10184

MCA (Revised)

Term-End Examination

December, 2013

MCSE-004 : NUMERICAL AND STATISTICAL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question number **1** is **compulsory.** Attempt **any three** from the rest. use of calculator is **allowed.***

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1. (a) Verify the distributive property of floating point numbers i.e. prove : a(b-c) ≠ ab-ac a=.5555E1, b=.4545E1, c=.4535E1 Define : Truncation error, Absolute Error and Relative Error. **5+3**

(b) Find the real root of the equation $x=e^{-x}$ using Newton-Raphson Method. List the cases where Newton's Method fail. **4+4**

(c) Solve by Gauss-Seidel Method **8**

$$2x_1 - x_2 + x_3 = -1$$
$$x_1 + 2x_2 - x_3 = 6$$
$$x_1 - x_2 + 2x_3 = -3$$

Correct to 3 decimal places.

(d) Let $f(x) = \ln(1+x)$, $x_0=1$ and $x_1=1.1$ use linear interpolation to calculate an approximate value of f(1.04) and obtain a bound on the truncation error. **8**

(e) Conside initial value problem 8

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

Find $y(0.2)$ using Runge-Kutta Method of fourth order. Also compare it with exact solution $y=-(1+x)+2e^x$ to find the error.

2. (a) Find the interval in which the smallest positive root of the following equation lies using Bisection Method $x^3 - x - 4 = 0$. 8

(b) Solve the following linear system of equations using Gauss Elimination method. 8

$x_1 + x_2 + x_3 = 3$

$4x_1 + 3x_2 + 4x_3 = 8$

$9x_1 + 3x_2 + 4x_3 = 7$

(c) Give properties of polynomial equations. 4

3. (a) The table below gives the values of tan$x$ for $0.10 \le x \le 0.30$ 8

X	0.10	0.15	0.20	0.25	0.30
$y = \tan x$	0.1003	0.1511	0.2027	0.2553	0.3093

Find (i) tan0.12 (ii) tan0.26

(b) Evaluate 8

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

(i) T rapezoidal and

(ii) Simpson's rule with h = 0.5 and h = .25

(c) Determine the value of y when $x = 0.1$ given that $y(0) = 1$ and $y^1 = x^2 + y$ 4

4. (a) A problem in statistics is given to the three students A, B and C whose chances of solving it are $\frac{1}{2}, \frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved. **6**

(b) Calculate the correlation coefficiant for the following heights (in inches) of fathers (x) and their sons (y) : **8**

x : 65 66 67 67 68 69 70

y : 67 68 65 68 72 72 69

(c) Three identical bags have the following proportion of balls . **6**

First bag : 2 black 1 white

Second bag: 1 black 2 white

Third bag : 2 black 2 white

One of the bag is selected and one ball is drawn. It turns out to be white. What is the probability of drawing a white ball again. The first one not been returned ?

5. (a) Evaluate $\int_1^6 \left[2 + \sin(2\sqrt{x})\right] dx$ using Simpsons rule with 11 points. **10**

(b) Estimate the sale of a particular quantity for 1966 using the following table **10**

Year :	1931	1941	1951	1961	1971	1981
Sale in thousands :	12	15	20	27	39	52