2014

(Second Semester)

MASTER OF COMPUTER APPLICATIONS

Paper No: MCA 205

(Numerical Analysis)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer question **No. 1** and **any four** from the rest:

1. Answer the following questions briefly: **2x6 = 12**

a) Differentiate between B tree and B+ tree.

b) Prove that $\Delta = E - 1$ for finite difference.

c) Write the Predictor-Corrector formula for Adams-bashforth method.

d) Differentiate between Breadth First Search and Depth First Search of a graph.

e) Give the format for synthetic division in Lin-Bairstow's Method.

f) Write Lagrange's interpolation formula for unequal intervals.

2. a) The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth surface:

x = height :	100	150	200	250	300	350	400
y = distance :	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the value of the y when i) x = 218 ft.

ii) x = 410 ft. **3+3=6**

b) Using Lagrange's formula , evaluate f(12) for the following values: **6**

X	5	7	11	13	17
Y=f(X)	150	392	1452	2366	5202

3. a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Weddle's rule by taking h = 1/6. **6**

b) Using modified Euler's Method , find an approximate value of y when x = 0.3, if $y' = x + y$ and y = 1 when x = 0.6 **6**

4. a) Apply Gauss Elimination Method to solve the equations: **6**

$$x + 4y - z = -5$$
$$x + y - 6z = -12$$
$$3x - y - z = 4$$

b) Apply Gauss Seidel Iteration Method to solve the following equations: 6

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

5. a) Solve the following by Runge-Kutta method : 6

$\frac{dy}{dx} = \log(x+y)$, with initial value of y(0) = 2 at x=1.2 with h = 0.2

b) Using Newton – Raphson method , find the positive roots of $x^4 - x = 10$ correct upto three decimal places. 6

6. a) Apply Graeffe's method to find all roots of the equation $x^4 - 3x + 1 = 0$ 6

b) Solve $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$, given that all the roots of f(x)= 0 are complex by using Lin-Bairstow Method . 6

7. a) Construct AVL (Height Balanced Tree) from the following Nodes: 6

50, 40, 35, 58, 48, 42, 60, 30, 33, 25

b) Explain Dijkstra's shortest path algorithm with an example 6

8. a) Using Modified Euler's Method , solve for y at x = 0.1 from $\frac{dy}{dx} = x + y + xy$ with initial condition of y(0) = 1 , taking step size of h = 0.025 **6**

b) Using Runge's Method , solve $\frac{dy}{dx} = x + y^2$ for x = 0.1 if y(0)= 1 **6**

**********II/MCA/205**********