S/C (2)

Roll Number: _____

Thapar Institute of Engineering and Technology, Patiala
Computer Science and Engineering Department

BE COE 4th yr. **UCS802 Compiler Construction**
Auxiliary Exam, 24th Aug, 2019 **Faculty: Karun Verma**

Time: 3 Hours **MM: 100**

Note: Attempt all the questions. All subparts of the question are to be solved in sequence and in continuation.

1. a) What is Syntax Directed Translation? 4
   b) What are attributes? Differentiate between various types of attributes. 6
2. Define Regular Expression. For a regular expression $(a|b)^*a(a|b)$ construct DFA directly from a regular expression. 3+7
3. Consider integer expression grammar.

   $ex \rightarrow ex\ addop\ term$ $\quad$ $term \rightarrow factor$

   $ex \rightarrow term$ $\quad$ $mulop \rightarrow *$

   $addop \rightarrow + \mid -$ $\quad$ $factor \rightarrow (ex)$

   $term \rightarrow term\ mulop\ factor$ $\quad$ $factor \rightarrow$ **number**

   a) Remove left recursion. 5
   b) Construct First and Follow sets for the non-terminals of the resulting grammar. 5
   c) Construct LL(1) parsing table for the grammar 5
   d) Show the actions of the LL(1) parser to recognize **3*(4-5*6)** 5
4. Consider the following grammar representing simplified expressions:

   stmt → **declare id** *optionList*
   optionList → *optionList option* | ϵ
   option → *mode* | *scale* | *precision* | *base*
   mode → **real | complex**
   scale → **fixed | floating**
   precision-> **single | double**
   base → **binary | decimal**

   a) Write a leftmost and a rightmost derivation for the **declare foo real fixed real floating**. 5
   b) Draw the parse tree for the string of part (a). 5
5. Represent $k = -(a-b) + (c * -x)/(a-y)$; in the form of triples and quadruples. 10
6. Consider the following grammar:

   $E \rightarrow (L) \mid \mathbf{a}$

   $L \rightarrow L, E \mid E$

   a) Construct the Canonical LALR(1) set for this grammar. 6
   b) Construct the general LALR(1) parsing table. 5
   c) Show the actions of LALR(1) to recognize **((a) , a , (a,a))** . 6
7. a) Explain Bottom-Up Evaluation of S-Attributed Definitions. 8
   b) What are quadruples? Explain with examples. 7
8. What is activation tree? Explain various units of activation tree. Draw the activation tree for: 8

```
...
printf("Enter Your Name: ");
scanf("%s", username);
show_data(username);
printf("Press any key to continue...");
...
int show_data(char *user)
 {
 printf("Your name is %s", username);
 return 0;
 }
...
```

Best Wishes