

Total number of printed pages – 7

B. Tech

PECS 3404

Seventh Semester Examination – 2007

COMPILER DESIGN

Full Marks – 70

Time – 3 Hours

Answer Question No. 1 which is compulsory
and any **five** from the rest.

The figures in the right-hand margin
indicate marks.

1. Answer the following questions : 2×10
- (a) What is syntax directed translation scheme ? What are the different forms of intermediate code used in compilation process ?

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- (b) What is the *dead code elimination* ?
- (c) What is *reduce-reduce (R-R) conflict* in LR parser ?
- (d) Why LR parsing is prefer over other parsers ?
- (e) What do you mean by runtime storage allocation ?
- (f) Eliminate left-recursion from the following grammar.

$E \rightarrow aa \mid abba \mid E b \mid E E$

- (g) Briefly describe one use for flow graphs in compiler writing.
- (h) Explain the concept of bootstrapping in compiler design process.
- (i) What is back-patching in the process of intermediate code generation ?

- (j) Differentiate between phase and a pass in compiler construction.

2. (a) What is the role of intermediate code generation in overall compiler design? 4
- (b) Define operator precedence relation and operator precedence grammar. Construct precedence function for the following precedence relation. 6

	-	*	/	↑	id	\$
-	•>	<•	<•	<•	<•	•>
*	•>	•>	<•	<•	<•	•>
/	•>	•>	•>	<•	<•	•>
↑	•>	•>	•>	<•	<•	•>
id	•>	•>	•>	•>		•>

3. (a) Discuss the construction of LR parser. What are the various data structures used in LR parser design ? Discuss the construction of **ACTION[]** and **GOTO[]** table. 5

- (b) Write the role of an error detector in compilation process ? Discuss different errors in Lexical-Phase. 5
4. (a) What are the necessity of optimization in compilation ? Discuss the factors influencing optimization ? 5
- (b) Explain the symbol table construct for the block structure programming language ? 5
5. Consider the following grammar :

$$E \rightarrow (L) \mid a$$

$$L \rightarrow L, E \mid E$$

- (a) Construct DFA of LR (0) items for this grammar.
- (b) Construct the SLR (1)-parsing table.
- (c) Show the parsing stack and actions of an SLR(1) parser for the input string
i. ((a), a, (a, a))
- (d) Is this grammar a LR (0) grammar ? If not describe the LR (0) conflict. 10

6. (a) What is an activation record ? Explain clearly the components of an activation record. 5
- (b) Construct DAG for the following sequence of statements

$$X = Y/Z$$

$$W = P * Y$$

$$Y = Y * Z$$

$$P = W - X$$

- Perform code generation assuming only one registers is available. 5

7. (a) Consider the following context-free grammar. Where S is the start symbol, and the terminals are a , ()

$$S \rightarrow ()$$

$$S \rightarrow a$$

$$S \rightarrow (A)$$

$$A \rightarrow S$$

$$A \rightarrow A, S$$

Show precisely why this grammar is not LL(1). Rewrite this grammar to make it suitable for recursive descent parsing. 5

(b) Discuss the importance of symbol table in compiler design. How is the symbol table manipulated at various phase of compilation? 5

8. (a) Find the FIRST and FOLLOW sets for each of the non-terminals in the following grammar. (in the grammar below ϵ denotes epsilon, the empty string) 4

A \rightarrow **aBa**

B \rightarrow **bCb** | **bcD**

C \rightarrow **cCc** | ϵ

D \rightarrow **Deb** | ϵ

(b) Differentiate between syntax directed definition and syntax directed translation scheme. 4

(c) Explain, why it is possible to design an independent Lexical analyzer. 2

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