Assignment 01 **Date: 16-01-2026**

Instructions:

1. **Solve the following questions neatly on paper.**
2. **Scan your answers and upload the file to the shared folder using the link provided below.**
3. **Clearly mention your name and roll number on the first page of the document.**
4. **Rename the file in the format rollNo_name.pdf before uploading.**

Submission Deadlines:

- **Offline submission: Tuesday, 20 January 2026, 12:00 noon**
- **Online submission: Monday, 19 January 2026, 12:00 noon**

Submission Link:https://drive.google.com/drive/folders/13zdwFxKO8Lya1XKCodmeklmwuzFParlU?usp=drive_link

Questions:

1. Prove that a mod b = b mod a if and only if a = b.
2. Use proof by induction to show that
   For all $n \geq 0$ and i = 1 to n:
   $\sum (i^2) = n(n + 1)(2n + 1) / 6$
3. Define Nondeterministic Finite Automaton (NFA) and Deterministic Finite Automaton (DFA) along with their formal definitions.
4. Give $\sum = \{a,b\}$, construct a DFA accepting strings starting and ending with a letter 'a'.
5. Construct a DFA for accepting language with strings having equal number of 0's and 1's.