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10CS63

Sixth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Compiler Design

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

- 1
 - a. Explain with neat diagram, the phases of compiler with example. (10 Marks)
 - b. Construct a transition diagram for recognizing relational operators. Sketch the program segment to implement it, showing the first state and one final state. (10 Marks)
- 2
 - a. Briefly explain the problems associated with top down parser. (03 Marks)
 - b. Show that following grammar is ambiguous: $S \rightarrow S + S \mid S * S \mid id$. Give an unambiguous grammar for the above grammar such that '+' has highest priority and * has less priority and both are left associative. (07 Marks)
 - c. Given the grammar $A \rightarrow (A) / a$
 - i) Construct predictive parser table.
 - ii) Check the grammar is LL(1) or not.
 - iii) Show the parser steps for the input ((a)). (10 Marks)
- 3
 - a. Obtain LR(0) items for the following grammar:
 $S \rightarrow L = R \mid R \quad L \rightarrow * R \mid id \quad R \rightarrow L$. (08 Marks)
 - b. Obtain FIRST and FOLLOW sets for the grammar shown in Q.3(a) and obtain SLR parsing table. Is the grammar SLR? (12 Marks)
- 4
 - a. Given the grammar:
 $A \rightarrow CC \quad C \rightarrow aC \mid b$
 - i) Construct sets of LR(1) items. (12 Marks)
 - ii) Construct canonical LR(1) parsing table. (03 Marks)
 - b. Write a note on the parse generator – YACC. (03 Marks)
 - c. Write the YACC specification of a simple desk calculator with following grammar for arithmetic expression:
 $E \rightarrow E + T \mid T$
 $T \rightarrow T * F \mid F$
 $F \rightarrow (E) \mid digit$ where digit between 0 to 9. (05 Marks)

Important Note : 1. On completing your answers, compulsorily 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.

PART – B

- 5 a. Explain type of attributes for non terminal with example. (04 Marks)
- b. Write annotated parse tree for expression $5 + 4 * 3n$ where grammar is
 $L \rightarrow En$
 $E \rightarrow E + T \mid T$
 $T \rightarrow T * F \mid F$
 $F \rightarrow (E) \mid \text{digit}$ (06 Marks)
- c. How different classes of SDD's that guarantee evaluation order? (06 Marks)
- d. Obtain postfix SDT for simple desk calculator. (04 Marks)
- 6 a. Obtain the directed acyclic graph for the expression $x + x * (y + z) + (y + z) * w$. (06 Marks)
- b. Explain the following with example:
 i) Quadraples ii) Triples iii) Indirect triples. (06 Marks)
- c. Explain SDT of switch statement. (08 Marks)
- 7 a. What is activation record? Explain structure and purpose of each field in the activation record. (06 Marks)
- b. Explain tasks of caller and callee when procedure called and exit. (08 Marks)
- c. Explain briefly the performance metrics to be considered while designing garbage collector. (06 Marks)
- 8 a. 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;
 and identify basic blocks. (10 Marks)
- b. Discuss the issues in the design of a code generator. (10 Marks)
