Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
B.VOC- SEMESTER– I EXAMINATION – WINTER 2023
Subject Code:1110701   **Date:26-12-2023**
Subject Name:Basic Mathematics
Time:10:30 AM TO 12:30 PM   **Total Marks:50**
Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Define length(Magnitude) of a vector and hence find the length of following vectors,	**05**

      i. $3\hat{\imath} + 2\hat{\jmath} + 6\hat{k}$

      ii. $\hat{\imath} - \hat{\jmath} + 2\hat{k}$

(b) If possible find a matrix multiplication AB, of matrix   **05**
$A = \begin{bmatrix} 1 & 0 & 2 \\ 3 & 1 & 0 \\ 5 & -1 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & -1 & 0 \\ 5 & 1 & -1 \\ -2 & 0 & 0 \end{bmatrix}$.

Q.2 **(a)** Find the inverse of the given matrix $\begin{bmatrix} 3 & -1 & 1 \\ 0 & 0 & 1 \\ 5 & -2 & 2 \end{bmatrix}$ by using the   **05**
Gauss-Jordan method

(b) Find the complex conjugate and modulus of $\dfrac{(2+i)(1-3i)}{3+2i}$.   **05**
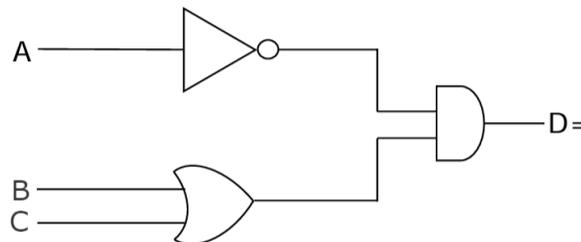
OR

(b) Find the roots of the equation $5x^2 - 2x - 6 = 0$.   **05**

Q.3 **(a)** What are logic gates? Explain NOT gate, AND gate and NAND gate with their block diagram symbol and the truth table.   **05**

(b) Show that the minimization of $F_1 = \bar{x} \cdot \bar{y} \cdot z + \bar{x} \cdot y \cdot z + x \cdot \bar{y}$ is $F_2 = x \cdot \bar{y} + \bar{x} \cdot z$.   **05**

OR

Q.3 **(a)** Find the Boolean expression of the given logic circuit.   **05**

(b) Express the Boolean function $F = x + yz$ as a sum of minterms.   **05**

Q.4 **(a)** Find $\frac{d}{dx}(e^x(x^2 + 3x + 8))$.   **05**

(b) Find $\int (3x^2 + 2x + 3)dx$ **05**

OR

Q.4 **(a)** Find $\frac{d}{dx}\left(\frac{\sin x}{x}\right)$.   **05**

(b) Find $\int x \cdot \log x \, dx$ **05**

Q.5 **(a)** Prove that the matrix $\begin{bmatrix} 1 & 1 & 2 \\ 1 & 3 & 4 \\ 2 & 4 & 6 \end{bmatrix}$ is symmetric.   **05**

(b) Find the order and degree of the following differential equations.   **05**

     i. $\frac{d^3y}{dx^3} - \left(\frac{dy}{dx}\right)^{\frac{1}{2}} = 0$

     ii. $\frac{d^3y}{dx^3} + \left(\frac{d^2y}{dx^2}\right)^3 + \left(\frac{dy}{dx}\right)^4 = 0$

OR

Q.5 **(a)** Form a differential equation from $y = c_1x^2 + c_2x + c_3$.   **05**

(b) Solve $\frac{dy}{dx} = \frac{y+1}{x}$.   **05**

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