SIXTH SEMESTER B.TECH. [ENGINEERING] (09 SCHEME) DEGREE EXAMINATION, APRIL 2016

IT/CS/PTCS 09 602—COMPILER DESIGN

Time : Three Hours   Maximum : 70 Marks

Part A

Answer all questions.

1. What is the need for separating the analysis phase into lexical analysis and parsing ?

2. Construct the behavior of the parser on sentence (a, a) using the grammar:

    $S \rightarrow (L) \mid a$

    $L \rightarrow L, S \mid S.$

3. What is lest factoring ? Do left factoring in the following grammar.

    $A \rightarrow aBcC \mid aBb \mid aB \mid a$

    $B \rightarrow \varepsilon$

    $C \rightarrow \varepsilon$

4. Differentiate syntax and parse trees with an example.

5. What are the different ways of representing intermediate code ? Give example.

$(5 \times 2 = 10 \text{ marks})$

Part B

Answer any four questions.

6. Write a LEX program to recognize the identifiers, numbers and keywords in a language.

7. Mention the disadvantage of Simple LR Parser. How can it overcome by Canonical LR Parser ?

8. Consider the following grammar

    $S \rightarrow AaAb \mid BbBb$

    $A \rightarrow \varepsilon$

    $B \rightarrow \varepsilon$

    (i) Construct a predictive parser table.

    (ii) Is it LL(1) parser ?

9. Differentiate parameter passing methods with example.

Turn over

10. Construct the Directed acyclic graph for the basic block given below and simplify the three address code.

d = b * c

e = a + b

b = b * c

a = e – d

11. What are the difference between intermediate code and target code ? What are the issued to be considered while generating target code ?

(4 × 5 = 20 marks)

Part C

12. (a) Describe the functions of each phases of compiler indicating the form of its input, output, and type of errors to be detected. Show the result of each step of translation of the statement

Y : = – (a + b) * (c + d) – (a + b + c)

Or

(b) (i) Write a LEX program for recognizing arithmetic expression. (4 marks)

(ii) What is the purpose of compiler construction tools? Describe any three compiler construction tools.

(6 marks)

13. (a) (i) Find the First and Follow for the grammar symbols in the following grammar

$S \rightarrow L = R \mid R$

$L \rightarrow *R \mid id$

$R \rightarrow L$

(5 marks)

(ii) How do you verify whether a given grammar is LL(1) or not without constructing predictive parsing table ?

(5 marks)

Or

(b) Consider the following grammar.

$S \rightarrow SS + \mid SS * \mid a$

(i) Construct the SLR sets of items and their GOTO functions.

(ii) Indicate any action conflicts in the sets of items.

(iii) Construct SLR parsing Table.

14. (a) (i) What is symbol table ? How it is implemented ? Explain the structure of the symbol table in detail.

(6 marks)

(ii) Differentiate between L-attributed and S-attributed definitions with example.

(4 marks)

Or

(b) Compare and Contrast different storage allocation schemes.

15. (a) Write the simple code generation algorithm with the functions used with the data structure involved. Convert the following three address codes into machine code using simple code generation algorithm.

t1 = a

t2 = b

t3 = t1 – t2

t4 = b

t5 = c

t5 = t4 + t5

t = t3 * t5

Or

(b) (i) What is the use of algebraic identities in optimization of basic blocks ?   (3 marks)

(ii) Optimize the following code using various optimization techniques.   (7 marks)

i = 1 ;

s = 0 ;

for (i = 1 ; i < = 5 ; i + +)

for (j = 1 ; j < = 5 ; j + +)

c [i] [j] = c [i] [j] + a [i] [j] + b [i] [j] ;

(4 × 10 = 40 marks)