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**Sixth Semester B.E. Degree Examination, December 2011**  
**Compiler Design**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
at least TWO questions from each part.**

**PART - A**

- 1 a. With a neat diagram, explain the different phases of compilation. (10 Marks)  
 b. Explain input buffering strategy, used in lexical analysis phase. (10 Marks)
- 2 a. Write the transition diagram for an unsigned number. (04 Marks)  
 b. Show that the following grammar is ambiguous:  $E \rightarrow E + E \mid E * E \mid (E) \mid id$ .  
 Write an unambiguous grammar for the same. (06 Marks)  
 c. Write a recursive descent parser for the grammar :  $S \rightarrow cAd \mid A \rightarrow ab/a$  and for the input 'cad' trace the parser. (10 Marks)
- 3 a. Construct the predictive parse table for the following grammar :  
 $S \rightarrow a \mid \uparrow(T)$   
 $T \rightarrow T, S \mid S$  (10 Marks)  
 b. Explain the working of a shift reduce parser. (05 Marks)  
 c. Explain handle pruning. Explain the same for the grammar  $E \rightarrow E + E \mid E * E \mid (CE) \mid id$  and the input string is  $id1 + id2 * id3$ . (05 Marks)
- 4 a. Consider the following grammar :  
 $S \rightarrow AS \mid b$   
 $A \rightarrow SA \mid a$   
 Construct the SLR parse table for the grammar. Show the actions of the parser, for the input string "abab". (10 Marks)  
 b. Construct the CLR parse table for the following grammar :  
 $S \rightarrow CC$   
 $C \rightarrow cC \mid d$  (10 Marks)

**PART - B**

- 5 a. Define the following with examples :  
 Synthesized attribute  
 Inherited attribute  
 S - attributed definitions  
 L - attributed definitions. (08 Marks)  
 b. Explain the parser stack implementation of post fix SDT, with an example. (08 Marks)

c. For the SDD shown below :

Production	Semantic rules
$L \rightarrow E_n$	$L.val = E.val$
$E \rightarrow E_1 + T$	$E.val = E_1.val + T.val$
$E \rightarrow T$	$E.val = T.val$
$T \rightarrow T_1 * F$	$T.val = T_1.val * F.val$
$T \rightarrow F$	$T.val = F.val$
$F \rightarrow (E)$	$F.val = E.val$
$F \rightarrow \text{digit}$	$F.val = \text{digit.lexval}$

construct the annotated parse tree for  $3 * 5 + 4n$ . (04 Marks)

- 6 a. Explain the following, with an example :
- Quadruples
  - Triples
  - Indirect triples. (09 Marks)
- b. Write an algorithm for the unification of a pair of nodes in a type graph. (06 Marks)
- c. Explain syntax directed translation of switch statements. (05 Marks)
- 7 a. What is an activation record? Explain its possible structure. (08 Marks)
- b. Explain the design goals for garbage collector. (06 Marks)
- c. Explain the desirable properties of memory manager. (06 Marks)
- 8 a. What is next use information? Write an algorithm to determine the liveness and next use info for each statement in a basic block. Apply the same for the following basic block :
- $T1 = \text{Add}(A) - 4$
  - $T2 = 4 * i$
  - $T3 = T1 [T2]$
  - $\text{Sum} = \text{Sum} + T3$
  - $I = I + 1$
  - If  $I \leq 20$  go to 3 (12 Marks)
- b. Generate the intermediate code for the statement:  $\text{sum} = A [i, j] + B [i, j]$ . Construct DAG and simplify the code. (08 Marks)

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