

Sixth Semester B.E. Degree Examination, December 2010
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. Explain with neat diagram, the various phases of a compiler. Mention the input and output for each phase. (08 Marks)
- b. Define static and dynamic scoping. Explain the working and output of the following programming segment if scoping used is static and dynamic:

```

BEGIN
  Boolean b := true
  Procedure P ;
  BEGIN
    Print (b) ;
  End ;
  BEGIN
    Boolean b := false ;
    Call P ;
  End ;
END;
  
```

(04 Marks)

- c. With an example, explain the use and coordination between 'LEX' and 'YACC' the compiler writing tools. (08 Marks)
- 2 Consider the grammar:
- $$E \rightarrow 5 + T \mid 3 - T$$
- $$T \rightarrow V \mid V * V \mid V + V$$
- $$V \rightarrow a \mid b$$
- a. What is the use of left factoring? Do the left factoring for the above grammar. (04 Marks)
- b. Write an algorithm to obtain the FIRST and Follow table. Obtain FIRST and Follow table for the above grammar. (08 Marks)
- c. Write an algorithm to construct the predictive parsing table. Construct predictive parsing table for the above grammar. (08 Marks)

- 3 Consider the grammar:

$$S \rightarrow E\#$$

$$E \rightarrow E - T$$

$$E \rightarrow T$$

$$T \rightarrow F \uparrow T$$

$$T \rightarrow F$$

$$F \rightarrow (E)$$

$$F \rightarrow i$$

- a. Write the algorithm to construct basic finite state control m/c for SLR (1) and action α goto functions entries. (08 Marks)
- b. Construct the following for the above grammar:
- Basic finite state control.
 - SLR (1) parsing table containing action and goto function entries. (12 Marks)

4 Consider the grammar;

$G \rightarrow S$

$S \rightarrow E = E$

$S \rightarrow f$

$E \rightarrow T$

$E \rightarrow E + T$

$T \rightarrow f$

$T \rightarrow T * f$

when terminal symbols are $\{=, +, *, f\}$

- Write an algorithm to construct finite state control for LR(1) parser. (08 Marks)
- Construct LR(1) finite state control and explain the algorithm to construct parsing table containing action α goto function entries. (12 Marks)

PART - B

- With an example, explain the concept of syntax directed definition. (08 Marks)
 - Write the grammar and syntax directed definitions for a simple desk calculator and show annotated parse tree for the expression $(3+4)*(5+6)$. (12 Marks)
- What is DAG? Construct a DAG for the following expression, $a + a * (b - c) + (b - c) * d$. (04 Marks)
 - With an example, explain the various formats of intermediate code. (10 Marks)
 - Write quadruple representation for, $a + a * (b - c) + (b - c) * d$. (06 Marks)
- Explain the run time storage scheme for C++-language. Give the structure of activation record and explain with suitable example. (12 Marks)
 - Explain the design goals for garbage collectors. (08 Marks)
- Discuss the following terms:
 - Basic blocks
 - Next-use information
 - Flow graph (10 Marks)
 - Explain the following code optimization with example:
 - Finding local common sub expression. (10 Marks)
 - Dead code elimination.
