Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–I&II EXAMINATION – SUMMER 2025

Subject Code:BE01000171 Date:17-06-2025

Subject Name:Remedial Mathematics

Time:10:30 AM TO 01:00 PM Total Marks:70

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 modulus function and identity of function.	**03**
	(b)	Differentiate $f(x) = x^2\sin(x)$ using the product rule.	**04**
	(c)	Solve the following system of linear equations using Cramer's Rule: • $x + y + z = 6$ • $2x - y + z = 3$ • $x + 2y + 3z = 14$	**07**
Q.2	**(a)**	Find the equation of the line passing through (-3,5) and perpendicular to the line through the points (2,5) and (-3,6)	**03**
	(b)	Prove A.B ≠ B. A for A = $\begin{pmatrix}1 & 2\\3 & 4\end{pmatrix}$ & B = $\begin{pmatrix}0 & 1\\4 & 5\end{pmatrix}$	**04**
	(c)	$If\ A = \begin{bmatrix}3 & 1\\-1 & 2\end{bmatrix}, show\ that\ A^2 - 5A + 7I.$ $Hence\ find\ A^{-1}$	**07**
		OR	
	(c)	(i) Find $\frac{dy}{dx}$, if $x = a\cos\theta$, $y = a\sin\theta$ (ii) Derive the trigonometry identity: sin2x = 2sinxcosx	**07**
Q.3	**(a)**	$Prove\ that: \frac{sinx + sin3x}{cosx + cos3x} = tan2x$	**03**
	(b)	$Find\ the\ limit\ of \lim_{x\to 0}\frac{ax + xcosx}{bsinx}$	**04**
	(c)	i) Find the distance between the parallel lines 3x - 4y + 7 = 0 and 3x - 4y + 5 = 0 ii) The slop of a line is double of the slop of another line. If tangent of the angle between them is $\frac{1}{3}$, find the slop of the lines	**07**

OR

Q.3 **(a)** Define the matrices (i) Zero matrix (ii) Scalar matrix (iii) Transpose of a matrix **03**

(b) State the Quotient (division) rule of derivative and compute the derivative of $\frac{x+1}{x-1}$ **04**

(c) $i) Evaluate: \lim_{x\to 0}(cosecx - cotx)$ **07**

$ii)$ *Find the derivate of* : $\frac{x + cosx}{tanx}$

Q.4 **(a)** Determine the order of the differential equations: **03**
i) $\frac{dy}{dx}$ +sinx = 10 ii) $y'' - secx^3 = y'$

(b) Find the general solution of: $\frac{dy}{dx} = (1 + x^2)(1 + y^2)$ **04**

(c) Find a particular solution of the differential equation **07**
$\frac{dy}{dx} + y\cot x = 4x\, cosec\, x \ (x \neq 0)$
given that y = 0 when x = π/2

OR

Q.4 **(a)** Find the second derivative of the function (x+1). sinx **03**

(b) Solve the differential equation: **04**
$e^x tany\, dx + (1 - e^x)sec^2 y\, dy = 0$

(c) Show that the differential equation (x- y) dy = (x+2y) dx is homogeneous and solve it. **07**

Q.5 **(a)** Evaluate: $\int(2x^2 + e^x)dx$ **03**

(b) Evaluate the definite integral $\int_1^2(4x^3\text{-}5x^2 +6x +9)\, dx$ **04**

(c) Evaluate the definite integral: $\int_0^1 \frac{2x+3}{5x^2+1}dx$ **07**

OR

Q.5 **(a)** Find $\int \frac{1-cosx}{1+cosx}dx$ **03**

(b) Integrate the function: xsin3x (By part method) **04**

(c) $\int \frac{3x-1}{(x-1)(x-2)(x-3)}\, dx$ **07**

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