Total number of printed pages – 7

B. Tech

PECS 3404

Seventh Semester Examination – 2006

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) Explain why it is possible to design an independent Lexical analyzer ?

   (b) Define and differentiate between compile time errors and runtime errors.

   (c) Explain the machine dependent and machine independent code optimization.

P.T.O.

(d) Explain the difference between Bottom-up and Top-down parsing.

(e) What are the drawbacks of SLR(1) parser ?

(f) What do you mean by porting of a compiler ?

(g) Describe the structure of LL parser.

(h) Describe various data structures used to create a symbol table.

(i) Distinguish between the syntax and semantics of a programming language ? Explain which parts of a compiler are primarily concerned with each.

(j) What are the major functioning of the five main stages of a compiler ?

2. (a) For the following grammar, find the FIRST and FOLLOW sets of each of the non-terminals

$S \rightarrow aAB \mid bA \mid \in$

$A \rightarrow aAb \mid \in$

$B \rightarrow bB \mid c$

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

(c) Test whether the following grammar is LL(1) ?

$S \rightarrow aAb$

$A \rightarrow cd \mid ef$

(d) Explain the concept of bootstrapping in compiler design process. 2.5×4

3. (a) Use T-diagram to describe the steps you would take to create a powerful compiler using a quick-dirty compiler. 2

(b) Define and discuss the objectives of SDTS. What do you mean by underlying source grammar. Explain with an example. 4

(c) Construct the DAG for the following statement

$Z = X - Y + X * Y * U - V/W + X + V.$ 4

4. (a) Describe the contents of a symbol table. How is the Symbol table involved in the interactions between the different components of the compiler and in error detection ? Give a simple example in each case. 5

(b) Explain the machine dependent and machine independent code optimization. What are their advantages ? 5

5. (a) Explain the working principle of operator precedence parsing algorithm. Explain the parsing action for the input string id_1-id_2/ id_3*id_4↑id_5- id_1 with the reference to the operator precedence relation table given below. 5

	–	*	/	↑	id	$
–	•>	<•	<•	<•	<•	•>
*	•>	•>	<•	<•	<•	•>
/	•>	•>	•>	<•	<•	•>
↑	•>	•>	•>	<•	<•	•>
id	•>	•>	•>	•>		•>

(b) What information is recorded in the Symbol Table of a compiler for a block structured language ? Give examples of how this information is created and/or used at each stage of compilation. 5

(a) Construct an LL(1) parsing Table for the following grammar 8

$S \rightarrow aBDh$

$B \rightarrow cC$

$C \rightarrow bC \mid \in$

$D \rightarrow EF$

$E \rightarrow g \mid \in$

$F \rightarrow f \mid \in$

(b) Explain how scope rules and the block structure of a programming language decides the structure of symbol table. 2

(a) Construct the SLR parsing table for the following grammar 8

$E \rightarrow E+T$

$E \rightarrow T$

$T \rightarrow T*F$

$T \rightarrow F$

$F \rightarrow id$

$L \rightarrow L, E / E$

(b) What is the objective of intermediate code generation ? What is the different form of intermediate code generated by intermediate code generation phase ? 2

8. (a) What is the objective of intermediate code generation ? Generator three address code for the following code segment. 4

```
main()
{
int a = 1;
int b[10];
while (a <= 10)
        b[a] = 2 **a;
}
```


(b) Find the canonical collection of sets of LR(1) items 3

$S \rightarrow AaAb$

$A \rightarrow BbBa$

$A \rightarrow \in$

$B \rightarrow \in$

(c) Write quadruples, triples and indirect triples for the following expression 3

x[i] := y

x := y[i]