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Sixth Semester B.E. Degree Examination, June/July 2016
Compiler Design

Time: 3 hrs.

Max. Marks:100

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

PART – A

1   a. With a neat diagram, explain various phases of compiler. **(10 Marks)**
    b. Construct a transition diagram for recognizing relational operators. Sketch the program segment to implement it, showing the first state and one in final state. **(10 Marks)**

2   a. Write an algorithm to eliminate left recursion from a grammar. Eliminate left recursion from the grammar: $S \rightarrow Aa \mid b$, $A \rightarrow Ac \mid sd \mid a$. **(08 Marks)**
    b. Show that the following grammar is ambiguous:
    Stmt $\rightarrow$ if expr then stmt
    $\qquad \mid$ if expr then stmt else stmt
    $\qquad \mid$ other
    write an unambiguous grammar for the same. **(06 Marks)**
    c. Give the rules for constructing FIRST and FOLLOW sets. **(06 Marks)**

3   a. What is meant by handle pruning? How it helps in shift reduce parsing? List the actions of a shift reduce parser. **(10 Marks)**
    b. For the grammar: $S \rightarrow SS+ \mid SS* \mid a$. Give a bottom-up parse for the input: aaa * a++. **(06 Marks)**
    c. What are two types of conflicts during shift-reduce-parsing? Give examples. **(04 Marks)**

4   a. What is the meaning of 'L' and 'R' in LR grammars? Why LR parsing is attractive? **(04 Marks)**
    b. Construct canonical LR(1) items for the augmented grammar: $s' \rightarrow s; s \rightarrow Cc; c \rightarrow cC \mid d$. **(10 Marks)**
    c. Write the yacc specification of a simple desk calculator with the following grammar for arithmetic expressions:
    $E \rightarrow E + T \mid T$
    $T \rightarrow T * F \mid F$
    $F \rightarrow (E) \mid id$. **(06 Marks)**

PART – B

5   a. Define the following with examples:
    i)   Synthesized attribute
    ii) Inherited attribute
    iii) S-Attributed definitions
    iv) L-Attributed definitions. **(08 Marks)**
    b. Explain the parser stack implementation of postfix STD with an example. **(08 Marks)**
    c. Define syntax directed definition for a simple type declaration. **(04 Marks)**

6 a. List any four common three address instruction forms. **(04 Marks)**

b. Discuss quadruples, triples and indirect triples representation. **(06 Marks)**

c. Write syntax directed definition for flow of control statements. **(10 Marks)**

7 a. Explain the desirable properties of memory manager. **(06 Marks)**

b. Explain in detail, the strategy for reducing fragmentation in heap memory. **(08 Marks)**

c. Explain the design goals for garbage collector. **(06 Marks)**

8 a. Discuss the issues in the design of code generator. **(10 Marks)**

b. Write intermediate code for the following source code

```
for i from 1 to 10 do
for j from 1 to 10 do
  a [i, j] = 0.0;
for i from 1 to 10 do
  a [i, i] = 1.0.
```

(10 Marks)

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