41850 (Pags s : Name._ ....

Reg. No.....

SECOND SEMESTER B.C.A. DEGREE EXAMINATION, APRIL/MAY 2013

(CCSS)

CA 2C 04—NUMERICAL METHODS IN C

rime : Three Hour Maximum : 30 Weightage

I. Answer all twelve questions :

1 When we say that is a root of the equation. $f(x) = 0$.

2 Give the Newton-Raphson iteration formula.

3 Let f be the polynomial $a_0 x'' + \ldots + a_{n-1} x + a_0$ of degree n. Find nth difference of $f(x)$.

4 In the process of Numerical integration, what is the order of the error in the trapezoidal rule ?

Fill in :he blanks :

5 The method of obtaining the solution of the system of equations AX = B by reducing the matrix A to a diagonal matrix is _____

(a) Gauss elimination method.

(b) Gauss-Jordan elimination method.

(c) Triangularisation method.

6 The process of computing the derivative $\frac{dy}{}$ for some particular value of is called

(a.) Interpolation. (b) Numerical differentiation.

(c) Numerical integration. (d) Extrapolation.

7 In the method of false position to find the root of $f(x) = 0$ between a and b, the first approximation is given by

(0) $x1 = \frac{a + b}{2}$ (b) $\frac{a f(b) - b f(a)}{f(b) - f(a)}$

(c) $\frac{a f(a) + b f(a)}{f(b) + f(a)}$ (d) $\frac{a f(a) - b f(b)}{f(a) \quad (b)} = x_1$

Turn over

8 ——— interpolation formula is used to interpolate the values of y near the end of the set of tabulated values.

(a) Newton's forward interpolation formula.

(b) Newton's backward interpolation formula.

(c) Gauss forward interpolation formula.

9 Fir $\Delta(2^x)$

(a) $2r+h$

(b) $2^x(2^h -$.

$2x\ 2x-h$

(d) $2'+h-2^{\cdot h}$.

10 Which method is based on the repeated application of the intermediate value theorem ?

(a) Iteration method.

(b) Bisection method.

(c) False position method.

(d) Second method.

11 WI. at is the base of the hexadecimal system ?

(a) 8.

(b) 10.

(c) 2.

(d) 16.

12 What is the relation between the average operator and the shift operator ?

(a) $\mu \quad E^{1/2} +$ 2

(b) $\mu = \frac{E^{1/2} - E^{-1/2}}{2}$

(c) $E = \frac{\mu^{1/2} + \mu^{-1/2}}{2}$.

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II. Short answer type questions. Answer all *nine* questions :— (12 1/4 3 weightage)

13 the first approximation of the root lying between 0 and 1 of the, equation $x^3 + 3x - 1 = 0$

14 Solve the following equations by Gauss Jordan method $x\ y\ 2,\ 2x$

15. Evaluate $(\Delta - V)x^2$ taking the interval of differencing as *h*.

26 Using Euler's method, solve $\frac{dy}{dx} = x + xy$ with y (0) = 2. Find y (0.1) and y (0.2).

27 Obtain. the least squares polynomial approximation of degree one for f (x) $= x^{1/2}$ in 10, 11.

28 .Find the value of x correct to one decimal place for which y = 7. Using Lagrange's inverse interpolation formula. Given

y	1	3	4
	4	12	19

(5 x 2 = 10 weightage)

IV. Essay type questions. Answer. any *two.*

29 Using Runge-Kutta method of fourth order, find y (0. 2) given that $\frac{dy}{dx} = x + xy$, y (0.1) = 2.1083.

30 Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ by using

(i) Trapezoidal rule. (2) Simpson's one third rule.

31 Solve the following system by the method of triangularisation :

2x – + 10z = 3, -x + 4y + 2z = 20.

(2 x 4 = 8 weightage)

16 Find a cubic polynomial which takes the following values using Newton's forward interpolation formula

	0	1	2	3
$f(x)$	1	2	1	10

17 Show that $y_n = 1 + \frac{c}{n}$ is a solution of the difference equation

$(n \quad (y_{n+1}) + n = 2n - 3.$

18 Find the n^{th} difference of e^{ax}.

19 Using Simpson's rule, find $\int_0^4 e^x \, dx$ given $e^0 = 1$, $e^1 = 2.72$, $e^2 = 7.39$, $e^3 = 20.09$ and $e^4 = 54.6$

20 Find $y(0.1)$ by Euler's method. Given that $\frac{dy}{dx} = y$, $y(0) = 1$

21 If $I_1 = 0.775, I_2 = 0.7828$, find I using Romberg's method.

(9 x 1 = 9 weightage)

III. Short essay question. Answer any *five* :

22 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.

23 Find the value of y from the following data at $x = 2.65$.

-1	0	1	2	3
-21	6	15	12	3

24 Solve the following system of equations by Gauss-Jordan method

$x + y + z = 9$
$2x - 3y + 4z = 13$
$3x + 4y + 5z = 40$

25 Using Taylor's series method, find y at $x = 1.1$ by solving $\frac{dy}{dx} = x^2 + y^2$ given $y(1) = 2.3$