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52 (5) CPDG ITB-HC-5016

2021

(Held in 2022)

COMPILER DESIGN

Paper : ITB-HC-5016

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Explain the different phases of a compiler, showing the output of each phase, using the example of the following statement

position = initial + rate * 60 10

2. What is the role of Lexical analyzer ? State the steps to convert a regular expression to NFA. 2+6=8

Contd.

Or

Explain the algorithm for conversion from NFA to DFA.

Construct an NFA for regular expression $R = a(a | b)^* ab$ and convert it into an equivalent DFA. 4+4=8

3. (a) Define handle. What do you mean by handle pruning ? 2
- (b) Construct predictive parsing table : 5

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

Or

What is parser ? What are the types of parser ? Explain each of them with example.

4. Check whether the following grammar is in SLR or not : 8

$$S \rightarrow L = R$$
$$S \rightarrow R$$
$$L \rightarrow *R$$
$$L \rightarrow id$$
$$R \rightarrow L$$

5. (a) What is three address code ? Write down the three representation of three address code for the following expression : $1+5=6$

$$a = b * - c + b * - c$$

- (b) Explain Syntax-directed translation for if-else statement. 5

Or

What is the importance of symbol table in compiler design ? How is the symbol table manipulated at various phases of compilation ? What are the operations of symbol table ? $1+3+1=5$

6. (a) What is loop optimization ? Describe three important techniques for loop optimization with example.

$$2+2+2+2=8$$

- (b) Construct a DAG for the following expression 2

$$(((a+a) + (a+a)) + ((a+a) + (a+a)))$$

7. What is Basic Block ? How to partition a code into Basic Block ? 6

Or

Draw the flow graph for the following 3-address code :

1. location = -1
2. i = 0
3. if i < 100 goto 5
4. goto 13
5. $t_1 = 4 * i$
6. $t_2 = A[t_1]$
7. if $t_2 = x$ goto 9
8. goto 10
9. location = i
10. $t_3 = i + 1$
11. $i = t_3$
12. goto 3
13.