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: http://www.makaut.com 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 → aSa | bS | c is http://www.makaut.com

(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

Confused between option (a) & (d)

(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 -> AA | (A) | 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 → aBc

B → bc | 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 → aBa		
B	B → ε	B → bB	

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

$X \rightarrow Yz \mid a$

$Y \rightarrow bZ \mid \varepsilon$

$Z \rightarrow \varepsilon$

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)  http://www.makaut.com
    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

11. Write short notes on *any three* of the following: 5×3=15

(a) LEX and YAAC

(b) Activation Record

(c) Symbol Table

(d) Left Recursion

(e) LALR