No. of Printed Pages : 4

CS-71

BACHELOR OF COMPUTER APPLICATIONS (PRE-REVISED)

14529

Term-End Examination

December, 2012

CS-71 : COMPUTER ORIENTED NUMERICAL TECHNIQUES

Time : 3 hours *Maximum Marks : 75*

Note : *Question number **1** is **compulsory**. Attempt **any three** from question number **2** to **5**. Calculator is **allowed**.*

1. (a) What is the relative error in the computation of x-y where $x = 0.3721448693$ and $y = 0.3720214371$ with five decimal digit of accuracy ? **6x5=30**

(b) Let $u = \frac{a-b}{c}$, $v = \frac{a}{c} - \frac{b}{c}$, $a = 0.41$, $b = .36$ and $c = .70$ Using two digit arithmetic show that $|e_v|$ is nearly two times $|e_u|$.

(c) Perform two iteration of Gauss Seidal method to solve the following equations :

$$10\ x_1 - 2x_2 - x_3 - x_4 = 3$$
$$-2\ x_1 + 10x_2 - x_3 - x_4 = 15$$
$$-x_1 - x_2 + 10x_3 - 2x_4 = 27$$
$$-x_1 - x_2 - 2x_3 + 10x_4 = -9$$

starting with $(x_1, x_2, x_3, x_4) = (0, 0, 0, 0)$.

(d) Find lagrange's interpolating polynomial for following data :

x	1	19	49	101
y	1	3	4	5

(e) Evaluate $\int_{0.2}^{0.4} \left(\sin x - \ln x + e^x\right) dx$ using Simpson $\frac{1}{3}$ rule, h = 0.1.

(f) Perform two iteration of Newton Raphson method to find an approximate value of $\frac{1}{15}$ starting with $x_0 = 0.02$.

2. (a) Find real root of the equation in four iteration by Bisection method $f(x) = x^3 - 4x - 9 = 0$ **3x5=15**

(b) Solve the following equation by Gauss Elimination method.

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$

(c) Using inverse lagrange's interpolation find value of x when $y = 3$ for following data :

x	4	7	10	12
y	-1	1	2	4

3. (a) Perform three iteration of Regula Falsi method for the equation : **3x5=15**

$2x^3 + 5x^2 + 5x + 3 = 0$, root in interval $[-2, -1]$

(b) Perform three iteration by Jacobi method for following equations :

$$\begin{bmatrix} -8 & 1 & 1 \\ 1 & -5 & -1 \\ 1 & 1 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 1 \\ 16 \\ 7 \end{bmatrix}$$

(c) Find $\int_1^7 f(x)\,dx$ using Trapezoidal rule for following data :

x	1	2	3	4	5	6	7
y	2.105	2.808	3.614	4.604	5.857	7.451	9.467

4. (a) Perform two iteration of Newton Raphson method to find root of equation $x^3 - 4x + 1 = 0$, starting with $x_0 = 0$. **3x5=15**

(b) Do three iteration of secant method to solve $x^3 + x - 6 = 0$, starting with $x_0 = 1$, $x_1 = 2$.

(c) Use Taylor series method to solve

$y^1 = x^2 + y^2$ for $x = 0.25$, $y(0) = 1$.

5. (a) Given $\frac{dy}{dx} = y - x$, $y(0) = 2$. Find y (0.1) and y (0.2) using Runge Kutta Method of fourth order, correct to 4 decimal places. **3x5=15**

(b) Find y when $x = 0.1$. Given that $y(0) = 1$ and $y^1 = x^2 + y$ with step length $h = 0.05$ using Euler's method.

(c) The equation $x^3 + 7x^2 + 9 = 0$ has a root between -8 and -7. Perform three iteration of Regula Falsi method to obtain the root.
