TEZPUR UNIVERSITY
Assignment Spring 2022
MMS 204 : Numerical Analysis
Total Marks: 30

The figures in the right-hand margin indicate marks for the individual question.
All questions are compulsory.
Answers should be concise and entire answer to a question should be together. State assumptions wherever made.

1. Solve the equation $x^2 - 40x + 1 = 0$, considering five digit decimal machine using the standard quadratic formula for the roots. Given $\sqrt{399} \doteq 19.975$, correctly rounded to five digits. Determine the relative errors in the computed roots. What were the relative errors for the data entering into the calculation? How many significant digits have been lost in the calculation? What is the reason for the loss? Suggest if possible remedial measures.   **3+1+2+1+2=9**

2. Determine the constants a, b, c and d such that the interpolating polynomial $y(x_0 + sh) = ay(x_0 - h) + by(x_0 + h) + h[cy'(x_0 - h) + dy'(x_0 + h)]$ becomes correct to the highest possible order. Find the error term. **5+2=7**

3. It is given that the polynomial equation $9x^4 + 12x^3 + 13x^2 + 12x + 4 = 0$ has a double root near -0.5. Perform three iterations to find this root using (i) Newton-Raphson method, (ii) modified Newton-Raphson method and (iii) Chebyshev method. Which of the three methods give fastest convergence?   **2+2+3+1=8**

4. Find the values of a, b, c such that the truncation error in the formula

$$\int_{-h}^{h} f(x)dx = h[af(-h) + bf(0) + af(h)] + h^2 c[f'(-h) - f'(h)]$$

is minimized.   **6**

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