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CS-71

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

Term-End Examination

00796

June, 2016

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 non-scientific calculator is allowed.*

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

(b) Find a root of the equation $x^3 - 4x - 9 = 0$, using the bisection method, correct to two decimal places.

(c) By using the Regula-Falsi method, find an approximate root of the equation $x^4 - x - 10 = 0$ that lies between 1·8 and 2. Carry out three approximations.

(d) Apply Newton-Raphson method to find an approximate root, correct to three decimal places, of the equation $x^3 - 3x - 5 = 0$.

(e) Solve the following system of linear simultaneous algebraic equations by Cramer's rule :

$$4x_1 + 3x_2 + 6x_3 = 13$$

$$2x_1 - 4x_2 + x_3 = 8$$

$$3x_1 - 2x_2 + 6x_3 = 17$$

(f) Given $\frac{dy}{dx} = \frac{y - x}{y + x}$, with $y = 1$ for $x = 0$. Find y approximately for $x = 0{\cdot}1$ by Euler's method (Five steps). *6×5=30*

2. (a) Using bisection method, compute one root of $e^x - 3x = 0$, correct to two decimal places.

(b) Find a real root of the equation $x^6 - x^4 - x^3 - 3 = 0$ by Regula-Falsi method in the interval (1·5, 16) correct to three places of decimal.

(c) Compute the cube root of 20, correct to two decimal places, by using any numerical method. *3×5=15*

3. (a) Solve $3x + \sin x - e^x = 0$, correct to 4 decimal places using the Newton-Raphson method.

(b) Find a real root of the equation $e^x - 3x = 0$ by the method of iteration.

(c) Solve the equations

$$2x_1 + x_2 + x_3 = 10$$

$$3x_1 + 2x_2 + 3x_3 = 18$$

$$x_1 + 4x_2 + 9x_3 = 16$$

using the Gauss elimination method. *3×5=15*

4. (a) Solve the equations

$$10x - y - z = -33$$

$$-x + 10y - z = 22$$

$$x + y - 10z = -11$$

by Gauss-Jordan method.

(b) Using Runge-Kutta method, find the value of y when $x = 0{\cdot}01$, given that $x = 0$ when $y = 1$ and $\frac{dy}{dx} = x^2 + y^2$.

(c) Solve the equations

$$6x - 3y + z = 11$$

$$2x + y - 8z = -15$$

$$x - 7y + z = 10$$

by Gauss-Seidel method. *3×5=15*

5. (a) Prove the following :

(i) $\Delta = E - 1$

(ii) $\Delta^2 = E^2 - 2E + 1$

(b) Use Lagrange's interpolation formula to fit a polynomial to the following data :

x	– 1	0	1	3
f(x)	2	1	0	– 1

Also compute f(2).

(c) Find

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

by using Simpson's $\frac{1}{3}$ rule. Hence, obtain the approximate value of π. *3×5=15*