

## BACHELOR IN COMPUTER APPLICATIONS

Term-End Examination

December, 2008

CS - 71 : COMPUTER ORIENTED NUMERICAL  
TECHNIQUES

Time : 3 hours

Maximum Marks : 75

*Note : Question number 1 is compulsory. Attempt only three Questions from the rest. In total you have to answer four questions. Calculator is allowed.*

1. (a) Find the relative error in the number 834.123 correct to five significant figures. 5
- (b) Prove that 5
  - (i)  $\nabla = \Delta E^{-1}$
  - (ii)  $E = 1 + \Delta$
- (c) Solve the equation  $3x^3 - 4x^2 + x + 88 = 0$ , one root being  $z + \sqrt{7}i$ . 5
- (d) Find the root of the equation  $xe^x = \cos x$  using the secant method, correct to four decimal places with initial value  $x_0 = 0$  and  $x_1 = 1$  5
- (e) Use iteration method to evaluate  $\sqrt[3]{48}$  correct to four decimal places. 5

- (f) Apply Lagrange's formula to find  $f(5)$  given. 5

x:	1	3	4	6	10
f(x):	0	18	48	180	900

2. (a) Describe Regula-Falsi method for finding root of an equation 6
- (b) From the following table, estimate the number of students, who obtained marks between 40 and 45, using Newton's Forward interpolation formula. 6

Marks	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80
No. of Students	31	42	51	35	31

- (c) A civil engineer has measured the height of a 10 floor building as 2950 cm and the working height of each beam as 35 cm while the true values are 2945 cm and 30 cm respectively. Compare their absolute and relative errors. 3
3. (a) Use Newton-Raphson Method to find the root of the equation  $x^3 - 4x + 1 = 0$  with  $x_0 = 0$ . 5

- (b) Evaluate  $\int_0^6 \frac{dx}{1+x^2}$ , by using Trapezoidal Rule. 5

- (c) Solve, by Jacobi iteration method, the equations are : 5

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25$$

4. (a) Given  $\frac{dy}{dx} = x^2 + y^2$ ,  $y(1) = 1.5$  and  $h = 0.1$ . 5

Find  $y(1.2)$  using Runge-Kutta method.

- (b) Solve the following system of equation by Gauss-Seidal iteration method, up-to two iteration. 5

$$27x + 6y - z = 85$$

$$6x + 15y + 2z = 72$$

$$x + y + 54z = 110$$

- (c) Find the smaller root of the equation  $x^2 - 400x + 1 = 0$ , using four digit arithmetic. 5

5. (a) Perform five iterations of the Bisection method to obtain the smallest Positive root of the equation 5

$$f(x) = x^3 - 5x + 1 = 0.$$

(b) Evaluate  $\int_1^2 x^2 dx$  by Simpson's Rule with 5

$$h=0.2.$$

(c) Apply Euler's method to find the solution 5

$$y' = y - \frac{2x}{y} \text{ on the interval } [0,1], \text{ with initial}$$

condition  $y(0) = 1$  for  $h = 0.2$

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