No. of Printed Pages : 5

CS-71

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

Term-End Examination

01840 **June, 2017**

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 the following numbers to three decimal places :

92·1657; 85·1020; 91·2678; 21·0065; 100·67892

(ii) For each of the following numbers, find the number of significant digits :

237·50; 0·0345; 137000; 0·0006032; 0·007 *5*

(b) If $N = \frac{4x^2y^3}{z^4}$ and $\Delta x = \Delta y = \Delta z = 0{\cdot}001$, compute the maximum relative error in N when x = 1, y = 2 and z = 3. *5*

(c) Solve the following system of equations using the Gauss-elimination method : 5

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

$$2x - 8y + z = -5$$

$$x - 2y + 9z = 8$$

(d) Find the real root of the equation

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

by the Newton-Raphson method, correct to three places of decimal. 5

(e) Prove that : 5

(i) $E^{-1} = 1 - \nabla$

(ii) $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$

(f) Find the real root of the equation

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

correct to two decimal places, by iterative method. 5

2. (a) Apply Lagrange's interpolation formula to find f(x) from the following data :

x :	0	1	2	4
f(x) :	1	1	2	5

Also compute f(3). 5

(b) 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

(c) The speed v in m/sec of a car, w.r.t. time t in seconds after it starts, is shown in the following table :

t	v
0	0
12	3·60
24	10·08
36	18·90
48	21·60
60	18·54
72	10·26
84	5·40
96	4·50
108	5·40
120	9·00

Using Simpson's $\frac{1}{3}$ rule, find the distance travelled by the car in 2 minutes. 5

3. (a) Find a root of the equation

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

correct to three decimals, using the bisection method. 5

(b) Find a root of the equation

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

correct to three decimal places, using the Regula-Falsi method. 5

(c) Solve the following system of equations by Jacobi's iteration method : 5

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

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

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

4. (a) Solve the following system of equations by the Gauss-Seidel iterative method : 5

$$10x + 2y + z = 9$$

$$2x + 20y - 2z = -44$$

$$-2x + 3y + 10z = 22$$

(b) Use Cramer's rule to solve the system of equations given below : 5

$$3x_1 + 2x_2 + x_3 = 7$$

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

$$5x_1 + 4x_2 - 2x_3 = 1$$

(c) Using the Runge-Kutta method of order 4, find $y(0{\cdot}2)$ for the equation

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

Take $h = 0{\cdot}2$. *5*

5. (a) The cubic $2x^3 - 9x^2 + 12x + \lambda = 0$ has two equal roots. Find λ and solve the equation completely. *5*

(b) Find the root of the equation

$$e^{-x} - x = 0,$$

correct to three decimal places, by the Secant method. *5*

(c) Using Euler's method, find the approximate value of y, when $x = 0{\cdot}6$, and

$$\frac{dy}{dx} = 1 - 2xy,$$

given that $y = 0$, when $x = 0$. Take $h = 0{\cdot}2$. *5*
