Roll No. ☐☐☐☐☐☐☐

TCS–601/TIT–601

B. Tech. (CS/IT) (Sixth Semester)
End Semester EXAMINATION, 2017
COMPILER DESIGN

Time : Three Hours]   [*Maximum Marks : 100*

Note : (i) This question paper contains *five* questions.

(ii) All questions are compulsory.

(iii) Instructions on how to attempt a question are mention against it.

(iv) Total marks assigned to each question are twenty.

1. Attempt any *two* questions of choice from (a), (b) and (c).   (2×10=20 Marks)

(a) What is a Compiler ? Write down the various phases of a compiler with the help of a suitable example.

(b) For each of the languages given below. Design a finite automata and regular

expressions to recognize them. In all cases the alphabet is $\{0, 1\}$.

(i) $L_1 = \{w|w$ does not contain the substring 110$\}$.

(ii) $L_2 = \{w|w$ contains and even number of 0's and exactly two 1's$\}$. Also, what is the role of Lexical analyzer ? Discuss.

(c) (i) Depict diagrammatically how a language is processed ?

(ii) What is a symbol table ? Explain briefly.

(iii) Differentiate tokens, patterns, lexeme with example.

2. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) (i) Explain the left recursion and show how it is eliminated. Describe the algorithm used for eliminating the left recursion.

(ii) Eliminate the left recursion from the grammar :

$$S \rightarrow aB|aC|Sd|Se$$
$$B \rightarrow bBc|f$$
$$C \rightarrow g$$

(b) Consider the following grammar :

$$S \rightarrow L = R$$
$$S \rightarrow R$$
$$L \rightarrow *R$$
$$L \rightarrow id$$
$$R \rightarrow L$$

(i) Is the grammar in LR (0) ?

(ii) Is the grammar in SLR (1) ?

(c) Show that the following grammar is LL(1). Also define FIRST and FOLLOW procedure :

$$S \rightarrow AaAb|BbBa$$
$$A \rightarrow \varepsilon$$
$$B \rightarrow \varepsilon$$

3. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) Consider the context free grammar given below :

$$S \rightarrow EN$$
$$E \rightarrow E + T|E - T|T$$
$$T \rightarrow T * F|T/F|F$$
$$F \rightarrow (E)| digit$$
$$N \rightarrow ;$$

(i) Obtain the SDD for the above grammar.

(ii) Construct the parse tree, syntax tree and annotated parse tree for the input string 6*7 + 8;

(b) Explain the run-time storage scheme for C language. Give the structure of activation records and explain with suitable example.

(c) Define the following with examples :

(i) Synthesized attributes

(ii) Inherited attribute

(iii) S-attributed definitions

(iv) L-attributed definitions

4. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) (i) Discuss the issues in the design of a code generator.

(ii) Write short notes on the following :

(a) The target machine

(b) Run-time storage management

(b) (i) Obtain the directed acyclic graph for the expression a + a* (b – c) + (b – c) * d. Also give the sequence of steps for constructing the same.

(ii) Translate the arithmetic expression a + – (b + c) into quadruples, triples and indirect triples.

(c) Write the three address code and construct the basic blocks for the following program segment :

Sum = 0;
For (i = 0, i < = 10; i ++)
Sum = sum + a [i]

5. Attempt any *two* questions of choice from (a), (b) and (c). (2×10=20 Marks)

(a) What is peephole optimization ? Discuss in detail.

(b) Explain the following code optimization with example :

(i) Finding local common subexpression

(ii) Dead code elimination

(c) Write a program which attempt to extract only comments from a C program and display the same on standard output.

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