May 2004

Bachelor of Computer Application (BCA) Examination

VI Semester

Computer Oriented Numerical Methods

Time : 3 Hours] [Max. Marks : 50

Note : *Attempt all questions.*

1. (a) Write a program to find root of equation $e^x - 4 \sin x = 0$ lying between 0 and 0.5 using Newton Raphson method.

   (b) What are the iterative methods of root finding? Mention these methods.

OR

Explain what are the types of errors that we usually come across in numerical methods?

Explain absolute, relative and percentage errors.

2. (a) Derive Trapezoidal quadrature formula for equi-distant ordinates.

   (b) A solid of revolution is formed by rotating about the x-axis, the area between x-axis and line x = 0 and x = 1, and a curve through the points with the following co-ordinates :

x	:	0	0.25	0.50	0.75	1.0
y	:	1	0.9896	0.9589	0.9089	0.8415

Estimate the volume of the solid formed using trapezoidal rule.

OR

Obtain a Taylor series expansion to approximate sin (x). Using this evaluate sin (9.75) to 4 places of decimal.

3. (a) Solve by Jacobi iteracton method the system :

$8x - 3y + 2z = 20$

$6x + 3y + 12z = 35$

$4x + 11y - z = 33.$

   (b) Solve by relaxation method the equations :

$10x - 2y + z = 12$

$x + 9y - z = 10$

$2x - y + 11z = 20.$

OR

Using Newton's Gregory backward interpolation formula compute f' and f" at x = 0.9 and x = 1 from the following table :

x	:	0	0.2	0.4	0.6	0.8	1.0
f (x)	:	1.00	1.16	3.56	13.96	41.96	101.00

4. (a) Solve the following set of equaton by Gauss-Jordan method :

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

$2x + 3y - z + 2w = 7$

$x + y + 3z - 2w = -6$

$x + y + z + w = 2.$

(b) What are ill-condtioned system of linear equation? Suggest a method of requirement of a solution.

OR

Find the solution to $\frac{dy}{dx} = y^2 - t^2$, $y(1) = 0$ at $t = 2$ by the modified Euler method using step size = 0.1

5. (a) Derive Simpson $\frac{1}{3}$ rd quarature formula for equidistant ordinates.

(b) Evaluate $\int_0^1 \frac{1}{1+x^2}\, dx$ by Simpsons $\frac{1}{3}$ rd rule where the interval of integration in subdivided into 6 equal parts.

OR

Using Runge-Kutta 4th order method, solve the differential equation $\frac{dy}{dx} = -xy$ for

$x = 1.6$ in step of $h = 0.2$ wth initial condition $y(1) = 2$.

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