2019

MCA

2nd Semester Examination

MCA (NUMERICAL METHODS)

PAPER – MCA-204

Full Marks : 100

Time : 2 hrs

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their Own words as far as practicable.

Illustrate the answers wherever necessary.

Answer any ***FIVE*** questions.

1. (a) Differentiate between absolute and percentage error with an example.

   (b) A polynomial passes through the points (1, -1) , (2, -1), (3,1) and (4, 5). Find the polynomial using Newton's forward inter polation formula. (7+7)

2. (a) Obtain the smallest positive root of $x^3 - 2x - 5 = 0$, correct upto two decimal place.

   (b) Obtain the positive root of the equations $x^2 - 1 = 0$ by regula falsi method.(5+9)

3. (a) Find Newtons Forward difference interpolating polynomial for the following data :

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

   (b) Solve the following linear system of equations :

$$x_1 + x_2 + x_3 = 3$$

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

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

   using the Gauss elimination method. 7+7

4. (a) Find the interpolating polynomial that fits the data :

x_x	0	1	2	5
f_x	2	3	12	147

   Using the lagrange interpolation formula .

(b) The value of y(5) using Euler's method to solve the ordinary differential equation $\frac{dy}{dx} + 2y = x^2$, y(1) = 5

with a step size of h = 2 most nearly is _____ ? 7+7

5. (a) Calculate the value of the integral

$\int_4^{5.2} \text{Log } x\,dx$ by

(i) Trapezoidal Rule

(ii) Simpson's y_3 Rule

(b) Solve the initial value problem

$U^1 = -2tu^2$ with U (0) = 1, h = 0.2

on the interval [0, 1]. Use the fourth order classical Runge – Kutta method (8+6)

6. (a) Solve the following system of equations by Jacobi method , determine the results for three approximations .

$3x + 4y + 15z = 54.8$

$X + 12y + 3z = 39.66$

$10x + y - 2z = 7.74$

(b) Solve the following system of equations by using Gauss–seidel iterations method , perform two iterations :

$8x - 3y + 2z = 20$

$6x + 3y + 12z = 35$

$4x + 11y - z = 33$ 7+7

7. (a) Use secast method to find the roots of the equation

$\mathbf{f(x) = 0.5e^x - 5x+2}$

(b) Taking 1.45 as a first approximation to a , apply the Newton Raphson procedure once to $f(x) = x^3 - 7/x+2$ to obtain a second approximation to a , giving your answer to 3 decimal places . 7+7

[Internal Assessment – 30]