02012

MCA (Revised)

Term-End Examination

June, 2011

MCSE-004 : NUMERICAL AND STATISTICAL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question No. 1 is **compulsory**. Attempt **any three** from the rest. Use of calculator is allowed.*

1. (a) Define Absolute Error, Relative Error and Percentage Error. Show that **3+5**

$$\frac{(a-b)}{c} \neq \frac{a}{c} - \frac{b}{c}, \text{ where :}$$

$a=0.41$, $b=0.36$ and $c=0.70$

(b) Find the real root of the equation $x^3-2x-5=0$ using Bisection Method. Upto four iterations only. **8**

(c) Solve by Jacobi's method the following system of linear equations. **8**

$2x_1-x_2+x_3=-1$

$x_1+2x_2-x_3=6$

$x_1-x_2+2x_3=-3$

Upto 3 - iterations only

(d) Write down the polynomial of lowest degree which satisfies the following set of numbers, using the forward difference polynomial. **8**

x	0	1	2	3	4	5	6	7
$f(x)$	0	7	26	63	124	125	342	511

(e) Evaluate **8**

$$I = \int_0^1 \frac{1}{1+x}\,dx,$$ correct to 3 decimal places

by

(i) Simpson's rule

$(h = 0.125)$

2. (a) Explain the cases where Newton's method fail. **4**

(b) Find a real root of the equation **8**

$f(x) = x^3 - x - 1 = 0$

Up to four iterations only.

(c) Use Gauss - Seidel Method to solve the equation : **8**

$x + y - z = 0$

$-x + 3y = 2$

$x - 2z = -3$

Initial solution vector is $[0.8\ 0.8\ 2.1]^T$.

Upto 3 - iterations only.

3. (a) The population of a town in the decennial census was as given below Estimate the population for the year 1895. **8**

Year : x	1891	1901	1911	1921	1931
Population : y (in Thousands)	46	66	81	93	101

(b) Evaluate $\int_1^6 [2 + \sin(2\sqrt{x})dx$ using simpson's rule with 5 points. **8**

(c) Explain Euler's Method for solving an ordinary differential equation. **4**

4. (a) Solve the initial value problem $\frac{dy}{dx} = 1 + y^2$ where $y=0$ when $x=0$ using Fourth order classical Runge-Kutta Method. Also find $y(0.2)$, $y(0.4)$ **10**

(b) Evaluate the integral $I = \int_1^2 \frac{2x\,dx}{1+x^4}$ using Gauss - Legendre 1 - point, 2 - point and 3 - point quadrature rules. Compare with the exact solution. **10**

5. (a) A box contains 6 red, 4 white and 5 black balls. A person draws 4 balls from the box at random. Find the probability that among the balls drawn there is at least one ball of each color. **8**

(b) Find the most likely price in Bombay corresponding to the price of Rs. 70 at Calcutta from the following **8**

	Calcutta	Bombay
Av. Price	65	67
Standard Deviation	2.5	3.5

Corelation Co - efficient between the prices of commodities in the two cities is 0.8.

(c) Ten coins are thrown simultaneously. Find the probability of getting at least seven heads. **4**