfying the inequality $|x_1 - x_2| < 1$. Which of the following intervals is (are) a subset (s) of S? $\left(\frac{1}{2}, \frac{1}{\sqrt{5}}\right)$ b. $\left(\frac{1}{\sqrt{5}}, 0\right)$ c. $\left(0, \frac{1}{\sqrt{5}}\right)$ d. $\left(\frac{1}{\sqrt{5}}, \frac{1}{2}\right)$

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60. Let `-pi/6beta_1 and alpha_2>beta_2$then$alpha_1+beta_2` equals

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61. The least value of $a \in \mathbb{R}$ for which $4ax^2 + \frac{1}{x} \geq 1$, for all $x > 0$, is

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62. Let p, q be integers and let α, β be the roots of the equation, $x^2 - x - 1 = 0$, where $\alpha \neq \beta$. For $n = 0, 1, 2, , leta_n = p\alpha^n + q\beta^n$. FACT : If $aandb$ are rational number and $a + b\sqrt{5} = 0, thena = 0 = b$. If $a_4 = 28, thenp + 2q =$ 7 (b) 21 (c) 14 (d) 12

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63. Let p, q be integers and let α, β be the roots of the equation $x^2 - 2x + 3 = 0$ where $\alpha \neq \beta$ For $n = 0, 1, 2, \ldots\ldots.,$ Let $\alpha_n = p\alpha^n + q\beta^n$ value $\alpha_9 =$

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64. Let $S(k) = 1 + 3 + 5 + \ldots + (2k - 1) = 3 + k^2$. Then which of the following is true ?

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65. Statement 1: For every natural number $n \geq 2$, $\frac{1}{\sqrt{1}} + \frac{1}{\sqrt{2}} + \dots + \frac{1}{\sqrt{n}} > \sqrt{n}$. Statement 2: For every natural number `ngeq2,""n(n+1)

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66. Assertion: For every natural number n, $(n+1)^7 - n^7 - 1$ is divisible by 7. Reason: For every natural number n, $n^7 - n$ is divisible by 7. (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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67. If $A = \begin{bmatrix} a & b \\ b & a \end{bmatrix}$ and $A^2 = \begin{bmatrix} \alpha & \beta \\ \beta & \alpha \end{bmatrix}$ then (A) $\alpha = a^2 + b^2, \beta = ab$ (B) $\alpha = a^2 + b^2, \beta = 2ab$ (C) $\alpha = a^2 + b^2, \beta = a^2 - b^2$ (D) $\alpha = 2ab, \beta = a^2 + b^2$

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68. Let $A = \begin{bmatrix} 0 & 0 & -1 \\ 0 & -1 & 0 \\ -1 & 0 & 0 \end{bmatrix}$ Then only correct statement about the matrix A is (A) A is a zero matrix (B) $A^2 = I$ (C) A^{-1} does not exist (D) $A = (-1)I$ where I is a unit matrix

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69. Let $A = \begin{bmatrix} 1 & -1 & 1 \\ 2 & 1 & -3 \\ 1 & 1 & 1 \end{bmatrix}$ and $10B = \begin{bmatrix} 4 & 2 & 2 \\ -5 & 0 & \alpha \\ 1 & -2 & 3 \end{bmatrix}$. If B is the inverse of A, then α is :

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70. If $A^2 - A + I = 0$, then the inverse of A is: (A) $A + I$ (B) A (C) $A - I$ (D) $I - A$

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71. If $A = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ then which one of the following holds for all $n \geq 1$ by the principle of mathematica induction? (A) $A^n = 2^{n-1}A + (n-1)I$ (B) $A^n = nA + (n-1)I$ (C) $A^n = 2^{n-1}A - (n-1)I$ (D) $A^n = nA - (n-1)AI$

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72. If A and B are square matrices of size $n \times n$ such that $A^2 - B^2 = (A-B)(A+B)$, then which of the following will be always true

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73. Let $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} a & 0 \\ 0 & b \end{pmatrix}, a, b \in N$) Then, (a) there cannot exist any B such that $AB = BA$

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74. Let $A = [55\alpha\alpha 0\alpha 5\alpha 005] \dot{I} \mathrm{f} |A^2| = 25,$ then $|\alpha|$ equals (1) 5^2 (2) 1 (3) 1/5 (4) 5

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75. Let A be a square matrix all of whose entries are integers. Then which one of the following is true? (1) If $det A = \pm 1, then A^1$ exists but all its entries are not necessarily integers (2) If $det A \neq \pm 1, then A^1$ exists and all its entries are non-integers (3) If $det A = \pm 1, then A^1$ exists and all its entries are integers (4) If $det A = \pm 1, then A^1$ need not exist

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76. Assertion: If $A \neq I$ and $A \neq -I, then \det A = -1,$ Reason: If $A \neq I$ and $A \neq -I$, then $tr(A) \neq 0$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) both A and R is false.

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77. Assertion: $adj(adjA) = (\det A)^{n-2}A$ Reason: $|adjA| = |A|^{n-1}$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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78. Consider the system of linear equations: $x_1 + 2x_2 + x_3 = 3$ $2x_1 + 3x_2 + x_3 = 3$ $3x_1 + 5x_2 + 2x_3 = 1$ The system has (1) exactly 3 solutions (2) a unique solution (3) no solution (4) infinite number of solutions

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79. Assertion: $Tr(A) = 0$ Reason: $|A| = 1$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) both A and R is false.

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80. The number of 3 3 non-singular matrices, with four entries as 1 and all other entries as 0, is (1) 5 (2) 6 (3) at least 7 (4) less than 4

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81. Let A and B be two symmetric matrices of order 3. Statement-1 : A(BA) and (AB)A are symmetric matrices. Statement-2 : AB is symmetric matrix if matrix multiplication of A with B is commutative. Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1. Statement-1 is true, Statement-2 is true; Statement-2 is true; Statement-2 is not a correct explanation for Statement-1. Statement-1 is true, Statement-2 is false. Statement-1 is false, Statement-2 is true.

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82. Assertion: Determinant ofa skew symmetric mastix of order 3 is zero. Reason: For any matix A, $\det(A^T) = \det(A)$ and $\det(-S) = -\det(S)$ (A) Both A and R are true and R is the correct explanation of A (B) Both A and R are true R is not te correct explanation of A (C) A is true but R is false. (D) A is false but R is true.

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83. If $\omega \neq 1$ is the complex cube root of unity and matrix $H = \begin{bmatrix} \omega & 0 \\ 0 & \omega \end{bmatrix}$, then H^{70} is equal to

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84. Let $A = (100210321)$ If u_1 and u_2 are column matrices such that $Au_1 = (100)$ and $Au_2 = (010)$, then $u_1 + u_2$ is equal to (1) (-110) (2) $(-11-1)$ (3) $(-1-10)$ (4) $(1-1-1)$

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85. If $P = \begin{bmatrix} 1 & \alpha & 3 \\ 1 & 3 & 3 \\ 2 & 4 & 4 \end{bmatrix}$ is the adjoint of a 3 X 3 matrix A and $|A| = 4$, then α is equal to: (A) 4 (B) 11 (C) 5 (D) 0

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86. If A is an $3x3$ non-singular matrix such that $\forall' - A' AandB = A^{-1}A'$, then BB' equals: B^{-1} (b) $\left(B^{-1}\right)'$ (c) $I + B$ (d) I

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87. If $A = [12221 - 2a2b]$ is a matrix satisfying the equation $\forall^T = 9I$, where I is 3×3 identity matrix, then the ordered pair (a, b) is equal to : (1) $(2, -1)$ (2) $(-2, 1)$ (3) (2, 1) (4) $(-2, -1)$

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88. If $A = [5a - b32]$ and A adj $A = \forall^T$, then $5a + b$ is equal to: (1) -1 (2) 5 (3) 4 (4) 13

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89. Let M be a 2 x 2 symmetric matrix with integer entries. Then M is invertible if (a)The first column of M is the transpose of the second row of M (b)The second row of Mis the transpose of the first olumn of M (c) M is a diagonal matrix with non-zero entries in the main diagonal (d)The product of entries in the main diagonal of Mis not the square of an integer

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90. Let $MandN$ be two 3×3 matrices such that $MN = NM \cdot$ Further, if $M \neq N^2 andM^2 = N^4,$ then Determinant of $(m^2 + MN^2)$ is 0 There is a 3×3 non-zeero matrix U such tht $(M^2 + MN^2)U$ is the zero matrix Determinant of $(M^2 + MN^2) \geq 1$ For a 3×3 matrix U, if $(M^2 + MN^2)U$ equal the zero mattix then U is the zero matrix

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91. Let $XandY$ be two arbitrary, 3×3 , non-zero, skew-symmetric matrices and Z be an arbitrary 3×3 , non-zero, symmetric matrix. Then which of the following matrices is (are) skew symmetric? a.$Y^3 Z^4 Z^4 Y^3$ b. $x^{44} + Y^{44}$ c. $X^4 Z^3 - Z^3 X^4$ d. $X^{23} + Y^{23}$

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92. Let $P = \begin{bmatrix} 1 & 0 & 0 \\ 4 & 1 & 0 \\ 16 & 4 & 1 \end{bmatrix}$ and I be the identity matrix of order 3. If $Q = [qij]$ is a matrix, such that $P^{50} - Q = I$, then $\frac{q_{31} + q_{32}}{q_{21}}$ equals

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93. Let $p = \begin{bmatrix} 3 & -1 & -2 \\ 2 & 0 & \alpha \\ 3 & -5 & 0 \end{bmatrix}$, where $\alpha \in \mathbb{R}$. Suppose $Q = [q_{ij}]$ is a matrix such that $PQ = kl$, where $k \in \mathbb{R}, k \neq 0$ and l is the identity matrix of order 3. If $q_{23} = -\frac{k}{8}$ and $\det(Q) = \frac{k^2}{2}$, then

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94. How many 3×3 matrices M with entries from $\{0, 1, 2\}$ are there, for which the sum of the diagonal entries of $M^T Mis5?$ 126 (b) 198 (c) 162 (d) 135

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95. For a real number α, if the system $[1\alpha\alpha^2\alpha1\alpha\alpha^2\alpha1][xyz] = [1-11]$ of linear equations, has infinitely many solutions, then $1 + \alpha + \alpha^2 =$

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96. If a,b,c are positive and are the $pth, qthrth$ terms respectively of a GP then $\begin{vmatrix} \log a & p & 1 \\ \log b & q & 1 \\ \log c & r & 1 \end{vmatrix} =$

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97. $x + iy = \begin{vmatrix} 6i & -3i & 1 \\ 4 & 3i & -1 \\ 20 & 3 & i \end{vmatrix}$, find x and y.

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98. If ω is the complex cube root of unity then $\begin{vmatrix} 1 & 1+i+\omega^2 & \omega^2 \\ 1-i & -1 & \omega^2-1 \\ -i & -i+\omega-1 & -1 \end{vmatrix} =$

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99. If the system of linear equations $x + 2ay + az = 0, x + 3by + bz = 0$ and $x + 4cy + cz = 0$ has a non-zero solution, then a, b, c

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100. If $1. \omega, \omega^2$ are the roots of unity, then $\Delta = \begin{vmatrix} 1 & \omega^n & \omega^{2n} \\ \omega^n & \omega^{2n} & 1 \\ \omega^{2n} & 1 & \omega^n \end{vmatrix}$ is equal to

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101. If $a_1, a_2, a_3, \ldots . a_n \ldots$ are in G.P. then the determinant $\Delta = \begin{vmatrix} \log a_n, \log a_{n+1}, \log a_{n+2} \\ \log a_{n+3}, \log a_{n+4}, \log a_{n+5} \\ \log a_{n+6}, \log a_{n+7}, \log a_{n+8} \end{vmatrix}$ is equal to- (A) -2 (B) 1 (C) -1 (D) 0

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102. If $a^2+b^2+c^2=-2andf(x)=$ $|a+a^2x(1+b^2)x(1+c^2)x(1+a^2)x1+b^2x(1+c^2)x(1+a^2)x(1+b^2)x$

, then $f(x)$ is a polynomial of degree 0 b. 1 c. 2 d. 3

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103. The system of equations $\alpha x+y+z=\alpha-1, x+\alpha y+z=\alpha-1, x+y+\alpha z=\alpha-1$ has no solution if alpha is (A) 1 (B) not -2 (C) either -2 or 1 (D) -2

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104. If $a_1, a_2, a_3, \ldots . a_n \ldots$ are in G.P. then the determinant $\Delta=\begin{vmatrix}\log a_n, \log a_{n+1}, \log a_{n+2} \\ \log a_{n+3}, \log a_{n+4}, \log a_{n+5} \\ \log a_{n+6}, \log a_{n+7}, \log a_{n+8}\end{vmatrix}$ is equal to- (A) -2 (B) 1 (C) -1 (D) 0

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105. If $D = |11111 + x1111 + y| \mathrm{f\,o\,r} x \neq 0, y \neq 0$ then D is (1) divisible by neither x nor y (2) divisible by both x and y (3) divisible by x but not y (4) divisible by y but not x

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106. If $x = cy + bz, y = az + cx, z = x + ay, where x, y, z$ are not all zeros, then find the value of $a^2 b^2 c^2 + 2ab \cdot$

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107. Let a, b, c be such that $b(a + c) \neq 0$. If $|aa + 1a - 1 - + 1b - 1 - 1c + 1| + |a + 1b + 1c - 1a - 1b - 1c + 1(-$

then the value of n is (1) zero (2) any even integer (3) any odd integer (4) any integer

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108. The number of values of k for which the linear equations $4x + ky + 2z = 0$ $kx + 4y + z = 0$ $2x + 2y + z = 0$ posses a non-zero solution is : (1) 3 (2) 2 (3) 1 (4) zero

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109. If the trivial solution is the only solution of the system of equations $x - ky + z = 0, kx + 3y - kz = 0, 3x + y - z = 0$ Then the set of all values of k is:

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110. Let P and Q be 3×3 matrices with $P \neq Q$. If $P^3 = Q^3 and P^2 Q = Q^2 P$, then determinant of $(P^2 + Q^2)$ is equal to (1) 2 (2) 1 (3) 0 (4) 1

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111. The number of values of k, for which the system of equations $(k+1)x+8y=4k\ kx+(k+3)y=3k-1$ has no solution, is (1) 1 (2) 2 (3) 3 (4) infinite

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112. If $\alpha, \beta \neq 0$, and $f(n)=\alpha^n+\beta^n$ and $|31+f(1)1+f(2)1+f(1)1+f(2)1+f(3)1+f(2)1+f(3)1+f(4)| =$, then K is equal to (1) $\alpha\beta$ (2) $\frac{1}{\alpha\beta}$ (3) 1 (4) -1

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113. The set of all values of λ for which the system of linear equations : $2x_1-2x_2+x_3=\lambda x_1\ 2x_1-3x_2+2x_3=\lambda x_2\ -x_1+2x_2=\lambda x_3$ has a non-trivial solution, (1) is an empty set (2) is a singleton (3) contains two elements (4) contains more than two elements

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114. The system of linear equations $x + \lambda y - z = 0$ $\lambda x - y - z = 0$ $x + y - \lambda z = 0$ has a non-trivial solution for : (1) infinitely many values of λ . (2) exactly one value of λ . (3) exactly two values of λ . (4) exactly three values of λ .

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115. If S is the set of distinct values of $'b$ for which the following system of linear equations $x + y + z = 1$ $x + ay + z = 1$ $ax + by + z = 0$ has no solution, then S is : a finite set containing two or more elements (2) a singleton an empty set (4) an infinite set

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116. The total number of distinct $x \in R$ for which $\begin{vmatrix} x & x^2 & 1 + x^3 \\ 2x & 4x^2 & 1 + 8x^3 \\ 3x & 9x^2 & 1 + 27x^3 \end{vmatrix} = 10$ is (A) 0 (B) 1 (C) 2 (D) 3

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117. If $f(x)|\cos(2x)\cos(2x)\sin(2x) - \cos x \cos x - \sin x \sin x \sin x \cos x|, then:$ $f'(x) = 0$ at exactly three point in $(-\pi, \pi)$ $f'(x) = 0$ at more than three point in $(-\pi, \pi)$ $f(x)$ attains its maximum at $x = 0$ $f(x)$ attains its minimum at $x = 0$

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118. Let T_n denote the number of triangles, which can be formed using the vertices of a regular polygon of n sides. It $T_{n+1} - T - n = 21, the \cap$ equals a.5 b. 7 c. 6 d. 4

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119. A student is to answer 10 out of 13 questions in an examination such that the he must choose t least 4 from the first five questions. The number of choices available to him are (A) 346 (B) 140 (C) 196 (D) 280

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120. The number of wys in which 6 men and 5 women can dine at a round table if no two women are to sit together is given by (A) $\lfloor 6 \times \lfloor 5$ (B) 30 (C) $\lfloor 5 \times \lfloor 4$ (D) $\lfloor 7 \times \lfloor 5$

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121. $\hat{} \; nC_r +^n C_{r+1} +^n C_{r+2}$ is equal to $(2 \leq r \leq n)$ (A) $2^n C_{r+2}$ (B) $2^{n+1} C_{r+1}$ (C) $2^{n+2} C_{r+2}$ (D) none of these

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122. How many ways are there to arrange the letters in the word GARDEN with the vowels in alphabetical order?

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123. The number of ways of distributing 8 identical balls in 3 distinct boxes so that none of the boxes is empty is

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124. If the letters of the word SACHIN are arranged in all possible ways and these words are written out as in dictionary, then the word SACHIN appears at serial number 602 (2) 603 (3) 600 (4) 601

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125. Find the value $50C_4 + \sum_{r=1}^{6} 56 - rC_3$.

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126. At an election a voter may vote for nany number of candidates , not greater than the number t be eected. There are 10 candidates and 4 are to be elected. If a voter for at lest one candidates, thene the number of ways in which he can vote is (A) 5040 (B) 6210 (C) 385 (D) 1110

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127. The set $S = \{1, 2, 3, , 12)$ is to be partitioned into three sets A, B, C of equal size. Thus, $A \cup B \cup C = S, A \cap B = B \cap C = A \cap C = \varphi$. The number of ways to partition S is (1) $\frac{12!}{3!(4!)^3}$ (2) $\frac{12!}{3!(3!)^4}$ (3) $\frac{12!}{(4!)^3}$ (4) $\frac{12!}{(4!)^4}$

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128. In a shop there are five types of ice-creams available. A child buys six ice-creams. Statement -1: The number of different ways the child can buy the six ice-creams is $\hat{} 10C_5$. Statement -2: The number of different ways the child can buy the six ice-creams is equal to the number of different ways of arranging 6 As and 4 Bs in a row. (1) Statement 1 is false, Statement $(2)(3)-2(4)$ is true (6) Statement 1 is true, Statement

$(7)(8)-2(9)$ (10) is true, Statement $(11)(12)-2(13)$ is a correct explanation for Statement 1 (15) Statement 1 is true, Statement $(16)(17)-2(18)$ (19) is true; Statement $(20)(21)-2(22)$ is not a correct explanation for Statement 1. (24) Statement 1 is true, Statement $(25)(26)-2(27)$ is false.

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129. How many different words can be formed by jumbling the letters in the word MISSISSIPPI in which no two S are adjacent? (A) $7.^6C_4.^8C_4$ (B) $8.^6C_4.^7C_4$ (C) $6.7.^8C_4$ (D) $6.8.^7C_4$

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130. From 6 different novels and 3 different dictionaries, 4 novels and 1 dictionary are to be selected and arranged in a row on a shelf so that the dictionary is always in the middle. Then the number of such arrangements is (1) less than 500 (2) at least 500 but less than 750 (3) at least 750 but less than 1000 (4) at least 1000

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131. There are two urns. Urn A has 3 distinct red balls and urn B has 9 distinct blue balls. From each urn two balls are taken out at random and then transferred to the other. The number of ways in which this can be done is (1) 36 (2) 66 (3) 108 (4) 3

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132. Statement-1 : The number of ways of distributing 10 identical balls in 4 distinct boxes such that no box is empty is $\hat{}\ 9C_3$. Statement-2 : The number of ways of choosing any 3 places from 9 different places is $\hat{}\ 9C_3$. Statement-1 is true, Statement-2 is true; Statement-2 is a correct explanation for Statement-1. Statement-1 is true, Statement-2 is true; Statement-2 is not a correct explanation for Statement-1. Statement-1 is true, Statement-2 is false. Statement-1 is false, Statement-2 is true.

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133. There are 10 points in a plane,. Out of these 6 are colinear. If Nis the number of triangles formed by joining these points then: (A) $100 < N \leq 140$ (B) $140 < N \leq 190$ (C) $N > 190$ (D) $N \leq 100$

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134. Assuming the balls to be identical except for difference in colours, the number of ways in which one or more balls can be selected from 10 white, 9 green and 7 black balls is (1) 880 (2) 629 (3) 630 (4) 879

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135. Let T_n be the number of all possible triangles formed by joining vertices of an n-sided regular polygon. If $T_{n+1} - T_n = 10$, then the value of n is (1) 5 (2) 10 (3) 8 (4) 7

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136. The number of integers greater than 6,000 that can be formed, using the digits 3, 5, 6, 7 and 8, without repetition, is : (1) 216 (2) 192 (3) 120 (4) 72

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137. Let A and B be two sets containing four and two elements respectively. Then the number of subsets of the set $A \times B$, each having at least three elements is : (1) 219 (2) 256 (3) 275 (4) 510

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138. If all the words (with or without meaning) having five letters, formed using the letters of the word SMALL and arranged as in a dictionary; then the position of the word SMALL is : (1) 46th (2) 59th (3) 52nd (4) 58th

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139. A man X has 7 friends, 4 of them are ladies and 3 are men. His wife Y also has 7 friends, 3 of them are ladies and 4 are men. Assume X and Y have no common friends. Then the total number of ways in which X and Y together can throw a party inviting 3 ladies and 3 men, so that 3 friends of each of X and Y are in the party, is : 469 (2) 484 (3) 485 (4) 468

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140. Let $n_1 < n_2 < n_3 < n_4 < n_5$ be positive integers such that $n_1 + n_2 + n_3 + n_4 + n_5 = 20$. Then the numbr of distinct arrangments $(n_1, n_2, n_3, n_4, n_5)$ is________

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141. Six cards and six envelopes are numbered 1, 2, 3, 4, 5, 6 and cards are to be placed in envelopes so that each envelope contains exactly one card and no card is placed in the envelope bearing the same number and moreover cards numbered 1 is always placed in envelope numbered 2. Then the number of ways it can be done is a.264 b. 265 c. 53 d. 67

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142. Let n be the number of ways in which 5 boys and 5 girls can stand in a queue in such a way that all the girls stand consecutively in the queue. Let m be the number in which 5 boys and 5 girls stand in such a way that exactly four girls stand consecutively in the queue. Then the value of $\frac{m}{n}$ is ____

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143. A debate club consists of 6 girsl nd 4 boys. A team of 4 members is to be selected from this club including the selection of a captain (from among these 4 memers) for the team. If the team has ot include at most one boy. Then the number of ways of selecting the team is (A) 380 (B) 320 (C) 260 (D) 95

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144. Word of length 10 are formed using the letters A,B,C,D,E,F,G,H,I,J. Let x be the number of such words where no letter is repeated; and let y be the number of such words where exactly one letter is repeated twice and no other letter is repeated. The, $\frac{y}{9x} =$

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145. The coefficient of $x^5 \in \left(1 + 2x + 3x^2 + \right)^{-3/2} is(|x| < 1)$ 21 b. 25 c. 26 d. none of these

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146. If $|x| < 1$ then coeficient oif x^n in expression of $\left(1 + x + x^2 + x^2 + \ldots\ldots\right)^2$ is (A) n (B) $n - 1$ (C) $n + 2$ (D)$n + 1$

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147. The numberof integral termsin the expansion of $\left(\sqrt[2]{3}-\sqrt[8]{5}\right)^{256}$ is (A) 32 (B) 33 (C) 34 (D) 35

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148. if x is a positive real number less than unity, then first negative term n the expansion of $(1+x)^{\frac{27}{5}}$ is:

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149. The coefficient of the middle term in the binomial expansion in powers of x of$(1+\alpha x)^4$ and of$(1-\alpha x)^6$ is the same, if α equals $-\frac{5}{3}$ b. $\frac{10}{3}$ c. $-\frac{3}{10}$ d. $\frac{3}{5}$

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150. The coefficient of x^n in the expansion of $(1-x)(1-x)^n$ is $n-1$ b. $(-1)^n(1-n)$ c. $(-1)^{n-1}(n-1)^2$ d. $(-1)^{n-1}n$

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151. In the coefficients of rth, $(r+1)th, and(r+2)th$ terms in the binomial expansion of $(1+y)^m$ are in A.P., then prove that $m^2-m(4r+1)+4r^2-2=0.$

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152. If the coefficient of $x^7 \in \left[ax^2-\left(\frac{1}{bx^2}\right)\right]^{11}$ equal the coefficient of x^{-7} in satisfy the $\left[ax-\left(\frac{1}{bx^2}\right)\right]^{11}, thenaandb$ satisfy the relation $a+b=1$ b. $a-b=1$ c. $b=1$ d. $\frac{a}{b}=1$

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153. If x is so small that x^3 and higher powers of x may be neglectd, then $\frac{(1+x)^{3/2}-\left(1+\frac{1}{2}x\right)^3}{(1-x)^{1/2}}$ may be approximated as $3x+\frac{3}{8}x^2$ b. $1-\frac{3}{8}x^2$ c. $\frac{x}{2}-\frac{3}{\times^2}$ d. $-\frac{3}{8}x^2$

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154. If the expansion in powers of x of the function $1/[(1-ax)(1-bx)]$ is a$a_0+a_1x+a_2x^2+a_3x^3+, thena_nis$ $\frac{b^n-a^n}{b-a}$ b. $\frac{a^n-b^n}{b-a}$ c. $\frac{b^{n+1}-a^{n+1}}{b-a}$ d. $\frac{a^{n+1}-b^{n+1}}{b-a}$

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155. For natural numbers $m, n,$ if $(1-y)^m(1+y)^n=1+a_1y+a_2y^2+, anda_1=a_2=10, then$

\`m n$c.$ m+n=80$d.$ m-n=20\`

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156. In the binomial expansion of $(a-b)^{\cap} \geq 5,$ the sum of the 5th and 6th term is zero. Then a/b equals $(n-5)/6$ b. $(n-4)/5$ c. $n/(n-4)$ d. $6/(n-5)$

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157. Find the sum

$\hat{}\ 20C_{10}.^{15}C_0+^{20}C_9.^{15}C_1+^{20}C_8.^{15}C_2+....+^{20}C_0.^{15}C_{10}$

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158. Statement 1: $\sum_{r=0}^{n}(r+1)^n c_r=(n+2)2^{n-1}.$ Statement 2: $\sum_{r=0}^{n}(r+1)^n c_r=(1+x)^n+nx(1+x)^{n-1}.$ (1) Statement 1 is false, Statement $(2)(3)-2(4)$ is true (6) Statement 1 is true, Statement $(7)(8)-2(9)$ (10) is true, Statement $(11)(12)-2(13)$ is a correct explanation for Statement 1 (15) Statement 1 is true, Statement $(16)(17)-2(18)$ (19) is true; Statement $(20)(21)-2(22)$ is not a correct explanation for Statement 1. (24) Statement 1 is true, Statement $(25)(26) - 2(27)$ is false.

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159. The remainder left out when $8^{2n}(62)^{2n+1}$ is divided by 9 is (1) 0 (2) 2 (3) 7 (4) 8

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160. The coefficient of x7 in the expansion of $\left(1 - x - x^2 + x^3\right)^6$ is : (1) 144 (2) -132 (3) -144 (4) 132

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161. If n is a positive integer, then $\left(\sqrt{3}+1\right)^{2n} - \left(\sqrt{3}-1\right)^{2n}$ is (1) an irrational number (2) an odd positive integer (3) an even positive integer (4) a rational number other than positive integers

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162. The term independent of x in expansion of $\left(\frac{x+1}{x^{2/3}} - \frac{x-1}{x - x^{1/2}}\right)$ is

(1) 120 (2) 210 (3) 310 (4) 4

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163. If the coefficients of x^3 and x^4 in the expansion of $(1 + ax + bx^2)(1 - 2x)^{18}$ in powers of x are both zero, then (a, b) is equal to (1) $\left(16, \frac{251}{3}\right)$ (3) $\left(14, \frac{251}{3}\right)$ (2) $\left(14, \frac{272}{3}\right)$ (4) $\left(16, \frac{272}{3}\right)$

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164. The sum of coefficients of integral powers of x in the binomial expansion of $(1 - 2\sqrt{x})^{50}$ is: (1) $\frac{1}{2}(3^{50} + 1)$ (2) $\frac{1}{2}(3^{50})$ (3) $\frac{1}{2}(3^{50} - 1)$ (4) $\frac{1}{2}(2^{50} + 1)$

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165. If the number of terms in the expansion of $\left(1 - \frac{2}{x} + \frac{4}{x^2}\right)^n, x \neq 0,$ is 28, then the sum of the coefficients of all the terms in this expansion, is : (1) 64 (2) 2187 (3) 243 (4) 729

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166. Coefficient of x^{11} in the expansion of $(1 + x^2)(1 + x^3)^7(1 + x^4)^{12}$ is 1051 b. 1106 c. 1113 d. 1120

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167. The coefficient of x^9 in the expansion of $(1 + x)(1 + x^2)(1 + x^3)\dots(1 + x^{100})$ is

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168. Let m be the smallest positive integer such that the coefficient of x^2 in the expansion of $(1+x)^2+(1+x)^3+(1+x)^4+\ldots\ldots.+(1+x)^{49}+(1+mx)^{50}$ is $(3n+1).^{51}C_3$ for some positive integer n. Then the value of n is

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169. $I\ 1, \log_9\left(3^{1-x}+2\right), \log_3\left(4.3^x-1\right)$ are in A.P. then x equals (A) $\log_{34}$ (B) $1-\log_{43}$ (C) $1-\log_{34}$ (D) $\log_4 3$

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170. The value of $2^{\frac{1}{4}}.4^{\frac{1}{8}}.8^{\frac{1}{16}},,,,,,,\infty$ is equal to.

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171. $x^{(x-1)-\frac{1}{2}(x-1)^2+\frac{1}{3}\left((x-1)^3\right).-\frac{1}{4}\left((x-1)^4\right).+\ldots\ldots\ldots}$ is equal to (A) $2\log x$ (B) $\log x$ (C) x^2 (D) none of these

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172. The sum of the series $\frac{1}{1.2}-\frac{1}{2.3}+\frac{1}{3.4}-\frac{1}{4.5}+$ ... is

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173. Let $T,$ be the r th term of an AP, for $r=1, 2, 3.$ if for some positive integers m, n we have $T_m=\frac{1}{n}$ and $T_n=\frac{1}{m},$ then T_{mn} equals (1998, 2M) $\frac{1}{mn}$ (b) $\frac{1}{m}+\frac{1}{n}$ 1 (d) 0

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174. The sum of series $\frac{1}{2}!+\frac{1}{4}!+16!+\ldots\ldots\ldots$ is (A) $\frac{e^2-1}{2}$ (B) $\frac{e^2-2}{e}$ (C) $\frac{e^2-1}{2e}$ (D) $\Big)(e-1)^2\frac{)}{2e}$

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175. The sum of the first n terms of the series $1^2 + 2.2^2 + 3^2 + 2.4^2 + ...$ is $\frac{n(n+1)^2}{2}$ when n is even. Then the sum if n is odd , is

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176. 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

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177. Let $x_1, x_2, ...x_n,$ bem n observations such that $\sum x_i^2 = 400$ and $\sum x_i = 80$. Then a possible value of n amongthe following is (1) 12 (2) 9 (3) 18 (4) 15

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178. The sum of the series $1+\frac{1}{4.2}!\frac{1}{16.4}!+\frac{1}{64.6}!+\ldots\ldots\ldots\to\infty$ is

(A) $\frac{e+1}{2\sqrt{e}}$ (B) $\frac{e-1}{\sqrt{e}}$ (C) $\frac{e-1}{2\sqrt{e}}$ (D) $\frac{e+1}{2}\sqrt{e}$

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179. Let $a_1, a_2, a_3\ldots\ldots\ldots$ be term of an A.P. if $\frac{a_1+a_2+\ldots.+a_p}{a_1+a_2+\ldots\ldots\ldots+a_q}=\frac{p^2}{q^2}p\neq q$ then $\frac{a_6}{a_{21}}$ euqals

$(A)\frac{41}{11}(B)\frac{11}{41}(C)\frac{13}{44}(D)\frac{15}{41}$

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180. If $a_1, a_2, \ldots\ldots\ldots a_n$ are in H.P, then the expression $a_1a_2+a_2a_3+\ldots+a_{n-1}a_n$ is equal to (A) $n(a_1-a_n)$ (B) $(n-1)(a_1-a_n)$ (C) na_1a_n (D) $(n-1)a_1a_n$

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181. 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) $\frac{1}{2}(1-\sqrt{5})$ (2) $\frac{1}{2}\sqrt{5}$ (3) $\sqrt{5}$ (4) $\frac{1}{2}(\sqrt{5}-1)$

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182. 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) 1/2 (3) $\frac{1}{\sqrt{2}}$ (4) $\sqrt{2}$

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183. The sum of the series $\frac{1}{2!}-\frac{1}{3!}+\frac{1}{4!}-\ldots$ upto infinity is (1) e^{-2} (2) e^{-1} (3) $e^{-1/2}$ (4) $e^{1/2}$

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184. 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

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185. The sum to 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

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186. A person is to count 4500 currency notes. Let a_n, denote the number of notes he counts in the nth minute if $a_1=a_2=a_3=.........=a_{10}=150$ and $a_{10}, a_{11}, ...$are in an AP with common difference -2, then the time taken by him to count all notes is :- (1) 24 minutes 10 11 (2) 34 minutes (3) 125 minutes (4) 135 minutes

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187. A man saves Rs. 200 in each of the first three months of his service. In each of the subsequent months his saving increases by Rs. 40 more than the saving of immediately previous month. His total saving from the start of service will be Rs. 11040 after : (1) 18months (2) 19months (3) 20months (4) 21months

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188. Let a_n be the n^{th} term of an A.P. If $\sum_{r=1}^{100} a_{2r} = \alpha \& \sum_{r=1}^{100} a_{2r-1} = \beta$, then the common difference of the A.P. is $\alpha - \beta$ (b) $\beta - \alpha$ $\frac{\alpha - \beta}{2}$ (d) None of these

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189. Statement-1 The sum of the series 1 +(1+ 2+4)+ (4+ 6+ 9)+(9+12+16) ... (361 +380 +400) is 8000. Statement-2 $\sum_{k=1}^{n} \left(k^3 - (k-1)^3\right) = n^3$for any natural number n. (1) Statement-1 is true, Statement-2 is false. (2) Statement-1 is false, Statement-2 is true. (3) Statement-1 is true, Statement-2 is true Statement-2 is a correct explanation for Statement-l

(4) Statement-1 is true, Statement-2 is true Statement-2 is not a correct explanation for Statement-l.

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190. If 100 times the 100^{th} term of an AP with non zero common difference equals the 50 times its 50^{th} term, then the 150^{th} term of this AP is (1) 150 (2) 150 times its 50^{th} term (3) 150 (4) zero

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191. 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) $\frac{7}{9}(99+10^{-20})$ (3) $\frac{7}{81}(179-10^{-20})$

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192. 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 the G.P. is $2-\sqrt{3}$ b. $2+\sqrt{3}$ c. $\sqrt{3}-2$ d. $3+\sqrt{2}$

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193. If $(10)^9+2(11)^1(10)^8+3(11)^2(10)^7+\cdot\cdot+10(11)^9=k(10)^9$, then k is equal to (1) $\frac{121}{10}$ (2) $\frac{441}{100}$ (3) 100 (4) 110

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194. The sum of first 9 terms of the series $\frac{1^3}{1}+\frac{1^3+2^3}{1+3}+\frac{1^3+2^3+3^3}{1+2+3}+\ldots\ldots$ is (1) 71 (2) 96 (3) 142 (4) 192

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195. If m is the A.M. of two distinct real numbers l and $n(l, n > 1)$ and G1, G2 and G3 are three geometric means between l and n, then $G14 + 2G24 + G34$ equals, (1) $4l^2$ mn (2) $4l^m$ ^ 2 mn (3) $4lmn^2$ (4) $4l^2m^2n^2$

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196. If the sum of the first ten terms of the series $\left(1\frac{3}{5}\right)^2 + \left(2\frac{2}{5}\right)^2 + \left(3\frac{1}{5}\right)^2 + 4^2 + \left(4\frac{4}{5}\right)^2 + \ldots\ldots,$ is $\frac{16}{5}$ m, then m is equal to: (1) 102 (2) 101 (3) 100 (4) 99

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197. For any three positive real numbers a, b and $c, 9(25a^2 + b^2) + 25(c^2 - 3ac) = 15b(3a + c)\cdot$ Then : a, b and$c$ are in $A\dot{P}\cdot$ (2) a, b and c are in $G\dot{P}\cdot$ b, c and a are in $G\dot{P}\cdot$ (4) b, c and a are in $A\dot{P}\cdot$

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198. Let $a, b, cR\cdot$ If $f(x) = ax^2 + bx + c$ is such that $a + b + c = 3$ and $f(x+y) = f(x) + f(y) + xy, \forall x, yR,$ then $\sum_{n=1}^{10} f(n) isequa < o: 190$ (2) 255 (3) 330 (4) 165

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199. If, for a positive integer n, the quadratic equation, $x(x+1) + (x-1)(x+2) + \; + (x+n-1)(x+n) = 10n$ has two consecutive integral solutions, then n is equal to : 10 (2) 11 (3) 12 (4) 9

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200. Let a,b ,c be positive integers such that $\frac{b}{a}$ is an integer. If a,b,c are in GP and the arithmetic mean of a,b,c, is b+2 then the value of $\frac{a^2 + a - 14}{a+1}$ is

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201. Suppose that all the terms of an arithmetic progression (A.P.) are natural numbers. If the ratio of the sum of the first seven terms to the sum of the first eleven terms is 6: 11 and the seventh term lies in between 130 and 140, then the common difference of this A.P. is

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202. Let $b_i > 1$ for i =1, 2,....,101. Suppose $\log_e b_1, \log_e b_2, \ldots, \log_e b_{101}$ are in Arithmetic Progression (A.P.) with the common difference $\log_e 2$. Suppose $a_1, a_2, \ldots, a_{101}$ are in A.P. such that $a_1 = b_1$ and $a_{51} = b_{51}$. If $t = b_1 + b_2 + \ldots. + b_{51}$ and $s = a_1 + a_2 + \ldots + a_{51}$ then

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203. The sides of a right angled triangle are in arithmetic progression. If the triangle has area 24, then what is the length of its smallest side?

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