

**1903000203040056**  
**EXAMINATION NOVEMBER 2024**  
**BACHELOR OF SCIENCE (NON-NEP) (THIRD SEMESTER)**  
**MATHEMATICAL METHODS - LEVEL 4**

[Time: As Per Schedule]

[Max. Marks: 50]

**Instructions:**

**1. Fill up strictly the following details on your answer book**

- a. Name of the Examination : **BACHELOR OF SCIENCE ( NON-NEP ) (THIRD SEMESTER)**
- b. Name of the Subject : **MATHEMATICAL METHODS - LEVEL 4**
- c. Subject Code No : **1903000203040056**

2. Sketch neat and labelled diagram wherever necessary.
3. Figures to the right indicate full marks of the question.
4. All questions are compulsory.
5. Follow usual notations.
6. Use of non-programmable calculator is allowed.

Seat No:

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Student's Signature

**Q.1 Answer any four:**

**8**

- (a) A function  $f(x)$  assumes the values (1,3), (2,5) and (3,11) then evaluate  $\Delta^2 f(X)$
- (b) Define shift operator and prove that  $E^{-1} = I - \nabla$
- (c) Find the order and degree of  $(Y_{k+5})^3 + (Y_{k+2})^4 + 3Y_{k+1} = 2k$
- (d) Evaluate  $\Delta^2 (3X - 1)^2, h = 2$
- (e) If difference equation is  $y_{k+2} - 2y_{k+1} + 2y_k = 0$  then find argument  $\theta$
- (f) Evaluate  $x^{(-1)}, h = 1$

**Q.2 Answer any two:**

**14**

- (a) Find the first term of the series whose second and subsequent terms are 8, 3, 0 - 1 and 0

(b) Obtain the estimate of missing terms

x	2	2.1	2.2	2.3	2.4	2.5	2.6
y	0.135	?	0.111	0.100	?	0.082	0.074

(c) (i) Define the operators  $\delta$  and  $\mu$  prove in usual notations  $\mu = \sqrt{1 + \delta^2/4}$ .

(ii) Evaluate  $\Delta^2(ab)^{2x}$ ,  $h = 1$

**Q.3 Answer any two:**

**14**

(a) Express the polynomial  $f(x) = x^3 - 5x^2 + 2x + 3$  in to factorial notation.

(b) Define a factorial function. Prove that  $\Delta^n x^{(n)} = n! h^n$  where h is length of the interval.

(c) Find the polynomial whose first order forward difference is  $x^3 + 3x^2 + 5x + 12$

**Q.4 Answer any two:**

**14**

(a) Define a difference equation. Solve

$$y_{k+4} - 4y_{k+3} + 6y_{k+2} - 4y_{k+1} + y_k = 0$$

(b) Define order of a difference equation. Solve

$$f(x + 3) + f(x + 2) - f(x + 1) - f(x) = 0$$

(c) Solve the difference equation  $y_{k+6} - y_k = 0$

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