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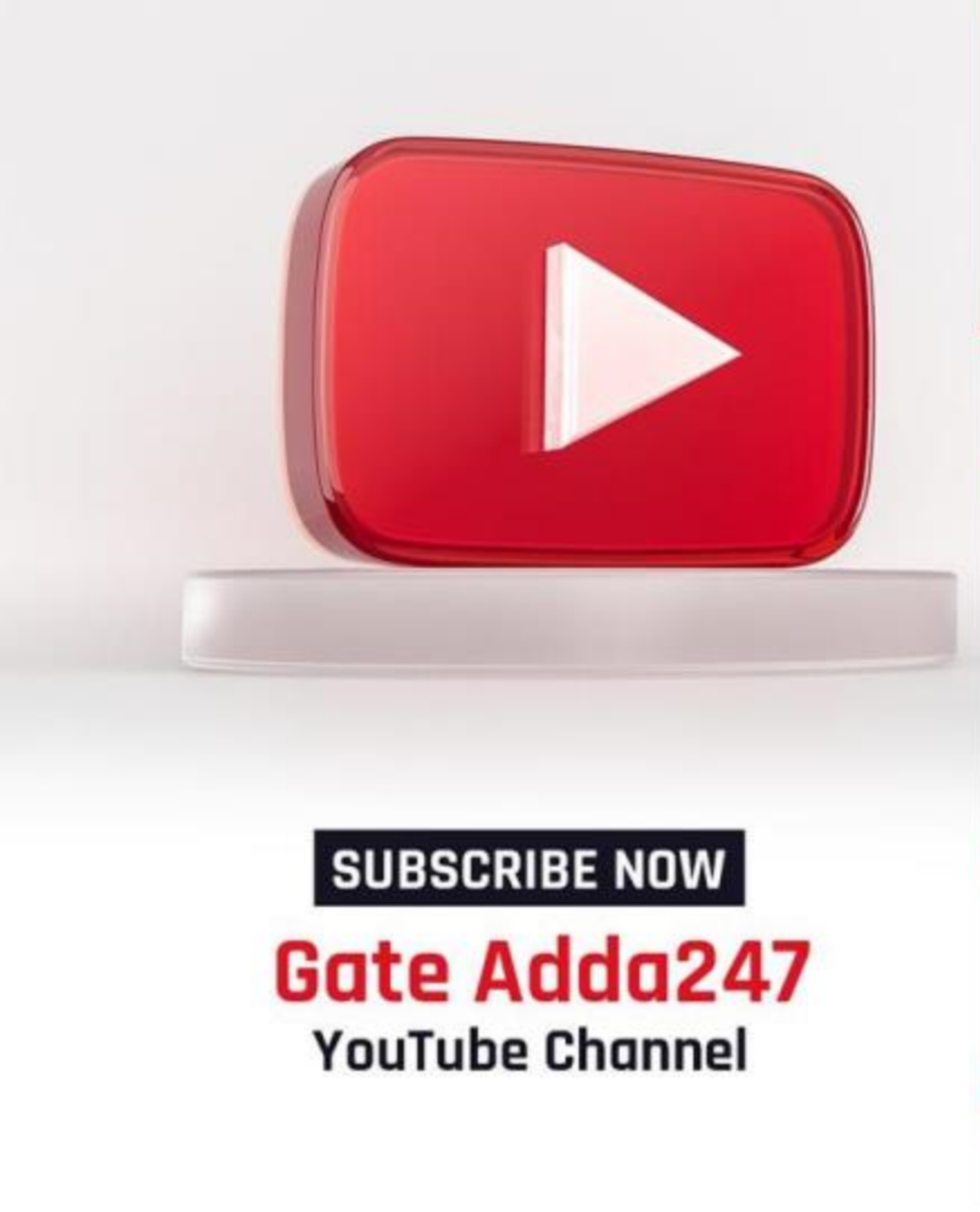

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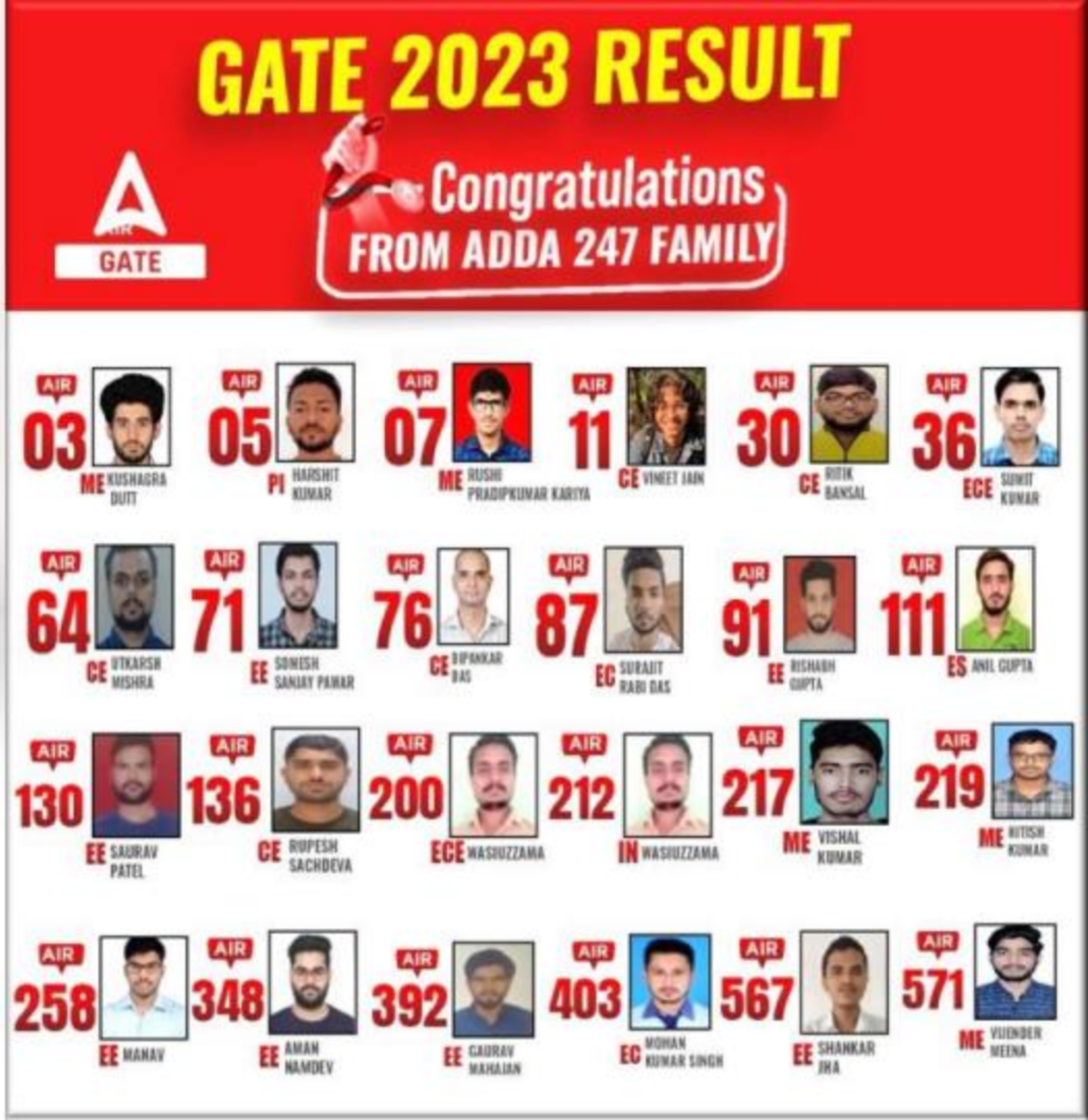

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ENGINEERS

EE & EC ENGINEERING

EXAM TARGET	SUBJECT	TIME	FACULTY
ALL PSUs	ENGINEERING MATHS	10:00 AM	ANANT SIR
GATE 2024-25	NETWORK THEORY	6:00 PM	RAVI SIR
GATE 2024-25	ELECTRICAL MACHINE	7:30 PM	SANTAN SIR
GATE 2024-25	COMMUNICATION	9:00 PM	RENU SIR

YouTube Classes Schedule

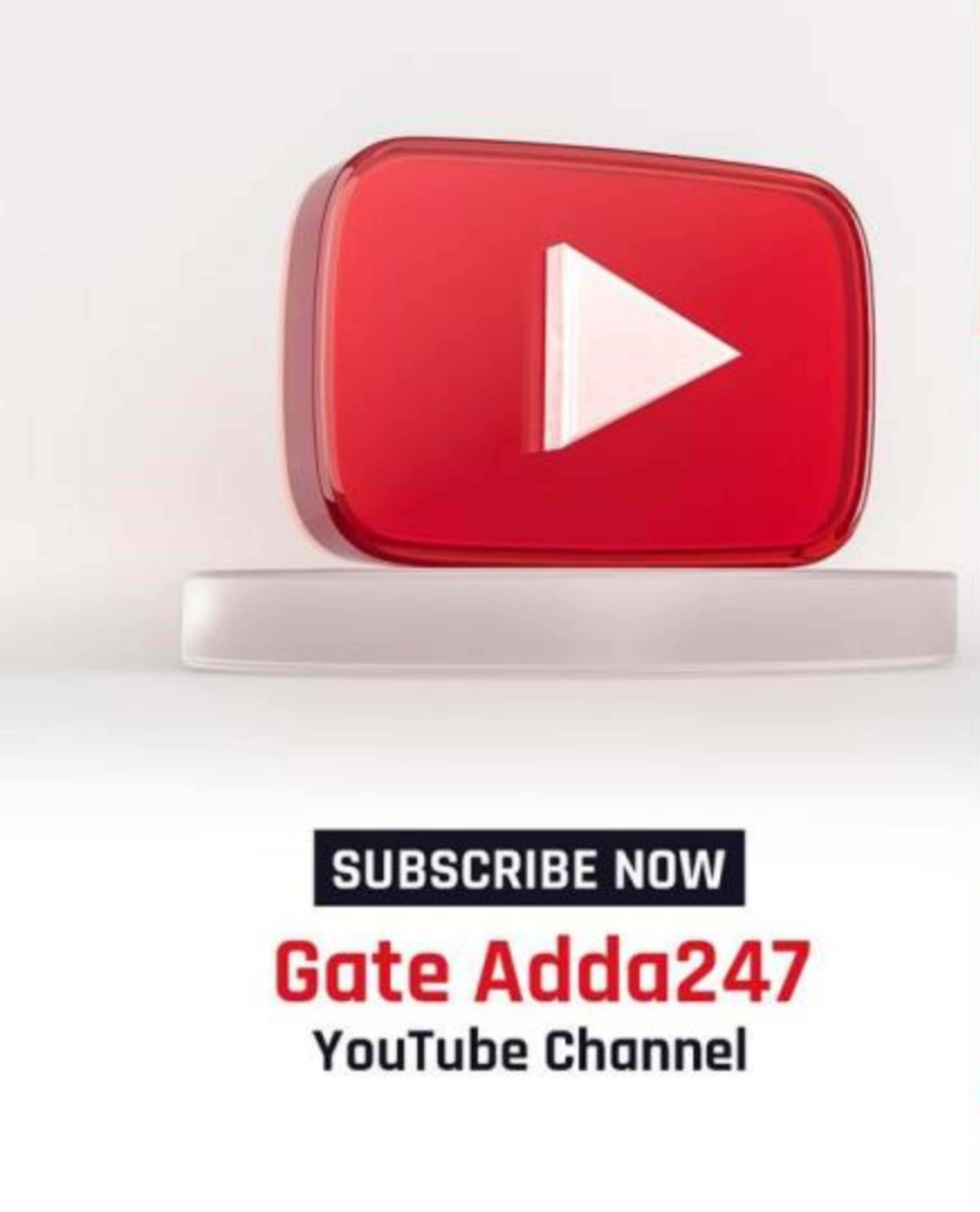
CIVIL ENGINEERING

EXAM TARGET	SUBJECT	TIME	FACULTY
ALL PSUs	ENGINEERING MATHS	10:00 AM	ANANT SIR
ALL PSUs	GEOTECHNICAL	1:00 PM	RUDRA SIR
GATE 2024-25	STEEL STRUCTURE	6.00 PM	REHAN SIR
GATE 2024-25	ENVIRONMENT	8:00 PM	PRATIK SIR
GATE 2024-25	SOM	9:00 PM	MUKESH SIR

YouTube Classes Schedule

MECHANICAL ENGINEERING

EXAM TARGET	SUBJECT	TIME	FACULTY
ALL PSUs	ENGINEERING MATHS	10:00 AM	ANANT SIR
ALL PSUs	PRODUCTION	11:30 PM	GAURAV SIR
ALL PSUs	THERMODYNAMICS	3:00 PM	KANISTH SIR
GATE 2024-25	HMT	4:30 PM	YOGESH SIR
GATE 2024-25	SOM	9:00 PM	MUKESH SIR



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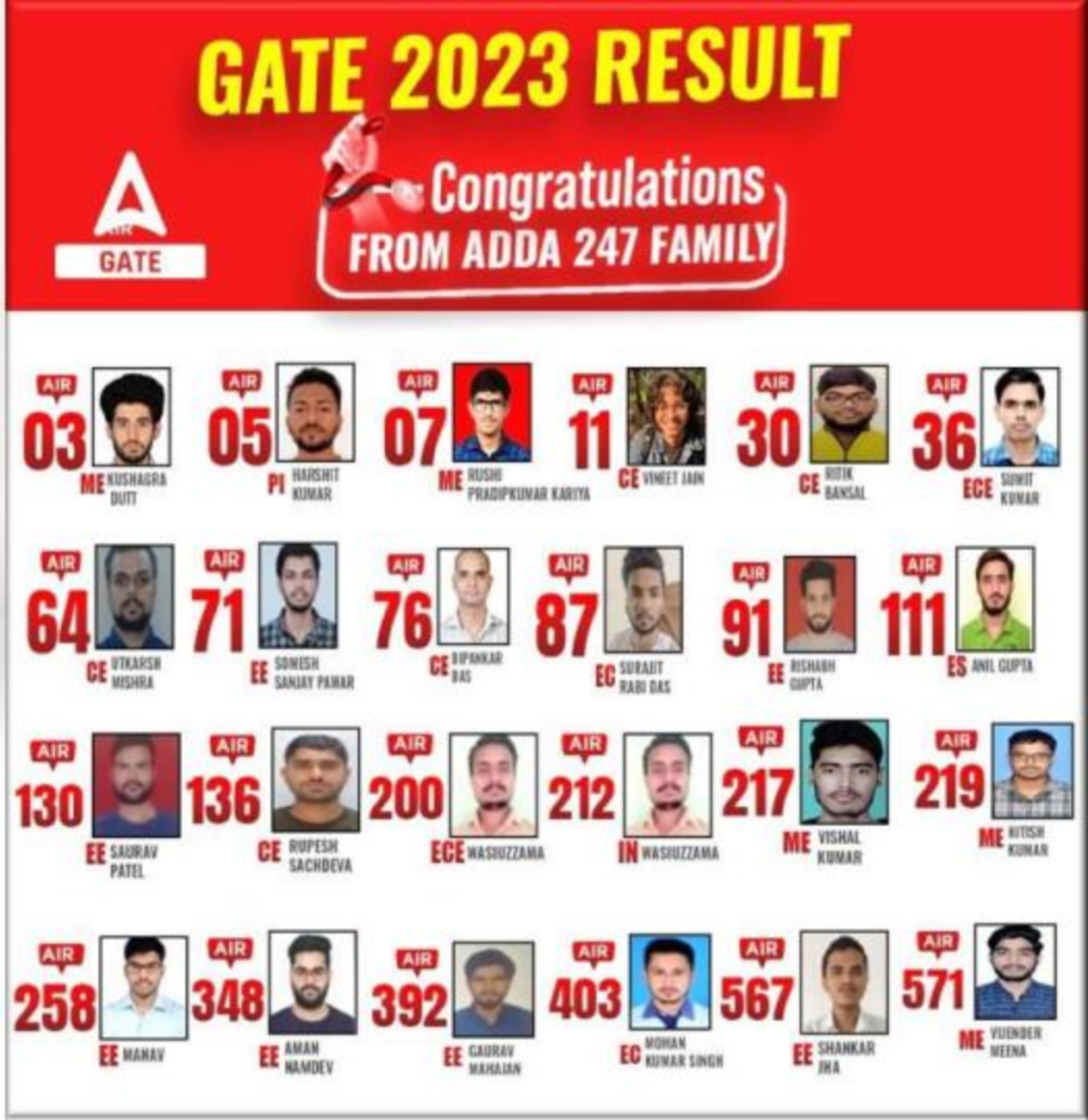

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HMT	MONDAY Live @11AM	YOGESH SIR
PRODUCTION	TUESDAY Live @11AM	GAURAV SIR
SOM	WEDNESDAY Live @8PM	MUKESH SIR
THERMODYNAMICS	THURSDAY Live @11AM	KANISTH SIR
ENGINEERING MATHEMATICS	FRIDAY Live @11AM	ANANT SIR

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NETWORK THEORY	SATURDAY Live @11AM	RAVI SIR
COMMUNICATION	WEDNESDAY Live @8PM	RENU SIR
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ELECTRICAL MACHINE	MONDAY Live @8PM	SANTAN SIR

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ENVIRONMENT	THURSDAY Live @8PM	PRATIK SIR
STEEL STRUCTURE	FRIDAY Live @8PM	REHAN SIR
GEOTECHNICAL	SATURDAY Live @11AM	RUDRA SIR
ENGINEERING MATHEMATICS	FRIDAY Live @11AM	ANANT SIR

Q:174

Euclidean norm (length) of the vector $[4\ \ -2\ \ -6]^T$ is

(a) $\sqrt{48}$ (b) $\sqrt{56}$ ✓

(c) $\sqrt{24}$ (d) $\sqrt{12}$

$\sqrt{(4)^2+(-2)^2+(-6)^2}$

$=\sqrt{16+4+36}=\sqrt{56}$

Q:175

Consider the following matrix:

$$R = \begin{bmatrix} 1 & 2 & 4 & 8 \\ 1 & 3 & 9 & 27 \\ 1 & 4 & 16 & 64 \\ 1 & 5 & 25 & 125 \end{bmatrix}_{4\times4}$$

The absolute value of the product of Eigen values of R is ___12___.

$A \to d_1, d_2, d_3, d_4 \to |A|$

linear transformation $\Big\downarrow$ $\qquad ||$

$B \to \mu_1, \mu_2, \mu_3, \mu_4 \to |B|$

$R_2 \leftarrow R_2 - R_1,\ R_3 \leftarrow R_3 - R_1,\ R_4 \leftarrow R_4 - R_1$

$$\begin{bmatrix} 1 & 2 & 4 & 8 \\ 0 & 1 & 5 & 19 \\ 0 & 2 & 12 & 56 \\ 0 & 3 & 21 & 117 \end{bmatrix} \to \begin{bmatrix} 1 & 2 & 4 & 8 \\ 0 & 1 & 5 & 19 \\ 0 & 0 & 2 & 18 \\ 0 & 0 & 6 & 60 \end{bmatrix} \to \begin{bmatrix} 1 & 2 & 4 & 8 \\ 0 & 1 & 5 & 19 \\ 0 & 0 & 2 & 18 \\ 0 & 0 & 0 & 6 \end{bmatrix}$$

$1, 1, 2, 6 = 12$

Q:176 What are the value of k for which the system of equations:

$$(3k-8)x + 3y + 3z = 0$$
$$3x + (3k-8)y + 3z = 0$$
$$3x + 3y + (3k-8)z = 0$$

has a not-trivial solution?

(a) $k = \frac{2}{3}, \frac{11}{3}, \frac{10}{3}$
(b) $k = \frac{2}{3}, \frac{10}{3}, \frac{11}{3}$
(c) $k = \frac{11}{3}, \frac{11}{3}, \frac{11}{3}$
(d) $k = \frac{2}{3}, \frac{11}{3}, \frac{11}{3}$

[EE, ESE-2019]

$\rho(A) < 3$

$|A_{3\times3}| = 0$

$$\begin{vmatrix} 3k-8 & 3 & 3 \\ 3 & 3k-8 & 3 \\ 3 & 3 & 3k-8 \end{vmatrix} = 0$$

$$\begin{vmatrix} 3k-2 & 3 & 3 \\ 3k-2 & 3k-8 & 3 \\ 3k-2 & 3 & 3k-8 \end{vmatrix} = 0$$

$$(3k-2)\begin{vmatrix} 1 & 3 & 3 \\ 1 & 3k-8 & 3 \\ 1 & 3 & 3k-8 \end{vmatrix} = 0$$

$k = \frac{2}{3}$

$$\begin{vmatrix} 1 & 3 & 3 \\ 1 & 3k-8 & 3 \\ 1 & 3 & 3k-8 \end{vmatrix} = 0$$

$$1\left((3k-8)(3k-8)-9\right) - 3\left(3k-8-3\right) + 3\left(3-3k+8\right) = 0$$

$$\left(9k^2 - 48k + 64 - 9\right) - 9k + 33 - 9k + 33 = 0$$

$$9k^2 - 66k - 121 = 0$$

$$k = \frac{66 \pm \sqrt{(66)^2 \cdot}}{2}$$

$$\begin{array}{r} 66 \times 66 \\ \hline 396 \\ 396\times \\ \hline 4356 \end{array} \qquad \begin{array}{r} 121 \times 36 \\ \hline 726 \\ 363\times \\ \hline 4356 \end{array}$$

Q:177

If $A = \begin{bmatrix} 2+i & 3 & -1+3i \\ -5 & i & 4-2i \end{bmatrix}$, then AA* will be

(where, A* is the conjugate transpose of A)

(a) Unitary matrix

(b) Orthogonal matrix

✓ (c) Hermitian matrix

(d) Skew Hermitian matrix

[EE, ESE-2019]

$$A^* = \begin{bmatrix} 2-i & -5 \\ 3 & -i \\ -1-3i & 4+2i \end{bmatrix}$$

$$AA^* = \begin{bmatrix} 2+i & 3 & -1+3i \\ -5 & i & 4-2i \end{bmatrix} \begin{bmatrix} 2-i & -5 \\ 3 & -i \\ -1-3i & 4+2i \end{bmatrix} = \begin{bmatrix} 24 & -20+2i \\ -20-2i & 25+1+16 \end{bmatrix}$$

real

Q:178 For the matrix $\begin{bmatrix} 1 & 5 \\ 3 & 3 \end{bmatrix}_{2\times 2}$, the eigen vectors are

(a) $\begin{bmatrix} 1 \\ 3 \end{bmatrix}$ and $\begin{bmatrix} 5 \\ 3 \end{bmatrix}$ (b) $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$ and $\begin{bmatrix} 5/3 \\ 1 \end{bmatrix}$

(c) $\begin{bmatrix} 1 \\ -1 \end{bmatrix}$ and $\begin{bmatrix} 3 \\ -3 \end{bmatrix}$ (d) $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ and $\begin{bmatrix} -5/3 \\ 1 \end{bmatrix}$ ✓

$\lambda_1 + \lambda_2 = 4$

$\lambda_1 \times \lambda_2 = -12$

$+6, -2$

for $\lambda = -2$

$\begin{bmatrix} 3 & 5 \\ 3 & 5 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = 0$

$3x_1 = -5x_2$

for $\lambda = 6$

$\begin{bmatrix} -5 & 5 \\ 3 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = 0$

$x_1 = x_2$

Q:179

Multiplication of real valued square matrices of same dimension is

(a) not always possible to compute

(b) associative

(c) always positive definite

(d) commutative

$A_{n\times n}\ B_{n\times n}$

$(AB)C = A(BC)$

$AB \neq BA$

Q:180

Let X be a square matrix. Consider the following two statements on X.

I. X is invertible.

II. Determinant of X is non-zero.

$$A^{-1} = \frac{adj\,A}{|A|}$$

Which one of the following is TRUE?

(a) I implies II; II does not imply I.

(b) II implies I; I does not imply II.

(c) I and II are equivalent statements.

(d) I does not imply II; II does not imply I.

Q:181 The set of equations

$$x + y + z = 1$$

$$ax - ay + 3z = 5$$

$$5x - 3y + az = 6$$

has infinite solution if a =

(a) – 4 (b) – 3

(c) 3 (d) 4 ✓

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ a & -a & 3 & 5 \\ 5 & -3 & a & 6 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ a & -a & 3 & 5 \\ 0 & -8 & a-5 & 1 \end{bmatrix}$$

$$\begin{vmatrix} 1 & 1 & 1 \\ a & -a & 3 \\ 0 & -8 & a-5 \end{vmatrix} = 0$$

$+8(3-a) + (a-5)(-a-a) = 0$

$24 - 8a - 2a^2 + 10a = 0$

$2a^2 - 2a - 24 = 0$

Q:182 The diagonal elements of a 3 – *by* – 3 matrix are –10, 5 and 0 respectively. If two of its eigen values are –15 each, the third eigen value is ___25___.

$-10+5+0 = d_1+d_2+d_3 = -5$

$d_1 = -15 = d_2$

$-30+d_3 = -5$

$d_3 = -5+30 = 25$

Q:183 Consider a non-singular 2 × 2 square matrix A. If trace $(A) = 4$ and trace $(A^2) = 5$, the determinant of the matrix A is 5.5 (upto 1 decimal place).

$A \to \lambda_1, \lambda_2$

$\lambda_1 + \lambda_2 = 4$

$B = A^2$

$B \to \mu_1, \mu_2$

$\mu_1 = \lambda_1^2$

$\mu_2 = \lambda_2^2$

$\mu_1 + \mu_2 = \text{trace}(A^2) = 5$

$\lambda_1^2 + \lambda_2^2 = 5$

$\lambda_1 \times \lambda_2 = ?$

$(\lambda_1 + \lambda_2)^2 = \lambda_1^2 + \lambda_2^2 + 2\lambda_1\lambda_2$

$16 = 5 + 2\lambda_1\lambda_2$

$\lambda_1\lambda_2 = \frac{11}{2} = 5.5$

Q:185

Consider matrix $A = \begin{bmatrix} k & 2k \\ k^2 - k & k^2 \end{bmatrix}$ and vector $X = \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$. The number of distinct real values of k for which the equation $AX = 0$ has infinitely many solutions is ___2___.

$$\begin{vmatrix} k & 2k \\ k^2-k & k^2 \end{vmatrix} = 0$$

$$k^3 - 2k^3 + 2k^2 = 0$$

$$2k^2 - k^3 = 0$$

$$k^2(2-k) = 0$$

$k = 0, 0$

$k = 2$

THANKS FOR

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