Compiler Design and Construction (Model Question)

Course Title: Compiler Design and Construction Full Marks: 60
Course No: CSC365 Pass Marks: 24
Semester: VI Time: 3 Hrs.

Section A
Attempt any TWO questions. (2 × 10 = 20)
1. Differentiate between top-down and bottom-up parsing methods. Construct SLR parse table for the following grammar.
S->aETe
E->Ebc
E->b
T->d

2. What are static and dynamic type checking? Write SDD to carry out type checking for the following expression.
E->id |E1 op E2 | E1 relop E2 | E1[E2] | E1↑

3. What is the role of intermediate code generation in the entire compilation process? Convert the following into three address code.

a+(b-c)*d

Section B
Attempt any EIGHT questions. (8 × 5 = 40)
4. Define compiler. Explain analysis phase of compiler.
5. “Symbol table is a necessary component of compiler”, justify this statement with examples.
6. Given a regular expression (ε + 0)*10. Construct the DFA recognizing the pattern described by this regular expression using syntax tree based reduction.
7. Define the terms token, pattern and lexeme. How input buffer can be used for scanner. Explain.
8. Find first and follow of all the non terminals in the following grammar.
E □ TA ; A□+TA|ε ; T□FB ; B□*FB | ε ; F□(E) | id
9. What is Syntax Directed Definition? Define synthesized and inherited attributes with example.
10. What do you mean by runtime storage allocation? Differentiate static and dynamic allocation.
11. Why is it necessary to optimize code? Explain any two code optimization techniques with example.
12. Explain about the factors affecting code generation.

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2078

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Time: 3 Hours

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Section A

Attempt all questions.

1 What are the task performed in lexical analysis. Define DFA. Given regular expression:

(a+b)*a(a+b)

2 Difference between LR(0) and LR(1) algorithm. Construct LR(1) parse table for s->AA ,A->aA/b

3 Type checking is the process of verifying that the types of expressions and variables used in a program are consistent and adhere to languages type system rules. The primary goal of type checking is to identify and prevent type-related errors before the program is executed.

Difference between compiler and interpreter.

5	What are the typical entries made in symbol table? Explain.
6	Define Left recursive grammar. Remove left recursion from the following grammar. S→SB | Ca B→Bb | c C→aB | a
7	What are the disadvantages of shift reduce parsin perform shift reduce parsing of string w=(x-x)-(x/x) for grammar E=E-E/ E/E / (E) / x
8	Define attribute grammar with example of inherited and synthesized attributes
9	Define three address code. Write down Quadruples for a=-b*(c+d)/e
10	List out the different types of runtime storage management techniques.
11	What are the advantages of code optimization. Define Dead-code elimination.
12	Factors affecting (target code generator) code generator/code generator design issues

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Section A

Attempt all question.

1 Explain briefly about different phases involved in compiler, with a block diagram.

2 Given a regular expression (ε + 0)*10. Construct the DFA recognizing the pattern described by this regular expression using syntax tree based reduction.

3 What is shift reduce parsing techniques? Show shift reduce parsing action for the string (x+x)*a, given the grammar

4 Construct SLR parsing table for the following grammar.
S -> aAa | bAb | ba

Define Syntax directed definition. Construct annotated parse tree for the input expression (5*3+2)*5 according to the following syntax directed definition.

5

Production	Semantic Rule
L -> En	Print E.val
$E \rightarrow E_1 + T$	$E.val \rightarrow E_1.val + T.val$
E -> T	E.val ->T.val
$T \rightarrow T_1 * F$	$T.val \rightarrow T_1.val * F.val$
T -> F	T.val -> F.val
F -> (E)	F.val -> (E.val)
F -> digit	F.val -> digit.lexval

6 Write Syntax Directed Definition to carry out type checking for the following expression.
E -> id | E1 op E2 | E1 relop E2 | E1[E2] | E1 ↑

7 Explain with example about different methods of intermediate code representation.

8 What is the purpose of code optimization? Explain different types of loop optimization techniques with example.

9 Discuss about different factors affecting the process of target code generation.

10 Discuss the importance of error handler in compiler. How is it manipulated in the different phases of compilation?