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.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :   10 × 1 = 10

   i)   Which of the following is an example of bottom up parsing ?

   a)   LL parsing

   b)   Predictive parsing

   c)   Recursive descent parsing

   d)   Shift-reduce parsing.

   ii) The output of the parser is

   a)   tokens   b)   syntax tree

   c)   parse tree   d)   non-terminals.

   iii) If x is a terminal, then FIRST (x) is

   a) ε b) $\{x\}$

   c) x^{*} d)   none of these.

   iv) YACC builds up

   a)   SLR parsing table

   b)   LALR parsing table

   c)   canonical LR parsing table

   d)   none of these.

   v)   Which one of the following is a too-down parser ?

   a)   Recursive descent parser

   b)   Operator precedence parser

   c)   An LR(k) parser

   d)   An LALR(k) parser.

vi) Cross-compiler is a compiler

    a)   which is written in a language that is different from the source language

    b)   that generates object code for host machine

    c)   which is written in a language that is same as the source language

    d)   that runs on one machine but produces object code for another machine.

vii) An ideal compiler should

    a)   be smaller in size

    b)   take less time for compilation

    c)   be written in a high level language

    d)   produce object code that is smaller in size and executes faster.   Ans : All of These

viii) Synthesized attribute can easily be simulated by an

    a)   LL grammar

    b)   LR grammar

    c)   ambiguous grammar

    d)   none of these.

ix) Type checking is normally done during

    a)   lexical analysis

    b)   syntax analysis

    c)   syntax directed translation

    d)   code generation.

x) The method which merges the bodies of two loops is

    a)   loop rolling   b)   loop jamming

    c)   constant folding   d)   none of these.

GROUP – B
(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2.   Consider the context-free grammar :

$$S \rightarrow SS + \mid SS * \mid \varepsilon$$

    a)   How the string $aa + a*$ can be generated by this grammar ?

    b)   Construct a parse tree for this string.   3 + 2

3   What is handle ? Consider the grammar

$$E \rightarrow E + E | E * E | id$$

Find the handles of the right sentential forms of the reduction for the string $id + id * id$ 2 + 3

4   Eliminate the left-recursion for the following grammar :

$$S \rightarrow (L) | a$$

$$L \rightarrow LS | S$$

5.   Construct the DAG for the following basic block :

$$d = b * c$$

$$e = a + b$$

$$b = b * c$$

$$a = e - d$$

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

$$S \rightarrow aBc$$

$$B \rightarrow bc | b$$ 2 + 3

GROUP - C
(Long Answer Type Questions)
Answer any *three* of the following. $3 \times 15 = 45$

7   a)   Construct NFA from the regular expression using Thompson's method $L = aa (a | b)^* ab$.

b)   Write regular definition for the following language : All strings of letter that contain the five vowels in order.

c)   Construct the predictive parsing table for the following grammars :

$$S \rightarrow AaAb | BbBa$$

$$A \rightarrow \varepsilon$$

$$B \rightarrow \varepsilon$$ 5 + 4 + 6

8.   Construct the LR(0) set of items and the SLR parsing table for the following grammar :

$$E \rightarrow E + T | T$$

$$T \rightarrow T * F | F$$

$$F \rightarrow (E) | id$$ 5 + 10

9.   a)   Translate the following expression :

$m = m + n \times - p + n \times - p$ into

(i) Quadruples,   (ii) Triples,   (iii) Indirect triples.

b)   What are the differences among Quadruples, Triples and Indirect triples ?

c)   Design a direct acyclic graph for the string :

$a + a * (b - c) + (b - c) * d$ $(3 + 3 + 3) + 3 + 3$

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10. a) Consider the following grammar :

$$S \rightarrow CC$$

$$C \rightarrow cC \mid d$$

Find the LR(1) set of items.

b) Describe about the operator precedence parser.

c) What are the two types of attributes that are associated with a grammar symbol ?   8 + 5 + 2

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