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CS-71

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Pre-Revised)

Term-End Examination

00763

December, 2018

CS-71 : COMPUTER ORIENTED NUMERICAL TECHNIQUES

Time : 3 hours *Maximum Marks : 75*

Note : *Question number 1 is **compulsory**. Attempt any **three** questions from questions number 2 to 5. Use of scientific calculator is permitted.*

1. (a) (i) Round off the following numbers to two decimal places : *2+3*

48·21416, 52·276, 2·379 and 81·255

(ii) Using 8-decimal digit floating point representation (with four digits for mantissa, two for exponent and one each for sign of exponent and mantissa), represent the following numbers in normalized floating point form (use chopping, if required) :

8976; – 897·892; – 0·0019276

(b) (i) For two floating point numbers $x_1 = 0{\cdot}5306 \times 10^3$ and $x_2 = 0{\cdot}6187 \times 10^4$, find $x_1 - x_2$ in floating point representation. *2+3*

(ii) Find the product of the two numbers given in question number b(i) above.

(c) (i) Write the following system of linear equations in matrix form : *2+3*

$$9x - 11y = -19$$

$$-2x - 13y = -21$$

(ii) Find an interval in which the following equation has a root :

$$x^3 - x^2 - 1 = 0$$

(d) Prove that

$$\mu^2 = 1 + \frac{1}{4}\delta^2. \qquad 5$$

(e) Using Newton's forward interpolation formula, find y at x = 8, from the following table : *5*

x	0	5	10	15	20	25
y	7	11	14	18	24	32

(f) Find a real root of the equation

$$x^3 - x - 11 = 0$$

correct to three decimal places using Bisection method. *5*

2. (a) Using Lagrange's interpolation formula, find the values of y when x = 10, from the following data : *3×5=15*

x	5	6	9	11
y	12	13	14	16

(b) Evaluate :

$$\int_0^1 \frac{1}{1+x^2}\,dx$$

using Simpson's $\frac{1}{3}$ rule taking $h = \frac{1}{4}$.

(c) Find a real root of the equation

$$x^3 - x - 1 = 0$$

correct to two decimal places by iterative method.

3. (a) Find a real root of the equation

$$x^3 - 3x^2 + 7x - 8 = 0$$

correct to three decimal places using Newton-Raphson's method. *3×5=15*

(b) Find a root of the equation

$$x^3 - 4x - 9 = 0$$

correct to three decimal places using Regula–Falsi method.

(c) Solve the following system of linear equations by Cramer's rule :

$$3x + 4y - z = 8$$

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

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

4. (a) Solve the following system of linear equations by Gauss elimination method : *3×5=15*

$$2x + y + 4z = 12$$

$$8x - 3y + 2z = 20$$

$$4x + 11y - z = 33$$

(b) Solve the following system of linear equations by Gauss-Seidel iterative method :

$$2x + y + z = 4$$

$$x + 2y + z = 4$$

$$x + y + 2z = 4$$

(c) Use Jacobi's iteration method to solve the following system of equations :

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

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

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

5. (a) If 0·333 is the approximate value of $\frac{1}{3}$, find absolute, relative, and percentage errors. *3×5=15*

(b) Use Runge–Kutta method to find y when x = 1·1 in steps of 0·1, given that

$$\frac{dy}{dx} = x^2 + y^2 \text{ and } y(1) = 1{\cdot}5.$$

(c) Using Euler's method, compute y for x = 0·1 and 0·2 choosing h = 0·1 from

$$\frac{dy}{dx} = y - \frac{2x}{y}, \quad y(0) = 1.$$