



BCA/CON : 302 (O)

2024

(3rd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : CON : 302 (Old Course)

(Computer Oriented Numerical Method)

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) Distinguish between round off-errors and truncation errors.

4

Or

Multiply the numbers $0.200000 \text{ E}4$ and $0.400000 \text{ E}2$.

- (b) Convert the octal number 563 to—
(i) decimal system;
(ii) binary system;
(iii) hexadecimal system.

6

2. (a) 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.

- (b) Use the false position method to find a root of the function $f(x) = x^2 - x - 2 = 0$ in the range $1 < x < 3$. 5
3. (a) Solve the following 3×3 system using Gauss elimination method with partial pivoting : 5

$$x + y + z = 7$$

$$3x + 3y + 4z = 24$$

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

Or

Obtain the solution of the following system of equations using Gauss-Seidel iteration method :

$$2x_1 + x_2 + x_3 = 5$$

$$3x_1 + 5x_2 + 2x_3 = 15$$

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

- (b) Solve the following system

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

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

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

using Gauss-Jordan method. 5

4. (a) Estimate the value of $\sin \theta$ at $\theta = 25^\circ$ using the Newton-Gregory forward difference formula or Newton-Gregory backward difference formula with the help of the following table :

6

θ	10	20	30	40	50
$\sin \theta$	0.1736	0.3420	0.5000	0.6428	0.7660

- (b) The table below gives square roots for integers :

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

Determine the square root of 2.5 using linear interpolation formula.

4

5. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using trapezoidal rule, take, $h = 0.25$.

4

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

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

6

Or

Estimate the integral, $\int_0^{2.7} \sqrt{x^2 + 1} dx$, using Simpson's 3/8th rule by taking the integration into 9 equal parts.

★ ★ ★

2 0 2 4

(3rd Semester)

BACHELOR OF COMPUTER APPLICATIONS

Paper : CON : 302 (Old Course)

(Computer Oriented Numerical Method)

(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) The octal equivalent of the hexadecimal number CD5 is

- (i) 3625 ()
- (ii) 6325 ()
- (iii) 3652 ()
- (iv) 6352 ()

(b) Simpson's 1/3rd 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 least 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) Second method ()

2. Fill in the blanks with appropriate words : 1×5=5

(a) False position method is also called

..... (linear interpolation method / linear extrapolation method).

(b) Gauss elimination method reduces the system

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

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

(d) Trapezoidal rule uses the interpolation

polynomial of the
(second order / third order).

(e) Numerical errors are also known as

..... (procedural errors / modelling errors).

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

(a) The radix of hexadecimal number system is 8.

True () False ()

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

True () False ()

(c) Complications in Newton-Raphson method will arise if the derivative of the function is zero.

True () False ()

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

True () False ()

(6)

4. Answer the following questions in brief :

2×3=6

(a) Write the formula for Newton-Raphson method.

(b) What is the difference between partial pivoting and complete pivoting?

- (c) Highlight the difference between Jacobi method and Gauss-Seidel method in iteration method.

★ ★ ★