May 2003

Bachelor of Computer Application (BCA) Examination

VI Semester

Computer Oriented Numerical Methods

Time : 3 Hours] [Max. Marks : 50

Note : *Attempt all questions.*

1. Use a computer program and find the roots of f (x) = 0 accurate to 5 x 10^{-6} using the bisecton method (write) a computer program only to solve this problem).

OR

Let f (x) = x^3 - 3x - 2

Using Newton Raphson formula and starting with x = 2.1, compute x_1, x_2, x_3.

2. (a) Explain ill conditioned equations with example. How does one get refinement of solutions.

(b) Write a computer pogram to solve following equations by back substitution process (a part of Gauss Elimination method) :

$2x_1 + 4x_2 - 6x_3 = -4$

$x_1 + 5x_2 + 3x_3 = 10$

$x_1 + 3x_2 + 2x_3 = 5$

OR

Use the none linear least square method and determine the exponential fit $y = Ce^{AX}$ for the five data points (0, 1.5), (1, 2.5) (3, 5.0) and (4, 7.5).

3. (a) Let f (x) = $8x/2^x$

use quadratic Lagrange interpolation based on the nodes $x_0 = 0$, $x_1 = 1$ and $x_2 = 2$ to approximate f (1. 5).

(b) Write a computer program to solve above problem.

OR

(a) Let f (x) = x^3 - 4x. Construct the divided difference table based on the nodes $x_0 = 1$, $x_1 = 2$, ... $x_5 = 6$ and find the Newton Polynomial based on x_0, x_1, x_2, x_3.

(b) Write a computer program to construct the divided difference table.

4. (a) Solve following integral taking step size 0.5 and use composite Trapezoidal rule :

$$\int_0^2 x e^{-x} dx.$$

(b) Write a computer program to solve above problem.

OR

Obtain Differentiation formula using Newton's forward interpolation formula.

Let f (x) = cos (x), using above differentiaton formula calculate approximation for f' (0. 8) wth step size = 0.1.

5. Find the solution to :

$$\frac{dy}{dt} = y^2 - t^2,\ y(1) = 0,\ \text{at } t = 2$$

by the modified Euler metod using step size = 0.1.

Use Runge Kutta Method to solve for y. (0.1) from :

$$\frac{dy}{dx} = x + y + xy,\ y(0) = 1 \text{ with step size} = 0.1.$$

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