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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 FALLOW 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:

$A \rightarrow CC \qquad C \rightarrow aC \mid b$

i) Construct sets of LR(1) items.

ii) Construct canonical LR(1) parsing table. **(12 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)**

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

$L \rightarrow En$

$E \rightarrow E + T \mid T$

$T \rightarrow T * F \mid F$

$F \rightarrow (E) \mid digit$ **(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)**

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