



**MAULANA ABUL KALAM AZAD UNIVERSITY OF
TECHNOLOGY, WEST BENGAL**

Paper Code : CS-702

COMPILER DESIGN

Time Allotted: 3 Hours

Full Marks: 70

The figures in the margin indicate full marks.

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

Answer all groups.

Group – A

(Multiple Choice Type Questions)

1. Choose the correct alternative of the following: 1×10=10
- (i) What is the output of lexical analyzer?
 - (a) A parse tree
 - (b) A list of tokens
 - (c) A syntax tree
 - (d) None of these
 - (ii) Parse tree is generated in the phase of
 - (a) Syntax Analysis
 - (b) Semantic Analysis
 - (c) Code Optimization
 - (d) Intermediate Code Generation
 - (iii) Shift reduce parsers are
 - (a) top down parser
 - (b) may be top down or bottom up
 - (c) bottom up parser
 - (d) None of these
 - (iv) The grammar $S \rightarrow aSa \mid bS \mid c$ is
 - (a) LL(1) but not LR(1)
 - (b) LR(1) but not LL(1)
 - (c) Both LL(1) and LR(1)
 - (d) None of these
 - (v) White spaces and Tabs are removed in
 - (a) Lexical Analysis
 - (b) Syntax Analysis
 - (c) Semantic Analysis
 - (d) All of these

- (vi) Left factoring guarantees
- (a) not occurring of backtracking
 - (b) cycle free parse tree
 - (c) error free target code
 - (d) correct LL(1) parsing table
- (vii) A parse tree showing the values of attributes at each node is called in particular
- (a) syntax tree
 - (b) annotated parse tree
 - (c) syntax direct parse tree
 - (d) direct acyclic graph
- (viii) Which of the following is not true for Dynamic Type Checking?
- (a) It increases the cost of execution
 - (b) Type checking is done during the execution
 - (c) All the type errors are detected
 - (d) None of the above
- (ix) Which of the following is not a loop optimization?
- (a) Induction variable elimination
 - (b) Loop jamming
 - (c) Loop unrolling
 - (d) Loop heading
- (x) YACC builds up
- (a) SLR parsing table
 - (b) LALR parsing table
 - (c) Canonical LR parsing table
 - (d) None of these

Group – B

(Short Answer Type Questions)

Answer any three of the following.

5×3=15

2. Describe analysis phase of a Compiler with a block diagram. 5
3. Describe with diagram the working process of Lexical Analyzer. 5
4. What is error handling? Describe the Panic Mode and Phrase Level error recovery technique with example. 1+4=5
5. What is ambiguity in grammar? Justify whether the grammar is ambiguous or not.

$A \rightarrow AA \mid (A) \mid a$

2+3=5

6. What is recursive descent parsing? Describe the drawbacks of recursive descent parsing for generating the string 'abc' from the grammar.

$S \rightarrow aBc$

$B \rightarrow bc \mid b$

1+4=5

Group – C**(Long Answer Type Questions)****Answer any three of the following.**

15×3=45

7. Describe with a block diagram the parsing technique of LL(1) parser. Parse the string 'abba' using LL(1) parser where the parsing table is given below.

	a	b	\$
S	$S \rightarrow aBa$		
B	$B \rightarrow \epsilon$	$B \rightarrow bB$	

Check whether the following grammar is LL(1) or not:

$$X \rightarrow Yz \mid a$$

$$Y \rightarrow bZ \mid \epsilon$$

$$Z \rightarrow \epsilon$$

4+4+7=15

8. Describe LR parsing with block diagram. What are the main advantages of LR parsing? Construct SLR parsing table for the grammar given below.

$$S \rightarrow Ab$$

$$A \rightarrow bA/a$$

4+3+8=15

9. (a) Construct DFA directly from the regular expression:

$$L = (a \mid b)^*ab$$

- (b) What are the main contributions of Syntax Directed Translation in Compiler?

- (c) Mention different loop optimization techniques. Optimize the following code:

```
do{
    item = 10;
    x =x + item;
}while (value<50);
```

7+3+5=15

10. (a) Translate the expression $a = (a + b) * (c + d) + (a + b + c)$ into

- (i) Quadruple
- (ii) Triple
- (iii) Indirect Triple

(b) Draw the flow graph for the following code:

```
Check (int n)
    flag = 0;
    for (i = 2; i<n/2; i++){
        if(n % i == 0){
            flag = 1;
            break;
        }
    }
    if (flag == 0)
        printf("Number is odd");
    else print("Number is even");
    exit
```

9+6=15

5×3=15

11. Write short notes on *any three* of the following:

- (a) LEX and YAAC
- (b) Activation Record
- (c) Symbol Table
- (d) Left Recursion
- (e) LALR