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MCA 4th Semester Examination, 2016

COMPILER DESIGN

PAPER—MCA - 403

Full Marks : 100

Time : 3 hours

Answer **Q.No 1** and any **four** from the rest

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

1. Answer any *seven* questions : 2 × 7

(*a*) What is compiler ?

(*b*) What is Interpreter ?

(*c*) Define cross compiler.

(*d*) What do you mean by left recursion ? Give example.

(*e*) What is left factoring ? How do you remove left factoring ?

(*f*) What is token ?

(*g*) What are the function of semantic analysis ?

(*h*) Define Handle.

(*i*) What is symbol Table ? What are its contents ?

(*j*) Define backpatching.

(*k*) Define basic block.

(*l*) What are the characteristics of peephole optimization ?

2. Consider the following grammar with terminals (, [,) and]

$$S \rightarrow TS \mid [S]\, S \mid)\, S \mid \epsilon$$
$$T \rightarrow (X)$$
$$X \rightarrow T\, X \mid [\, X]\, X \mid \epsilon$$

(*a*) Construct First and follow sets for the non-terminals.

(*b*) Construct its LL(1) parsing table.

(*c*) Is this grammar LL(1) ? 7 + 6 + 1

3. Consider the following grammar

$$S \rightarrow aS \mid Ab$$
$$A \rightarrow XYZ \mid E$$
$$X \rightarrow cS \mid E$$
$$Y \rightarrow dS \mid E$$
$$Z \rightarrow eS$$

(*a*) Is this LL(1) grammar ?

(*b*) Give a left most derivation of the string aebb.

(*c*) If we add the production $X \rightarrow bS$ then the grammar will be LL(1) or not. 5 + 4 + 5

4. Consider the following grammar : 14

$$E \rightarrow E + T \mid T$$
$$T \rightarrow T * F \mid F$$
$$F \rightarrow (E) \mid id$$

(*a*) Frame the transition table and Action/Go-to table of the given grammar.

(*b*) Demonstrate that the grammar is SLR or not.

5. Consider the grammar

$S \rightarrow aABe$
$A \rightarrow Abc \mid b$
$B \rightarrow d$

Construct the canonical passing table for this grammar. 14

6. Construct an LALR (1) parsing table for the following grammar : 14

$D \rightarrow L : T$
$L \rightarrow L, id \mid id$
$T \rightarrow integer$

7. (*a*) What do you mean by syntax directed definition and syntax directed translation scheme ? (2 + 2)

(*b*) What is inherited and synthesized attribute ? (2 + 2) (*c*) Explain with example, syntax directed definition and translation scheme and their attribute. (3 + 3)

8. (*a*) Consider the following three address code : 7

1. PROD = 0
2. I = 1
3. $T_1 = 4 * I$
4. $T_2 = addr(A) - 4$
5. $T_3 = addr(B) - 4$
6. $T_5 = T_4[T_1]$
7. $T_6 = T_3 * T_5$
8. PROD = PROD + T_6
9. I = I + 1
10. if I < = 20 goto (3)

(*i*) Find the basic blocks and flow graph of above reduce.

(*ii*) Optimize the code reduce.

(*b*) Construct DAG for the following basic block : 7

1. D = B * C
2. E = A + B

3. $B = B * C$
4. $G = A + B$
5. $A = E - D$
6. $F = E * D$
7. IF $F \leq 10$ goto (1).

[*Internal Assessment* : 30 Marks]