A Premier Institute for Pre-Medical & Pre Engineering

SRI VIDYA ARADHANA ACADEMY

VAA

"Transforming Your DREAMS Into Reality...!"

PCMB — PHYSICS CHEMISTRY MATHEMATICS BIOLOGY

NEET/JEE

Topic: Target JEE 2027

Mathematics | **Revision Week 04** | Chetan Sir

"What you revise with discipline today, you will recall with confidence on exam day."

TUESDAY 14TH JULY

1. The least value of **n** for which the number of integral terms in the Binomial expansion of $(\sqrt[3]{7}+\sqrt[12]{11})^n$ is 183, is : **[JEE Main 2025]**

(A) 2184 (B) 2172 (C) 2196 (D) 2148

2. Let P be the set of seven digit numbers with sum of their digits equal to 11. If the numbers in P are formed by using the digits 1, 2 and 3 only, then the number of elements in the set P is : **[JEE Main 2025]**

(A) 164 (B) 158 (C) 161 (D) 173

3. Consider an A. P. of positive integers, whose sum of the first three terms is 54 and the sum of the first twenty terms lies between 1600 and 1800. Then its 11th term is : **[JEE Main 2025]**

(A) 108 (B) 90 (C) 122 (D) 84

4. If $x^2-y^2+2hxy+2gx+2fy+c=0$ is the locus of a point, which moves such that it is always equidistant from the lines $x+2y+7=0$ and $2x-y+8=0$, then the value of $g+c+h-f$ equals **[JEE Main 2024]**

(A) 8 (B) 14 (C) 29 (D) 6

5. Consider two circles $C_1 : x^2+y^2=25$ and $C_2 : (x-\alpha)^2+y^2=16$, where $\alpha \in (5,9)$. Let the angle between the two radii (one to each circle) drawn from one of the intersection points of C_1 and C_2 be $\sin^{-1}\left(\frac{\sqrt{63}}{8}\right)$. If the length of common chord of C_1 and C_2 is β, then the value of $(\alpha\beta)^2$ equals **[JEE Main 2024]**

6. Let $A=[a_{ij}]=\begin{bmatrix}\log_5 128 & \log_4 5\\ \log_5 8 & \log_4 25\end{bmatrix}$. If A_{ij} is the cofactor of a_{ij}, $C_{ij}=\sum\limits_{k=1}^{2} a_{ik}A_{jk}, 1\le i,j\le 2$, and $C=[C_{ij}]$, then $8|C|$ is equal to : **[JEE Main 2025]**

(A) 288 (B) 262 (C) 222 (D) 242

7. Let $A=[a_{ij}]$ be a 2×2 matrix such that $a_{ij}\in\{0,1\}$ for all i and j. Let the random variable X denote the possible values of the determinant of the matrix A. Then, the variance of X is: **[JEE Main 2025]**

(A) $\frac{5}{8}$ (B) $\frac{1}{4}$ (C) $\frac{3}{4}$ (D) $\frac{3}{8}$

8. Let α,β $(\alpha\neq\beta)$ be the values of m, for which the equations $x+y+z=1$, $x+2y+4z=m$ and $x+4y+10z=m^2$ have infinitely many solutions. Then the value of $\sum\limits_{n=1}^{10}(n^\alpha+n^\beta)$ is equal to : **[JEE Main 2025]**

(A) 3410 (B) 560 (C) 3080 (D) 440

9. Let A $=[a_{ij}]$ be a matrix of order 3×3, with $a_{ij}=(\sqrt{2})^{i+j}$. If the sum of all the elements in the third row of A^2 is $\alpha+\beta\sqrt{2}$, $\alpha,\beta\in\mathbf{Z}$, then $\alpha+\beta$ is equal to : **[JEE Main 2025]**

(A) 210 (B) 280 (C) 224 (D) 168

10. Let M and m respectively be the maximum and the minimum values of

$$f(x)=\begin{vmatrix} 1+\sin^2 x & \cos^2 x & 4\sin 4x \\ \sin^2 x & 1+\cos^2 x & 4\sin 4x \\ \sin^2 x & \cos^2 x & 1+4\sin 4x \end{vmatrix}, x \in R$$

Then $M^4 - m^4$ is equal to : **[JEE Main 2025]**

(A) 1280 (B) 1040 (C) 1215 (D) 1295

WEDNESDAY 15TH JULY

11. The remainder, when 7^{103} is divided by 23, is equal to: **[JEE Main 2025]**

(A) 9 (B) 6 (C) 14 (D) 17

12. If all the words with or without meaning made using all the letters of the word "KANPUR" are arranged as in a dictionary, then the word at 440th position in this arrangement is : **[JEE Main 2025]**

(A) PRNAKU (B) PRKAUN (C) PRKANU (D) PRNAUK

13. Let $a_1, a_2, \ldots, a_{2024}$ be an Arithmetic Progression such that $a_1 + (a_5 + a_{10} + a_{15} + \ldots + a_{2020}) + a_{2024} = 2233$. Then $a_1 + a_2 + a_3 + \ldots + a_{2024}$ is equal to **[JEE Main 2025]**

14. A line passing through the point A$(9,0)$ makes an angle of 30° with the positive direction of x-axis. If this line is rotated about A through an angle of 15° in the clockwise direction, then its equation in the new position is : **[JEE Main 2024]**

(A) $\frac{y}{\sqrt{3}+2} + x = 9$ (B) $\frac{x}{\sqrt{3}+2} + y = 9$

(C) $\frac{x}{\sqrt{3}-2} + y = 9$ (D) $\frac{y}{\sqrt{3}-2} + x = 9$

15. If the circles $(x+1)^2 + (y+2)^2 = r^2$ and $x^2 + y^2 - 4x - 4y + 4 = 0$ intersect at exactly two distinct points, then **[JEE Main 2024]**

(A) $\frac{1}{2} < \mathrm{r} < 7$ (B) $3 < \mathrm{r} < 7$ (C) $5 < \mathrm{r} < 9$ (D) $0 < \mathrm{r} < 7$

16. Let $S = \left\{m \in \mathbf{Z} : A^{m^2} + A^m = 3I - A^{-6}\right\}$, where $A = \begin{bmatrix} 2 & -1 \\ 1 & 0 \end{bmatrix}$. Then $n(S)$ is equal to **[JEE Main 2025]**

17. Let A be a square matrix of order 3 such that $\det(A) = -2$ and $\det(3\,\mathrm{adj}(-6\,\mathrm{adj}(3A))) = 2^{m+n} \cdot 3^{mn}, m > n$. Then $4m + 2n$ is equal to **[JEE Main 2025]**

18. Let $\mathrm{A} = \begin{bmatrix} \frac{1}{\sqrt{2}} & -2 \\ 0 & 1 \end{bmatrix}$ and $\mathrm{P} = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}, \theta > 0$. If $\mathrm{B} = \mathrm{PAP}^\top, \mathrm{C} = \mathrm{P}^\top \mathrm{B}^{10} \mathrm{P}$ and the sum of the diagonal elements of C is $\frac{m}{n}$, where $\gcd(m,n) = 1$, then $m + n$ is : **[JEE Main 2025]**

(A) 127 (B) 2049 (C) 258 (D) 65

19. For a 3×3 matrix M, let trace (M) denote the sum of all the diagonal elements of M. Let A be a 3×3 matrix such that $|A| = \frac{1}{2}$ and trace $(A) = 3$. If $B = \mathrm{adj}(\mathrm{adj}(2A))$, then the value of $|B| +$ trace (B) equals : **[JEE Main 2025]**

(A) 56 (B) 132 (C) 174 (D) 280

20. If the system of linear equations :

$x + y + 2z = 6$

$2x + 3y + \mathrm{a}z = \mathrm{a} + 1$

$-x - 3y + \mathrm{b}z = 2\,\mathrm{b}$

where $a, b \in \mathbf{R}$, has infinitely many solutions, then $7a + 3b$ is equal to : **[JEE Main 2025]**

(A) 12 (B) 9 (C) 22 (D) 16

THURSDAY 16TH JULY

21. If $\sum\limits_{r=0}^{5} \frac{{}^{11}C_{2r+1}}{2r+2} = \frac{\mathrm{m}}{\mathrm{n}}, \gcd(\mathrm{m},\mathrm{n}) = 1$, then $\mathrm{m} - \mathrm{n}$ is equal to **[JEE Main 2025]**

22. The number of 6-letter words, with or without meaning, that can be formed using the letters of the word MATHS such that any letter that appears in the word must appear at least twice, is **[JEE Main 2025]**

23. Let $a_1, a_2, a_3, \ldots$ be a G.P. of increasing positive terms. If $a_1 a_5 = 28$ and $a_2 + a_4 = 29$, then a_6 is equal to: **[JEE Main 2025]**

(A) 812 (B) 784 (C) 628 (D) 526

24. Let R be the interior region between the lines $3x - y + 1 = 0$ and $x + 2y - 5 = 0$ containing the origin. The set of all values of a, for which the points $\left(a^2, a+1\right)$ lie in R, is : **[JEE Main 2024]**

(A) $(-3, 0) \cup \left(\frac{2}{3}, 1\right)$ (B) $(-3, 0) \cup \left(\frac{1}{3}, 1\right)$

(C) $(-3, -1) \cup \left(\frac{1}{3}, 1\right)$ (D) $(-3, -1) \cup \left(-\frac{1}{3}, 1\right)$

25. Consider a circle $(x-\alpha)^2 + (y-\beta)^2 = 50$, where $\alpha, \beta > 0$. If the circle touches the line $y + x = 0$ at the point P, whose distance from the origin is $4\sqrt{2}$, then $(\alpha+\beta)^2$ is equal to **[JEE Main 2024]**

26. If A, B, and $\left(\operatorname{adj}\left(A^{-1}\right) + \operatorname{adj}\left(B^{-1}\right)\right)$ are non-singular matrices of same order, then the inverse of $A\left(\operatorname{adj}\left(A^{-1}\right) + \operatorname{adj}\left(B^{-1}\right)\right)^{-1}$ is equal to **[JEE Main 2025]**

(A) $\frac{AB^{-1}}{|A|} + \frac{BA^{-1}}{|B|}$ (B) $\operatorname{adj}\left(B^{-1}\right) + \operatorname{adj}\left(A^{-1}\right)$

(C) $AB^{-1} + A^{-1}B$ (D) $\frac{1}{|AB|}(\operatorname{adj}(B) + \operatorname{adj}(A))$

27. Let $A = [a_{ij}]$ be a 3×3 matrix such that $A\begin{bmatrix}0\\1\\0\end{bmatrix} = \begin{bmatrix}0\\0\\1\end{bmatrix}$, $A\begin{bmatrix}4\\1\\3\end{bmatrix} = \begin{bmatrix}0\\1\\0\end{bmatrix}$ and $A\begin{bmatrix}2\\1\\2\end{bmatrix} = \begin{bmatrix}1\\0\\0\end{bmatrix}$, then a_{23} equals : **[JEE Main 2025]**

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

28. Let A be a 3×3 matrix such that $X^T A X = O$ for all nonzero 3×1 matrices $X = \begin{bmatrix}x\\y\\z\end{bmatrix}$. If $A\begin{bmatrix}1\\1\\1\end{bmatrix} = \begin{bmatrix}1\\4\\-5\end{bmatrix}$, $A\begin{bmatrix}1\\2\\1\end{bmatrix} = \begin{bmatrix}0\\4\\-8\end{bmatrix}$, and $\det(\operatorname{adj}(2(A+I))) = 2^\alpha 3^\beta 5^\gamma$, $\alpha, \beta, \gamma \in N$, then $\alpha^2 + \beta^2 + \gamma^2$ is **[JEE Main 2025]**

29. For some a, b, let $f(x) = \begin{vmatrix} a + \frac{\sin x}{x} & 1 & b \\ a & 1 + \frac{\sin x}{x} & b \\ a & 1 & b + \frac{\sin x}{x} \end{vmatrix}$, $x \neq 0$, $\lim_{x \to 0} f(x) = \lambda + \mu a + \nu b$. Then $(\lambda + \mu + v)^2$ is equal to : **[JEE Main 2025]**

(A) 25 (B) 16 (C) 9 (D) 36

30. Let M denote the set of all real matrices of order 3×3 and let $S = \{-3, -2, -1, 1, 2\}$. Let
$S_1 = \left\{A = [a_{ij}] \in M : A = A^T \text{ and } a_{ij} \in S, \forall i, j\right\}$,
$S_2 = \left\{A = [a_{ij}] \in M : A = -A^T \text{ and } a_{ij} \in S, \forall i, j\right\}$,
$S_3 = \left\{A = [a_{ij}] \in M : a_{11} + a_{22} + a_{33} = 0 \text{ and } a_{ij} \in S, \forall i, j\right\}$.
If $n(S_1 \cup S_2 \cup S_3) = 125\alpha$, then α equals **[JEE Main 2025]**

FRIDAY 17TH JULY

31. Let the coefficients of three consecutive terms T_r, T_{r+1} and T_{r+2} in the binomial expansion of $(a+b)^{12}$ be in a G.P. and let p be the number of all possible values of r. Let q be the sum of all rational terms in the binomial expansion of $(\sqrt[4]{3} + \sqrt[3]{4})^{12}$. Then $p + q$ is equal to: **[JEE Main 2025]**

(A) 295 (B) 283 (C) 299 (D) 287

32. From all the English alphabets, five letters are chosen and are arranged in alphabetical order. The total number of ways, in which the middle letter is ' M ', is : **[JEE Main 2025]**

(A) 6084 (B) 5148 (C) 14950 (D) 4356

33. For positive integers n, if $4a_n = (n^2 + 5n + 6)$ and $S_n = \sum_{k=1}^{n} \left(\frac{1}{a_k}\right)$, then the value of $507 S_{2025}$ is : **[JEE Main 2025]**

(A) 540 (B) 675 (C) 1350 (D) 135

34. If the sum of squares of all real values of α, for which the lines $2x - y + 3 = 0, 6x + 3y + 1 = 0$ and $\alpha x + 2y - 2 = 0$ do not form a triangle is p, then the greatest integer less than or equal to p is **[JEE Main 2024]**

35. Let a variable line passing through the centre of the circle $x^2 + y^2 - 16x - 4y = 0$, meet the positive co-ordinate axes at the points A and B. Then the minimum value of $OA + OB$, where O is the origin, is equal to **[JEE Main 2024]**

(A) 12 (B) 20 (C) 24 (D) 18

36. Let $A = \begin{bmatrix} 2 & 2+p & 2+p+q \\ 4 & 6+2p & 8+3p+2q \\ 6 & 12+3p & 20+6p+3q \end{bmatrix}$.
If $\det(\operatorname{adj}(\operatorname{adj}(3A))) = 2^m \cdot 3^n$, $m, n \in \mathbb{N}$, then $m + n$ is equal to **[JEE Main 2025]**

(A) 22 (B) 20 (C) 24 (D) 26

37. Let $\mathrm{A} = \begin{bmatrix} \alpha & -1 \\ 6 & \beta \end{bmatrix}$, $\alpha > 0$, such that $\det(\mathrm{A}) = 0$ and $\alpha + \beta = 1$. If I denotes 2×2 identity matrix, then the matrix $(I + A)^8$ is : **[JEE Main 2025]**

(A) $\begin{bmatrix} 257 & -64 \\ 514 & -127 \end{bmatrix}$

(B) $\begin{bmatrix} 766 & -255 \\ 1530 & -509 \end{bmatrix}$

(C) $\begin{bmatrix} 1025 & -511 \\ 2024 & -1024 \end{bmatrix}$

(D) $\begin{bmatrix} 4 & -1 \\ 6 & -1 \end{bmatrix}$

38. Let $a \in R$ and A be a matrix of order 3×3 such that $\det(A) = -4$ and $A + I = \begin{bmatrix} 1 & a & 1 \\ 2 & 1 & 0 \\ a & 1 & 2 \end{bmatrix}$, where I is the identity matrix of order 3×3. If $\det((a+1)\operatorname{adj}((a-1)A))$ is $2^{\mathrm{m}}3^{\mathrm{n}}$, m, n $\in \{0, 1, 2, \ldots, 20\}$, then m + n is equal to : **[JEE Main 2025]**

(A) 14 (B) 17 (C) 15 (D) 16

39. Let A be a 3×3 real matrix such that $A^2(A - 2I) - 4(A - I) = O$, where I and O are the identity and null matrices, respectively. If $A^5 = \alpha A^2 + \beta A + \gamma I$, where α, β, and γ are real constants, then $\alpha + \beta + \gamma$ is equal to : **[JEE Main 2025]**

(A) 76 (B) 12 (C) 4 (D) 20

40. Let A be a 3×3 matrix such that $|\operatorname{adj}(\operatorname{adj}(\operatorname{adj} \mathrm{A}))| = 81$.

If $S = \left\{ n \in \mathbb{Z} : (|\operatorname{adj}(\operatorname{adj} A)|)^{\frac{(n-1)^2}{2}} = |A|^{(3n^2 - 5n - 4)} \right\}$, then $\sum_{n \in S} \left| A^{(n^2+n)} \right|$ is equal to : **[JEE Main 2025]**

(A) 820 (B) 866 (C) 750 (D) 732

ANSWER KEY

1. (A)	**2.** (C)	**3.** (B)	**4.** (B)	**5.** 1575	**6.** (D)	**7.** (D)	**8.** (D)
9. (C)	**10.** (A)	**11.** (C)	**12.** (B)	**13.** 11132	**14.** (D)	**15.** (B)	**16.** 2
17. 34	**18.** (D)	**19.** (D)	**20.** (D)	**21.** 2035	**22.** 1405	**23.** (B)	**24.** (B)
25. 100	**26.** (D)	**27.** (B)	**28.** 44	**29.** (B)	**30.** 1613	**31.** (B)	**32.** (B)
33. (B)	**34.** 32	**35.** (D)	**36.** (C)	**37.** (B)	**38.** (D)	**39.** (B)	**40.** (D)