B.Sc. Engg. (CSE) 8th Semester **31 October 2019**

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
ORGANISATION OF ISLAMIC COOPERATION (OIC)
Department of Computer Science and Engineering (CSE)

SEMESTER FINAL EXAMINATION **SUMMER SEMESTER, 2018-2019**

DURATION: 3 Hours **FULL MARKS: 150**

CSE 4801: Compiler Design

Programmable calculators are not allowed. Do not write anything on the question paper.

There are 8 (eight) questions. Answer any 6 (six) of them.

Figures in the right margin indicate marks.

1. a) Discuss on various methods to translate text from one computer language to other. 8
   b) What is bootstrapping? 2
   c) Define lexical error. Explain recovery strategies from various lexical errors. 10
   d) Discuss the functions of error handler during compilation. 5

2. a) In C programing language variables can be declared as per following format- 10

   Data_Type $var_1, var_2, var_3, \ldots\ldots, var_n;$

   Common data type keywords in C are *int*, *char* and *float*.

   Now, design a grammar to recognize multiline of variable declarations in C format.
   b) Write a program using Lex and Yacc which can convert an infix expression into postfix expression. 10
   c) What is a DAG? Mention its applications in compilation process. 5

3. a) What are the various ways to pass a parameter to a function? Discuss each of those in brief. 10
   b) What is dangling else problem? Explain along with a sample grammar and input, 10
   c) Rewrite the grammar to resolve dangling else issue. 5

4. a) Consider the following grammar:

   $S \rightarrow A$
   $A \rightarrow A{+}A \mid B{+}{+}$
   $B \rightarrow y$

   and input: y + + + y + +

   i. Draw a parse tree. 5
   ii. Show a leftmost derivation. 5

   b) List some compiler construction tools. Discuss any two of them. 10
   c) Differentiate tokens, patterns and lexeme. 5

5. a) Consider the following grammar with terminals [,], a, b, c, +, and -:

$S \rightarrow [\, S\, X\,]$
$\quad\mid a$
$X \rightarrow \varepsilon$
$\quad\mid +\, S\, Y$
$\quad\mid Y\, b$
$Y \rightarrow \varepsilon$
$\quad\mid -\, S\, X\, c$

i. Find the set of FIRST and FOLLOW for each of the non-terminal of this grammar. 5

ii. Generate the parse table for predictive parsing. 10

b) Discuss the phases that constitute the front end of a compiler. 10

6. a) Distinguish static checks and dynamic checks during semantic analysis. List and define various types of static checks. 10

b) Discuss efficient implementations of symbol table for a compiler. 10

c) What is a syntax tree? Classify attributes in a syntax tree. 5

7. a) You are needed to design a compiler for a language which could support recursion. What type of storage allocation strategy will you prefer to implement? Justify your choice. 10

b) Write short notes on the followings: 15
Left recursion, handle and handle pruning, buffer pair, cousins of compiler.

8. a) What is *activation record*? Briefly discuss common contents of an *activation record*. 10

b) Write a simple calculator program using lex and yacc. The program should support following operators (comma separated) having usual meanings. Each operator should support standard rules of associativity and precedence. 15

+, -, *, /, ^, (,)