

**2103000203023002**  
**EXAMINATION NOVEMBER 2024**  
**BACHELOR OF SCIENCE ( NON-NEP ) (THIRD SEMESTER)**  
**MATHEMATICS PAPER - VI**

[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 : **MATHEMATICS PAPER - VI**
  - c. Subject Code No : **2103000203023002**
2. Sketch neat and labelled diagram wherever necessary.  
3. Figures to the right indicate full marks of the question.  
4. All questions are compulsory.

Seat No:

--	--	--	--	--	--

Student's Signature

**Q.1 Answer any FIVE as directed.**

**10**

- (1) The actual value is 125.68 cm and the measured value is 119.66 cm.  
Find the absolute and relative errors.
- (2) (i) Round-off the given numbers to two decimal places:  
0.90015, 200.3651  
(ii) Round-off the given numbers to four significant digits:  
51.545, 2.36054
- (3) Find the interval in which the root of the equation  $2x^3 - 2x - 5 = 0$ .
- (4) Prove that  $\Delta - \nabla \equiv \delta^2$ .
- (5) Find the value of  $\left(\frac{\Delta}{E}\right)\left(\frac{1}{x^1}\right); h = 1$
- (6) Find the value of  $\left(\frac{\Delta^2}{E^2}\right)x^2$ , when the value of  $x$  vary by a constant increment one.
- (7) Construct the backward difference table for the data: (0, -5), (2, 1), (4, 14) (6, 20) and (8, 31).
- (8) Define interpolation.

**Q.2 Attempt any TWO.**

**10**

- (1) Find the value of  $u = \frac{x^2\sqrt{y}}{z^3}$ , then find the percentage error in  $u$  when  $x = 6.54 \pm 0.01, y = 48.64 \pm 0.02$  and  $z = 13.5 \pm 0.03$ .

- (2) Sum the numbers: 105.6, 27.28, 5.63, 0.1467, 0.000523, 208.5, 0.0235, 0.432 and 0.0467, where each number is correct to the digits given. Also estimate the absolute error in the sum.
- (3) (a) Find the absolute error in the product of two numbers  $a$  and  $b$ .  
 (b) Find the absolute error in the quotient of two numbers  $a$  and  $b$ .

**Q.3 Attempt any TWO.**

**10**

- (1) Explain 'Iteration Method' to obtain the real root of an equation  $f(x) = 0$ .
- (2) Find a real root of the equation  $x = 3e^{-x}$ , using 'Method of false-position' correct up to four decimal places.
- (3) Find a real root of the equation  $xe^x = \cos x$ , using 'Newton-Raphson Method' correct up to four decimal places.

**Q.4 Attempt any TWO.**

**10**

- (1) Prove that
- (a)  $e^x \left( u_0 + x\Delta u_0 + \frac{x^2}{2}\Delta^2 u_0 + \dots \right) = u_0 + xu_1 + \frac{x^2}{2}u_2 + \dots$ .
- (b)  $1 + \Delta \equiv (E - 1)\nabla^{-1}$
- (2) Prove that
- (a)  $y_3 = y_2 + \Delta y_1 + \Delta^2 y_0 + \Delta^3 y_0$ ;
- (b)  $e^{hD} = E$
- (3) Show that (a)  $\Delta^2 \equiv (1 + \Delta)\delta^2$ ; (b)  $1 + \mu^2\delta^2 = \left[ 1 + \frac{\delta^2}{2} \right]^2$

**Q.5 Attempt any TWO.**

**10**

- (1) Derive Newton's backward difference interpolation formula.
- (2) Find  $f(2.5)$  from the following data:

$x$	2	4	6	8	10
$f(x)$	2.01	2.85	3.41	4.67	6.32

- (3) Using Gauss's formula, obtain  $f(12.8)$ :

$x$	11	12	13	14	15	16
$f(x)$	37	48	51	61	83	104

\*\*\*\*\*