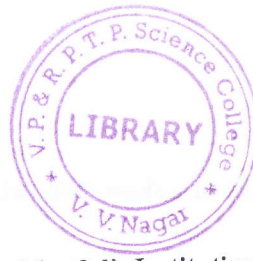


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A Charutar Vidya Mandal's Institution

V. P. & R. P. T. P. SCIENCE COLLEGE

(AUTONOMUS) (Grant-in-Aid)

Affiliated to Sardar Patel University, Vallabh Vidyanagar -388120



Bachelor of Science (Semester II) Internal Examination-2025

US02IDMTH01: Basics of Matrices

Date: 06-03-2025 Day: Thursday

Time: 12:45 pm to 1:45 pm

Total marks: 20

NOTE: The symbols used in this paper have usual meaning unless specified.

Q. 1 Write the most appropriate answer from the following multiple-choice questions. [06]

- (1) A matrix A is said to be symmetric if
(a) $A = A^0$ (b) $A = A^T$ (c) $A = -A^T$ (d) $A = -A^0$
- (2) If A is a non-singular matrix of order n , then the rank of A is:
(a) 0 (b) 1 (c) $n - 1$ (d) n
- (3) The matrix _____ is not an elementary matrix.
(a) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 1 & -1 \\ 0 & 1 \end{bmatrix}$
- (4) The non-homogeneous system of equations $AX = b$, where A is of order $m \times n$ has a solution if and only if
(a) $\rho(A) = n$ (b) $\rho(A) = m$ (c) $\rho(A) = \rho(A, b)$ (d) $\rho(A) \neq \rho(A, b)$
- (5) Characteristic roots of identity matrix I of order 2 are:
(a) 1, 1 (b) 1, -1 (c) -1, -1 (d) 0, -1
- (6) If characteristic roots of a square matrix A of order 2 are 1 and 2 then A satisfies the equation
(a) $A^2 + 3A + 2I = \bar{O}$ (b) $A^2 - 3A + 2I = \bar{O}$
(c) $A^2 - 3A - 2I = \bar{O}$ (d) $A^2 + 3A - 2I = \bar{O}$

- Q. 2 (A) Determine rank of the matrix $\begin{pmatrix} 1 & 2 & 3 & 4 & -1 \\ 4 & 1 & 5 & -6 & 10 \\ 2 & 0 & 2 & -2 & 6 \end{pmatrix}$ by reducing it to row echelon form. [04]**
- (B) Find inverse of the matrix $\begin{pmatrix} 2 & 1 & 5 \\ -1 & 0 & 1 \\ 3 & 2 & 0 \end{pmatrix}$ using elementary row operations, if exists. [03]**

OR

Q. 2 (A) Show that diagonal elements of a skew-symmetric matrices are zero. [03]

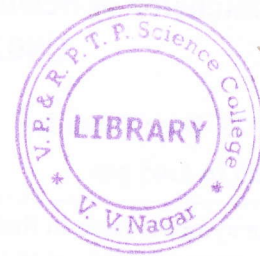
(B) By definition in terms of minor of a matrix find the rank of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ -3 & -6 & -9 \end{pmatrix}$ [04]

Q. 3 (A) Using Gaussian elimination method solve the system of linear equations :

$$x + y + z = 6$$

$$x - y + z = 2$$

$$2x + y - z = 1$$



[04]

(B) Find characteristic roots of the matrix $\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$. [03]

OR

Q. 3 (A) Using Cramer's rule solve the following system of linear equations.

$$5x + 3y + 7z = 4$$

$$3x + 26y + 2z = 9$$

$$7x + 2y + 10z = 5$$

[03]

(B) Using Cayley-Hamilton theorem find A^{-1} for $A = \begin{pmatrix} 1 & 2 & 0 \\ 2 & -1 & 0 \\ 0 & 0 & -1 \end{pmatrix}$. [04]

All The Best