

GUJARAT TECHNOLOGICAL UNIVERSITY

B.VOC- SEMESTER-I EXAMINATION – WINTER 2024

Subject Code:1110701

Date:21-12-2024

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.

Q.1 (a) Define length(Magnitude) of a vector and hence find the length of following vectors, **Marks 05**
 i. $3\hat{i} + 2\hat{j} + 6\hat{k}$
 ii. $\hat{i} - \hat{j} + 2\hat{k}$

(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 $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$ **05**

(b) Find the real and imaginary term of $\frac{(2+i)(1-2i)}{3-i}$. **05**

OR

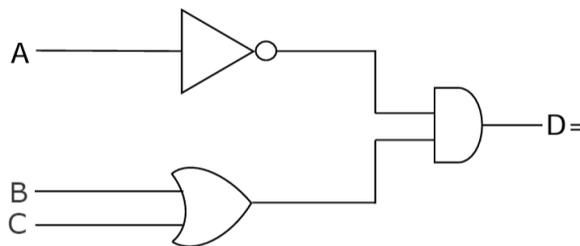
(b) Find the roots of the equation $5x^2 - 2x - 6 = 0$. **05**

Q.3 (a) Define logic gates. Explain different types of gates **05**

(b) Show that the minimization of $F_1 = \bar{x} \cdot \bar{y} \cdot z + \bar{x} \cdot y \cdot z + \bar{x} \cdot y$ 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) Design a Boolean function of $AB + CD$ using logic gates **05**

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

(b) Find $\int(3x^3 + 2x + 1)dx$ **05**

OR

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

(b) Find $\int 1 \cdot \log x dx$ **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. $\frac{d^3y}{dx^3} - \left(\frac{d^2y}{dx^2}\right)^{\frac{1}{2}} = 0$

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

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**
