15U214 (Pages: 2) Name : ……………………….

Reg. No. : ..…………………

SECOND SEMESTER B.C.A DEGREE EXAMINATION JUNE 2016

(CUCBCSS – UG)
(COMPLEMENTARY COURSE)

CC15U BCA2 C04 – NUMERICAL METHODS IN C

(2015 Admission)

Time : Three hours   Maximum : 80 Marks

Part A

Answer all questions.

1. Define floating point number. Give example.
2. What is a 1) multiple root, 2)simple root of $f(x) = 0$.
3. What is a singular matrix? Check whether $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ is singular
4. Find the Eigen values of the matrix $\begin{bmatrix} 5 & 0 \\ 1 & 7 \end{bmatrix}$.
5. What is a symmetric matrix. Give example.
6. What is an interpolating polynomial.
7. Write the Linear Lagrange interpolation formula.
8. If $f(x) = e^{ax}$, show that $\Delta^n f(x) = (e^{ah} - 1)^n e^{ax}$.
9. Define the Simpson's rule of numerical integration.
10. What is an ordinary differential equation . Give example.   **(10x1=10 marks)**

Part B

Answer all five questions.

11. Find the smaller root of the equation $x^2 - 400x + 1 = 0$
12. Obtain the smallest positive root of $x^3 - 5x + 1 = 0$ in 3 steps using bisection method.
13. Find the inverse of $\begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$.
14. Given $f(2) = 4, f(2.5) = 5.5$ find the linear interpolating polynomial using Newton's divided difference interpolation.
15. Find the characteristic equation of $A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 1 \\ 2 & 5 & 6 \end{bmatrix}$.   **(5x2=10 marks)**

Part C

Answer any five questions.

16. Apply Newton Raphson's method to determine a root of $f(x) = \cos x - xe^x$.

17. Solve $\begin{bmatrix} 2 & 2 & 1 \\ 4 & 2 & 3 \\ 1 & 1 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ using Gauss elimination method.

18. Show that $\delta = \nabla(1 - \nabla)^{-1/2}$.

19. Using the Lagrange interpolation method find $f(5)$.

x	-1	1	4	7
$f(x)$	-2	0	63	342

20. Explain Hermite interpolation.

21. Evaluate $\int_0^1 (1 + \frac{\sin x}{x}) dx$ using trapezoidal rule.

22. Determine the first three non-zero terms in the Taylor series for $u(t)$ and hence find $u(1)$, where $u' = t^2 + u^2$, $u(0) = 0$.

23. Construct difference table for the sequence of values $f(x) = (0,0,0,\varepsilon,0,0,0)$ where ε is an error.

(5x4=20 marks)

Part D

Answer any five questions

24. Solve $x + 2y - z = 2, 3x + 6y + z = 1, 3x + 3y + 2z = 3$ using Cramer's rule.

25. Explain the direct method to solve the system of equations $AX = B$.

26. Find the inverse of the matrix $\begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ using Gauss – Jordan method.

27. Solve $4x + y + z = 4, x + 4y - 2z = 4, 3x + 2y - 4z = 6$ Using LU decomposition method.

28. Using Simpson's three eight rule evaluate $\int_0^1 \frac{1}{1+x} dx$.

29. Obtain the least square polynomial approximation of degree one and two for $f(x) = \sqrt{x}$ on $[0,1]$.

30. Use Euler method to solve numerically the initial value problem $u' = 2tu^2$, $u(0) = 1$ with $h = .2$.

31. Find numerical solution at $x = .8$ for $u' = \sqrt{t + u}$, $u(.4) = .41$ with $h = .2$ using the fourth order classical Runge-Kutta method.

(5x8=40 marks)

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