Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.VOC - SEMESTER– I EXAMINATION – SUMMER 2024

Subject Code: 1110701 Date:24-05-2024

Subject Name: Basic Mathematics

Time:02:30 PM TO 04:30 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)**	If $\vec{v}_1 = 5\hat{i} + 4\hat{j} + 7\hat{k}$, $\vec{v}_2 = \hat{i} + 2\hat{j} - \hat{k}$ then evaluate the following expressions, $I)\vec{v}_1 + 2\vec{v}_2 \quad II)2\vec{v}_1 - \vec{v}_2$	**05**
	(b)	If Find A+2B , 3A-B where A=$\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & -1 \\ 1 & -2 & 2 \end{bmatrix}$ and B=$\begin{bmatrix} 1 & 3 & 2 \\ 2 & 3 & -1 \\ 1 & 2 & 2 \end{bmatrix}$.	**05**
Q.2	**(a)**	Find the inverse of the given matrix by using the Gauss-Jordan method $A = \begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$	**05**
	(b)	Solve $z^2 - (5+i)z + 8 + i = 0$.	**05**
		OR	
	(b)	If α and β are the roots of $3x^2 + 4x + 8 = 0$, find $\alpha + \beta$, $\alpha - \beta$.	**05**
Q.3	**(a)**	Explain any three logic gates with their block diagram symbol and the truth table.	**05**
	(b)	Prove that $x + x \cdot y = x$ using the truth table.	**05**
		OR	
Q.3	**(a)**	State De Morgna's theorem for Boolean algebra. Also, write the complement of the following Boolean functions. (a) $F = \bar{x} \cdot y \cdot \bar{z} + \bar{x} \cdot \bar{y} \cdot z$ (b) $F = (x+y) \cdot (\bar{x}+z) \cdot (y+z)$	**05**
	(b)	Check whether F_2 is a minimization of F_1, where $F_1 = \bar{x} \cdot \bar{y} \cdot z + \bar{x} \cdot y \cdot z + x \cdot \bar{y}$ and $F_2 = x \cdot \bar{y} + \bar{x} \cdot z$.	**05**
Q.4	**(a)**	Find $\int (2x+3)^2 dx$.	**05**
	(b)	Find $\frac{d}{dx}\left(e^{3x} \sin 3x \right)$.	**05**
		OR	
Q.4	**(a)**	Find $\int (3\cos x - 4\sin x + \sec^2 x) dx$.	**05**
	(b)	Find derivative of function $f(x) = x/(x-2)$.	**05**

Q.5 **(a)** Find determinant $\begin{vmatrix} 1 & 3 & 2 \\ -3 & -1 & -3 \\ 2 & 3 & 1 \end{vmatrix}$. **05**

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

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

OR

Q.5 **(a)** Solve $2xy\,dx + x^2dy = 0$. **05**

(b) Solve $\frac{dy}{dx} - y = e^{2x}$. **05**

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