Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III (OLD) EXAMINATION – SUMMER 2022

Subject Code:130002 Date:08-07-2022

Subject Name:Advanced 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.**

			MARKS
Q.1	**(a)**	(i) Define Dirac – Delta function.	**02**
		(ii) Find the inverse laplace transform of in $\frac{s^2+1}{(s+1)(s-2)^2}$	**05**
	(b)	Find the series solution of y"=2y' in powers of x.	**07**
Q.2	**(a)**	(i) Find the fourier sine series of $f(x) = e^x$ in $0 < x < \pi$.	**03**
		(ii) $\frac{dy}{dx} + 2y\ tanx = sinx$	**04**
	(b)	Find the Fourier series of $f(x) = x + \|x\|$ in the interval $-\pi < x < \pi$.	**07**
		OR	
	(b)	Find the Fourier series for $f(x) = -\pi\ ; \quad \pi < x < 0$ $f(x) = -\pi\ ; \quad \pi < x < 0$ $= x - \pi; \quad 0 < x < \pi$	**07**
Q.3	**(a)**	(i) Find the value of $B(\frac{3}{2}, \frac{1}{2})$.	**02**
		(ii) Show that $\int_0^\infty \frac{\lambda^3 sin\lambda x}{\lambda^4+4} d\lambda = \frac{\pi}{2} e^{-x} cosx$, where x > 0.	**05**
	(b)	Solve $y'' + a^2 y = tanx$ by using Variation of Parameters.	**07**
		OR	
Q.3	**(a)**	(i) $ye^x dx + (2y + e^x)dy = 0$.	**03**
		(ii) $y''' - 3y'' + 3y' - y = 4e^t$	**04**
	(b)	Using the power- series method, Solve $(1 - x^2)y'' - 2xy' + 2y = 0$	**07**
Q.4	**(a)**	(i) Find the Laplace transform of $\frac{e^{-t} sint}{t}$.	**03**
		(ii) Find the inverse Laplace transform of $\log(1 + \frac{w^2}{s^2})$.	**04**
	(b)	Using the convolution method to solve $\frac{s+2}{(s^2+4s+5)^2}$	**07**

OR

Q.4	**(a)**	(i) Solve $y''' - 6y' + 11y' - 6y = 0.$	**03**
		(ii) $x^2y'' - xy' + y = \sin(logx)$	**04**
	(b)	Solve $y'' + 4y' + 3y = e^{-t}, y(0) = y'(0) = 1.$	**07**
Q.5	**(a)**	(i) Solve $(y + z)p + (z + x)q = x + y$	**03**
		(ii) $x^2ydx - (x^3 + xy^2)dy = 0.$	**04**
	(b)	Solve $\frac{\partial u}{\partial x} = 2\frac{\partial u}{\partial t} + u$, where $u(x, 0) = 6e^{-3x}$by method of separation variables.	**07**

OR

Q.5	**(a)**	(i) Form a Partial Differential Equation by eliminating the arbitrary constants from the equation $z = (x - 2)^2 + (y - 3)^2$	**03**
		(ii) Solve $(D^2 - 2DD' + D'^2)z = e^x + 2y + x^3$	**04**
	(b)	Solve $y'' + 2y' + 4y = 2x^2 + 3e^{-x}$ by using method of Undetermined coefficients.	**07**

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