7. (a) Find the largest Eigen value of the matrix, using power method :

$$A = \begin{bmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{bmatrix}$$

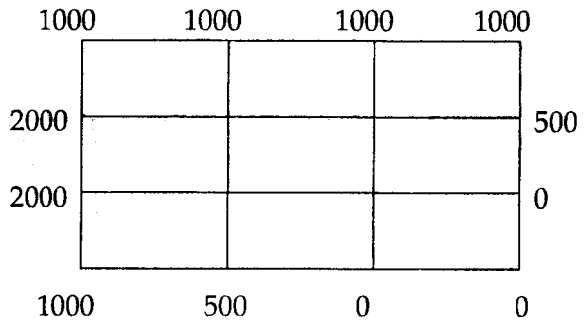
(b) Determine the eigen value and the corresponding eigen vector of the matrix by using Jacobi's Method :

$$\begin{bmatrix} 2 & 3 & 1 \\ 3 & 2 & 2 \\ 1 & 2 & 1 \end{bmatrix}$$

SECTION – D

8. Using Runge-Kutta method of order 4, find y for $x = 0.1, 0.2, 0.3$ Given the $\frac{dy}{dx} = xy + y^2, y(0) = 1$. Continue the solution at $x = 0.4$ using Milne's method.

9. Solve the elliptic equation $u_{xx} + u_{yy} = 0$ for the following square mess with boundary values as shown :



Roll No. .....

24835

B. Tech. 6th Semester (Fire Tech. & Safety) Examination – May, 2016

APPLIED NUMERICAL TECHNIQUE AND COMPUTING

Paper : FT-310-F

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. **1** is ***compulsory***. Attempt total ***five*** questions with selecting ***one*** question from each Section. All questions carry equal marks.

1. (a) Round off the following numbers correct to four significant figures : 2.5×8
3.26245, 35.46735, 0.70035, 18.265101, 0.859378

(b) Define forward differences and backward differences.

(c) What are direct methods and iterative method to solve the system of linear equations ?

(d) Discuss the rate of convergence of Newton Raphson Method.

(e) What is Crank Nicolson Method ? Why is it known as implicit method ?

(f) What are the limitations of Taylor's series method for solving ordinary differential equations ?

(g) Define the terms Interpolation and Extrapolation.

(h) Write the finite difference approximations to partial derivatives in x and y directions.

SECTION – A

2. (i) Define the term absolute error. Given that :

$a = 10.00 \pm 0.05$

$b = 0.0356 \pm 0.0002$

$c = 15300 \pm 100$

$d = 6200 \pm 100$

Find the maximum value of the absolute error in

(a) $a + b + c + d$ (b) c^3

(ii) If $u = 4x^2y^3/z^4$ and errors in x, y, z be 0.001. Compute the relative maximum error in u when $x = y = z = 1$

3. (a) Given that :

x :	150	152	154	156
$y = \sqrt{x}$:	12.247	12.329	12.410	12.490

Evaluate $\sqrt{155}$ using Lagrange's interpolation.

(b) Find the natural cubic spline to fit the data :

x :	1	2	3	4
y :	0	1	0	0

SECTION – B

4. (a) Given that :

x :	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y :	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find $\frac{dy}{dx}$ at 1.0 and 1.5

(b) Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ using

(i) Trapezoidal rule taking $h = \frac{1}{4}$

(ii) Simpon's rule taking $h = \frac{1}{6}$

5. (a) Find a real root of the equation $3x = \cos x + 1$ by Secant Method correct to four decimal places.

(b) Using Newton-Raphson formula, find a root of the equation :

$x \sin(x) + \cos(x) = 0$ up to three decimal places

SECTION – C

6. (a) Solve the system :

$9x - 2y + z = 50$

$x + 5y - 3z = 18$

$-2x + 2y + 7z = 19$

by using iterative method.

(b) Solve the system :

$2x + 4y + z = 3$

$3x + 2y - 2z = -2$

$x - y + z = 6$

by using Gauss elimination method.