5. (a) Explain Karnaugh map method for 2 and 3 variables. (CO2)

OR

(b) Define the following : (CO2)

(i) SOP and POS forms with example

(ii) Logic gates

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TBC–205/TBI–204

B. C. A. (SECOND SEMESTER)

MID SEMESTER

EXAMINATION, 2021-22

DISCRETE MATHEMATICAL STRUCTURES AND GRAPH THEORY

Time : 1½ Hours

Maximum Marks : 50

Note : (i) Answer all the questions by choosing any ***one*** of the sub-questions.

(ii) Each sub-question carries 10 marks.

1. (a) Define the following with examples : (CO1)

Diagonal matrix, Signular matrix, Scalar matrix, Column matrix, Skew symmetric matrix

P. T. O.

OR

(b) If : (CO1)

$$A = \begin{bmatrix} -1 & 2 & 3 \\ 5 & 7 & 9 \\ -2 & 1 & 1 \end{bmatrix}$$

and $$B = \begin{bmatrix} -4 & 1 & -2 \\ 1 & 2 & 0 \\ 1 & 3 & 1 \end{bmatrix}$$

then show that :

(i) $(A+B)^T = A^T + B^T$

(ii) $(A-B)^T = A^T - B^T$

2. (a) Solve the system of linear equations by matrix method : (CO1)

$$x - y + z = 4$$
$$2x + y - 3z = 0$$
$$x + y + z = 0$$

OR

(b) Find the inverse of the matrix : (CO1)

$$A = \begin{bmatrix} 2 & 1 & 3 \\ 4 & -1 & 0 \\ -7 & 2 & 1 \end{bmatrix}$$

3. (a) Find the eigen values and eigen vectors of the matrix : (CO1)

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$$

OR

(b) Find the characteristic equation of the matrix : (CO1)

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

and verify that it is satisfied by A.

4. (a) (i) State and prove De-Morgan's law. (CO2)

(ii) Define Boolean algebra with properties.

OR

(b) Simplify the following Boolean expressions : (CO2)

(i) $(A+B)(A\bar{B}\bar{C} + A\bar{B}C + AB\bar{C} + ABC)$

(ii) $\overline{(A\bar{B} + \bar{A}B)}$