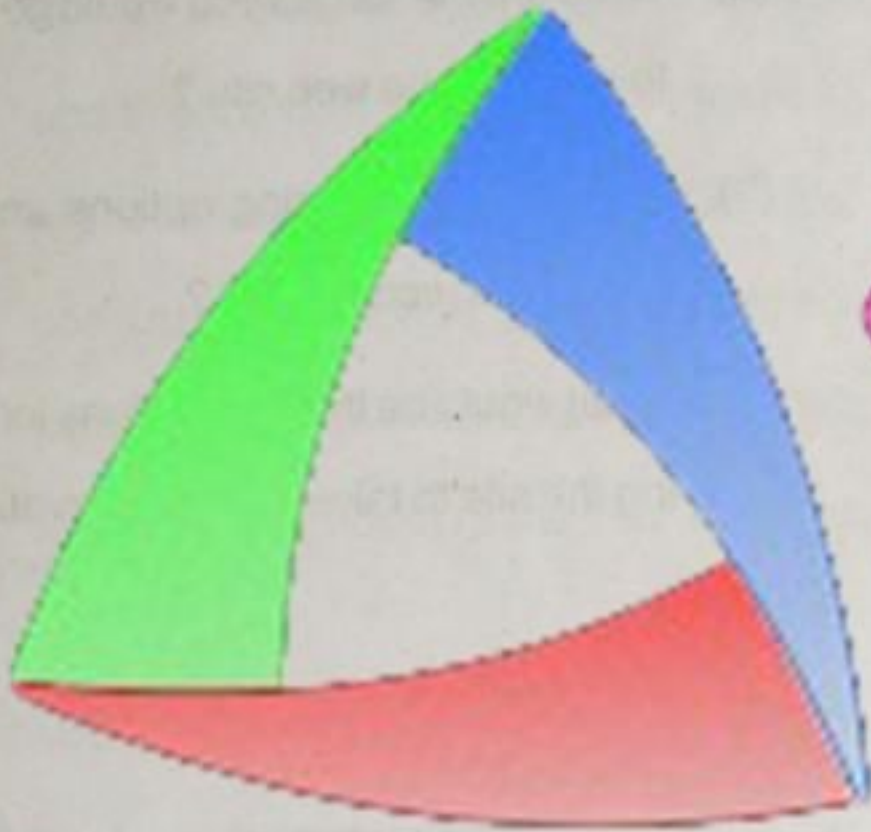


Seventh Semester Examination – 2006

COMPILER DESIGN

Full Marks – 70

Time : 3 Hours



EGT O G E T

The figures in the right-hand margin indicate marks.

THE WORLD OF STUDY... 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.

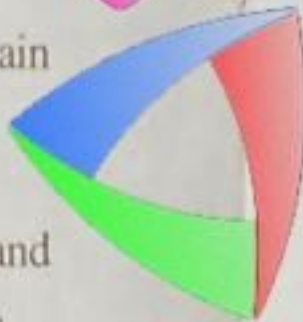
- (d) Explain the difference between Bottom-up and Top-down parsing.
- (e) What are the drawbacks of SLR(1) parser?
- (f) What do you mean by porting of a compiler?
- (g) Describe the structure of LL parser.
- (h) Describe various data structures used to create a symbol table.
- (i) Distinguish between 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

$$S \rightarrow aAB \mid bA \mid \epsilon$$

$$A \rightarrow aAb \mid \epsilon$$

$$B \rightarrow bB \mid c$$



- (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 $id_1-id_2/id_3*id_4\uparrow id_5-id_1$ 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

$$S \rightarrow aBDh$$

$$B \rightarrow cC$$

$$C \rightarrow bC \mid \epsilon$$

$$D \rightarrow EF$$

$$E \rightarrow g \mid \epsilon$$

$$F \rightarrow f \mid \epsilon$$

(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? Generate 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

$S \rightarrow AaAb$

$A \rightarrow BbBa$

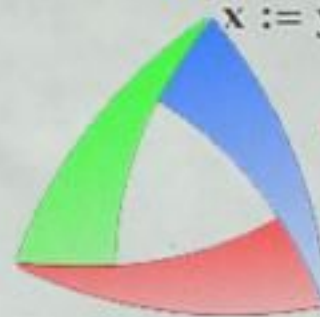
$A \rightarrow \epsilon$

$B \rightarrow \epsilon$

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

$x[i] := y$

$x := y[i]$



EGTOGET

THE WORLD OF STUDY...