Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (NEW) - EXAMINATION – SUMMER 2018

Subject Code:2130002 **Date:16/05/2018**

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 **(a)** Solve $\frac{dy}{dx} = e^{x-y} + x^2 e^{-y}$ by variable separable method. **03**

(b) Solve $\frac{dy}{dx} + y \sin x = e^{\cos x}$ **04**

(c) State convolution theorem and hence find $L^{-1}\left[\frac{1}{(s^2+4)^2}\right]$ **07**

Q.2 **(a)** Solve $y''-3y'+2y=e^{3x}$ **03**

(b) Find Fourier series for $f(x) = x^2;\ -\pi \le x \le \pi$ **04**

(c) Find Fourier series in the interval $(0,2\pi)$ if **07**

$$f(x) = \begin{cases} -\pi & 0 < x < \pi \\ x - \pi & \pi < x < 2\pi \end{cases}$$

and hence show that $\sum_{n=1}^{\infty} \frac{1}{(2n+1)^2} = \frac{\pi^2}{8}$

OR

(c) Find the series solution of $y''+x^2y=0$ about an ordinary point $x=0$ **07**

Q.3 **(a)** Solve $y'''-6y''+11y'-6y=0$ **03**

(b) Solve $(D^2+9)y = \cos 4x$ **04**

(c) Solve $y''+4y=4\tan 2x$ by method of variation parameter. **07**

OR

Q.3 **(a)** Find $L^{-1}\left[\frac{1}{(s+1)(s+2)}\right]$ **03**

(b) Solve $y''-2y'+5y = 5x^3 - 6x^2 + 6x$ by method of undetermined coefficients. **04**

(c) Find the series solution of $8x^2y''+10xy'-(1+x)y=0$ **07**

Q.4 **(a)** Solve $(x^4+y^4)dx - xy^3dy = 0$ **03**

(b) Express sinx as cosine series in $0 < x < \pi$ **04**

(c) Find Fourier series for $f(x) = e^{ax}$ in $(0,2\pi);\ a > 0$ **07**

OR

Q.4 **(a)** Find $L[\cos^2 t]$ **03**

(b) Find $L\left[e^{2t}\sin 3t\right]$ **04**

(c) Solve $y''+y=\sin 2t$; with $y(0)=2,\ y'(0)=1$ by using Laplace transform. **07**

Q.5 **(a)** Solve $p^2+q^2=1$ **03**

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

(c) Solve $\frac{\partial^2 z}{\partial x^2}-4\frac{\partial z}{\partial x\partial y}+4\frac{\partial^2 z}{\partial y^2}=e^{2x+3y}$ **07**

OR

Q.5 **(a)** Solve $p^2-q^2=x-y$ **03**

(b) Solve $\frac{\partial^3 z}{\partial x^2\partial y}=\cos(2x+3y)$ **04**

(c) Solve by Charpit's method $p=(z+qy)^2$ **07**

****