

BCA/CON : 302 (O)

Date _____

2025

(3rd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : CON : 302 (Old Course)

(Computer Oriented Numerical Methods)

Full Marks : 70

Pass Marks : 45%

Time : 3 hours

(PART : B—DESCRIPTIVE)

(Marks : 50)

*The figures in the margin indicate full marks
for the questions*

1. (a) Divide the number $0.876543E-5$ by $0.200000E-3$ and normalize the result. **4**

Or

Distinguish between round-off errors
and truncation errors.

- (b) Convert the octal number 4706 to—
(i) decimal system;
(ii) binary system;
(iii) hexadecimal system. **6**

2. (a) Use the secant method to estimate the root of the equation $x^2 - 4x - 10 = 0$ with the initial estimates of $x_1 = 4$ and $x_2 = 2$. 5

- (b) Find the root of the equation $f(x) = x^2 - 3x + 2$ in the vicinity of $x = 0$ using Newton-Raphson method. 5

Or

Find the root of the equation $x^2 - 4x - 10 = 0$ using bisection method.

3. (a) Solve the following 3×3 system using Gauss elimination method with complete pivoting : 5

$$\begin{aligned}x + y + z &= 7 \\3x + 3y + 4z &= 24 \\2x + y + 3z &= 16\end{aligned}$$

Or

Obtain the solution of the following system of equations using Jacobi iteration method :

$$\begin{aligned}2x_1 + x_2 + x_3 &= 5 \\3x_1 + 5x_2 + 2x_3 &= 15 \\2x_1 + x_2 + 4x_3 &= 8\end{aligned}$$

- (b) Solve the following system of equations using Gauss-Jordan method : 5

$$2x_1 + 4x_2 - 6x_3 = -8$$

$$x_1 + 3x_2 + x_3 = 10$$

$$2x_1 - 4x_2 - 2x_3 = -12$$

4. (a) Consider the following table :

x	1	2	3	4	5
$f(x)$	1	1.4142	1.7321	2	2.2361

Find the square root of 2.5 using the second-order Lagrange interpolation polynomial. 4

- (b) In an examination, the number of candidates who secured marks between certain limits were as follows :

Marks	0-19	20-39	40-59	60-79	80-99
No. of candidates	41	62	65	50	17

Estimate the number of candidates getting less than 22 marks. 6

5. (a) Evaluate

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

using Simpson's $\frac{1}{3}$ rd rule, take step size $(h) = \frac{1}{4}$. 4

- (b) Use Runge-Kutta method of second-order to find an approximate value of y when $x = 0.02$, given that

$$\frac{dy}{dx} = x^2 + y \text{ and } y(0) = 1$$

6

Or

Using Simpson's $\frac{3}{8}$ th rule, evaluate the integral

$$\int_0^{4.5} \sqrt{x} dx$$

by dividing the range of integration into 9 equal parts.

★★★

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(3rd Semester)

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(PART : A—OBJECTIVE)

(Marks : 20)

The figures in the margin indicate full marks for the questions

1. Choose the most appropriate answer from the given options by putting a Tick (✓) mark in the brackets provided : 1×5=5

(a) $(428)_{10} = (?)_{16}$

(i) 2AC ()

(ii) 1AC ()

(iii) 1BC ()

(iv) 1CA ()

(b) Simpson's $\frac{3}{8}$ th rule is also called as

(i) one-point formula ()

(ii) two-point formula ()

(iii) three-point formula ()

(iv) four-point formula ()

(c) Which one of the following numbers has the most precision?

(i) 4.3201 ()

(ii) 4.32 ()

(iii) 4.320106 ()

(iv) 4.32010 ()

(d) The 2's complement of a binary number 01100101 is

(i) 10011010 ()

(ii) 10011011 ()

(iii) 00011010 ()

(iv) 01100111 ()

(e) The simplest and most reliable of iterative methods for the solution of the non-linear equations is

(i) false position method ()

(ii) bisection method ()

(iii) Newton-Raphson method ()

(iv) secant method ()

2. Fill in the blanks by choosing appropriate words :

1×5=5

(a) Bisection method is also called

..... (binary chopping method / mean position method).

(b) Gauss elimination method reduces the system of

equations to the
(upper triangular / lower triangular) form.

(c) Gauss-Jordan method is an
(elimination method / iterative method).

(d) Simpson's $\frac{1}{3}$ rd rule uses the interpolation

polynomial of the
(third order / fourth order).

(e) Inherent errors are also known as

..... (input errors / output errors).

3. State whether the following statements are *True* or *False* by putting a Tick (✓) mark : 1×4=4

(a) The radix of binary number system is 10.

True () *False* ()

(b) Blunders are errors that are caused due to human imperfection.

True () *False* ()

(c) The convergence of secant method is known as superlinear convergence.

True () *False* ()

(d) Euler method is the simplest one-step method.

True () *False* ()

4. Answer the following questions in brief :

2×3=6

(a) Write the linear interpolation formula.

(b) Write the difference between partial pivoting and complete pivoting.

partial pivoting
complete pivoting

- (c) Highlight the difference between Gauss elimination method and Gauss-Jordan elimination method.
