

III Semester B.C.A. Degree Examination, April/May 2021
(Y2K8 Scheme) (R)
COMPUTER SCIENCE
BCA 306 : Numerical Analysis and Linear Programming

Time : 3 Hours

Max. Marks : 60/70

Instructions : Answer all Sections.(Section – D is applicable only for the students of
2012-13 and onwards).

60 marks for Repeater students prior to 2012-13.

SECTION – A

I. Answer any five of the following : (5×2=10)

- 1) Write any two types of errors.
- 2) Subtract 0.0943 E-3 from 0.5352 E-3.
- 3) Write the formula for Secant method.
- 4) Explain Gauss Elimination method for system of linear equations.
- 5) Write the formula for Trapezoidal rule for numerical integration.
- 6) Write the formula for Newton – Back – Ward interpolation formula.
- 7) Write the Newton – divided difference formula.
- 8) Define surplus variables.

SECTION – B

II. Answer any three of the following : (3×5=15)

- 9) Find a real root of the equation $x^3 - 2x - 5 = 0$ in (2, 3), using Newton-Raphson method. Correct to three decimal places in four stages.

- 10) Estimate $f(1.4)$ from the following data :

x	1	2	3	4	5
f(x)	10	26	58	112	194

- 11) Evaluate $\int_0^3 \frac{dx}{(1+x)^2}$ by using Simpson's $\left(\frac{1}{3}\right)^{\text{rd}}$ rule. Divide into 3 equal parts.

P.T.O.



- 12) Solve $10x + 2y + z = 9$, $x + 10y - z = -22$, $-2x + 3y + 10z = 22$ using Gauss-Jacobi Method.
- 13) Solve $\frac{dy}{dx} = x + y$, and $y(0) = 1$ for $x = 1.1$ using Taylor's Series Method upto 3rd degree.

SECTION - C

III. Answer **any five** questions of the following :

(5×7=35)

- 14) Determine the single-precision machine representation of the decimal number 52.234375 in both single precision and double precision.
- 15) Find the real root of the equation $f(x) = x^3 - 5x + 1 = 0$ between (0, 1) using bisection method perform in five stages.

- 16) Using Lagrange's interpolation formula find $f(6)$ from the following data :

x	3	7	9	10
f(x)	168	120	72	63

- 17) Evaluate $\int_0^1 \frac{dx}{1+x}$ using trapezoidal rule by taking $h = \frac{1}{6}$.
- 18) Solve by Gauss elimination method.
 $2x + y + z = 10$, $3x + 2y + 3z = 18$, $x + 4y + 9z = 16$.
- 19) Solve $\frac{dy}{dx} = x + y$ with initial condition $y = 1$ when $x = 0$ when $x = 0.2$ using Runge Kutta fourth order.
- 20) a) A company owned by Shree group produces two products P and Q. Each P requires 4 hours of grinding and 2 hours of polishing and each Q requires 2 hours of grinding and 5 hours of polishing. The total available hours for grinding is Rs. 20 and for polishing is Rs. 24. Profit per unit of P is Rs. 6 and that of Q is Rs. 8. Formulate the LPP. 3
- b) Solve using graphical method.
 Min $Z = 3x + 2y$ subject to the constraints,
 $5x + y \geq 10$, $2x + 2y \geq 12$ and $x + 4y \geq 12$, where $x, y \geq 0$. 4
- 21) Solve by simplex method
 Max $z = x_1 - x_2 + 3x_3$ subject to
 $x_1 + x_2 + x_3 \leq 10$, $2x_1 - x_3 \leq 2$, $2x_1 - 2x_2 + 3x_3 \leq 0$,
 Where $x_1, x_2, x_3 \geq 0$. 7



SECTION - D

IV. Answer any one of the following :

(1x10=10)

22) a) Write the dual of the following LPP :

Max $Z = 2x_1 + 2x_2$ subject to

$4x_1 + 5x_2$

$7x_1 + 8x_2 \leq 9$

$10x_1 + 11x_2 \leq 12, x_1, x_2 \geq 0.$

5

b) Find a real root of the equation $x^3 - 2x - 5 = 0$ in (2, 3) using secant method. Perform only 4 iterations.

5

23) a) Find $f(10)$ using Newton's divided difference formula.

5

x	4	7	9	12
f(x)	-43	83	327	1053

b) Use Taylor's series method to find y at $x = 1.1$ given that $\frac{dy}{dx} = x + y$ and $y(1) = 0$, upto terms containing third degree.

5

SECTION - B

x	1	2	3	4	5
f(x)	10	25	50	112	134