

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-III(New) EXAMINATION – SUMMER 2016

Subject Code:2130002**Date:07/06/2016****Subject Name:Advanced 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.

Q.1 Answer the following one mark each questions : 14

- 1 Integrating factor of the differential equation
 $\frac{dx}{dy} + \frac{3x}{y} = \frac{1}{y^2}$ is _____
- 2 The general solution of the differential equation $\frac{dy}{dx} + \frac{y}{x} = \tan 2x$ _____.
- 3 The orthogonal trajectory of the family of curve $x^2 + y^2 = c^2$ is _____
- 4 Particular integral of $(D^2 + 4)y = \cos 2x$ is _____
- 5 $X=0$ is a regular singular point of
 $2x^2y'' + 3xy'(x^2 - 4)y = 0$ say true or false.
- 6 The solution of
 $(y - z)p + (z - x)q = x - y$ is _____
- 7 State the type ,order and degree of differential equation
 $\left(\frac{dx}{dy}\right)^2 + 5y^{\frac{1}{3}} = x$ is _____
- 8 Solve $(D+D')z = \cos x$
- 9 Is the partial differential equation
 $2\frac{\partial^2 u}{\partial x^2} + 4\frac{\partial^2 u}{\partial x \partial y} + 3\frac{\partial^2 u}{\partial y^2} = 6$ elliptic?
- 10 $L^{-1}\left(\frac{1}{(s+a)^2}\right) =$ _____
- 11 If $f(t)$ is a periodic function with period t then
 $L[f(t)] =$ _____
- 12 Laplace transform of $f(t)$ is defined for +ve and -ve values of t . Say true or false.
- 13 State Duplication (Legendre) formula.
- 14 Find $B\left(\frac{9}{2}, \frac{7}{2}\right)$

Q.2 (a) Solve : $9y y' + 4x = 0$

03

	(b)	Solve : $\frac{dy}{dx} + y \cot x = 2 \cos x$	04
	(c)	Find series solution of $y'' + xy = 0$	07
	OR		
	(c)	Determine the value of (a) $J_2^1(x)$ (b) $J_2^3(x)$	07
Q.3	(a)	Solve $(D^2 + 9)y = 2\sin 3x + \cos 3x$	03
	(b)	Solve $y'' + 4y' = 8x^2$ by the method of undetermined coefficients.	04
	(c)	(i) Solve $x^2p + y^2q = z^2$ (ii) Solve by charpit's method $px+qy = pq$	07
	OR		
Q.3	(a)	Solve $y'' + 4y' + 4 = 0$, $y(0) = 1$, $y'(0) = 1$	03
	(b)	Find the solution of $y'' + a^2y' = \tan ax$, by the method of variation of parameters.	04
	(c)	Solve the equation $u_x = 2u_t + u$ given $u(x,0) = 4e^{-4x}$ by the method of separation of variable.	07
Q.4	(a)	Find the fourier transform of the function $f(x) = e^{-ax^2}$	03
	(b)	Obtain fourier series to represent $f(x) = x^2$ in the interval $-\pi < x < \pi$.Deduce that $\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\pi^2}{6}$	04
	(c)	Find Half-Range cosine series for $F(x) = kx$, $0 \leq x \leq \frac{l}{2}$ $= k(l-x)$, $\frac{l}{2} \leq x \leq l$ Also prove that $\sum_{n=1}^{\infty} \frac{1}{(2n-1)^2} = \frac{\pi^2}{8}$	07
	OR		
Q.4	(a)	Expres the function $F(x) = 2$, $ x < 2$ $= 0$, $ x > 2$ as Fourier integral.	03
	(b)	Find the fourier series expansion of the function $F(x) = -\pi$ $-\pi < x < 0$ $= x$ $0 < x < \pi$	04
	(c)	Find fourier series to represent the function $F(x) = 2x-x^2$ in $0 < x < 3$	07
Q.5	(a)	Find $L^{-1} \left\{ \frac{1}{(s+\sqrt{2})(s-\sqrt{3})} \right\}$	03
	(b)	Find the laplace transform of (i) $\frac{\cos at - \cos bt}{t}$ (ii) $t \sin at$	04
	(c)	State convolution theorem and use to it evaluate $L^{-1} \left\{ \frac{1}{(s^2+a^2)^2} \right\}$	07

OR

- Q.5** (a) $L\{t^2 \cosh 3t\}$ **03**
- (b) Find $L^{-1}\left\{\frac{1}{s^4-81}\right\}$ **04**
- (c) Solve the equation $y'' - 3y' + 2y = 4t + e^{3t}$, when $y(0)=1, y'(0) = -1$ **07**
