MCA 3rd Semester COMPUTER BASED NUMERICAL METHODS 2006

Time : Three hours Maximum: 100 marks

PART A Answer ALL questions. (8 x 5 = 40 marks)

1. (a) Use the Secant method to determine the root of the equation x4 - x -10 = 0 .
Or
(b) Apply Newton - Raphson's method to determine a root of the equation x - e -x = 0 .

2. (a) Find 2 iterations with the Muller method for the following equation X3 –1/2 =0with X0 = 0.
Or
(b) Find two iterations with the Chebyshev method for finding root of the equation
x = 1/2 + sin x with Xo = 1.

3. (a) Solve by Gauss elimination method for the following
x+y+z=3
2x- y+3z= 16
3x+y-z=-3.
Or
(b) Solve by Triangularization method
x+5y+z=14
2x+ y+ 3z= 13
3x+ y+4z=17.

4. (a) Solve the following system of equation by using Gauss - Seidel method
8x-3y+2z= 20
4x+lly-z = 33
6x+3y+12z= 35.
Or
(b) Find the inverse of A = using partition method.

5. (a) Using Lagrange's formula, fit a polynomial to the data.
Or
(b) Prove that = 1/2 2 + 1+ 2/4

6. (a) Using Newton's divided difference formula find f(from the following data:
(b) Find the approximate value of f' (2.0) and f''(2.0) using the methods based on linear
interpolation

7. (a) Compute r(0.6) from the following table using the formula Richardson extrapolation.
x: 0.2 0.4 0.5 0.6 0.7 0.8 1.0
f(x): 1.42 1.88 2.13 2.39 2.66 2.94 3.56
With h=0.2.
Or

3 -1 1
3 -1 1
5 -2 2
X : 0 1 3 4
Y : -12 0 6 12
X : 4 5 7 10 11 13
F(x): 48 100 294 900 1210 2028
X : 2.0 2.2 2.6
Y : 0.6932 0.7885 0.9555
(b) Solve the equation $dy = 1- y$ given $y(0)= 0$
dx
using Euler method for the solutions at $x = 0.1, 0.2, 0.3$

8. (a) Solve the initial value problem $y' = y = (2x/y)$ $y(0) = 1$ for x=01 ,0.2
using backward Euler method
Or
(b) Using mid-point method find y(0.1), y(0.2)
given $(dy/dx) = X2 + y2$, y(0)=1.

PART B Answer ALL questions. (5 x 12 = 60 marks)

9. (a) Using Bairstow's method to obtain the quadratic factor of the equation
$X4 - 3X3 + 20X2 + 44x + 54=0$ with $(p,q) = (2,2)$ (perform three iterations).
Or
(b) Using Graeffe's root squaring method to find the roots of $X4 - X3 + 3X2 +X-4 =0$.

10. (a) Find the largest eigen value of
and the corresponding eigen vector.

(b) Find all the eigen values of the matrix.

11. (a) Obtain a linear polynomial approximation
to the function $f(x)= X3$ on the interval [0,1] using the least square approximation.
Or
(b) Find the least squares approximation of second degree for the data.
0.8

12. (a) Calculate
$(1 + sin x/ x)$ dx correct to four decimal places.
0
(Or)
5 5
(b) Evaluate $dx dy / (x2 + y2) 1/2$ using the trapezoidal rule.

13. (a) Given the initial value problem $u' = t2 + u2$, u(O)= 0 find the Taylor series for u(t) and
hence obtain u(0.5)
(b) Solve the initial value problem $u'= -2tu2$, u(O)=1 with $h = 0.1$ for x=0.l, 0.2. Use the
fourth order classical Runge -Kutta method