Seat No./Enrollment No.: ________

GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF ENGINEERING – SEMESTER 3 – EXAMINATION – SUMMER 2026

Subject Code: 2130002 **Date: 01/07/2026**

Subject Name: Advance Engineering Mathematics

Time: 02:30 PM TO 05:30 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.

Q.1	**(a)**	Define : Beta and Gamma function	**03**
	(b)	Solve: $9yy' + 4x = 0.$	**04**
	(c)	Find the Fourier series of the function $f(x) = x; 0 < x < 2\pi.$	**07**
Q.2	**(a)**	Get the solution of $(2xycosx^2 - 2xy + 1)dx + (sinx^2 - x^2)dy = 0.$	**03**
	(b)	$(x^4 + y^4)dx - xy^3dy = 0.$	**04**
	(c)	Find the Fourier cosine integral of $f(x) = e^{-kx}, where\ x > 0, k > 0.$	**07**
		OR	
	(c)	Find the general solution of $\frac{dy}{dx} + \frac{y}{x} = \frac{y^2}{x^2}$	**07**
Q.3	**(a)**	Classify the singular points of the differential equation $x^2y'' + xy' - 2y = 0.$	**03**
	(b)	$(D^2 - 4)y = e^{2x} + e^{-4x}$	**04**
	(c)	By using method of Variation of parameter obtain the general solution of $\frac{d^2y}{dx^2} + y = sinx$	**07**
		OR	
Q.3	**(a)**	Find the complementary function of $(D^3 - 3D^2 - D + 3)y = 0$	**03**
	(b)	Using Method of Undetermined coefficient find the solution of $(D^2 - 2D + 5)y = 25x^2 + 12.$	**04**
	(c)	To get series solution of $y' - 2xy = 0$	**07**
Q.4	**(a)**	$L(t^2 + sin2t).$	**03**
	(b)	$L(tcosat)$	**04**
	(c)	Using convolution theorem for finding inverse Laplace transform of $\frac{1}{(s+5)s^2}$.	**07**
		OR	
Q.4	**(a)**	$L(e^{-3t}u(t-2))$	**03**
	(b)	Get the inverse Laplace transform of $\log\left(\frac{s+a}{s+b}\right)$	**04**
	(c)	Solution of the IVP using the Laplace transform: $y' - 3y = 1; y(0) = 1$	**07**
Q.5	**(a)**	$z = px + qy - 2\sqrt{pq}$ Obtain the complete solution	**03**
	(b)	$xp + yq = 3z.$	**04**

	(c)	Use Charpit's method for find the solution of . $px + qy = pq$.	**07**

OR

Q.5	**(a)**	Get the complete solution of $\sqrt{p} + \sqrt{q} = 1$.	**03**
	(b)	$(D^2 + 10DD' + 25D'^2)z = e^{3x+2y}$.	**04**
	(c)	Apply method separation of variables, to get the solution of partial differential equation $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}, u(0,y) = 8e^{--3y}$.	**07**

*****