

JEE MAIN MATRICES — SPECIAL MATRICES: IDEMPOTENT, NILPOTENT, INVOLUTORY, ORTHOGONAL (JEE) — PYQS

Max. Marks: 12
Questions: 3

Section A (MCQ) — 2 questions

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

[JEE Main 2025 (Online) 2nd April Morning Shift]

- (1) $\begin{bmatrix} 257 & -64 \\ 514 & -127 \end{bmatrix}$ (2) $\begin{bmatrix} 766 & -255 \\ 1530 & -509 \end{bmatrix}$
 (3) $\begin{bmatrix} 1025 & -511 \\ 2024 & -1024 \end{bmatrix}$ (4) $\begin{bmatrix} 4 & -1 \\ 6 & -1 \end{bmatrix}$

Scan or tap for the full solution



- Q.2** Let $A = \begin{bmatrix} \frac{1}{\sqrt{2}} & -2 \\ 0 & 1 \end{bmatrix}$ and $P = \begin{bmatrix} \cos \theta & -\sin \theta \\ \sin \theta & \cos \theta \end{bmatrix}$, $\theta > 0$. If $B = PAP^T$, $C = P^T B^{10} P$ 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 (Online) 28th January Evening Shift]

- (1) 127 (2) 2049 (3) 258 (4) 65

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Section B (Numerical) — 1 question

- Q.3** Let $A = \begin{bmatrix} 0 & 2 & -3 \\ -2 & 0 & 1 \\ 3 & -1 & 0 \end{bmatrix}$ and B be a matrix such that $B(I - A) = I + A$. Then the sum of the diagonal elements of $B^T B$ is equal to _____

[JEE Main 2026 (Online) 23rd January Evening Shift]

Scan or tap for the full solution



ANSWER KEY

Section A (MCQ) — 2 questions

Ques.	1	2									
Ans.	2	4									

Section B (Numerical) — 1 question

Ques.	3										
Ans.	3										