Student Exam No._____

GANPAT UNIVERSITY

M. TECH. SEMESTER: I (ELECTRICAL)

REGULAR EXAMINATION NOV – DEC 2015

3EE 101: NUMERICAL TECHNIQUES

Time: 3 Hours **Total Marks: 60**

Instruction:
1. This question paper has two sections. Attempt each section in separate answer book.
2. Figures to the right indicates full marks.
3. Be precise and to the point in answering the descriptive questions.

Section - 1

Que. – 1 **(A)** Find a root of the equation $xe^x - 3 = 0$ correct to three decimal places using the method of False position (Regula falsi method). **05**

(B) Using the Secant method, find the roots correct to four decimal places. **05**

$$x = 2sinx \qquad x_0 = 1.5$$

OR

Que. – 1 **(A)** Find a root of the following equation correct to three decimal places, using the bisection method. **05**

$$x - cosx = 0$$

(B) Find by Newton-Raphson method the root of the following equation correct to four decimal places: **05**

$$4x^4 - 9x^3 + 1 = 0$$

Que. – 2 **(A)** Estimate the production for 2004 and 2006 from the following data: **05**

Year:	2001	2002	2003	2004	2005	2006	2007
Production:	200	200	260	----	350	----	430

(B) The following table gives the results of the measurements of train resistance, V is the velocity in miles per hour, R is the resistance in pounds per ton: **05**

V:	20	40	60	80	100	120
R:	5.5	9.1	14.9	22.8	33.3	46.0

If R is related to V by the relation $R = a + bv + cV^2$, find a, b and c.

OR

Que. – 2 **(A)** Construct Newton's forward interpolation polynomial for the following data: **05**

x:	4	6	8	10
y:	1	3	8	16

(B) Predict the mean radiation dose at an altitude of 3000 feet by fitting an exponential curve $y = ab^x$ to the given data: **05**

Altitude (x):	50	450	780	1200	4400	4800	5300
Dose of radiation (y):	28	30	32	36	51	58	69

Que. – 3 **Attempt the following questions:**

(A) Derive Lagrange's interpolation formula. 04

(B) Define Inherent errors and Truncation errors. Find the relative error if the number X = 0.004997 is (i) truncated to three decimal digits (ii) rounded off to three decimal digits. 04

(C) What do you mean by convergence? Give its significance. 02

Section – II

Que. – 4 (A) Find the first and second derivatives of f (x) at x = 1.5 if 05

x:	1.5	2.0	2.5	3.0	3.5	4.0
f(x):	3.375	7.000	13.625	24.000	38.875	59.000

(B) Use Simpson's 1/3rd rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates. 05

OR

Que. – 4 (A) Find the value of cos (1.74) from the following table: 05

x:	1.7	1.74	1.78	1.82	1.86
sin x:	0.9916	0.9857	0.9781	0.9691	0.9584

(B) Evaluate $\int_0^1 \frac{dx}{1+x}$ applying (i) Trapezoidal rule and (ii) Simpson's 1/3rd rule. 05

Que. – 5 (A) Find by Taylor's series method, the values of y at x = 0.1 and x = 0.2 to five places of decimals from $\frac{dy}{dx} = x^2y - 1, y(0) = 1$. 05

(B) Using the finite difference method, find y(0.25), y(0.5) and y(0.75) satisfying the differential equation $\frac{d^2y}{dx^2} + y = x$, subject to the boundary conditions y(0) = 0, y(1) = 2. 05

OR

Que. – 5 (A) Using Euler's method, find an approximate value of y corresponding to x=1, given that dy/dx = x + y and y = 1 when x = 0. 05

(B) Using Runge-Kutta method of order 4, compute y (0.2) and y (0.4) from $10\frac{dy}{dx} = x^2 + y^2$, y (0) = 1, taking h = 0.1. 05

Que. – 6 **Attempt any two:** 10

(A) Solve the following equations by Gauss elimination method.

$$10x + y + 2z = 13$$
$$3x + 10y + z = 14$$
$$2x + 3y + 10z = 15$$

(B) Solve the following system of equations by Gauss-Seidel method:

$$8x - 3y + 2z = 20$$
$$6x + 3y + 12z = 35$$
$$4x + 11y - z = 33$$

(C) Solve the equation

$$x^3 - 12x^2 + 39x - 28 = 0$$

Given that roots being in arithmetic progression.

END OF PAPER