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Sixth Semester B.E. Degree Examination, June/July 2017
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. List the phases of compiler in order. Use these phases to translate $a = bc * cd + 50.00$ into the target code in assembly language. (08 Marks)
 - b. What are the applications of compiler? Explain. (08 Marks)
 - c. Write the regular definition and transition diagram for valid unsigned number. (04 Marks)

- 2
 - a. Why it is necessary for regular expression to define the lexical syntax of a languages? Give reasons. (04 Marks)
 - b. Define ambiguity. Is the following grammar ambiguous? If yes remove the ambiguity and rewrite the grammar

$$\langle \text{stmt} \rangle \rightarrow \text{if} \langle \text{expr} \rangle \text{ then} \langle \text{stmt} \rangle$$

$$\quad \quad \quad | \text{if} \langle \text{expr} \rangle \text{ then} \langle \text{stmt} \rangle \text{ else} \langle \text{stmt} \rangle$$

$$\quad \quad \quad | a$$

$$\langle \text{expr} \rangle \rightarrow b$$
(08 Marks)
 - c. Find the FIRST and FOLLOW set for the following grammar (05 Marks)

$$E \rightarrow TX$$

$$T \rightarrow (E) / \text{int } Y$$

$$X \rightarrow +E / \epsilon$$

$$Y \rightarrow *T / \epsilon$$
 Fig. Q2 (c)
 - d. When we say that the grammar G is LL(1) grammar? (03 Marks)

- 3
 - a. Write an algorithm to construct predictive parser table. Construct a predictive parser table for grammar given in Fig. Q2 (c), and parse the string $w = \text{int}$. (12 Marks)
 - b. Define handle, handle pruning with example. (03 Marks)
 - c. What are the actions a shift-reduce parser makes? Write the parse tree and shift-reduce configurations for the derivation $S \xRightarrow{*} \alpha BxAz \Rightarrow \alpha Bxyz \Rightarrow \alpha rxyz$. (05 Marks)

- 4
 - a. Write a schematic of LR parser. Write the canonical collection of set of LR(0) items and SLR parsing table for the following grammar: (14 Marks)

$$E \rightarrow E + T / T$$

$$T \rightarrow T * F / F$$

$$F \rightarrow (E) / \text{id}$$
 - b. Construct LR(1) goto graph for below grammar: (06 Marks)

$$X \rightarrow YZ / a$$

$$Y \rightarrow bZ / c$$

$$Z \rightarrow c$$

PART – B

- 5 a. Define synthesized attribute, inherited attributes and attribute grammar. (03 Marks)
- b. Write a SDD and annotated parse tree for u^*s for below grammar suitable for top-down parser.
 $T \rightarrow T * F / F$
 $F \rightarrow \text{digits}$ (07 Marks)
- c. Construct a syntax tree for expression $a+b-c$ using the grammar
 $E \rightarrow E + T / E - T / T$
 $T \rightarrow (E) / \text{id} / \text{num}$ (06 Marks)
- d. What is the need for eliminating left recursion? Eliminate left recursion from SDT
 $E \rightarrow E + T \{ \text{print}(' +') \}$
 $E \rightarrow T$ (04 Marks)
- 6 a. Which are the common three address instruction forms? Explain. (09 Marks)
- b. Define jumping code. Translate the following code to jumping code:
 $\text{if} (X < 10 \parallel X > 20 \ \&\& \ X \neq Y) \ X = 1$ (05 Marks)
- c. Translate the following switch statement to intermediate code.
 $\text{Switch} (E) \{$
 Case $V_1 : S_1 \text{ break} ;$
 Case $V_2 : S_2 \text{ break} ;$
 .
 .
 .
 Case $V_{n-1} : S_{n-1} \text{ break} ;$
 Default : S_n
 $\}$ (06 Marks)
- 7 a. Write the possible activations and activation tree corresponding to quick sort call quicksort (1, 9). (06 Marks)
- b. What are the basic functions and properties of memory management? Explain locality in program in detail. (08 Marks)
- c. What is garbage collection? What are the performance metric that must be considered when designing a garbage collector? (06 Marks)
- 8 a. Write intermediate code and flow graph for below 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)
- b. What is the need for optimization? List and explain any three local optimization methods. (10 Marks)

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