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- (b) Transform the matrix to tri-diagonal form by using Householder's method

$$A = \begin{bmatrix} 1 & 4 & 3 \\ 4 & 1 & 2 \\ 3 & 2 & 1 \end{bmatrix}$$

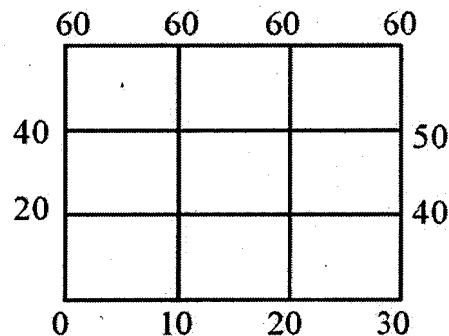
Also find the Eigen values and corresponding eigen vectors.

Section-D

8. Use Milne's Method to find $y(0.3)$ from

$\frac{dy}{dx} = x^2 + y^2$, $y(0) = 1$. Find the initial values $y(-0.1)$, $y(0.1)$ and $y(0.2)$ by using Taylor's series method.

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



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B.Tech. 6th Semester F-Scheme (Fire Tech & Safety)
Examination, May-2017

APPLIED NUMERICAL TECHNIQUES AND
COMPUTING

Paper-FT-310-F

Time allowed : 3 hours]

[Maximum marks : 100

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

1. (a) Define error. What are the various types of error? 2½×8
- (b) State Simpson's $\frac{3}{8}$ th Rule.
- (c) Define the terms Interpolation and Extrapolation.
- (d) State Newton's backward Interpolation formula.
- (e) Using Euler's method, find approximate value of y when
 $x = 0.6$ of $\frac{dy}{dx} = 1 + 2xy$, $y(0) = 1$ (take $h = 0.2$)
- (f) Write the finite difference approximations to partial derivatives in x and y directions
- (g) Describe Numerical differentiation and Numerical integration.
- (h) What is curve fitting? What is the need for such an exercise?

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[P.T.O.]

Section-A

2. (a) If $R = 10 x^3 y^2 z^2$ and errors in x, y, z are 0.03, 0.001, 0.02 respectively at $x = 3, y = 1, z = 2$. Calculate the absolute error, percentage error and relative error in evaluating R
- (b) Round off the numbers 865250 and 37.46235 to four significant figures and compute absolute error, percentage error and relative error in each case.
3. (a) Find the cubic splines to fit the data and evaluate $y(1.5)$ and $y'(2)$

x	1	2	3
y	-6	-1	16

- (b) Find the cubic polynomial which takes the following values :

x	0	1	2	3
f(x)	1	2	1	10

Hence or otherwise evaluate $f(4)$.

Section-B

4. (a) Derive the derivatives formulae using forward difference formula and hence find the first and second derivatives of $f(x)$ at 1.1 if

x	1.0	1.2	1.4	1.6	1.8	2.0
f(x)	0	0.128	0.544	1.296	2.432	4.00

- (b) Use Romberg's method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to 4 decimal places.
5. (a) Find the iterative formulae for finding \sqrt{N} , where N is real number, using Newton-Raphson formula. Hence evaluate $\sqrt{27}$ to four decimal places.
- (b) Find the real root of the equation $3x = \cos x + 1$ by Regula-Falsi Method correct to four decimal places.

Section-C

6. (a) Solve the equations :
- $$2x + y + z = 10;$$
- $$3x + 2y + 3z = 18;$$
- $$x + 4y + 9z = 16$$
- by Gauss elimination method.
- (b) Solve the equations :
- $$10x - 2y - 3z = 205;$$
- $$-2x + 10y - 2z = 154;$$
- $$-2x - y + 10z = 120$$
- by Relaxation method.
7. (a) Find the largest Eigen value of the matrix, using power method

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & -4 & 2 \\ 0 & 0 & 7 \end{bmatrix}$$