


RAN-2403000503063001
S.Y.B.Sc. (NEP) (Sem. - III) Examination November - 2025
MH-SEC-301- Mathematical Methods
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 marks of the questions.
- (4) Follow usual notations and conventions.

Seat No.:

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Student's Signature

Q.1. Answer any FIVE from the following questions.
[5]

- (1) Write the order and degree of the difference equation
 $f^4(x+1)f(x) - f^3(x) - 9f^4(x+2) - 11f(x) - 4f(x+1) = f^3(x)$
- (2) Prove that $\nabla \equiv 1 - E^{-1}$.
- (3) If $y = 3x + 5$, find the difference equation.
- (4) Prove that $x^{(-2)} = \frac{1}{(x+1)(x+2)}$
- (5) Evaluate: $\Delta^{10} \{(1-ax)(1-bx^2)(1-cx^3)(1-dx^4)\}$.
- (6) Find the value of $\Delta \{2x^{(3)} - 3x^{(2)} + 3x^{(1)} - 10\}$.

Q.2. Attempt any TWO.
[10]

- (1) Prove the following:
 (i) $\Delta \log f(x) = \log \left(1 + \frac{\Delta f(x)}{f(x)} \right)$, (ii) $E \equiv e^{hD}$.
- (2) Express the polynomial $2x^3 - x^2 + 3x - 4$ in factorial notation.
- (3) Form a forward difference table for the function $f(x) = x^3 - 2x^2 - 3x - 1$ for $x = 0, 1, 2, 3, 4$. Hence show that $\Delta^4 f(x) = 0$.

Q.3. Attempt any TWO.
[10]

- (1) Find the Linearly independent solution of the difference equation
 $y_{k+2} - 6y_{k+1} + 8y_k = 0$ where $y_0 = 0$ and $y_1 = 1$ and write general solution.
- (2) Show that $y_x = C_1 + C_2 6^x$ is a solution of $y_{x+2} - 7y_{x+1} + 6y_x = 0$.
- (3) Find the general solution of $2y_{k+2} - 13y_{k+1} - 7y_k = 9$ where $y_0 = 0$ and $y_1 = 1$.