

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

M.A./M.Sc. SECOND SEMESTER EXAMINATION, MAY 2023

FIRST YEAR [BATCH 2022-24]

MATHEMATICS

Paper : CC10

Date : 29/05/2023

Time : 11.00 am – 1:00 pm

Full Marks : 30

Answer all questions, Maximum one can score is 30.

1. How will you establish that the Hermite interpolation polynomial obtained for a given set of two data points is unique. (5)
2. Under which condition the fixed point iteration converges at least quadratically? Establish your claim. (1+3)
3. Perform one iteration using Graeffe's method and find the approximate roots of the equation: $x^3 - 6x^2 + 11x - 6 = 0$. (5)
4. Construct the sequence of Aitken's Δ^2 -process for accelerating convergence of $\{x_n\}_n \rightarrow x^*$. State the required condition on $\{x_n\}_n$ for its convergence. (3+1)
5. Compute the total operation count of Gauss Elimination method. (5)
6. Discuss the convergence of Jacobi method for finding eigenvalues of a symmetric matrix. (5)
7. Find the value for $k \in \mathbb{N}$ such that $|I_k| < \epsilon$, where I_k is the interval containing the root at k^{th} iteration in Bisection method and ϵ is a small positive number. (3)
8. Express the function $\frac{3x^2 + x + 1}{x^3 - 6x^2 + 11x - 6}$ as a sum of partial fractions, using Lagrange interpolation formula. (5)

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