

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III(OLD) • EXAMINATION – WINTER 2016

Subject Code:130002

Date:31/12/2016

Subject Name:Advanced Engineering Mathematics (New)

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) Attempt the following
- (i) Solve $(x - y^2x)dx = (y - x^2y)dy$ **04**
- (ii) Solve $\frac{dy}{dx} + y \tan x = \sin 2x$ **03**
- (b) Find power series solution of the equation $y' = 2xy$ **07**
- Q.2** (a) Solve the p.d.e. $u_{xx} = 16u_y$ **07**
- (b) Attempt the following
- (i) Solve $(D^2 + D - 6)y = e^{2x}$ **04**
- (ii) Solve $(D^3 + D)y = \cos x$ **03**
- OR**
- (b) Attempt the following
- (i) Solve $(D^2 - 5D + 6)y = xe^{4x}$ **04**
- (ii) Solve $(D^3 + 8)y = x^4 + 2x + 1$ **03**
- Q.3** (a) Find Fourier series for $f(x) = x + x^2, -\pi < x < \pi$ **07**
- (b) Find Fourier series for $f(x) = x^2, -1 < x < 1$ **07**
- OR**
- Q.3** (a) If $f(x) = \begin{cases} -1 + x, & -\pi < x < 0 \\ 1 + x, & 0 < x < \pi \end{cases}$. Find the Fourier series for $f(x)$. **07**
- (b) Find a Fourier sine series for $f(x) = \pi x - x^2, 0 < x < \pi$ **07**
- Q.4** (a) Solve $\frac{d^2y}{dt^2} - 4y = 24 \cos 2t$ given that at $t = 0, y = 3$ and $\frac{dy}{dt} = 4$. **07**
- (b) Using convolution theorem find $L^{-1} \left\{ \frac{a}{s^2(s^2 + a^2)} \right\}$ **07**
- OR**
- Q.4** (a) Attempt the following
- (i) Find $L \{ u(t-4)(t-4)^2 \}$ **04**
- (ii) Find $L \{ 4te^{-t} \}$ **03**
- (b) Attempt the following
- (i) Find $L^{-1} \left\{ \frac{e^{-2s}}{s-3} \right\}$ **04**
- (ii) Find $L^{-1} \left\{ \frac{s+2}{s^2-2s+5} \right\}$ **03**
- Q.5** (a) Attempt the following

- (i) Define (1) Gamma Function and find $\sqrt{\frac{5}{2}}$ (2) Sawtooth wave function. **04**
- (ii) Form partial differential equation for $z = (x + a)(y + b)$ **03**
- (b) Express the function $f(x) = \begin{cases} 2, & |x| < 2 \\ 0, & |x| > 2 \end{cases}$ as a Fourier Integral. **07**

OR

- Q.5** (a) Attempt the following
- (i) Solve the p.d.e. $u_{xy} = -u_x$ **04**
- (ii) Find the complete integral of $(p + q)(z - px - qy) = 1$ **03**
- (b) Attempt the following
- (i) Solve $x^2 p + y^2 q = z^2$ **04**
- (ii) Solve $p^2 + q^2 = 4$ **03**
