26-28

Begum Rokeya University, Rangpur.

Department of Computer Science and Engineering

(B.Sc. Engg.) 4th Year 1st Semester Final Examination, 2017.(Session:2013-14)

Course Title: **Compiler Design** ; Course Code: **CSE 4101**

Full Marks: 50 Time:3.00 Hours

Answer Any Five from the Given Questions

(Note: Numbers in the right margin indicate marks for each question. Answer questions sequentially)

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1. (a) What do you mean by front end in compiler design? Show the output produced by it in different stages for ***a:=b*c/36***; where a, b and c are real numbers. 4

   (b) Explain the way in which high level languages are processed by interpreter and compiler. 2

   (c) Explain the role of assembler, compiler, loader and linker in the language processing system. 4

2. (a) Define lexeme, token and pattern. Identify the lexemes that make up the tokens in the following program segment ***E =M*C**2***. Indicate corresponding token and pattern. 4

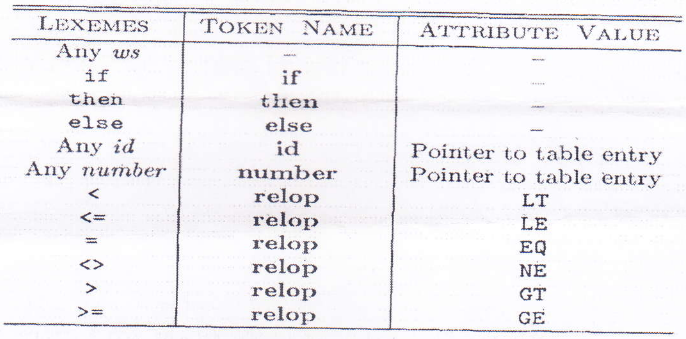
   (b) What is the relationship with lexical analyzer, regular expressions and transition diagram? Give an example. 3

   (c) Write a regular expression for unsigned numbers and design the transition diagram for it. 3

3. (a) You are given a table (Table-1) containing some **tokens**, their tokens and corresponding attribute value. Now write a **lex** program to identify these lexemes. 5

Table-1

2.22F(+1-(t)2



LEXEMES	TOKEN NAME	ATTRIBUTE VALUE
Any *ws*	–	–
if	if	–
then	then	–
else	else	–
Any *id*	id	Pointer to table entry
Any *number*	number	Pointer to table entry
<	relop	LT
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   (b) Construct an NFA for the regular expression: **(a|b)*abb** and convert this **NFA** to corresponding **DFA** by subset construction of that **NFA**. 5

4. (a) What are the four components of a **CFG**? Define with example. 3

   (b) Give a leftmost and rightmost derivations of the following grammar and hence test for the ambiguity of the grammar: 5

   $E \rightarrow E + T \mid T$ E → T

   $T \rightarrow T * F \mid F$ T → F

   $F \rightarrow (E) \mid a$ F → a

   (c) How can we eliminate ambiguity of a grammar? 2

5. (a) What is an **LL(1)** grammar? When the grammar is said to be **LL(1)** grammar? 2

   (b) Write the comparisons between SLR and LALR parser 2

   (c) Write the conflicts that may occur during shift reduce parsing. Consider the dangling-else grammar. 3

   (d) What do you mean by Handle pruning? Left factor the given grammar: 3

   $L \rightarrow \text{int} \mid \text{int}, L \mid (L)$

6. You are given the following grammar:

$A \rightarrow A * B | B$

$B \rightarrow B + E | E$

$E \rightarrow (K) | \boldsymbol{id}$ $E \rightarrow (A) | id$

Using LL(1) parser-

(i) Check for the recursion and factor of grammar

(ii) Identify the FIRST() and FOLLOW() of above grammar

(iii) Produce corresponding parse table

(iv) Push the operations in a Stack according to Inputs of parse table

(v) Generate the corresponding parse tree.

7. **(a)** What is the purpose of defining augmented grammar before constructing LR(0) items? 3

(b) What are different intermediate code forms? Convert the expression **a = b * - c + b * - c** into three address statements. 4

(c) What is code optimization? Explain machine dependent and independent code optimization. 3

~~$A \rightarrow BA'$~~ $B \rightarrow EB'$

~~$A' \rightarrow *BA' | \epsilon$~~ ~~$B' \rightarrow +EB' | \epsilon$~~

~~$E \rightarrow (A) | id$~~

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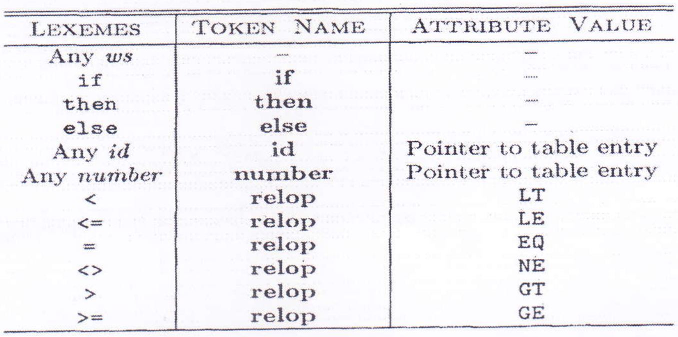

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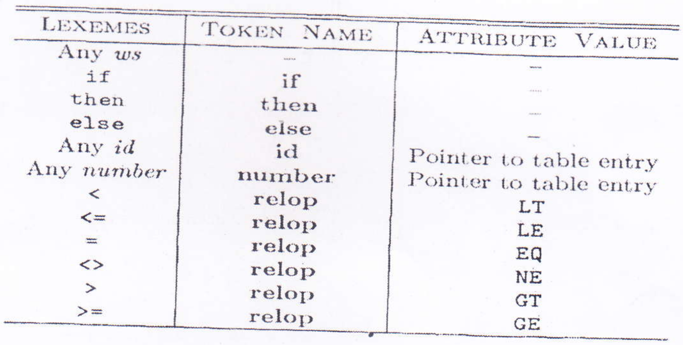

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