No. of Printed Pages : 7

BCS-054

BACHELOR OF COMPUTER APPLICATIONS (BCA) (Revised)

01075 **Term-End Examination**

June, 2018

BCS-054 : COMPUTER ORIENTED NUMERICAL TECHNIQUES

Time : 3 hours *Maximum Marks : 100*

Note :

(i) Any calculator is allowed during examination.

(ii) Question no. 1 is ***compulsory.*** *Attempt any* ***three*** *more from the next four questions.*

1. (a) Explain with suitable example, the advantages of using Normalized form of representing numbers. *3*

(b) For two floating point numbers $x_1 = 0{\cdot}7268 \times 10^5$ and $x_2 = 0{\cdot}6271 \times 10^4$, find $x_1 - x_2$ in floating point representation. *3*

(c) Find the product of two numbers given in question number 1(b) above, in floating point notation. 3

(d) Write the following system of linear equations in matrix form 3

$$-8x + 15y = -1$$

$$7x - 4y = 10$$

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

$$x^2 - 12x + 30 = 0.$$ 2

(f) Write briefly the steps of bisection method to find roots of an equation. 3

(g) Write E and μ in terms of ∇. 3

(h) Write the expressions, one for each, which is obtained by applying each of the following operators to f(x) for some $h > 0$: 3

(i) D

(ii) E

(iii) ∇

(i) State formulae for each of the following interpolations : 4

(i) Newton's Forward Difference Formula

(ii) Stirling's Formula

(j) Construct a difference table for the following data : 3

x	1	2	3	4
f(x)	8	12	17	25

(k) State Trapezoidal rule for finding the value of integral $\int_a^b f(x)\,dx$. 4

(l) Explain each of the following concepts with a suitable example : 6

(i) Boundary value problem

(ii) Order of a differential equation

(iii) Degree of a differential equation

2. (a) Using 8-decimal digit floating point representation (4 digits for mantissa, 2 for exponent and one each for signs of mantissa and exponent), represent the following numbers in normalized floating point form : *3*

(i) 0·000725

(ii) – 89·6532

(iii) – 98876

(b) Briefly discuss how ZERO is represented as a floating point number for 8-decimal digit representation mentioned above in Q. No. 2(a). *3*

(c) Let a = $476{\cdot}9 \times 10^6$, b = $657{\cdot}2 \times 10^4$ and c = $-\ 5{\cdot}342 \times 10^4$. Find out, whether '+' is associative for a, b and c (i.e., you have to find whether a + (b + c) = (a + b) + c or not), using 8-decimal digit representation mentioned in Q. No. 2(a). *14*

3. (a) Solve the following system of linear equations, using Partial Pivoting : *11*

$$2x - 3y + 5z = 4$$

$$x + 5y - 4z = 2$$

$$4x + 3y - 7z = 0$$

(b) Explain the relative advantages of direct methods over iterative methods for solving a system of linear equations. *4*

(c) Solve the following system of linear equations by Gaussian Elimination Method : *5*

$$8x - 5y = 11$$

$$3x + 7y = 13$$

4. (a) The population of a city in a census taken once in 10 years is given below in thousands. Estimate the value in 1975. *8*

Year	1970	1980	1990	2000	2010
Population	45	52	68	94	130

(b) Derive operators δ and Δ in terms of E. *5*

(c) Find Newton's Backward difference form of interpolating polynomial for the data : *7*

x	f(x)
6	21
8	42
10	85
12	157

5. Attempt any ***two*** parts of (a), (b) and (c) below :

(a) Find approximate value of $I = \int_2^4 \frac{dx}{4 + 3^x}$ using Simpson's (1/3) rule taking $h = 0{\cdot}5$. *10*

(b) The values of $y = \sqrt{x}$ are given below for $x = 1{\cdot}5\ (0{\cdot}5)\ 3{\cdot}5$.

x	1·5	2·0	2·5	3·0	3·5
f(x)	1·2247	1·4142	1·5811	1·7320	1·8708

Compute the value of $f'(x)$ at $x = 1{\cdot}0$. *10*

(c) Solve the following IVP using Euler's method :

$$y' = 1 - 2xy, \quad y(0{\cdot}2) = 0{\cdot}1948$$

Find $y(0{\cdot}4)$ with $h = 0{\cdot}1$. *10*
