



A Premier Institute for Pre-Medical & Pre Engineering

**VIDYA
ARADHANA
ACADEMY**

"Transforming Your DREAMS Into Reality...!"



NEET/JEE

Topic: Target JEE 2027

Mathematics

Revision Week 01

Chetan Sir

Tuesday 9th June

Q1. JEE Main 2024

Let $R = \begin{pmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{pmatrix}$ be a non-zero 3×3 matrix, where

$x \sin \theta = y \sin \left(\theta + \frac{2\pi}{3} \right) = z \sin \left(\theta + \frac{4\pi}{3} \right) \neq 0, \theta \in (0, 2\pi)$. For a square matrix M , let trace (M) denote the sum of all the diagonal entries of M . Then, among the statements:

(I) Trace (R) = 0

(II) If trace ($\text{adj}(\text{adj}(R))$) = 0, then R has exactly one non-zero entry.

(A) Only (I) is true

(B) Only (II) is true

(C) Both (I) and (II) are true

(D) Neither (I) nor (II) is true

Q2. JEE Main 2024

Let a and b be two distinct positive real numbers. Let 11^{th} term of a GP, whose first term is a and third term is b , is equal to p^{th} term of another GP, whose first term is a and fifth term is b . Then p is equal to

(A) 20

(B) 24

(C) 21

(D) 25

Q3. JEE Main 2024

Suppose $2 - p, p, 2 - \alpha, \alpha$ are the coefficients of four consecutive terms in the expansion of $(1 + x)^n$. Then the value of $p^2 - \alpha^2 + 6\alpha + 2p$ equals

(A) 8

(B) 4

(C) 6

(D) 10

Q4. JEE Main 2024

In an examination of Mathematics paper, there are 20 questions of equal marks and the question paper is divided into three sections : A, B and C . A student is required to attempt total 15 questions taking at least 4 questions from each section. If section A has 8 questions, section B has 6 questions and section C has 6 questions, then the total number of ways a student can select 15 questions is _____.

Q5. JEE Main 2024

The number of real solutions of the equation $x(x^2 + 3|x| + 5|x - 1| + 6|x - 2|) = 0$ is _____.

Q6. JEE Main 2024

Consider the system of linear equations $x + y + z = 5, x + 2y + \lambda^2 z = 9, x + 3y + \lambda z = \mu$, where $\lambda, \mu \in \mathbb{R}$. Then, which of the following statement is NOT correct?

(A) System is consistent if $\lambda \neq 1$ and $\mu = 13$

(B) System is inconsistent if $\lambda = 1$ and $\mu \neq 13$

(C) System has unique solution if $\lambda \neq 1$ and $\mu \neq 13$

(D) System has infinite number of solutions if $\lambda = 1$ and $\mu = 13$

Q7. JEE Main 2024

Let S_n be the sum to n -terms of an arithmetic progression 3, 7, 11,

If $40 < \left(\frac{6}{n(n+1)} \sum_{k=1}^n S_k \right) < 42$, then n equals _____.

Q8. JEE Main 2024

The values of α , for which $\begin{vmatrix} 1 & \frac{3}{2} & \alpha + \frac{3}{2} \\ 1 & \frac{1}{3} & \alpha + \frac{1}{3} \\ 2\alpha + 3 & 3\alpha + 1 & 0 \end{vmatrix} = 0$, lie

in the interval

(A) $(-2, 1)$

(B) $(-\frac{3}{2}, \frac{3}{2})$

(C) $(-3, 0)$

(D) $(0, 3)$

Q9. JEE Main 2024

If $2 \tan^2 \theta - 5 \sec \theta = 1$ has exactly 7 solutions in the interval $[0, \frac{n\pi}{2}]$, for the least value of $n \in \mathbb{N}$, then $\sum_{k=1}^n \frac{k}{2^k}$ is equal to:

(A) $\frac{1}{2^{14}} (2^{15} - 15)$

(B) $1 - \frac{15}{2^{13}}$

(C) $\frac{1}{2^{15}} (2^{14} - 14)$

(D) $\frac{1}{2^{13}} (2^{14} - 15)$

Q10. JEE Main 2024

Let $\alpha = \sum_{k=0}^n \left(\frac{{}^nC_k}{k+1} \right)$ and $\beta = \sum_{k=0}^{n-1} \left(\frac{{}^nC_k {}^nC_{k+1}}{k+2} \right)$ If $5\alpha = 6\beta$, then n equals _____.

Wednesday 10th June

Q11. JEE Main 2024

The 20^{th} term from the end of the progression $20, 19\frac{1}{4}, 18\frac{1}{2}, 1$

(A) -115

(B) -100

(C) -110

(D) -118

Q12. JEE Main 2024

Let $\alpha = \frac{(4!)!}{(4!)^{3!}}$ and $\beta = \frac{(5!)!}{(5!)^{4!}}$. Then :

- (A) $\alpha \in \mathbf{N}$ and $\beta \in \mathbf{N}$
 (B) $\alpha \in \mathbf{N}$ and $\beta \notin \mathbf{N}$
 (C) $\alpha \notin \mathbf{N}$ and $\beta \in \mathbf{N}$
 (D) $\alpha \notin \mathbf{N}$ and $\beta \notin \mathbf{N}$

Q13. JEE Main 2024

For $\alpha, \beta \in (0, \pi/2)$, let $3 \sin(\alpha + \beta) = 2 \sin(\alpha - \beta)$ and a real number k be such that $\tan \alpha = k \tan \beta$. Then, the value of k is equal to

- (A) 5 (B) $-2/3$ (C) -5 (D) $2/3$

Q14. JEE Main 2024

If α, β are the roots of the equation, $x^2 - x - 1 = 0$ and $S_n = 2023\alpha^n + 2024\beta^n$, then :

- (A) $2S_{12} = S_{11} + S_{10}$ (B) $S_{12} = S_{11} + S_{10}$
 (C) $S_{11} = S_{10} + S_{12}$ (D) $2S_{11} = S_{12} + S_{10}$

Q15. JEE Main 2024

Let A be a 2×2 real matrix and I be the identity matrix of order 2. If the roots of the equation $|A - xI| = 0$ be -1 and 3 , then the sum of the diagonal elements of the matrix A^2 is

Q16. JEE Main 2024

Let $2^{\text{nd}}, 8^{\text{th}}$ and 44^{th} terms of a non-constant A. P. be respectively the $1^{\text{st}}, 2^{\text{nd}}$ and 3^{rd} terms of a G. P. If the first term of the A. P. is 1, then the sum of its first 20 terms is equal to -

- (A) 990 (B) 980 (C) 960 (D) 970

Q17. JEE Main 2024

The coefficient of x^{2012} in the expansion of $(1 - x)^{2008} (1 + x + x^2)^{2007}$ is equal to _____.

Q18. JEE Main 2024

Let A be a 3×3 real matrix such that

$$A \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix} = 2 \begin{pmatrix} 1 \\ 0 \\ 1 \end{pmatrix}, A \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix} = 4 \begin{pmatrix} -1 \\ 0 \\ 1 \end{pmatrix}, A \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix} = 2 \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}.$$

Then, the system $(A - 3I) \begin{pmatrix} x \\ y \\ z \end{pmatrix} = \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}$ has :

- (A) exactly two solutions
 (B) infinitely many solutions
 (C) unique solution
 (D) no solution

Q19. JEE Main 2024

The number of ways in which 21 identical apples can be distributed among three children such that each child gets at least 2 apples, is

- (A) 130 (B) 136 (C) 142 (D) 406

Q20. JEE Main 2024

If $\log_e a, \log_e b, \log_e c$ are in an A.P. and $\log_e a - \log_e 2b, \log_e 2b - \log_e 3c, \log_e 3c - \log_e a$ are also in an A.P. then $a : b : c$ is equal to

- (A) $6 : 3 : 2$ (B) $9 : 6 : 4$
 (C) $25 : 10 : 4$ (D) $16 : 4 : 1$

Thursday 11th June**Q21. JEE Main 2024**

Let A be a 3×3 matrix and $\det(A) = 2$. If $n = \det(\underbrace{\text{adj}(\text{adj}(\dots(\text{adj} A)))}_{2024\text{-times}})$, then the remainder when n is divided by 9 is equal to _____.

Q22. JEE Main 2024

Let a, b, c be the lengths of three sides of a triangle satisfying the condition $(a^2 + b^2)x^2 - 2b(a + c)x + (b^2 + c^2) = 0$. If the set of all possible values of x is the interval (α, β) , then $12(\alpha^2 + \beta^2)$ is equal to _____.

Q23. JEE Main 2024

Let the coefficient of x^r in the expansion of $(x + 3)^{n-1} + (x + 3)^{n-2}(x + 2) + (x + 3)^{n-3}(x + 2)^2 + \dots + (x + 2)^{n-1}$ be α_r . If $\sum_{r=0}^n \alpha_r = \beta^n - \gamma^n, \beta, \gamma \in \mathbf{N}$, then the value of $\beta^2 + \gamma^2$ equals _____.

Q24. JEE Main 2024

If each term of a geometric progression $a_1, a_2, a_3, \dots$ with $a_1 = \frac{1}{8}$ and $a_2 \neq a_1$, is the arithmetic mean of the next two terms and $S_n = a_1 + a_2 + \dots + a_n$, then $S_{20} - S_{18}$ is equal to

- (A) -2^{15} (B) 2^{15} (C) -2^{18} (D) 2^{18}

Q25. JEE Main 2024

Let $A = \begin{bmatrix} 2 & 1 & 2 \\ 6 & 2 & 11 \\ 3 & 3 & 2 \end{bmatrix}$ and $P = \begin{bmatrix} 1 & 2 & 0 \\ 5 & 0 & 2 \\ 7 & 1 & 5 \end{bmatrix}$. The sum of the prime factors of $|P^{-1}AP - 2I|$ is equal to

- (A) 66 (B) 27 (C) 23 (D) 26

Q26. JEE Main 2024

If for some $m, n; {}^6C_m + 2({}^6C_{m+1}) + {}^6C_{m+2} > {}^8C_3$ and ${}^{n-1}P_3 : {}^nP_4 = 1 : 8$, then ${}^nP_{m+1} + {}^{n+1}C_m$ is equal to

- (A) 380 (B) 376 (C) 372 (D) 384

Q27. JEE Main 2024

Let S_n denote the sum of the first n terms of an arithmetic progression. If $S_{10} = 390$ and the ratio of the tenth and the fifth terms is $15 : 7$, then $S_{15} - S_5$ is equal to :

- (A) 800 (B) 890 (C) 790 (D) 690

Q28. JEE Main 2024

Let for any three distinct consecutive terms a, b, c of an A.P, the lines $ax + by + c = 0$ be concurrent at the point P and $Q(\alpha, \beta)$ be a point such that the system of equations $x + y + z = 6$, $2x + 5y + \alpha z = \beta$ and $x + 2y + 3z = 4$, has infinitely many solutions. Then $(PQ)^2$ is equal to _____.

Q29. JEE Main 2024

The sum of the solutions $x \in \mathbb{R}$ of the equation $\frac{3 \cos 2x + \cos^3 2x}{\cos^6 x - \sin^6 x} = x^3 - x^2 + 6$ is

- (A) 3 (B) 1 (C) 0 (D) -1

Q30. JEE Main 2024

Let the set $C = \{(x, y) \mid x^2 - 2y = 2023, x, y \in \mathbb{N}\}$. Then $\sum_{(x,y) \in C} (x + y)$ is equal to _____.

Friday 12th June**Q31. JEE Main 2024**

Remainder when $64^{32^{32}}$ is divided by 9 is equal to _____.

Q32. JEE Main 2024

If three successive terms of a G.P. with common ratio $r (r > 1)$ are the lengths of the sides of a triangle and $[r]$ denotes the greatest integer less than or equal to r , then $3[r] + [-r]$ is equal to _____.

Q33. JEE Main 2024

Let the system of equations $x + 2y + 3z = 5$, $2x + 3y + z = 9$, $4x + 3y + \lambda z = \mu$ have infinite number of solutions. Then $\lambda + 2\mu$ is equal to :

- (A) 22 (B) 17 (C) 15 (D) 28

Q34. JEE Main 2024

Number of ways of arranging 8 identical books into 4 identical shelves where any number of shelves may remain empty is equal to

- (A) 18 (B) 16 (C) 12 (D) 15

Q35. JEE Main 2024

The number of solutions, of the equation $e^{\sin x} - 2e^{-\sin x} = 2$, is :

- (A) 0 (B) 1
(C) 2 (D) more than 2

Q36. JEE Main 2024

Let $a, ar, ar^2, \dots$ be an infinite G.P. If $\sum_{n=0}^{\infty} ar^n = 57$ and $\sum_{n=0}^{\infty} a^3 r^{3n} = 9747$, then $a + 18r$ is equal to

- (A) 27 (B) 38 (C) 31 (D) 46

Q37. JEE Main 2024

Let $A = I_2 - 2MM^T$, where M is a real matrix of order 2×1 such that the relation $M^T M = I_1$ holds. If λ is a real number such that the relation $AX = \lambda X$ holds for some non-zero real matrix X of order 2×1 , then the sum of squares of all possible values of λ is equal to _____.

Q38. JEE Main 2024

Let m and n be the coefficients of seventh and thirteenth terms respectively

in the expansion of $\left(\frac{1}{3}x^{\frac{1}{3}} + \frac{1}{2x^{\frac{1}{3}}}\right)^{18}$. Then $\left(\frac{n}{m}\right)^{\frac{1}{3}}$ is :

- (A) $\frac{1}{9}$
(B) $\frac{1}{4}$
(C) $\frac{4}{9}$
(D) $\frac{9}{4}$

Q39. JEE Main 2024

Let α and β be the roots of the equation $px^2 + qx - r = 0$, where $p \neq 0$. If p, q and r be the consecutive terms of a non constant G.P. and $\frac{1}{\alpha} + \frac{1}{\beta} = \frac{3}{4}$, then the value of $(\alpha - \beta)^2$ is :

- (A) 8 (B) 9 (C) $\frac{20}{3}$ (D) $\frac{80}{9}$

Q40. JEE Main 2024

The number of integers, between 100 and 1000 having the sum of their digits equals to 14, is _____.

Saturday 13th June**Q41. JEE Main 2024**

Consider the matrices : $A = \begin{bmatrix} 2 & -5 \\ 3 & m \end{bmatrix}$, $B = \begin{bmatrix} 20 \\ m \end{bmatrix}$ and $X = \begin{bmatrix} x \\ y \end{bmatrix}$. Let the set of all m , for which the system of equations $AX = B$ has a negative solution (i.e., $x < 0$ and $y < 0$), be the interval (a, b) . Then $8 \int_a^b |A| dm$ is equal to _____.

Q42. JEE Main 2024

The sum of the coefficient of $x^{2/3}$ and $x^{-2/5}$ in the binomial expansion of $(x^{2/3} + \frac{1}{2}x^{-2/5})^9$ is

- (A) 19/4 (B) 69/16 (C) 63/16 (D) 21/4

Q43. JEE Main 2024

Let $B = \begin{bmatrix} 1 & 3 \\ 1 & 5 \end{bmatrix}$ and A be a 2×2 matrix such that $AB^{-1} = A^{-1}$. If $BCB^{-1} = A$ and $C^4 + \alpha C^2 + \beta I = O$, then $2\beta - \alpha$ is equal to

- (A) 16 (B) 10 (C) 8 (D) 2

Q44. JEE Main 2024

The value of $\frac{1 \times 2^2 + 2 \times 3^2 + \dots + 100 \times (101)^2}{1^2 \times 2 + 2^2 \times 3 + \dots + 100^2 \times 101}$ is

- (A) $\frac{305}{301}$ (B) $\frac{306}{305}$ (C) $\frac{32}{31}$ (D) $\frac{31}{30}$

Q45. JEE Main 2024

Let $\alpha, \beta; \alpha > \beta$, be the roots of the equation $x^2 - \sqrt{2}x - \sqrt{3} = 0$. Let $P_n = \alpha^n - \beta^n, n \in \mathbb{N}$. Then $(11\sqrt{3} - 10\sqrt{2})P_{10} + (11\sqrt{2} + 10)P_{11} - 11P_{12}$ is equal to

- (A) $10\sqrt{3}P_9$ (B) $11\sqrt{3}P_9$
(C) $11\sqrt{2}P_9$ (D) $10\sqrt{2}P_9$

Q46. JEE Main 2024

There are 4 men and 5 women in Group A, and 5 men and 4 women in Group B. If 4 persons are selected from each group, then the number of ways of selecting 4 men and 4 women is _____.

Q47. JEE Main 2024

Let A be a 2×2 symmetric matrix such that $A \begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 3 \\ 7 \end{bmatrix}$ and the determinant of A be 1. If $A^{-1} = \alpha A + \beta I$, where I is an identity matrix of order 2×2 , then $\alpha + \beta$ equals _____.

Q48. JEE Main 2024

The number of solutions of the equation $4\sin^2 x - 4\cos^3 x + 9 - 4\cos x = 0; x \in [-2\pi, 2\pi]$ is :

- (A) 0 (B) 3
(C) 1 (D) 2

Q49. JEE Main 2024

Let three real numbers a, b, c be in arithmetic progression and $a+1, b, c+3$ be in geometric progression. If $a > 10$ and the arithmetic mean of a, b and c is 8, then the cube of the geometric mean of a, b and c is

- (A) 120
(B) 316
(C) 312
(D) 128

Q50. JEE Main 2024

If the coefficients of x^4, x^5 and x^6 in the expansion of $(1+x)^n$ are in the arithmetic progression, then the maximum value of n is:

- (A) 28
(B) 21
(C) 7
(D) 14

ANSWER KEY

1. D	2. C	3. -	4. 11376	5. 1	6. C	7. 9	8. C	9. D	10. 10
11. A	12. A	13. C	14. B	15. 10	16. D	17. 0	18. C	19. B	20. B
21. 7	22. 36	23. 25	24. A	25. D	26. C	27. C	28. 113	29. D	30. 46
31. 1	32. 1	33. B	34. D	35. A	36. C	37. 2	38. D	39. D	40. 70
41. 450	42. D	43. B	44. A	45. A	46. 5626	47. 5	48. A	49. A	50. D