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Total Number of Pages : 02

Course: B.Tech
Sub Code: RCS6C002

6th Semester Regular / Back Examination: 2022-23

SUBJECT: Compiler Design

BRANCH(S): CST/ CSE/ CSEAIME/ IT

Time : 3 Hour

Max Marks : 100

Q.Code : M440

Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.

The figures in the right hand margin indicate marks.

Part-I

Q1 Answer the following questions:

(2 x 10)

- Differentiate DFA and NFA.
- Mention the job of Lexical Analysis.
- Explain the specifications of LEX programming.
- What do you mean by LL(1)?
- What is handle pruning?
- What is backpatching?
- Explain loop invariant with an example.
- What is S-attributed Grammar?
- Differentiate static and dynamic storage allocation.
- Mention the features of symbol table.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- Illustrate the output of each phase of compilation for the input "a = (b+c) * (b+c) * 2".
- Describe the structure of a LEX programming. Write a LEX specification for removing single line and double line comments from a C file.
- Define and differentiate token, lexeme and pattern. Find the lexemes, their token group and the pattern for the following piece of code.

```
int main()
{
    int a, b;
    printf("Enter two integers to swap\n");
    scanf("%d%d", &a, &b);
    a = a + b;
    b = a - b;
    a = a - b;
    printf("a = %d\nb = %d\n", a, b);
    return 0;
}
```

- d) Prove that following grammar is not SLR(1) but CLR(1).
 $S \rightarrow AaAb \mid BbBa$
 $A \rightarrow \epsilon$
 $B \rightarrow \epsilon$
- e) Write the algorithm for computing FIRST() and FOLLOW() function. Find the FIRST() and FOLLOW() for the following non-terminals whose sets of productions given below
 $S \rightarrow ACB \mid CbB \mid Ba$
 $A \rightarrow da \mid BC$
 $B \rightarrow g \mid \epsilon$
 $C \rightarrow h \mid \epsilon$
- f) Describe the issues associated with grammars in top-down parsing with suitable example.
- g) Compare local optimization with global optimization with suitable example.
- h) Compare static, stack and heap allocations.
- i) Construct the DAG for the following basic block:
 $d := b * c$
 $e := a + b$
 $b := b * c$
 $a := e - d$
- j) Explain loop jamming and loop unrolling with suitable example.
- k) Describe Peephole optimization
- l) How the scope information of variables are stored in symbol table? Explain.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

- Q3** Consider the following grammar (16)
 $D \rightarrow \text{Type Tlist};$
 $\text{Type} \rightarrow \text{int} \mid \text{float}$
 $\text{Tlist} \rightarrow \text{Tlist, id} \mid \text{id}$
 a) Find the SLR parser for the above grammar.
 b) Show the parsing of the string "int id, id, id;" using the parsing table constructed above.
- Q4** List the commonly used intermediate representations. Write the following expression in all types of intermediate representations you know (16)
 $(a - b) * (c + d) - (a + b)$
- Q5** (8×2)
 i) Explain the simple code generator with a suitable example
 ii) Write detailed notes on basic blocks and flow graphs
- Q6** Obtain the translation scheme for obtaining the three-address code for the following grammar (16)
 $S \rightarrow \text{id} := E$
 $E \rightarrow E_1 + E_2 \mid E_1 * E_2 \mid -E_1 \mid (E_1) \mid \text{id}$