MCA.II/05.14.0468

B

MCA DEGREE II SEMESTER EXAMINATION MAY 2014

CAS 2204 APPLIED NUMERICAL ANALYSIS

(Regular and Supplementary)

Time : 3 Hours | Maximum Marks : 50

PART A

(Answer ***ALL*** questions)

(15 x 2 = 30)

I. (a) Describe secant method and write its pseudocode.
(b) Explain the Newton's method and write its algorithm.
(c) Write the pseudocode of Horner's method.

II. (a) Find the characteristic polymial of the matrix
$$A = \begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix}$$
(b) Write an algorithm for row-reduction in Guasian elimination.
(c) What is a norm? What are the different properties of norm?

III. (a) Discuss Bezier curves.
(b) Describe the construction of a B.spline surface.
(c) Explain the method of least squares for fitting curves of the form $ax^2 + bx + c$

IV. (a) Explain Simpson's one-third rule.
(b) Explain Romberg method of integration.
(c) Explain the method of constructing Newton-Gregory polynomials from an evenly spaced data.

V. (a) What are the limitations of the cubic spline for getting higher derivatives?
(b) Explain Taylor-series method for solving the first order differential equation.
(c) What is meant by the term stiff differential equation? Give an example.

PART B

(All questions carry equal marks)

(5 x 4 = 20)

VI. Find the root of the equation $xe^x = \cos x$, using the secant method correct to four decimal places.

OR

VII. Find by Newton's method, the complex root of the equation $x^3 - x^2 - 1 = 0$

VIII. Apply Gauss-Jordan method to solve the equations
x+y+z=9
2x-3y+4z=13
3x+4y+5z=40

OR

(P.T.O.)

IX. Find the inverse of the matrix

$$A = \begin{bmatrix} 1 & -1 & 2 \\ 3 & 0 & 1 \\ 1 & 0 & 2 \end{bmatrix}$$

X. Fit a cubic through the first four points of the following table and use it to find the interpolated value for x=3.0

x	:	3.2	2.7	1.0	4.8	5.6
f(x)	:	22.0	17.8	14.2	38.3	51.7

OR

XI. Fit a parabola by the methods of least squares to the following data

X	:	0	1	2	3
Y	:	1	1	2	3

Predict Y at X = 4

XII. Integrate $f(x) = \frac{1}{x^2}$ over the interval $[0.2, 1]$ using Simpson's $\frac{1}{3}$ rule.

OR

XIII. Write an algorithm to obtain and estimate of the derivative from difference table.

XIV. For the differential equation,

$\frac{dy}{dt} = y - t^2, y(0) = 1$ starting values are known

$y(0.2) = 1.2186, y(0.4) = 1.4682$ & $y(0.6) = 1.7379$. Use the Milne method to advance the solution to t=1.2, carry four decimals.

OR

XV. Use Runge-kutta method to find $y(0.2)$ for the equation $\frac{d^2y}{dx^2} = \frac{xdy}{dx} - y$ given that $y(0) = 1, y'(0) = 0$.

***