# 2412E1122

Candidate's Seat No :_____

**MSc IT DMVI Sem-3 Examination**

**DMVIBSC-17**

**Mathematical Foundation of Computer Science**

**December-2024**

**Time : 2-30 Hours]** **[Max. Marks : 70**

Instructions:

- Figures to the right indicate Full Marks.
- Do not write anything on the question paper.
- Simple calculator is allowed. Do not use a scientific calculator.

Question:1 Choice the correct answer: [14]

[1] Find the determinant of matrix $\begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$

(A)-2

(B)3

(C)4

(D)-5

2 If a matrix has 5 rows and 1 column, it is called?

(A)Row matrix

(B) square matrix

(C)Column matrix

(D)Null matrix

3 Which of the following is a square matrix?

(A)A matrix with 3 rows and 2 columns

(B) A matrix with 4 rows and 4 columns

(C) A matrix with 2 rows and 3 columns

(D) A matrix with 1 row and 4 columns

(P.T.O)

4 A matrix in which all the diagonal elements are one is called?

(A) diagonal matrix

(B) Scalar matrix

(C) Null matrix

(D) Identity matrix

5 A matrix with only one row is called?

(A) Row matrix

(B) Column matrix

(C) square matrix

(D) Diagonal matrix

6 The output of an AND gate is 1 when
(A) At least one input is 1
(B) All inputs are 1
(C) All inputs are 0
(D) At least one input is 0

7 What is the output of a NOR gate if both inputs are 1?
(A) 0
(B) 1
(C) Depends on the third input
(D) Indeterminate

8 Which gate's output is always 0 when all inputs are 1?
(A) NOR
(B) NAND
(C) XOR
(D) AND

9 a matrix with 3 rows and 3 columns is called

(A) square matrix

(B) row matrix

(C) column matrix

(D) null matrix

10 a matrix which satisfy A = $A^T$ *is callled*:

(A)idempotent matrix

(B) involutory matrix

(C) nilpotent matrix

(D) symmetric matrix

11 a matrix which satisfies $A^2 = A$ is called?

(A)Idempotent matrix

(B)Involutory matrix

(C)Nilpotent matrix

(D)Symmetric matrix

12 a matrix with 5 rows and 4 columns is called?

(A)rectangular matrix

(B)Square matrix

(C)row matrix

(D)column matrix

13 a matrix which satisfy $A^3 = 0$ is called?

(A)Idempotent matrix

(B)Involutory matrix

(C)Nilpotent matrix

(D)Symmetric matrix

14 a matrix in which all the elements are zero is called ?

(A) Unit matrix

(B) Scalar matrix

(C) null matrix

(D) Identity matrix

Question:2 Answer the following question [14]

[A] Let A = {1,2,3}, B = {3,4,5}, C = {2,3,6}.Find [07]

i. $A \cup B \cap C$

ii. $A - B \cup C$.

[B] Simplify the following Boolean expression: [07]

$(A + B')(A' + C)$.

(P.T.O)

| | | |
|---|---|---|
| Question:3 | Answer the following question | [14] |
| [A] | Write the truth table for $(P \wedge Q) \vee (\neg P \vee \neg Q)$ | [07] |
| [B] | Prove that $\sqrt{2}$ is an irrational number using proof by contradiction. | [07] |
| Question: 4 | Answer the following question. | [14] |
| [A] | Find determinant of given matrix: | [07] |

$$X = \begin{bmatrix} 2 & 6 & 0 \\ 5 & 2 & -2 \\ 6 & 4 & 0 \end{bmatrix}$$

OR

Find determinant of given matrix:

$$X = \begin{bmatrix} 2 & 1 & 3 \\ 5 & 6 & 2 \\ 1 & 5 & 0 \end{bmatrix}$$

[B] Find inverse of given matrix by row elementary method: [07]

$$A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & -1 & 0 \\ 2 & 2 & 1 \end{bmatrix}$$

OR

Find inverse of given matrix by row elementary method:

$$A = \begin{bmatrix} 3 & 0 & 2 \\ 2 & 0 & -2 \\ 0 & 1 & 1 \end{bmatrix}$$

| | | |
|---|---|---|
| Question: 5 | Answer the following question. | [14] |
| [A] | Find values of given system of linear equation by Cramer's rule | [07] |

$x + y + z = 2$

$2x + y + 3z = 9$

$x - 3y + z = 10$

OR

Find values of given system of linear equation by Cramer's rule

$2x + 3y - 5z = 1$

$x + y - z = 2$

$2y + z = 8$

[B] Find values of given system of linear equation by Jordan method: [07]

$x + 2y + 4z = 8$

$2x + 3y + 5z = 10$

$3x + 2y + 6z = 15$

OR

Find values of given system of linear equation by Jordan method:

$x + y + z = 9$

$2x - 3y + 4z = 13$

$3x + 4y + 5z = 40$