

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. SIXTH SEMESTER EXAMINATION, MAY 2023

THIRD YEAR (BATCH 2020-23)

MATHEMATICS (HONOURS)

Paper : CC13

Date : 11/05/2023

Time : 11.00 am – 1.00 pm

Full Marks : 50

Answer ALL the questions, maximum you can obtain is 50. You may use non-programmable calculator.

1. Define and give examples. [5×3]
 - a) Round-off error.
 - b) Absolute error.
 - c) Relative error.
 - d) Percentage error.
 - e) Significant figure.
2. Discuss the drawbacks of Secant method. How is Regula-Falsi method better/ worse than the Secant Method? [3+2]
3. Prove or disprove the statement:-
Newton-Raphson method has a second order convergence. [5]
4. Describe and derive Newton's forward difference interpolating polynomial. What are the advantages and disadvantages of this method? [6+4]
5. Derive the condition for convergence of the Gauss-Seidal method. [5]
6.
 - a) Consider the initial value problem $y' = -2y$ with the initial condition $y(0)=1$. Using Euler's method with step length = 0.02, obtain approximate solution for the above problem in the interval $[0,0.06]$ [5]
 - b) Compute $y(0.02)$ using modified Euler method for the above problem correct upto 3 decimal places. [5]
7. Solve the following system using Gauss Elimination method.
 $3.120 \times 10^{-4} x_1 + 6.032 \times 10^{-3} x_2 = 0.003328$
 $5.000 \times 10^{-1} x_1 + 8.942 \times 10^{-1} x_2 = 0.9471$ [6]
8. Approximate the integral $\int_0^1 \sin x \, dx$ using Simpson's $\frac{1}{3}$ rule. [4]

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