RAN-2603000506043001

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T. Y. B. Sc. (Sem.-VI) Examination March - 2026

Minor - Numerical Methods - II Theory (Paper - MH-ME-601)

Time: 1 Hour] **[Total Marks: 25**

સૂચના : / Instructions

(1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book
(2) All questions are compulsory.
(3) Figures to the right indicate full marks of the question.
(4) Follow usual notations.

Seat No.:

Student's Signature

Q.1 Answer any five from the followings. 5

1. Which interpolation formulas are specifically designed to handle data sets where the independent variable (x) is not equally spaced.
2. State the formula for finding first order derivative at the point $x = x_n$.
3. True or False: Euler's method is a self-starting method.
4. Write the Trapezoidal Rule formula for a single interval $[x_0, x_1]$.
5. Write the formula of Simpson's 1/3 rule for numrical itegration.
6. If $f(x) = \frac{1}{x}$, what is the value of the divided difference $[a, b]$?

Q.2 Answer any two from the followings. 10

1. Derive Newtons Divided Difference Formula.
2. Resolve $\frac{x+5}{(x-1)(x-2)(x-4)}$ into partial fractions using the interpolation approach.
3. Given the data points $(0, -12), (1, 0), (3, 6), (4, 12)$, find the value of y at $x = 2$ using the Lagrange interpolation formula.

Q.3 Answer any two from the followings. 10

1. Evaluate $\int_0^1 \frac{dx}{1+x}$ by using Simpsons 1/3 rule and Simpsons 3/8 rule with $h = 0.125$. Compare both results.
2. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using the Trapezoidal rule with $h = 0.2$.
3. Use Picard's method to approximate the value of y at $x = 0.1$ given that $y = 1$ when $x = 0$ and $\frac{dy}{dx} = \frac{y-x}{y+x}$.
