

**B. E. (Seventh Semester)**  
**EXAMINATION, Dec., 2011**  
(Computer Science & Engg. Branch)  
**COMPILER DESIGN**  
(CS-701)

*Time : Three Hours*

*Maximum Marks : 100*

*Minimum Pass Marks : 35*

**Note :** Attempt all questions. Internal choice is given. All questions carry equal marks.

**Unit-I**

1. (a) Discuss the various tasks performed by the compiler in the lexical and syntax analysis phase. 10
  - (b) Write short notes on the following : 10
    - (i) Bootstrapping
    - (ii) Compiler writing tools
- Or*
2. (a) What is LEX ? Describe auxiliary definitions and translation rules for LEX with suitable examples. 10
  - (b) Discuss the advantages and disadvantages of single pass and multipass compilers. 10

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**Unit-II**

3. (a) Consider the following grammar :

$A \rightarrow ABd|Aa|a$

$B \rightarrow Be|h$

Remove left recursion from above grammar. 10

- (b) What do you understand by TOP down translation ? Explain taking any example of your choice. 10

*Or*

4. (a) Draw the syntax tree and DAG for the expression : 10

$(a * b) + (c - d) * (a * b) + b$

- (b) Consider the grammar :

$S \rightarrow ACB|CbB|Ba$

$A \rightarrow da|BC$

$B \rightarrow g|E$

$C \rightarrow h|E$

Calculate FIRST and FOLLOW. 10

**Unit-III**

5. (a) Differentiate between Implicit type conversion and Explicit type conversions with the help of an example. 10

- (b) Explain various storage allocation strategies. Which storage allocation model is to be used if a language permits recursion ? 10

*Or*

6. (a) What do you mean by heap allocation ? Explain the various terms related to heap allocation : 10
  - (i) Free list

- (ii) Reference count
  - (iii) Fragmentation
  - (iv) Bit map
- (b) Explain the various data structures used for implementing the symbol table and compare them. 10

#### Unit - IV

7. (a) Construct 3 address code for the following : 10  
 if  $[(a < b) \text{ and } ((c > d) \text{ or } (a > d))]$  then  
 $z = x + y * z$   
 else  $z = z + 1$

- (b) Construct the DAG for the following basic block :

$d := b * c$

$c := a + b$

$b := b * c$

$a := e - d$

Then generate the code for the above constructed DAG using only one register. 10

Or

8. (a) Using Backpatching, generate an intermediate code for the following expression : 1

$A < B \text{ OR } C < D \text{ AND } P < Q$

- (b) Write quadruples, triples and indirect triples for expression :

$-(a + b) * (c + d) - (a + b + c)$

#### Unit - V

9. (a) Describe the necessary and sufficient conditions for performing constant propagation and constant elimination. 5