Student Exam No:-_____

GANPAT UNIVERSITY
M.TECH SEM-I ELECTRICAL ENGINEERING
REGULAR EXAMINATION NOV DEC-2013
3EE101:- NUMERICAL TECHNIQUES

Time: 3 Hours **Total Marks:-70**

Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

SECTION-I

Q:1 **(A)** Find the value of t when A= 85 from the following table,using Langrange's method: **(6)**

T:	2	5	8	14
A:	94.8	87.9	81.3	68.7

(B) Find the value of cos 1.74 using the table given below: **(6)**

x:	1.70	1.74	1.78	1.82	1.86
sin x:	0.9916	0.9857	0.9781	0.9691	0.9584

OR

Q:1 **(A)** Using trapezoidal rule evaluate $\int_0^{\frac{\pi}{3}} \tan x \, dx$ by taking 8 intervals. **(6)**

(B) **(6)**

a) $\mu = \frac{2+\Delta}{2\sqrt{(1+\Delta)}} + \sqrt{(1+\frac{1}{4}\delta^2}$

b) $1 + \frac{\delta^2}{2} = \sqrt{(1+\delta^2\mu^2)}$

Q:2 **(A)** Solve the equation $x^4 - 2x^3 + 4x^2 + 6x - 21 = 0$, given that the sum of two roots is zero. **(6)**

(B) Define various types of errors. Give one practical example of source of each type. **(5)**

OR

Q:2 **(A)** Explain newton-raphson method for finding real root of equation. **(6)**

(B) Solve the equations by jacobi's iteration method correct to three decimal places, **(5)**
$10x + y - z = 11.19$,
$x + 10y + z = 28.08$,
$-x + y + 10z = 35.61$.

Q:3 **Attempt any two:** **(12)**

(A) Answer the following with reasons:

(i)Prove that $\delta(E^{\frac{1}{2}} + E^{\frac{-1}{2}}) = \Delta E^{-1} + \Delta$

(ii)To fit $y = ab^x$ by least square method,normal equations are_____?

(iii)Wheneve Trapezodial rule is applicable,Simpson's $1/3^{rd}$ rule can also be applied.

(iv)state the Simpson's $3/8^{th}$ rule for numerical integration.

(v)if $y = x^2 - 2x + 2$,taking interval of differencing as unity, $\Delta^2 y$ =_____?

(vi) The fourth divided difference for x_0, x_1, x_2, x_3, x_4= _____?

(B) A thermocouple gives the following output for rise in temperature:

Temp(°C)	0	10	20	30	40	50
Output(mV)	0.0	0.4	0.8	1.2	1.6	2.0

Find the output of thermocouple for 37°C temperature using Newton's Divide difference formula.

(C) Fit a curve of form $y=ae^{bx}$ to the following data:

x:	0	1	2	3
y:	1.05	2.10	3.85	8.30

SECTION-II

Q:4 **(A)** Apply Milne's method to find a solution of the differential equation $dy/dx = x - y2$ in the range of $0 \leq x \leq 1$ for boundary condition $y = 0$ at $x = 0$. **(6)**

(B) Solve $x4 - 5x3 + 20x2 - 40x + 60 = 0$, given that all the roots of $f(x) = 0$ are complex, by Lin-Bairstow method. **(6)**

OR

Q:4 **(A)** Solve by Taylor's series method the equation $dy/dx = \log(xy)$ for $y(1.1)$ and $y(1.2)$, given that $y(1) = 2$. **(6)**

(B) Find the real root of equation $x\, e^x = \cos x$ using secant method correct to four decimal places **(6)**

Q:5 **(A)** Solve the equations by Relaxation method, **(6)**

$10x - 2y - 3z = 205$,
$-2x + 10y - 2z = 154$,
$-2x - y + 10z = 120$

(B) Using modified Euler's method, find $y(0.2)$ and $y(0.4)$ given **(5)**
$y' = y + ex$, $y(0) = 0$.

OR

Q:5 **(A)** Apply Runge-Kutta fourth order method to find an approximate value of y when $x = 0.2$ given that $dy/dx = x + y$ and $y = 1$ when $x = 0$. **(6)**

(B) Write a short note on Ill-conditioned equations. **(5)**

Q:6 **Attempt any two:** **(12)**

(A) Find the real root of equation $x \log_{10} x = 1.2$ by regula-falsi method correct to four decimal places.

(B) The velocity v (km/min)of a two-wheeler which starts from rest , is given at fixed intervals of time t (min) as follows:

t	2	4	6	8	10	12	14	16	18	20
v	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20 minutes.

(C) Solve the following system of equations by Gauss-Jacobi's iteration method correct to three decimal places:
$5x - y + z = 10$, $2x + 4y = 12$, $x + y + 5z = -1$. Start with (2,3,0).

END OF PAPER
Best of Luck