No. of Printed Pages : 4

CS-71

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

00475

Term-End Examination

December, 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 0·667 is the approximate value of $\frac{2}{3}$, find the absolute, relative, and percentage errors.

(b) Using bisection method, find a real root of the equation $x^3 - 5x + 1 = 0$, correct to two decimal places.

(c) Find the root of the equation $xe^x = \cos x$ using the Regula-Falsi method, correct to four decimal places.

(d) Apply Newton-Raphson method to find an approximate root, correct to three decimal places, of the equation $x - 2 \sin x = 0$.

(e) By the fixed point iteration process, find the root, correct to three decimal places, of the equation $x = \cos x$ near $\left(x = \frac{\pi}{4}\right)$.

(f) Solve the following set of simultaneous equations by Cramer's rule :

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

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

$$3x_1 - 5x_2 + 4x_3 = 5$$ *6×5=30*

2. (a) Find the root of the equation $e^x = x + 2$ using bisection method, correct to three decimal places.

(b) By using the Regula-Falsi method find the root, correct to three decimal places, of the following equation over the indicated interval :

$$xe^x = 3 \text{ over } (1, 1{\cdot}5)$$

(c) Find the cube root of 7, correct to three decimal places, by using any suitable numerical method. *3×5=15*

3. (a) Using Newton-Raphson method, find the real root of the equation $x \tan x = 1{\cdot}28$, correct to three decimal places.

(b) Solve the following algebraic equations by using Gauss' elimination method :

$$x + y + z = 6$$

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

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

(c) Solve the following simultaneous equations by using Gauss-Jordan method :

$$5x - 2y + 3z = 18$$

$$x + 7y - 3z = -22$$

$$2x - y + 6z = 22$$

3×5=15

4. (a) Solve the following simultaneous equations :

$$x + y + z = 3$$

$$2x - y + 3z = 16$$

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

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

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

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

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

(c) Solve $\frac{dy}{dt} + y^2 = 0$, given boundary conditions $y = 1$ at $t = 0$. Find approximately the value of y for $t = 1$ by Euler's method in five steps. *3×5=15*

5. (a) Prove the following :

(i) $\Delta = E\nabla = \nabla E = \delta E^{1/2}$

(ii) $\delta = E^{1/2} - E^{-1/2}$

(b) Use Lagrange's interpolation formula to compute f(27) from the given data :

x :	14	17	31	35
f(x) :	68·7	64·0	44·0	39·1

(c) Use Runge-Kutta method to aproximate y, when $x = 0{\cdot}1$ and $x = 0{\cdot}2$, given that $x = 0$, when $y = 1$ and $\frac{dy}{dx} = x + y$. *3×5=15*
