Seat No.: ________ Enrolment No.___________

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III EXAMINATION – SUMMER 2020

Subject Code: 2130002 **Date:26/10/2020**

Subject Name: Advanced Engineerng Mathematics

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

			MARKS
Q.1	**(a)**	Solve $\frac{dy}{dx} = e^{x-y} + x^2e^{-y}$.	**03**
	(b)	Solve $\frac{dy}{dx} + 2xy = 2e^{-x^2}$.	**04**
	(c)	State convolution theorem and use it to find $L^{-1}\left[\frac{1}{(s^2+a)^2}\right]$.	**07**
Q.2	**(a)**	Solve $y''-3y'+2y = e^x$.	**03**
	(b)	Find Fourier series for $f(x) = x^2;\ -\pi \le x \le \pi$.	**04**
	(c)	Find a power series solution of $y''+y=0$ near the ordinary point x=0.	**07**
		OR	
	(c)	Find Fourier series in the interval $(0,2\pi)$ if $f(x) = \begin{cases} -\pi & 0<x<\pi \\ x-\pi & \pi<x<2\pi \end{cases}$ and hence show that $\sum_{n=1}^{\infty}\frac{1}{(2n+1)^2} = \frac{\pi^2}{8}$.	**07**
Q.3	**(a)**	Find $L^{-1}\left[\frac{e^{-3s}}{s^2}\right]$.	**03**
	(b)	Solve $y''-4y'-12y = \sin x$ by method of undetermined coefficient.	**04**
	(c)	Solve $y''+y = \sec x$ by using method of variation of parameters.	**07**
		OR	
Q.3	**(a)**	Solve $\frac{d^3y}{dx^3} - 3\frac{dy}{dx} + 2y = 0$.	**03**
	(b)	Solve $(D^2 - D - 2)y = \sin 2x$.	**04**
	(c)	Solve by Charpit's method $p = (z+qy)^2$.	**07**
Q.4	**(a)**	Find $L[e^{-t}\sin^2 t]$.	**03**
	(b)	Find $L^{-1}\left[\frac{3}{s^2+6s+18}\right]$.	**04**
	(c)	Solve $y''-y'-2y=0$; with $y(0)=1,\ y'(0)=0$ by using Laplace	**07**

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transform.

OR

Q.4	**(a)**	Solve $(x^4 + y^4)dx - xy^3 dy = 0$.	**03**
	(b)	Find cosine series for $f(x) = e^x$ in $0 < x < L$.	**04**
	(c)	Find Fourier series for $f(x) = 3x(\pi^2 - x^2)$ in $-\pi < x < \pi$.	**07**
Q.5	**(a)**	Solve $pq = 1$.	**03**
	(b)	Solve $p^2 - x = q^2 - y$.	**04**
	(c)	Find a series solution of $y'' + xy' + y = 0$ near the ordinary point x=0.	**07**

OR

Q.5	**(a)**	Solve $\frac{\partial^2 z}{\partial x \partial y} = \sin x \sin y$ given that $\frac{\partial z}{\partial y} = -2\sin y$ when $x = 0$ and $z = 0$ when y is an odd multiple of $\pi/2$.	**03**
	(b)	Solve $r - 2s + t = \sin(2x + 3y)$.	**04**
	(c)	Solve $(p^2 + q^2)x = pz$.	**07**

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