

This question paper contains 1 printed pages

Your Roll No

6263

M. Sc. Computer Science / II Sem.

MCS – 206 – Numerical Computing

(Admissions of 2009 and onwards)

Time 2 hours

J
Maximum Marks .50

(Write your Roll No on the top immediately on receipt of this question paper)
Attempt all questions Use of Scientific Calculator and Statistical Tables allowed.

1 Derive the iterative formula(s) for solution of $f(z) = 0$ using Newton's method (7)

2 Approximate the following integral using Gaussian numerical integration for $n = 3$

$$\int_0^{\pi/2} \sin x e^{\sqrt{x}} dx$$

(use $x = \pm 0.7746$, $w = 0.5556$, $x = 0.0$, $w = 0.8889$) (6)

3 Find the first 3 iterations Δ for the root of the equation $x^3 + x^2 - 3x - 3$, using the Secant method Use 1.500 & 2.000 as initial points (5)

4 Find the solution to the following system of equations using iteration method

$$\begin{aligned} 6x - 2y + z &= 11 \\ x + 2y - 5z &= -1 \\ -2x + 7y + 2z &= 5 \end{aligned}$$

(8)

5 Approximate the following integral using Gaussian numerical integration for $n = 3$

$$\int_0^{\pi/2} \sin x e^{\sqrt{x}} dx \quad (\text{use } x = \pm 0.7746, \quad w = 0.5556, \quad x = 0.0, \quad w = 0.8889)$$

(5)

6. Find the linear least square approximation to $f(x) = e^x$ on $[0,2]$. Compare the error with linear Taylor polynomial about $x_0 = 1.0$ (6)

7 Solve the following differential equation using Predictor Corrector Euler's method

$$\frac{dy}{dx} = y^2 + x^2 \quad \text{given } y(1) = 0 \quad \text{for } x = 1.5 \quad \text{with } h = 0.25.$$

(6)

8 Use Galerkin's technique to approximate the solution of

$$\frac{d^2y}{dx^2} = 3x + 1, \quad y(0) = 0 \quad y(1) = 0$$

using a quadratic in x as the approximation function (7)