83010 (Pages : 3) Name..... 44

Reg. No.....

SECOND SEMESTER B.C.A. DEGREE EXAMINATION, MAY 2015

(CUCBCSS—UG)

Complementary Course

BCA 2C04—NUMERICAL METHODS IN 'C'

Time : Three Hours Maximum : 80 Marks

Part A

Answer all **ten** *questions.*

1. Add the normalized floating points 0.6756 E4 and 0.7644 E6.
2. Define the percentage error.
3. Find the second approximation of a real root of the equation $x^3 - x - 1 = 0$ using bisection method.
4. Write the Newton-Raphson formula.
5. Give an example of a matrix which is both upper and lower triangular.
6. Write the following system of equations in matrix form.

   $2x + 4y + z = 3, 3x + 2y - 2z = 2, x - y + z = 6.$

7. Find the eigen values of the matrix $\begin{bmatrix} 2 & 2 \\ 1 & 3 \end{bmatrix}$.
8. Find $\nabla\left(e^{3x}\right)$.
9. Express the shift operator E in terms of the differential operator D.
10. Write the Gauss Quadrature formula.

(10 × 1 = 10 marks)

Part B

Answer all **five** *questions.*

11. Find the relative error and percentage error if 0.005998 is rounded-off to 3 decimal digits.
12. Find the second approximation to the 4^{th} root of 32 using Regula-falsi method.
13. Solve $2x + 3y = 8, x - 2y + 3 = 0$ using cramer's rule

Turn over

14. Evaluate $(\Delta - \nabla)\, x^2$ taking interval of differencing as h.

15. Write the fourth order Runge-Kutta formula. (5 × 2 = 10 marks)

Part C

Answer any **five** *questions.*

16. Using Regula-falsi method compute the real root of $xe^x = 2$ correct to 3 decimal places.

17. Use Newton's method to find a root of the equation $x^3 - 3x - 5 = 0$ correct to 3 decimal places.

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

19. Solve by Gauss elimination method

$x + 2y + z = 3,\ 2x + 3y + 3z = 10,\ 3x - y + 2z = 13.$

20. Find the area of a circle of diameter 82 units using Newton's forward interpolation formula Giv the following table.

Diameter (d) :	80	85	90	95	100
Area (A) :	5026	5674	6362	7088	7854

21. Find the Lagrange's interpolating polynomial for the following function $f(x)$

x :	0	1	2	5
$f(x)$:	2	5	7	8

22. Prove that

(a) $\Delta^4 y_0 = y_4 - 4y_3 + 6y_2 - 4y_1 + y_0$.

(b) $\left(E^{1/2} + E^{-1/2}\right)(1 + \Delta)^{1/2} = 2 + \Delta$.

23. Given the following table

x :	0	1	2	3	4
e^x :	1	2.72	7.39	20.09	54.60

Evaluate $\int_0^4 e^x\, dx$ using simpson's $\frac{1}{3}$ rule.

(5 × 4 = 20

Part D

45

Answer any **five** *questions.*

24. Find the real root of $x^4 - x = 10$, correct to 3 decimal places by Newton-Raphson method,

25. Estimate the production for the year 1964 and 1966 from the following table

year	:	1961	1962	1963	1965	1967
Production	:	200	220	260	350	430

26. Find the Lu factorization of the matrix

$$\begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 2 & 1 & 3 \end{bmatrix}.$$

27. Find the value of y when $x = 5$. Given that

x	:	1	3	4	8	10
y	:	8	15	19	32	40

28. Using Gauss-Jordan method find the inverse of the matrix

$$\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}.$$

29. Find $f'(1.1)$ from the fllowing table

x	:	1.0	1.2	1.4	1.6	1.8	2.0
$f(x)$	:	0	0.128	0.544	1.296	2.432	4.000

30. Use modified Euler's method to determine $y(0.2)$ is two steps from $\frac{dy}{dx} = x^2 + y, y(0) = 1$.

31. Calculate $\int_2^{10} \frac{dx}{1+x}$ by dividing $[2, 10]$ in to 8 equal parts upto 4 decimal places using

(a) Trapezoidal rule ; (b) Simpson's rule.

(5 × 8 = 40 marks)