

**B.E. 7th semester Examination 2012.**  
**Computer Science & Technology**  
**Subject: Compiler Construction**  
**Subject Code: CS 703**

**Full Marks:70**

**Time: 3Hrs**

**Answer Question no. 1 and any four from the remaining questions.**

1. [2x7=14]
- (a) What are the reasons for designing a multi-pass compiler ?  
(b) Define four types of grammar and show their hierarchical relationship.  
(c) Inserting a code-optimizer within a compiler increases compilation time. How would you justify the presence of code-optimizer within a compiler?  
(d) Define left-recursive grammar. How left-recursion can be eliminated from the grammar?  
(e) Define leftmost canonical and rightmost canonical derivation .  
(f) Define synthesized attribute and inherited attribute.  
(g) Write context-free grammar to detect the strings over the alphabet {a,b} such that every a is immediately followed by b.
2. (a) State the conditions to be fulfilled for common sub-expression and loop optimization? [3]  
(b) Explain how DAG can be used for common sub-expression elimination? [3]  
(c) Define available expression and reaching definition data flow property. Which purposes are these data flow property useful for? How would you construct data flow equations for these properties. State those equations. [3+1+2+2]
3. Assuming single register available write a syntax directed code generation scheme in order to generate target code for an expression. Use the example  $a + b + c$  for generation of target code. [14]
- 4.(a) Write a grammar to generate intermediate code for the assignment statement using integer variables, addition, multiplication and unary minus operations and bracketed expressions only. Define the attribute values required for generating intermediate code for the assignment using syntax directed translation scheme. Design the syntax directed translation scheme for this grammar. [3+4+4]
- (b) Explain the scheme with the help of a parse tree for the statement: [3]  
$$K = (B+C) * B * (-S)$$
5. Given the grammar with the following rules where {S,E,T} is the set of non-terminal symbols and {;,a,\$} is the set of terminal symbols, \$ is the special terminal symbol used as an end-marker.
- $S \rightarrow E\$$   
 $E \rightarrow T \mid E ; T$   
 $T \rightarrow \epsilon \mid Ta$
- (a) Compute the FIRST and FOLLOW of non-terminal symbols E and T. [3]  
(b) Construct LR(0) finite control for the given grammar. [5]  
(c) Is the grammar SLR(1)? Draw Parsing table for the parser. [1+5]

6. (a) What are the criteria required to be satisfied for static storage allocation. [2]
- (b) Define activation record. What are the different parts of activation record?  
Explain the role of activation base pointer in activation record during execution by using a suitable program segment. [1 + 1 + 3]
- (c) What is the role of display in activation record? How will display be created when a function at level  $j$  ( $j < i$ ) will be entered from a function at level  $i$ ? [2+5]

7. (a) Define the following three operator precedence relations: [3]

$<, ==, >$

- (b) State the roles of finite automata and regular expression in design of lexical analyzer. How would you design a finite automata for any regular expression? [2+5]
- (d) What is three-address code? Discuss about relative advantages and disadvantages associated with various implementations of three address code. [1+3]