Student Exam No:-_____

GANPAT UNIVERSITY
B.TECH SEM-IV ELECTRICAL ENGINEERING
REGULAR EXAMINATION MAY-JUNE-2014
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)** Certain corresponding values of x & $log_{10}x$ are given below: **(6)**

x:	300	304	305	307
log_{10}x:	2.4771	2.4829	2.4843	2.4871

Find $\log_{10}310$ by Newton's Divided Difference.

(B) The result of measurement of electric resistance R of a copper wire at various temperatures is listed below **(6)**

t:	19	25	30	36	40	45	50
R:	76	77	79	80	82	83	85

Using the method of least square, find the straight line R= $a+bt$ that fits best in the data.

OR

Q:1 **(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) Using cayley-Hamilton theorem, find the inverse of the matrix **(6)**

$$\begin{vmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 1 \end{vmatrix}$$

Q:2 **(A)** Using the finite difference method, find y(0.25), 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) Using trapezoidal rule evaluate $\int_0^{\frac{\pi}{3}} \tan x \, dx$ by taking 8 intervals **(5)**

OR

Q:2 **(A)** Using Taylor's series method, compute y(0.2) to three decimal points from $\frac{dy}{dx}$=1-2xy given that y(0)=0 **(6)**

(B) What are the basic sources of errors in numerical computation? Explain with suitable block diagram **(5)**

Q:3 **(A)** Prove the following: a) $\mu\delta=\frac{1}{2}(\Delta+\nabla)$ b) $\mu^2=1+\frac{\delta^2}{2}$ c) $\delta=\Delta E^{-\frac{1}{2}}=\nabla E^{\frac{1}{2}}$ **(6)**

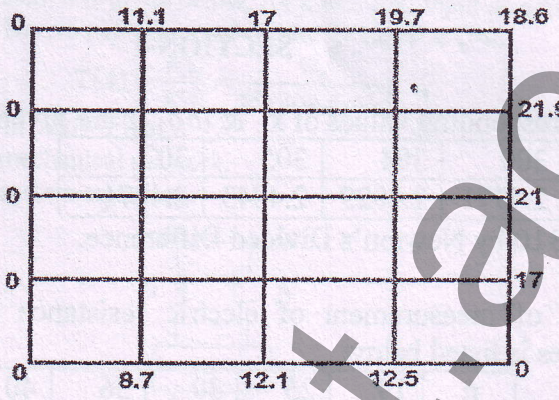
(B) Using Runge-Kutta method of fourth order, solve $\frac{dy}{dx}=\frac{x^2-y^2}{x^2+y^2}$ with y(0)=1 a x=0.2 and 0.4 **(6)**

SECTION-II

Q:4 **(A)** Solve the following equations using Relaxation Method: **(6)**

$$10x-2y-2z=6;\ -x+10y-2z=7;\ -x-y+10z=8$$

(B) Compute the first iteration for Laplace Equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values shown in figure. **(6)**



OR

Q:4 **(A)** Use the modified Euler's method to obtain y (0.2) given that $\frac{dy}{dt} = -2ty^2$, $y(0) = 1$, Take $h = 0.1$. **(6)**

(B) Solve the Poisson equation $u_{xx} + u_{yy} = -81xy$; $0 < x < 1, 0 < y < 1$ given that $u(0,y) = 0$, $u(x,0) = 0$, $u(1,y) = 100$, $u(x,1) = 100$ and $h = 1/3$. **(6)**

Q:5 **(A)** Solve the following system of equations by Jacobi's method up to three decimal places, **(6)**

$$2x_1 + x_2 + 6x_3 = 9$$
$$8x_1 + 3x_2 + 2x_3 = 13$$
$$x_1 + 5x_2 + x_3 = 7$$

(B) Use Secant method to find root of $x \log 10\, x = 1.9$ correct to 3 decimal places. **(5)**

OR

Q:5 **(A)** Solve the following equations by Gauss-Seidal method. **(6)**

$$8x + 2y - 2z = 8$$
$$x - 8y + 3z = -4$$
$$2x + y + 9z = 12$$

(B) Find a real root of $\cos x - 3x + 5 = 0$, correct to four decimal places using the Successive Approximation method. **(5)**

Q;6 **Attempt any two.** **(12)**

(A) Solve the following system of equations using the Gauss-Jordan method.

$$x - 2y = -4$$
$$5y + z = -9$$
$$4x - 3z = -10$$

(B) Use the Newton-Raphson method to estimate the root of $f(x) = ex - x$ with an initial guess of $x0 = 0$ accurate to four decimal places.

(C) Derive the equation of Euler's method.

END OF PAPER