End Semester Examination

Date: 24th **April, 2025**   **Time: 2 Hrs**

This exam contains **3 questions** and is worth **50 points**. Communication with other students and the use of any digital aids *(assignment codes, locally installed AI tools, internet-connected large language models, etc.)* is strictly prohibited. Complete the exam on time. Late submissions will get a **20% penalty** if up to 3 minutes late, and **won't be evaluated** after that. All exam files *(e.g., Lex, YACC, or text files)* must be named as: `QuestionNo_RollNo.extension`. *For example:* `Question1_2101001.y`. Do not **zip** your files. Upload them individually to **Google Classroom**.

Question	1	2	3	Total
Mark	15	15	20	50

1. Write a grammar to show shift/reduce conflicts in YACC. Remove the conflicts by appropriate means. Submit the necessary files (grammar, LEX/YACC, input, output showing conflicts, and output after resolving conflicts).

2. Write a Lex and/or Yacc program that accepts all strings over the input alphabet $\{a, b\}$ that belong to the language:

$$L = \{a^n b^m \mid n \neq m\}$$

3. For a banking system language (CALC), create a lexical analyzer and parser that computes various interest calculations. The available operations are:

Regular	Simple	Compound
$x + (x * 2.01)/100 * k$	$x + (x * 5.5 * k)/100$	$x * (1 + 5.7/k)^k$

Parse and compute the result based on the following grammar:

$$S \rightarrow E$$
$$E \rightarrow \epsilon$$
$$E \rightarrow \text{regular}(E, E)$$
$$E \rightarrow \text{simple}(E, E)$$
$$E \rightarrow \text{compound}(E, E)$$
$$E \rightarrow \text{NUM}$$
$$\text{NUM} \rightarrow \text{DIGIT}^+$$
$$\text{DIGIT} \rightarrow 0 \mid 1 \mid 2 \mid \cdots \mid 9$$

Sample Inputs and Outputs

```
regular(simple(compound(500,2),2),2)      8557.1922975

simple(regular(500,2),4)                   634.522
```