Student Exam No:-_____

GANPAT UNIVERSITY
B.TECH SEM-IV ELECTRICAL ENGINEERING
REGULAR EXAMINATION MAY-JUNE-2013
2EE404:-COMPUTER ORIENTED NUMERICAL METHODS

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)** Fit a least square curve of the form $y= a x^b$ for the following data: Where a and b are constants **(6)**

x:	61	26	7	2.6
y:	350	400	500	600

(B) (i) Prove that $\delta = \Delta E^{-1/2}$ and hence prove that $E=\left(\frac{\Delta}{\delta}\right)^2$. **(6)**

(ii)$\Delta^{10}[(1-x)(1-2x^2)(1-3x^3)(1-4x^4)=$_____.

OR

Q:1 **(A)** From the data given below, find the number of students whose weight is between 60 to 70. **(6)**

Weight	0-40	40-60	60-80	80-100	100-120
No. of students	250	120	100	70	50

(B) A thermocouple gives the following output for rise in temperature: **(6)**

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 Divided difference formula.

Q:2 **(A)** Find all the Eigen values & Eigen vectors of the matrix **(6)**

$$\begin{vmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{vmatrix}$$

(B) Solve the equations **(5)**
10x+2y+z=9; 2x+20y-2z=-44; -2x+3y+10z=22, by using Jacobi's method.

OR

Q:2 **(A)** Solve the equations, **(6)**
10x-2y+z=12; x+9y −z=10; 2x-y+11z=20, by using gauss elimination Relaxation method.

(B) Show that the following systems of equations are ill-conditioned or not? **(5)**
$3x_1+ x_2=9$; $3.015x_1+ x_2=3$

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

(A) Using the finite difference method, find y(0025), y(0.5), 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.

(B) Construct the table of differences for the data:

X:	0	1	2	3	4
F(x):	1.0	1.5	2.2	3.1	4.6

Evaluate $\Delta^3 f(2)$.

(C) What are the basic sources of errors in numerical computation? Explain with suitable block diagram.

SECTION-II

Q:4 (A) Solve $dy/dx=y^2+x, y(0)=1$ using Taylor's series method and compute y(0.1) and y(0.2) (6)

(B) Use the iterative method, find the inverse of (6)

$$A=\begin{vmatrix}1 & 10 & 1\\ 2 & 0 & 1\\ 3 & 3 & 2\end{vmatrix} \text{ taking } B=\begin{vmatrix}0.4 & 2.4 & -1.4\\ 0.14 & 0.14 & -0.14\\ -0.85 & -3.8 & 2.8\end{vmatrix}$$

OR

Q:4 (A) Using the finite difference method, find y(0025), y(0.5), y(0.75) satisfying the differential equation $\frac{d^2y}{dx^2}+y=x$, subject to the boundary conditions $y(0)=0, y(1)=2$. (6)

(B) Write and explain the two limitations of Newton-Raphson method. (6)

Q:5 (A) 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

(B) Evaluate the real root of the equation $x - cos\ x = 0$, by using bisection method. (5)

OR

Q:5 (A) Find $\int_0^6 \frac{e^x}{1+x}\,dx$ using Simpson's 1/3rd rule. (6)

(B) Given that $\frac{dy}{dx}=\frac{y-x}{y+x}$ with initial conditions y=1 at x=0; find y for x=0.1 by Euler's rule. (5)

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

(A) (i)Classify the equation $(1+x^2)\frac{\partial^2 u}{\partial x}+(5+2x^2)\frac{\partial^2 u}{\partial x \partial t}+(4+x^2)\frac{\partial^2 u}{\partial t}=0$

(ii) Define absolute, relative and percentage errors. Illustrate each of them with suitable examples.

(B) From the following data:

X:	1.8	2.0	2.2	2.4	2.6
Y:	2.9	3.6	4.4	5.5	6.7

Find x when y=5 using iterative method.

(C) Using Euler-Maclaurin formula, find the value of $log_e 2$ from $\int_0^1 \frac{dx}{1+x}$

END OF PAPER

Best of Luck