

**BACHELOR OF COMPUTER APPLICATIONS
(PRE-REVISED)**

Term-End Examination

December, 2013

**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. Use of scientific calculator is allowed.*

1. (a) If 0.667 is the approximate value of $\frac{2}{3}$, find **6x5=30**
the absolute, relative, and percentage errors.
- (b) Using Bisection method, find a real root of the equation correct to three decimal places.
 $x^3 - 5x + 1 = 0$
- (c) Solve the equation
 $x^3 + 6x + 20 = 0$,
one root being $1 + 3i$.
- (d) Find the root of the equation
 $x e^x = \cos x$
Using the Regula-falsi method correct to four decimal places.
- (e) Solve $3x + \sin x - e^x = 0$
correct to 4 decimal places using Newton-Raphson method.

- (f) Solve the set of simultaneous equations by Cramer's Rule

$$x_1 + 2x_2 - 3x_3 = -4$$

$$2x_1 - 3x_2 + x_3 = -1$$

$$3x_1 - 5x_2 + 4x_3 = 5$$

2. (a) Using Newton-Raphson method, compute the root of the following equation correct to four decimal places. 3x5=15

$$x e^x = 1$$

- (b) Solve the equation $x = 0.21 \sin(0.5 + x)$ by iteration method with the approximate root as 0.1.

- (c) Solve the following equations by Gauss-elimination method :

$$x + y + z = 6$$

$$3x + 3y + 4z = 20$$

$$2x + y + 3z = 13.$$

3. (a) Find a root of the equation by using Bisection method correct to three decimal places. 3x5=15

$$x + \log x = 5.$$

Take initial interval [3.2,4]

- (b) Use Jacobi's iteration method to solve the following systems of equations :

$$13x_1 + 5x_2 - 3x_3 = 14$$

$$2x_1 + 12x_2 + x_3 = 29$$

$$3x_1 - 4x_2 + 10x_3 = 25$$

- (c) Using Newton's interpolation formula, compute $f(0.5)$ for the following data.

| | | | | | |
|-------|-------|-------|-------|--------|--------|
| $x :$ | 0 | 1 | 2 | 3 | 4 |
| $f :$ | 1.000 | 2.718 | 7.389 | 20.086 | 54.598 |

4. (a) By using the Regula - falsi method, find the root, correct to three decimal places of the equation **3x5=15**

$$x \log_{10} x = 1.2$$

that lies between 2 and 3.

- (b) Solve the following equations by Gauss-Seidal method.

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

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

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

- (c) Use Lagrange's interpolation formula to compute $f(27)$ from the following data :

| | | | | |
|----------|------|------|------|------|
| $x :$ | 14 | 17 | 31 | 35 |
| $f(x) :$ | 68.7 | 64.0 | 44.0 | 39.1 |

5. (a) By the Secant method, find the root, correct to four decimal places, of the equation $x^3 - 2x - 1 = 0$ **3x5=15**

that lies between 1 and 2.

- (b) Evaluate $\int_0^1 e^x dx$ approximately in steps of 0.2 using Trapezoidal rule.

- (c) Use Runge - Kutta method to approximate y , when $x=0.1$ given that $x=0$, when $y=1$,

and $\frac{dy}{dx} = x^2 + y^2$.
