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S.Y. B. Sc. (NEP) (Sem.-III) Examination March - 2026

Mathematical Methods (MH-SEC-301)

[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.:

Student's Signature

Q.1. Answer any FIVE from the following questions. **05**

1. Prove that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$.
2. Write the order and degree of difference equation
$f^3(x).f^4(x+1) - 2f(x).f(x+2) + 4f^2(x+3) = f(x)$.
3. Find $\Delta^3(logx)$.
4. Prove that $\Delta^2 = (1+\Delta)\delta^2$.
5. Prove that $x^{(-2)} = \frac{1}{(x+1)(x+2)}$
6. Find the value of $\Delta\{(\tan^{-1}x)\}$, where h = 1.

Q.2. Attempt any TWO. **10**

1. Prove that $y_1 + y_2 + y_3 + \cdots + y_n = \binom{n}{1}y_1 + \binom{n}{2}\Delta y_1 + \cdots + \Delta^{n-1}y_1$
2. Find the 6^{th} term of the series 8, 12, 19, ___, 29, 42, ___ by constructing a difference table.
3. Express the given polynomials in to fractional notation,
$f(x) = 3x^3 - 4x^2 + 3x - 11$ and hence find the fourth forward difference.

Q.3. Attempt any TWO. **10**

1. Find solution of difference equation $2Y_{k+2} + 13Y_{k+1} - 7Y_k = 0$, with $Y_0 = 0$ & $Y_1 = 1$.
2. Find the general solution of difference equation $Y_{k+2} - 6Y_{k+1} + 8Y_k = 0$, also check the solution is LI or not.
3. Show that $y_x = C_1 + C_2 2^x - x$ is a solution of $y_{x+2} - 3y_{x+1} + 2y_x = 1$ and find particular solution if $y_0 = 0$ & $y_1 = 3$.