C 62735 **(Pages : 3)** **Name..................................**

Reg. No.........................

SECOND SEMESTER B.C.A. DEGREE EXAMINATION, MAY 2014

(U.G.–CCSS)

Complementary Course

CA 2C 04—NUMERICAL METHODS IN C

Time : Three Hours Maximum : 30 Weightage

Part A (Objective Type Questions)

Answer all **twelve** *questions.*

1. The numbers in the computer word can be stored in two forms. Which are they ?
2. Define the inherent error.
3. When we can say that is a root of the equation $f(x) = 0$.
4. Define the central difference operator 5 .
5. Write Newton's forward difference approximation of 0 (h^2).
6. What is the formula to find $\int_a f(x)\,dx$ using Simpson's rule ?

Fill in the blanks :

7. To avoid the difficulty of keeping every number less than 1 in magnitude during computation, most computers use ______ representation for a real number.
8. Bisection method is based on the repeated application of the ______ ~~theorem.~~
9. In Gauss-Jordan elimination method the coefficient matrix is reduced to a ______ matrix.
10. If there are n + 1 distinct points a $x_0 < x_1 < x_2 <$ $< x_n$ b, then the problem of Lagrange and Newton interpolation for the continuous function $f(x)$ on [a, b] *is* to obtain $p(x)$ satisfying the conditions ______
11. The Hermite interpolating polynomial interpolates not only the function $f(x)$ but also its ______ at a given set of tabular points.
12. The general problem of numerical integration is to find an approximate value of the integral I = ______ where $w(x) > 0$ in [a, b] •

(12 x $^1/_4$ = 3 weightage)

Turn over

Part B (Short Answer Questions)

Answer all **nine** *questions.*

13. Find the decimal number corresponding to the binary number $(111 \cdot 011)_2$.

14. Construct the difference table for the sequence of values $f(x) = (0, 0, 0, \varepsilon, 0, 0, 0)$.

15. Solve the equations $x + y = 2$ and $2x + 3y = 5$ by Gauss-Jordan method.

16. State intermediate value theorem.

17. Evaluate $\int_0^4 e^x dx$ by Simpson's '1/3' rule using the data $e = 2.72$, $e^2 = 7.39$, $e^3 = 20.09$ and $e^4 = 54.60$.

18. Perform 2 iterations of the bisection method to obtain a real root of the equation $x^3 - x - 11 = 0$.

19. Solve $\frac{dy}{dx} = 1 - y, y(0) = 0$ using Euler's method. Find y at $x = 0.1$.

20. Find the n^{th} difference of e^x.

21. Show that $\mu = \left[1 + \delta^2 / 4\right]^{1/2}$.

(9 x 1 = 9 weightage)

Part C (Short Essay Questions)

Answer any **five** *questions.*

22. Apply Cramer's rule to solve the equations, $3x + y + 2z = 3$, $2x - 3y - z = 3$ and $x + 2y + z = 4$.

23. Solve the following system of equations using Gaussian elimination method $x + y + z = 9$, $2x - 3y + 4z = 13$ and $3x + 4y + 5z = 40$.

24. Construct Newton's forward interpolation polynomial for the following data :

x :	4	6	8	10
y :	1	3	8	16

25. Evaluate $\int_0^{10} \frac{dx}{1 + x^2}$ by using Trapezoidal rule.

26. Using Taylor's method, find y (0.1) from $\frac{dy}{dx} + 2xy = 1$, $y_o = 0$.

27. Evaluate $\sqrt{12}$ to four places of decimals by Newton-Raphson method.

28. The equation $8x^3 - 12x^2 - 2x + 3 = 0$ has 3 real roots in the interval [-2, 3]. Find the intervals each of unit length containing each one of these roots.

(5 x 2 = 10 weightage)

Part D (Essay Questions)

Answer any **two** *questions.*

29. (a) Write the Lagrange's interpolation formula.

(b) Use Lagrange's formula to find the value of y at $x = 6$ from the following data :

x :	3	7	9	10
	168	120	72	63

30. (a) Find $y'(x)$ *given* :

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

(b) The population of a certain town is shown in the following table :

Year x	: 1931	1941	1951	1961	1971
Population in 1961 y	: 40.62	60.80	79.95	103.56	132.65

31. (a) What is the relation between Runge-Kutta method and modified Euler's method.

(b) Use Runge-Kutta method of the fourth order to find y (0.1) given that :

$\frac{dy}{dx} = \frac{1}{x+y}, y(0) = 1$.

(2 x 4 = 8 weightage)