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10CS63

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

<stmt> → if <expr> then <stmt>

¦ if <expr> then <stmt> else <stmt>

¦ a

<expr> → b **(08 Marks)**

c. Find the FIRST and FOLLOW set for the following grammar **(05 Marks)**

$E \rightarrow TX$

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

$X \rightarrow +E / \in$

$Y \rightarrow *T / \in$

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 = 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 $S \overset{*}{\Rightarrow} \alpha BxAz \Rightarrow \alpha Bxyz \Rightarrow \alpha rxyz$. **(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:

$E \rightarrow E + T / T$

$T \rightarrow T * F / F$

$F \rightarrow (E) / id$ **(14 Marks)**

b. Construct LR(1) goto graph for below grammar:

$X \rightarrow YZ / a$

$Y \rightarrow bZ / \in$

$Z \rightarrow \in$ **(06 Marks)**

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.

$T \rightarrow T * F / F$

$F \rightarrow digits$ **(07 Marks)**

c. Construct a syntax tree for expression a+b–c using the grammar

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

$T \rightarrow (E) / id / num$ **(06 Marks)**

d. What is the need for eliminating left –recursion? Eliminate left recursion from SDT

$E \rightarrow E + T\{print('+')\}$

$E \rightarrow T$ **(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:

if (X < 10 || X > 20 && X = Y) X = 1 **(05 Marks)**

c. Translate the following switch statement to intermediate code.

```
Switch (E) {
        Case V1 : S1 break ;
        Case V2 : S2 break ;
        .
        .
        .
        Case Vn-1 : Sn-1 break ;
        Default : Sn
      }
```
(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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