19U203S (Pages: 2) Name:……..……..

Reg. No……...……

SECOND SEMESTER B.C.A DEGREE EXAMINATION, APRIL 2020

(CUCBCSS - UG)

CC15U BCA2 C04 – NUMERICAL METHODS IN C

(Complementary Course)

(2015, 2016 Admissions - Supplementary)

Time: Three Hours Maximum: 80 Marks

Part A

Answer ***all*** questions. Each question carries 1 mark.

1. Define Shift operator E.
2. Define Newton's Forward difference interpolation formula.
3. Express the Central difference operator δ in terms of shift operator E.
4. Write the Gauss Quadrature formula.
5. What is the formula to find $\int_a^b f(x)dx$ using simpson's $\frac{1}{3}$ rule?
6. The numbers in the computer word can be stored in two forms. Which are they?
7. Define algebraic equation, give an example.
8. Bisection method is based on the repeated application of the ……. Theorem.
9. Write the Newton Raphson formula.
10. Express the following equations in matrix form

$$3x + 5y + 2z = 3, \quad 2x - 2y + 8z = 6, \quad 3x + y + z = 6$$

(10 x 1 = 10 Marks)

Part B

Answer ***all*** questions. Each question carries 2 marks.

11. Write the second order Runge-Kutta formula.
12. Evaluate $(\Delta - \nabla)x^2$ taking interval of difference as 'h'
13. Solve $x^3 - x - 1 = 0$ for the root between $x = 1$ and $x = 2$, by using bisection method.
14. Solve $2x + 3y = 8,\ x - 2y + 3 = 0$ using Cramer's rule.
15. Using Regula- falsi method, find a real root of the equation, $x^{2.2} = 69$, between 5 and 8. Write three steps.

(5 x 2 = 10 Marks)

Part C

Answer any ***five*** questions. Each question carries 4 marks.

16. Construct Newton's forward difference interpolating polynomial for the following data,

x :	0.1	0.2	0.3	0.4	0.5
y :	1.40	1.56	1.76	2.00	2.28

17. Prove that

a) $\delta = 2\sinh(\frac{hD}{2})$ b) $\mu = \cosh(\frac{hD}{2})$

18. Evaluate $\int_1^2 \frac{dx}{x}$ using Trapizoidal rule, taking h = 0.25

19. Given the following table

x :	1	2	3	4	5
log x :	0	0.6931	1.0986	1.3862	1.6094

Evaluate $\int_1^5 logx\ dx$ using Simpson's $\frac{1}{3}$ rule

20. Solve the equations $x + 2y + z = 3,\ 2x + 3y + 3z = 10,\ 3x - y + 2z = 13$ by Gauss elimination method.

21. Find a positive root of the equation $xe^x = 1$, which lies between 0 and 1.

22. Find the LU factorization of the matrix $\begin{bmatrix} 3 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & 2 & 2 \end{bmatrix}$

23. Using Gauss-Jordan method find the inverse of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 4 & 3 & -1 \\ 3 & 5 & 3 \end{bmatrix}$

(5 x 4 = 20 Marks)

Part D

Answer any ***five*** questions. Each question carries 8 marks.

24. Write the algorithm of method of False position and using it, find a real root of the equation, $f(x) = x^3 + x - 1 = 0$ near $x = 1$.

25. Apply Cramer's rule to solve the equations

$$x + 2y - z = 2, \qquad 3x + 6y + z = 3, \quad 3x + 3y + 2z = 3.$$

26. Set up a Newton iteration for computing the square root of a given positive number. Using the same find the square root of 2 exact to six decimal places.

27. Use Runge-Kutta method of the fourth order, solve the differential equation $\frac{dy}{dx} = x + y$, $y(0) = 1$, for the range $0 \le x \le 0.3$ taking h = 0.1

28. Solve $\frac{dy}{dx} = x - y^2$ using Taylor series given $y(0) = 1$. Also find y(0.1) correct into four decimal places.

29. Find y at x = 21 and x = 28 given that

x :	20	23	26	29
y :	0.3420	0.3907	0.4384	0.4848

30. Using Modified Euler method obtain the solution of the differential equation $\frac{dy}{dx} = 1 - y$, $y(0) = 0$ for the range $0 \le x \le 0.2$ by taking $h = 0.1$

31. Find y'(x) given

x :	0	1	2	3	4
y(x) :	1	1	15	40	85

(5 x 8 = 40 Marks)

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