May 2005

Bachelor of Computer Application (BCA) Examination

VI Semester

Computer Oriented Numerical Methods

Time : 3 Hours] [Max. Marks : 50

Note : *Solve any two from each question.*

1. (a) What do you mean by convergence of solution? Prove that order of convergene of secant method is 1.62.

   (b) Find cube root of 12 upto four places of decimal.

   (c) Find real root of equation $x \log_{10} x - 1.2 = 0$ by False Position method.

2. (a) Write an algorithm to find roots of system of equations by Gauss Elimination method.

   (b) What do you mean by Refinement of solution? Also explain the methods of curve fitting.

   (c) Solve the following system of equation by Gauss-Jordan's method :

$$x + 2y + z = 8$$
$$2x + 3y + 4z = 20$$
$$4x + 3y + 2z = 16$$

3. (a) What do you man by forward, backward and divided difference oprator?

   Prove that : (i) $E\nabla = \nabla E$ (ii) $(1 + \Delta)(1 - \nabla) = 1$.

   (b) The population of a country in the decennial census were as under. Estimate the population for the year 1925 :

Year x	:	1891	1901	1911	1921	1931
Population y (in thousands)	:	46	66	81	93	101

   (c) The following values of the function f (x) for values of x are given :

   f (1) = 4, f (2) = 5, f (7), f (8) =4.

   Find the value of f (6).

4. (a) Write a program in C language to solve the integration by Trapezoidal rule.

(b) Find first and second order derivatives of the function tabulated below at x = 1.1 :

x :	1.0	1.2	1.4	1.6	1.8	2.0
f (x) :	0	0.1280	0.5440	1.296	2.432	4.00

(c) Evaluate $\int_0^4 e^x \, dx$ by Simpson's 1/3rd rule. Given that $e^1 = 2.72$, $e^2 = 7.39$, $e^3 = 20.09$, $e^4 = 54.60$. Compare it with actual value.

5. (a) Use Picard's method to approximate y when x = 0.2 given that y = 1, when x = 0, $\frac{dy}{dx} = x - y$.

(b) Given that $\frac{dy}{dx} = \frac{y-x}{y+x}$ with the initial condition y = 1, x = 0. Find y at x = 0.1 by Eulers method.

(c) Using Runga-Kutta 4th order method, solve the differential equation $\frac{dy}{dx} = xy$ for x = 1.6 in steps of n = 0.2 with initial condition y (1) = 2.

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