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10CS63

Sixth Semester B.E. Degree Examination, June/July 2015

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 a diagram, the phases of compiler. (08 Marks)
 - b. Write regular definitions for the following using extended regular expression notation :
 - i) identifier (06 Marks)
 - ii) unsigned number. (06 Marks)
 - c. Write a program for look ahead code with sentinels. (06 Marks)

- 2
 - a. Define left – recursive grammar. Eliminate left recursion from the following grammar :

$$E \rightarrow E + T \mid T$$

$$T \rightarrow T * F \mid F$$

$$F \rightarrow (E) \mid \text{id.}$$
(05 Marks)
 - b. Given the grammar :

$$S \rightarrow AaAb \mid BbBa$$

$$A \rightarrow \epsilon$$

$$B \rightarrow \epsilon$$
 - i) compute FIRST() and FOLLOW() functions
 - ii) construct predictive parsing table
 - iii) parse the input string $w = ab$. (09 Marks)
 - c. Show that the following grammar is ambiguous $E \rightarrow E + E \mid E * E \mid (E) \mid \text{id}$, write an equivalent un-ambiguous grammar for the same. (06 Marks)

- 3
 - a. What is meant by handle pruning? construct Bottom – up parse tree for the input string $w = aaa * a ++$. Using the grammar :

$$S \rightarrow SS + \mid SS * \mid a.$$
(06 Marks)
 - b. Explain the working of shift reduce parser. Parse the input string $\text{id} * \text{id}$. Using the grammar of question no, 2(a). (08 Marks)
 - c. With a diagram, explain the model of an LR parser. (06 Marks)

- 4
 - a. Write an algorithm to construct LALR parsing table. (06 Marks)
 - b. Construct the parsing table for LALR(1) parser using the grammar :

$$S \rightarrow CC$$

$$C \rightarrow aC$$

$$C \rightarrow d.$$
(10 Marks)
 - c. Compare LALR and canonical LR parsers. (04 Marks)

Important Note : 1. On completing your answers, temporarily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg, $42+8 = 50$, will be treated as malpractice.



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PART - B

- 5 a. Explain the concept of syntax directed definition. (04 Marks)
b. Consider the context free grammar given below :
S → EN
E → E + T | E - T | T
T → T * F | T / F | F
F → (E) | digit
N → ;
i) Obtain SDD for the above grammar
ii) Annotated parse tree for the input string 5 * 6 + 7. (10 Marks)
c. Define :
i) Synthesized attribute (06 Marks)
ii) Inherited attribute.
- 6 a. Construct DAG and three address code for the following expression :
a + a * (b - c) + (b - c) * d. (08 Marks)
b. Explain the following with an example : i) quadruples ii) triples. (08 Marks)
c. Generate three address code for the following statement :
switch (ch)
{ case 1 : c = a + b ; break ;
 case 2 : c = a - b ; break ;
}
- 7 a. With a neat diagram, describe the general structure of an activation record. (06 Marks)
b. Explain in the strategy for reducing fragmentation in heap memory. (08 Marks)
c. Explain briefly the performance metrics to be considered while designing a garbage collector. (06 Marks)
- 8 a. Discuss the various issues in the design of a code generator. (10 Marks)
b. What are basic blocks and flow graphs? Write an algorithm to partition the three address instructions into basic blocks. (06 Marks)
c. List the characteristics of a peephole optimization. (04 Marks)

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