MCA22

USN	1	M	S							

M S RAMAIAH INSTITUTE OF TECHNOLOGY
(AUTONOMOUS INSTITUTE, AFFILIATED TO VTU)
BANGALORE – 560 054
SUPPLEMENTARY SEMESTER EXAMINATIONS – AUGUST 2011

Course & Branch: Master of Computer Applications   **Semester: II**

Subject: Computer Oriented Numerical Methods   **Max. Marks: 100**

Subject Code: MCA22   **Duration: 3 Hrs**

Instruction to the Candidates:
- Answer one full question from each unit.

UNIT – I

1. a) Write an algorithm for generating Fibonnacci sequence. (06)
   b) Explain the following terms with examples: (06)
         i) Integer arithmetic   ii) Floating point arithmetic
         iii) Errors in numbers
   c) Perform the following: (4x2=8)
         i) Convert 17.375_{10} to binary
         ii) Convert 001001111010.1010010_{2} to decimal
         iii) Convert 110100101010.1100 to hexadecimal
         iv) Convert 456_{8} to binary

2. a) With an example, illustrate the non associativity property of arithmetic with floating point number. (06)
   b) Illustrate with examples the arithmetic operations with normalized floating point numbers. (06)
   c) Perform the following: (08)
         i) Convert 0.7_{10} to binary
         ii) Convert 1101001.1110011 to octal
         iii) Convert 110101111111 to hexadecimal
         iv) Convert 643_{8} to binary

UNIT – II

3. a) Explain Bisection method. Perform five iterations of Bisection method to obtain smallest positive root of the equation $f(x) = x^3 - 5x + 1$ in the interval (0, 1). (10)
   b) Explain Newton-Raphson method and secant method with graphical representation. Mention advantages and disadvantages of both the methods. (10)

4. a) Give an algorithmic description of solving an algebraic equation $f(x) = 0$ in (a,b) using method of false position. (10)
   b) Using Secant method, find the smallest positive root of the following equation $f(x) = x^3 - 3x^2 + x + 1 = 0$ (10)

UNIT – III

5. a) Explain the process of pivoting. Solve the equations using Gauss-elimination method (10)

$$x_1 + x_2 + x_3 = 6$$
$$3x_1 + 3x_2 + 4x_3 = 20$$
$$2x_1 + x_2 + 3x_3 = 13$$

b) Solve the equations using Gauss-seidal method with initial approximation (10)
$x^0 = 0$. Perform two iterations

$2x_1 - x_2 + 0x_3 = 7$

$-x_1 + 2x_2 - x_3 = 1$

$0x_1 - x_2 + 2x_3 = 1$

6. a) Explain illconditioned system of equations with an example. (08)
b) Write an algorithm for pivotal condensation. (06)
c) Write an algorithm to solve a system of equation using Gauss-sedial method. (06)

UNIT – IV

7. a) Obtain a Taylor series approximation about x=1 up to second degree terms (06)
for the function $f(x) = \dfrac{1}{1+x^2}$

b) Using the data $\sin(0.1) = 0.09983$ and $\sin(0.2) = 0.19867$, find the (06)
approximate value of $\sin(0.15)$ by Lagranges interpolation.

c) Fit a straight line $y = a + bx$ to the following values given in the table (08)

x	1	2	4	5	6	8	9
y	2	5	7	10	12	15	19

8. a) For the following data calculate the differences and obtain forward and (10)
backward difference polynomial. Interpolate at $x = 0.25$ and $x = 0.35$

x	0.1	0.2	0.3	0.4	0.5
$f(x)$	1.40	1.56	1.76	2.00	2.28

b) The values of xi and $f(xi)$ are given below. Find the cubic splines for this (10)
table and find $f(x)$ at $x = 3.5$

x	1	2	3	4	5
$f(x)$	30	15	32	18	25

UNIT – V

9. a) Write an algorithm for Trapezoidal rule. (06)
b) Integrate $5x^3 - 3x^2 + 2x + 1$ from $x = -1$ to $x = 1$ using Simpson's rule with (06)
$h = 1$.

c) Solve the differential equation $\dfrac{dy}{dx} = -xy$, given that (08)

$y(0) = 1, y(0.05) = 0.999$ using predictor corrector method.

10. a) Write an algorithm to implement Rung-Kutta fourth order formula. Solve (12)
using Runge-Kutta fourth order the differential equation $\dfrac{dy}{dx} = x + y^2$ at

$x = 0.4$ given $y(0) = 0$ and $h = 0.2$.

b) Explain Euler's method. Solve the differential equation $\dfrac{dy}{dx} + xy = 0, y(0) = 1$ (08)
from $x = 0$ to $x = 0.25$ using Euler's method where $h = 0.05$.

****