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Model question

Electronics Sem-I

Paper-CC-02

Question 1.

$$\begin{vmatrix} 3 & 0 & 0 \\ 4 & 2 & 0 \\ 5 & 3 & 7 \end{vmatrix} = A \text{ then } |A| = ?$$

- (a) 40
- (b) 50
- (c) 42
- (d) 15

Answer: (c) 42

Question 2.

The inverse of $A = \begin{vmatrix} 2 & 3 \\ 5 & k \end{vmatrix}$ Type equation here.

k will not be obtained if A has the value

- (a) 2
- (b) 32
- (c) 52
- (d) 152

Answer: (d) 152

Question 3.

For any unit matrix I

- (a) $I^2 = I$
- (b) $||I|| = 0$
- (c) $||I|| = 2$
- (d) $||I|| = 5$

Answer: (a) $I^2 = I$

Question 4.

A matrix $A = [a_{ij}]_{m \times n}$ is said to be symmetric if

- (a) $a_{ij} = 0$
- (b) $a_{ij} = a_{ji}$
- (c) $a_{ij} = a_{ij}$
- (d) $a_{ij} = 1$

Answer: (b) $a_{ij} = a_{ji}$

Question 5.

If $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ then A^2 is

- (a) $27A$
- (b) $2A$
- (c) $3A$
- (d) 1

Answer: (c) $3A$

Question 6.

A matrix $A = [a_{ij}]_{m \times n}$ is said to be skew symmetric if

- (a) $a_{ij} = 0$
- (b) $a_{ij} = a_{ji}$
- (c) $a_{ij} = -a_{ji}$
- (d) $a_{ij} = 1$

Answer: (b) $a_{ij} = a_{ji}$

Question 7.

$A = [a_{ij}]_{m \times n}$ is a square matrix if

- (a) $m = n$
- (b) $m < n$
- (c) $m > n$
- (d) None of these

Answer: (a) $m = n$

Question 8.

If A and B are square matrices then $(AB)' =$

- (a) $B'A'$
- (b) $A'B'$
- (c) AB'
- (d) $A'B'$

Answer: (a) $B'A'$

Question 9.

If $A = \begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix}$ and adj A is

- (a) $\begin{vmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{vmatrix}$
- (b) $\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}$
- (c) $\begin{vmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{vmatrix}$
- (d) $\begin{vmatrix} -1 & 0 \\ 0 & -1 \end{vmatrix}$

Answer: (c) $[\cos\theta -\sin\theta \sin\theta \cos\theta]$

Question 10.

$A^2 - A + I = 0$ then the inverse of A

- (a) A
- (b) $A + I$
- (c) $I - A$
- (d) $A - I$

Question 11.

If $\begin{vmatrix} x & 8 \\ 3 & 3 \end{vmatrix} = 0$, the value of x is

- (a) 3
- (b) 8
- (c) 24
- (d) 0

Answer: (b) 8

Question 12.

If $A = \begin{vmatrix} i & 0 \\ 0 & i \end{vmatrix}$ then $A^2 =$

(a) $\begin{vmatrix} 1 & 0 \\ 0 & -1 \end{vmatrix}$

(b) $\begin{vmatrix} -1 & 0 \\ 0 & -1 \end{vmatrix}$

(c) $\begin{vmatrix} -1 & 0 \\ 0 & -1 \end{vmatrix}$

(d) $\begin{vmatrix} -1 & 0 \\ 0 & 1 \end{vmatrix}$

Answer: (b) $\begin{vmatrix} -1 & 0 \\ 0 & -1 \end{vmatrix}$

Question 13.

Let A be a non-singular matrix of the order 2×2 then $|A^{-1}| =$

(a) $|A|$

(b) $1/|A|$

(c) 0

(d) 1

Answer: (b) $1/|A|$

Question 14.

If $A = \begin{vmatrix} 1 & 2 \\ 2 & 1 \end{vmatrix}$ then $\text{adj } A =$

(a) $\begin{vmatrix} 1 & -2 \\ -2 & 1 \end{vmatrix}$

(b) $\begin{vmatrix} 2 & 1 \\ 1 & 1 \end{vmatrix}$

(c) $\begin{vmatrix} 1 & -2 \\ -2 & -1 \end{vmatrix}$

(d) $\begin{vmatrix} -1 & 2 \\ -2 & -1 \end{vmatrix}$

Answer: (a) $\begin{vmatrix} 1 & -2 \\ -2 & 1 \end{vmatrix}$

Question 15.

If $A = \begin{vmatrix} 1 & 0 \\ 1 & 1 \end{vmatrix}$ $B = \begin{vmatrix} 0 & 1 \\ 1 & 0 \end{vmatrix}$ then $AB =$

(a) $\begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix}$

(b) $\begin{vmatrix} 1 & 1 \\ 1 & 0 \end{vmatrix}$

(c) $\begin{vmatrix} 1 & 0 \\ 0 & 1 \end{vmatrix}$

(d) 10

Answer: (b)

Group-B

Short answer type:

1. Discuss conjugate of matrices and their properties.
2.
 - a. The necessary and sufficient condition for a square matrix to be invertible is that it is non-singular.
 - b. Show that inverse of a matrix is unique
3. Find the inverse of the matrix:

$$\begin{pmatrix} 3 & 5 & 6 \\ 6 & 7 & 8 \\ 6 & 0 & 1 \end{pmatrix} \quad \begin{pmatrix} 0 & 2 & 4 \\ 5 & 3 & 2 \\ 1 & 0 & 3 \end{pmatrix}$$

4. Discuss orthogonality of a matrix with an example.

Group-C

Long Questions

1.
 - a. Discuss crammer rule in matrices.
 - b. Using crammer rule solve the following equation
$$\begin{aligned} 3x+y-2z &= 2 \\ 2x-3y-z &= -3 \\ 2x+3y-5z &= 0 \end{aligned}$$
2.
 - a. State the Gaussian elimination method.
$$\begin{aligned} 5X_1+3X_2-2X_3 &= 5 \\ 3X_1+X_2+5X_3 &= 1 \\ 7X_1-4X_2-3X_3 &= -6 \end{aligned}$$
3. Find the characteristic equation of the matrix

$$\begin{pmatrix} 2 & 3 & 6 \\ 5 & -3 & 3 \\ 4 & 7 & 2 \end{pmatrix}$$