Total No. of Questions : 3]

SEAT No. :

PE-1498

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F.Y. B.Sc. (Computer Science)
MATHEMATICS
MTC-101-T: Matrix Algebra
(NEP) (Rev. 2024) (Semester - I)

Time : 2 Hours] *[Max. Marks : 30*

Instructions to the candidates:

1) ***Figure to the right indicate full marks.***
2) ***All questions are compulsory.***
3) ***Use of single memory non programmable scientific calculator is allowed.***

Q1) Attempt any five of the following. **[5 × 2 = 10]**

a) Define symmetric matrix. Give one example of symmetrix matrix.

b) If $A=\begin{bmatrix} 8 & 6 \\ 5 & 4 \end{bmatrix}$, then find determinant of matrix A.

c) State any two properties of determinant.

d) For the following system of linear equation, write the matrix form AX = B

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

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

$7x + 2y + 10 = 5$

e) If $A=\begin{bmatrix} 0 & 1 \\ -1 & 1 \end{bmatrix}$ and $B=\begin{bmatrix} 5 & 1 \\ -2 & 3 \end{bmatrix}$, then find 5A + 3B.

f) If A is 5 × 7 matrix and nullity (A) = 4, then find rank of A.

g) Describe the nature of solution for the following system of linear equation.

$x + 2y = 5$

$7x + 14y = 35$

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Q2) Attempt any two of the following. **[2 × 5 = 10]**

a) Verify that det (A,B) = det (A) det (B) for the following matrices.

$$A=\begin{bmatrix}1 & 1\\ -1 & 3\end{bmatrix} \text{ and } B=\begin{bmatrix}4 & 2\\ -2 & 3\end{bmatrix}$$

b) By elementary row transformation, reduce the following matrix into row Echelon form. $A=\begin{bmatrix}1 & 2 & 1\\ 3 & 2 & 3\\ 1 & 1 & 2\end{bmatrix}$

c) Use Cramer's rule of compute system of linear equation

$2x + 8y = 18$

$2x + 2y - 3z = 3$

$x + 2y + 7z = 12$

d) Find the inverse of Matrix $A=\begin{bmatrix}2 & 1 & 3\\ 1 & -1 & 1\\ 1 & 4 & -2\end{bmatrix}$ by adjoint method.

Q3) Attempt any one from the following. **[1 × 10 = 10]**

a) Use LU-Decomposition of A to solve AX = b where

$$A=\begin{bmatrix}3 & -7 & -2\\ -3 & 5 & 1\\ 6 & -4 & 0\end{bmatrix} \text{ and } B=\begin{bmatrix}-7\\ 5\\ 2\end{bmatrix} \text{ and } X=\begin{bmatrix}x\\ y\\ z\end{bmatrix}$$

b) i) Solve the following system of equation by Gauss elimination method.

$x + 2y + 3z = 1$

$4x + 5y + 6z = 2$

$7x + 8y + 9z = 0$

ii) Find the inverse of the matrix $A=\begin{bmatrix}1 & -2 & -1\\ -1 & 5 & 6\\ 5 & -4 & 5\end{bmatrix}$, If it exist. Use row transformation method.

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