

## Lab Performance Test 2 Syllabus

### Course Outcome

**CO3: Designing front end of compiler (Lexical Analysis, Syntax Analysis and Semantic Analysis) using LEX and YACC.**

### Marks Distribution:

Lab Class	Questions	Question Types	Time	Easy	Marks	CO
Lab Class 3 and Lab Class 4	Q1 (a)	Lexical Analysis	12 min	Easy	30%	CO3
	Q1 (b)	Syntax Analysis	12 min	Easy	40%	
	Q1 (c)	Semantic Analysis	25 min	Hard	30%	

### Special Instructions:

1. Students are allowed to open the following softwares: VSCode, NotePad, File Explorer and Snipping tool (to take screenshot) to write their code.
2. Students are allowed to open the following websites in their web browsers: google classroom and google form.
3. Students are expected to use their word processor programs like MS Word or LibreOffice to edit their lab report.

### Reading Assignment (Optional):

**Book 1:** Compilers 2nd Ed - Principles, Techniques, & Tools - Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman - Pearson (2007).

Topic Name	Book	Chapter	Topics
Lexical Analysis	Book 1	Chapter 3	3.5 (FLEX)
Syntax Analysis	Book 1	Chapter 4	4.9 (BISON)

### Code Repository:

1. Lab Class 3: <https://github.com/nahin100/17-CSE4102/tree/main/Lab3>
2. Lab Class 4 (**Important**):  
<https://github.com/nahin100/17-CSE4102/tree/main/Lab4>

## Problem Sets:

### 1. LEX (FLEX) and YACC (BISON): Consider following code snippets:

01.

```
float num = input("Enter a number: ")
if num > 0:
    print("Positive number")
elif num == 0:
    print("Zero")
else:
    print("Negative number")
```

02.

```
dim i as integer
For i = 1 To 9.9
    For j = 10 To 20
        Next j
    Next i
```

03.

```
function isEven(n : int)
begin
    return n % 2.0 == 0;
end
```

- Perform Lexical Analysis on the given code snippet.
- Perform Syntax Analysis on the given code snippet.
- Perform Semantic Analysis on the given code snippet.

### Instructions for Question 1:

- For question a:** For given input, the lexical analyzer will reply 'input -> Token Name' for the correct inputs.

For example, for question 03, output will be

```
function -> FUNCTION
isEven -> ID
( -> LP
n -> ID
: -> COLON
int -> INT_TYPE
) -> RP
begin -> BEG
return -> RET
n -> ID
```

```
% -> MOD
2.0 -> FLOAT_NUM
== -> EQUAL
0 -> INT_NUM
; -> SEMI
end -> END
```

- b. For question b:** For given input, the parser will reply 'Parsing Finished' for the correct code snippet.

```
Parsing Finished
```

- c. For question c:** Student will need to perform following semantic checkings:

- ☐ Checking whether a variable is declared before use.

```
a = 10; //variable is not declared but used
```

- ☐ Checking whether a variable is declared more than once.

```
int a;
int a = 10; //same variable is declared more than once
```

- ☐ Perform type checking of variable

```
int a = 10.0;
//float number is used instead of integer
```

- ☐ Perform type checking of expression

```
float b = 10.0;
char c = 'c';
int a = b+c;
//type of b and c do not match type of a
```

For example, for question 03, output will be

```
In line 3, n with type int does not match with type
float.
```

**Regarding Extra Time:**

If someone takes more than 10 minutes to submit his answer, then there will be mark penalty and following chart will be used to evaluate answers (Suppose exam starts at 9:30 AM):

	<b>100% Marks</b>	<b>70% Marks</b>	<b>0% Marks</b>
<b>Q1a</b>	12 min (Submit at or before 9:42 AM)	12 min (Submit at or before 9:54 AM)	Submit after 09:54 AM
<b>Q1b</b>	12 min (Submit at or before 9:54 AM)	12 min (Submit at or before 10:06 AM)	Submit after 10:06 AM
<b>Q1c + Lab Report</b>	20 min (Submit at or before 10:19 AM)	20 min (Submit at or before 10:31 AM)	Submit after 10:31 AM

**Questions:**

Every student will be given different question sets based on Roll number. Link to Google form will be given 1 minute before the lab test. Students will have to submit their answers to Google Classroom.

**Upload Instructions:**

- 1. Separate Folders:** Create separate folders (also for Q2a and Q2b) for each question when uploading.
- 2. Roll Number+Questions:** Add your Roll Number and paste given Questions to program files.
- 3. Snapshots:** Take separate snapshots of the terminal which shows outputs [Run the program using command without adding output.txt: `a < input.txt`]. Do not fabricate the snapshots. If found, the student will get punished severely.
- 4. Please rename your file/files with this format:** [Lab Performance Test No]\_[Roll Number]\_[Question No] (Example: `LPT1_1703060_Q2a`). Upload files to google classroom classwork.
  - Question 1:** Submit both output files and Makefile.
  - Question 2:**
    - a. Tokenize:** Submit Flex file, Makefile, input and output text files.
    - b. Parsing:** Submit Flex file (Different from the Flex file submitted for Tokenization), Bison file, Makefile, input and output text files.

## 5. Warning:

- a. Do not submit the .exe file. Google Drive may block the file and the zipped folder cannot be downloaded/examined by the examiner.
- b. Do not zip files using winrar or 7zip. Zip files using only the default windows zip file (.zip) feature (Instructions: Right Click on Folder -> Send to -> Compressed (zipped) folder).

## Tips:

1. Rather than writing everything from scratch, just write your codes within existing source code by editing them.
2. Ensure **Laptop Battery Backup + Internet**
3. Use `mingw32-make` instead of `make` if you face any problem.

## Upload Lab Report Instructions:

1. Use this Lab Report Template: [Link](#)
2. Please rename your lab report with this format: [Lab Performance Test No]\_[Roll Number]\_Lab\_Report (Example: LPT1\_1703060\_Lab\_Report). Upload Lab Report to google classroom classwork.
3. Lab Report Preparation:
  - **Question:** Paste your question.
  - **Solution:** Paste contents of your source code. Bold out your own code.
  - **Output:** Paste your output snapshot.
4. Do not cheat in the lab report. Cheating will cause severe punishments.

## Academic Honesty Policy:

1. Do not cheat and be honest.
2. Do not share your answers.
3. *If it is found that someone cheated by copying someone's program file/snapshot, then the original author of the files (If identified) will get severe punishments.*
4. *Someone found guilty of cheating will have his/her test score reset and will have to retake all the lab tests on only the hardest question sets.*
5. *If someone is aware of someone's/organized group's cheating, he/she is welcomed to send (anonymous) mail to the teacher. Teacher will keep the sender's identity secret and reward that sender heavily with extra marks.*

## Lab Performance Test 1 Syllabus

### Course Outcome

**CO1: Understanding the practical approach of how a compiler works.**

**CO2: Understanding how LEX and YACC is used for lexical and syntax analysis.**

### Marks Distribution:

Lab Class	Questions	Question Types	Time	Easy	Marks	CO
Lab Class 1	Q1	Stages of C compiler	8 min	Easy	100	CO1
Lab Class 2	Q2 (a)	LEX Intro (FLEX)	10 min	Easy	70	CO2
	Q2 (b)	YACC Intro (BISON)	20 min	Hard	30	

### Reading Assignment (Optional):

**Book 1:** Compilers 2nd Ed - Principles, Techniques, & Tools - Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman - Pearson (2007).

Topic Name	Book	Chapter	Topics
Lexical Analysis	Book 1	Chapter 3	3.5 (FLEX)
Syntax Analysis	Book 1	Chapter 4	4.9 (BISON)

### Code Repository (17 Series)

1. **Lab Class 1:** <https://github.com/nahin100/17-CSE4102/tree/main/Lab%201>
2. **Lab Class 2:** <https://github.com/nahin100/17-CSE4102/tree/main/Lab2>

### Code Repository (18 Series)

1. **Lab Class 1:** To be added.
2. **Lab Class 2:** To be added.

### Problem Sets:

1. **Stages of C compiler:** Consider following code snippet:

```
#include<math.h>
#define INTEGER int

int main()
{
    INTEGER a=10;
    INTEGER b=20;
    return 0;
}
```

Show output files of all stages along with dumped object file generated by C compiler along with Makefile.

**2. LEX (FLEX) and YACC (BISON):** Consider following code snippets:

**01.**

```
RUET CSE 17
CUET CSE 18
BUET EEE 19
```

**02.**

```
University of Dhaka
University of Rajshahi
University of Chittagong
```

**03.**

```
001-180
//Comment: will accept all inputs within range.
```

**04.**

```
Series: 16 series to 20 series
Department_Codes: 00 to 10
Roll_Numbers: 001 to 180

Format: (Series)(Department_Codes)(Roll_Numbers)
Accepted Inputs: 1703010, 2000001
//Comment: will accept all the roll numbers within
acceptable range.
```

- a. Show a flex file which can tokenize given statements.
- b. Show a bison file which can parse given statements.

**Instructions for Question 2:**

- a. **For question a:** For given input, the lexical analyzer will reply 'input -> Token Name' for the correct inputs.

For example, for question 02 of 2, output will be 'University -> UNIVERSITY\_NAME' for 'University' input.

- b. **For question b:** For given input, the parser will reply 'Accepted' for the correct statements.

For example, for question 02 of 2, output will be 'Accepted' for 'University of Chittagong' input.

### Regarding Extra Time:

If someone takes more than 10 minutes to submit his answer, then there will be mark penalty and following chart will be used to evaluate answers (Suppose exam starts at 9:30 AM):

	100% Marks	70% Marks	0% Marks
<b>Q1</b>	8 min (Submit at or before 9:38 AM)	8 min (Submit at or before 9:46 AM)	Submit after 09:46 AM
<b>Q2a</b>	10 min (Submit at or before 9:48 AM)	10 min (Submit at or before 9:58 AM)	Submit after 9:58 AM
<b>Q2b + Lab Report</b>	20 min (Submit at or before 10:08 AM)	20 min (Submit at or before 10:28 AM)	Submit after 10:28 AM

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  - **Question 1:** Submit both output files and Makefile.
  - **Question 2:**



- c. **Tokenize:** Submit Flex file, Makefile, input and output text files.
- d. **Parsing:** Submit Flex file (Different from the Flex file submitted for Tokenization), Bison file, Makefile, input and output text files.

#### 10. Warning:

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