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S. Y. B. Sc. (Sem.-IV) (NEP-NCF) Examination September - 2025

Mathematics (Paper-VIII : Theory)

MH-MJ1-401- Numerical Methods-II

Time: 2 Hours] **[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) Write the formula of Simpson's 3/8 rule for numrical itegration.
2) Write the formula of Trapezoidal rule for numrical itegration.
3) State the formula for finding first order derivative at the point $x = x_0$
4) Define initial value problem.
5) State the formula for finding second order derivative at the point $x = x_0$
6) Write Newton's Divided Difference Interpolation formula.

Q.2. Answer any two from the followings. **[10]**

1) Use Newton's Divided Difference Interpolation formula to find y_2 from the data $y_1 = -3, y_3 = 9, y_4 = 30, y_6 = 132$.
2) Derive the formula to find the first order differentiation at the point $x = x_n$.
3) Derive Lagrange's Interpolation formula.

Q.3. Answer any two from the followings. **[10]**

1) Derive the Simpson's 1/3 rule for numrical itegration.
2) Explain Euler's method for solving a differential equation of first order $\frac{dy}{dx} = f(x, y)$, given $y(x_0) = y_0$.
3) Use Picard's method to find y (0.l) from $\frac{dy}{dx} = x + y$; $y(0) = 1$.