Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) EXAMINATION – WINTER 2021

Subject Code:2130002 Date:15-02-2022

Subject Name:Advance Engineering Mathematics

Time:10:30 AM TO 01:30 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.**

			MARKS
Q.1	**(a)**	Solve $yy' - 2x = 0$.	**03**
	(b)	Find $L^{-1}\left[\frac{2s+1}{s(s+1)}\right]$.	**04**
	(c)	Expand $f(x) = \frac{1}{2}(\pi - x)$ as a Fourier series in the interval $(0,2\pi)$.	**07**
Q.2	**(a)**	Define unit step function and rectangle function.	**03**
	(b)	Solve $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = 12e^x$.	**04**
	(c)	Find a power series solution of $y'' + xy = 0$ about the ordinary point $x = 0$.	**07**
		OR	
	(c)	Find the Fourier series of $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$	**07**
Q.3	**(a)**	Find $L\left[\int_0^t \int_0^t sinat\, dt\, dt\right]$.	**03**
	(b)	Solve $(D^2 + 9)y = \sin 2x + cos\, 4x$.	**04**
	(c)	Find the inverse Laplace transform of $\frac{1}{(s^2+4)^2}$ by Convolution theorem.	**07**
		OR	
Q.3	**(a)**	Solve $\frac{dy}{dx} + 2ytanx = sinx$.	**03**
	(b)	Find $L^{-1}\left[\frac{6+s}{s^2+6s+13}\right]$.	**04**
	(c)	Solve $y'' + 4y = 8x^2$ by method of undetermined coefficients.	**07**
Q.4	**(a)**	Find the half range sine series of $f(x) = e^x\ in$ $0 < x < \pi$.	**03**
	(b)	Find the Laplace transform of 1) te^{-t} 2) $e^{-at}cosbt$.	**04**
	(c)	Solve $y'' + y = cosecx$ by method of variation of parameters.	**07**
		OR	
Q.4	**(a)**	Find the Laplace transform of $\frac{sin2t}{t}$.	**03**
	(b)	Solve $\left(D^2 + 10DD' + 25D'^2\right)z = e^{3x+2y}$.	**04**
	(c)	Solve by Laplace Transform $y' + 2y = e^{-3t}$ with $y(0) = 1$.	**07**
Q.5	**(a)**	Form a partial differential equation for the equation $z = (x-3)^2 + (y-4)^2$.	**03**

(b) Solve $p - x^2 = q + y^2$. **04**

(c) Solve $z = pq$ by Charpit's method. **07**

OR

Q.5 **(a)** Solve $z = px + qy - 2\sqrt{pq}$. **03**

(b) Solve $xp + yq = 3z$. **04**

(c) Solve $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, given that $u(0, y) = 8e^{-3y}$ by the method of separation of variables. **07**

****