April-2016

कंठस्थ - 001

Seat Number

* 0 3 7 0 *

MATHEMATICS PAPER - I : MTH-111
Matrices (111101)

P. Pages : 4

Time : Two Hours

Max. Marks : 60

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Graph or diagram should be drawn with the black ink pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. All questions are compulsory.
5. Figures to right indicates full marks.

1. a) Attempt **any six** of the following. **6**

i) If A, B are matrices such that product AB is defined then (AB)'= -----
   a) A' B' b) B' A'
   c) AB d) None of these.

ii) If A is non-singular matrices of order n, then | adj A | = -------
   a) $|A|^{n-1}$ b) $|A|^{n}$
   c) |A| d) None of these.

iii) If A is a matrix of order m x n then $\rho(A)$ ---- min {m,n}
   a) $\leq$ b) $\geq$
   c) > d) None of these.

iv) Eij(-K): The elementary matrix obtained by applying ------- transformation
   a) Cij(k) b) Rij(k)
   c) Cij d) None of these.

v) If $\rho(A) = \rho(A,B]$=n the number of unknowns then Ax=B possesses a --- --- solution.
   a) Unique solution b) No solution
   c) Infinitely many solutions d) None of these

vi) If Ax= λx then x is called ---
   a) Eigen Value b) Eigen vector
   c) Characteristic value d) None of these.

vii) An orthogonal matrix A is called Improper orthogonal if |A|= ---
a) 0 b) 1
c) -1 d) None of these.

viii) If r is rank, S is index & n is number of variables of quadratic form is negative definite if.
a) r=n, s=0 b) r=s, n=0
c) r=n=s d) None of these.

b) Attempt **any six** of the following. 6

i) Define cofactor of an element of matrix.

ii) If A, B are square matrices Then |AB|= -----

iii) Define elementary matrix.

iv) Let $I=\begin{bmatrix}1 & 0 & 0\\ 0 & 1 & 0\\ 0 & 0 & 1\end{bmatrix}$ find $E_{23(5)}$

v) State condition of consistency of system of equation Ax=B.

vi) Write the characteristic equation of matrix A.

vii) Define proper orthogonal matrix.

viii) Write quadratic form in two variables.

2. Attempt **any six** of the following. 12

i) If A is non-singular matrix of order n Then prove that $A^{-1}=\frac{1}{|A|}$

ii) If $A=\begin{bmatrix}2 & 0 & -1\\ 3 & 4 & 0\\ -1 & 1 & 1\end{bmatrix}$ find cofactor A_{22} & A_{31}

iii) Define rank of matrix.

iv) Reduce the matrix $A=\begin{bmatrix}1 & 2\\ -2 & -4\\ 3 & 6\end{bmatrix}$ to its normal form.

v) Define trivial & non-trivial solution of system $Ax = 0$.

vi) Find Eigen value of matrix $A = \begin{bmatrix} 2 & 3 \\ 4 & 7 \end{bmatrix}$

vii) Verify that the matrix A is orthogonal where $A = \begin{bmatrix} \frac{1}{2} & \frac{\sqrt{3}}{2} \\ \frac{-\sqrt{3}}{2} & \frac{1}{2} \end{bmatrix}$

viii) Find the matrix of quadratic form $3x^2+14xy+y^2$

ix) If A is non-singular matrix then prove that $(A^1)^{-1} = (A^{-1})^1$

3. Attempt **any four** of the following. 12

i) If A, B are non-singular square matrices of same order then prove that $(AB)^{-1}=B^{-1}A^{-1}$

ii) Let $A = \begin{bmatrix} 1 & -2 \\ 5 & -7 \end{bmatrix}$ show that adj (adj A)= A

iii) Prove that every non-singular matrix can be expressed as product of a finite number of elementary matrices.

iv) Find the rank of matrix $A = \begin{bmatrix} 2 & 3 & 2 \\ 3 & 2 & 3 \\ 1 & 4 & 1 \end{bmatrix}$

v) Examine for consistency the following system of equations.
$2x+6y+11=0$
$6x+20y-6z+3=0$
$6y-18z+1=0$

vi) Prove that Inverse of an orthogonal matrix is equal to the transpose of that matrix.