CHL260

MAJOR CHL260

Time: 2 Hour **MM: 40**

1.(a) What is METHOD of LINES; explain in your own words with examples? (2)

(b) The ends of a unit length cylinder are maintained at 100^{o} and 50^{o}. The curved surface loses heat by convection to surrounding air at 20^{o}. The heat transfer coefficient is proportional to $(T-20)^{0.25}$ when all of the constants of the system are substituted, the PDE becomes

$$\frac{\partial T}{\partial t} = 0.005 \frac{\partial^2 T}{\partial z^2} - 0.01 (T-20)^{1.25}$$

The cylinder is divided into five sections longitudinally, with $\Delta z = 0.2$. Write down the balances at the four interior nodes, and write a program to plot the temperature profile of the four interior temperatures with heat loss for time 0(0.2)50. (10)

2.(a) Derive the Explicit and Implicit finite Difference scheme for the simplest Parabolic Partial Differential equation

$$\frac{\partial T}{\partial t} = \alpha \frac{\partial^2 T}{\partial x^2}, \quad \text{with } T(x,t) = \begin{cases} T(a,t_0) = T_a \\ T(b,t_0) = T_b \end{cases}$$

and, discuss their stability criteria. (2, 2, 1)

(b) Find all the Eigen values of the real symmetric matrix

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

using the Jacobi method. Iterate till the off-diagonal elements, in magnitude, are less than 0.2 (up to fourth rotation). Write clearly the value of theta at each step. (3, 3, 2, 2)

3. (a) Write down the general form of **typedef** statement and give at least **two** benefits with examples. (1, 2)

(b) Answer the pointer value for the following: (5)

	Pointer variable	Pointer value	Pointer increment	Pointer value after increment
i	char *a;	12	a++; / ++a; a=a+3;	? ?
ii	int *b;	12	b++; / ++b; b=b+2;	? ?
iii	long *c;	12	c++; / ++c; c=c+3;	? ?
iv	float *d;	12	d++; / ++d; d=d+4;	? ?
v	double *e;	12	e++; / ++e; e=e+10;	? ?

(c) Write a program for adding integer parameters passed as command line arguments. (5)