Major CHL 260

Time 2 hours. 1st May 2008 Max. Marks: 50

Attempt all Questions

1. (a) Write a program in C or MATLAB to solve the system of linear equations

$$X_1 + 2X_2 - X_3 = 2$$
$$3X_1 + 6X_2 + X_3 = 1$$
$$3X_1 + 3X_2 + 2X_3 = 3$$

By using Cramer's rule. (6)

(b) Using the Jacobi method find all the eigenvalues and the corresponding eigenvectors of the symmetric matrix A by applying a series of orthogonal transformations

$$A = \begin{bmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{bmatrix}$$ (10)

2. Perform two iterations of the Bairstow method using synthetic division or otherwise to extract a quadratic factor $X^2 + pX + q$ from the polynomial

$P_3(X) = X^3 + X^2 - X + 2 = 0.$

Use the initial approximations $p_0 = -0.9$, $q_0 = 0.9$ (10)

3. Write a program and tabulate for solving the one dimensional (PDE) Wave equation using suitable explicit finite difference scheme, boundary and initial conditions are

$$\frac{\partial^2 u}{\partial t^2} = k \frac{\partial^2 u}{\partial x^2}, \quad \text{for } k = 1$$

$u(x,0) = f(x) = 0.2x(1-x)\sin(\pi x)$, $\left.\frac{\partial u(x,0)}{\partial t}\right|_{t=0} = g(x) = 0.$

$u(0,t) = u(1,t) = 0, \quad 0 < t <= 1.0$

Take $\Delta x = 0.05$, mention clearly the stability criteria and find Δt accordingly for the second order PDE. (10)

4.(a) Write a program in C or MATLAB to find the matrix is Orthogonal Matrix or not. (7)

(b) Write a C program (CP.C) to copy any kind of file (.txt or .exe) which accepts the source and destination file name from the command line. Finally the program should work for copying the file E.g.

```
CP source.exe dest.exe
      OR
CP source.txt dest.txt
```

(7)