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BCS-054

**BACHELOR OF COMPUTER
APPLICATIONS (BCA)
(REVISED)**

Term-End Examination

June, 2026

**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.*

(iii) *Attempt any three questions from the next four questions.*

1. (a) Explain the floating point number representation with the help of an example. 5
- (b) Briefly describe the terms Accuracy and Precision with suitable example. 5
- (c) Solve the following system of linear equations, by using Gauss Elimination method : 5

$$x_1 + x_2 + x_3 = 3$$

$$4x_1 + 3x_2 + 4x_3 = 8$$

$$9x_1 + 3x_2 + 4x_3 = 7$$

- (d) Compare Bisection method with Regula-Falsi method. Use Regula-Falsi method to find the positive root of equation :

$$x^3 + 4x^2 - 10 = 0,$$

correct up to two decimal places. 10

- (e) Perform two iterations of Secant method to find the root of the equation :

$$x^3 + 4x^2 - 10 = 0,$$

near $x = 0$ and $x = 1$. 5

- (f) Find $\Delta^n f(x)$, where $f(x)$ is a polynomial of degree n , say : 5

$$f(x) = a_0x^n + a_1x^{n-1} + a_2x^{n-2} + \dots + a_n.$$

- (g) Construct the difference table for the following set of data :

x	$f(x)$
1	2.105
2	2.808
3	3.614
4	4.604
5	5.857
6	7.451
7	9.467
8	11.985

Identify and list the forward differences for $f(1)$ and backward differences for $f(8)$, separately. 5

2. (a) If $f(x) = x^3$, find the value of $f(a, b, c)$, where $f(a, b, c)$ is the second divided difference. 5
- (b) Given the following values of $f(x) = \ln x$, find the approximate value of $f'(2.0)$ and $f''(2.0)$ by using Lagrange's interpolation formula : 10

x	$f(x)$
2.0	0.69315
2.2	0.78846
2.6	0.95551

- (c) Find the approximate value of
$$I = \int_0^1 \frac{dx}{1+x}$$
 using Simpson's rule (take 3 nodal points). 5

3. (a) Use Euler method to find the solution of $y' = f(t, y) = t + y$, given $y(0) = 1$. Find the solution on interval $[0, 0.8]$ with $h = 0.2$ (Note : t is independent variable, instead of x). 10

- (b) Solve the following system of equations by Gauss-Jacobi method correct up to two decimal places only : 10

$$-4x_1 + x_2 + 10x_3 = 21;$$

$$5x_1 - x_2 + x_3 = 14;$$

$$2x_1 + 8x_2 - x_3 = -7$$

4. (a) Using Newton-Raphson method, find square root of 10 with initial approximation $x_0 = 3$. 5

- (b) Use forward difference table to find the first and second derivatives of $y = f(x)$ at $x = 1.1$ from the following tabulated

values, using Newton's forward difference interpolation formula : 10

x	$f(x)$
1.0	0.0000
1.2	0.1280
1.4	0.5440
1.6	1.2960
1.8	2.4320
2.0	4.0000

(c) Evaluate the integral $I = \int_0^1 \frac{dx}{\sqrt{1+x^2}}$ by

using trapezoidal rule, dividing the interval $[0, 1]$ into five equal parts. 5

5. (a) Solve the initial value problem (IVP) $y' = 2y + 3e^t$, $y(0) = 0$ using classical Runge-Kutta method of order 4, and find $y(0.1)$ taking $h = 0.1$. 10

(b) Write short notes on the following : 5+5

(i) Iterative methods of solving linear algebraic equations

(ii) Bisection method

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