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Question Paper Code : 70446

B.E./ B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Sixth Semester

Computer Science and Engineering

CS 8602 – COMPILER DESIGN

(Common to: Computer Science and Business Systems)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Give the significance of symbol table. Draw a sample table.
2. Compare and contrast Compiler and Interpreter.
3. Write down the CFG for the set of odd length strings in $\{a, b\}^*$ such that the it is a palindrome.
4. Write the algorithm to compute FOLLOW of a non-terminal.
5. What is an L-attribute? Give examples.
6. Convert the following statement into three address codes
$$x = a * b + c * e$$

Represent the codes using quadraples and indirect triple.
7. When do you call a variable to be syntactically live at a point?
8. What is the use of a Heap memory? When is it created and used?
9. Define peephole.
10. Can DAG be used for optimization? Give example.

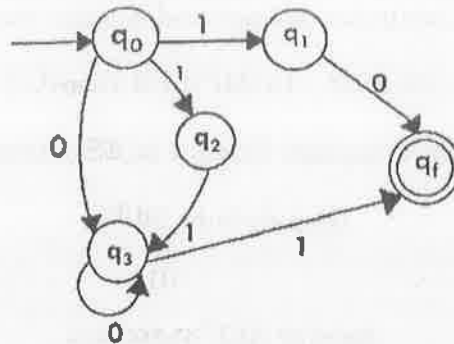
PART B — (5 × 13 = 65 marks)

11. (a) “Every statement of the software written in any programming language is translated to machine-understandable language before execution.” – Elaborate on the translation process. Explain the process using the statement, “if (a==10) {print(“Welcome”)} else {print(“Exit”)}.

(Assume the statement is to be written in Python language).

Or

- (b) Convert the following NFA to DFA.



12. (a) Check whether the following grammar can be implemented using SLR parser. Check whether the string “0a*a1” is accepted or not using SLR parsing.

$S \rightarrow 0A1 \mid a$

$A \rightarrow A*S \mid B$

$B \rightarrow a$

Or

- (b) Check whether the following grammar can be implemented using CLR parser. Check whether the string “wxynzs” is accepted or not using CLR parsing.

$A \rightarrow BCD \mid Ab \mid c$

$B \rightarrow w \mid Bx$

$C \rightarrow yCz \mid n$

$D \rightarrow DB \mid s$

13. (a) Generate three address codes for the following piece of code and hence write the syntax directed translation.

```
while (a<b or a>c)
```

```
{  
  if (a==1)  
  {  
    c = c+1  
    continue  
  }  
  else  
  {  
    b = b+1  
    break  
  }  
}
```

Or

- (b) Generate three address codes for the following piece of code and hence write the syntax directed translation.

```
while (a<b and c>b)
```

```
do  
  if c < d  
  then  
    x := y + z  
    break  
  else  
    x := y - z
```

14. (a) Write the code generation algorithm. Explain the process of register allocation and assignment.

Or

- (b) Construct basic blocks and flowgraph for the following piece of code.

```
for i from 1 to m:  
  for j from 1 to n:  
    a [i, j] = 5.0;  
  for k from 1 to m:  
    b [i, i] = 1.0;  
print ("Done")
```

15. (a) Elaborate any five peephole optimization techniques with example.

Or

- (b) Elaborate on the storage allocation techniques.

PART C — (1 × 15 = 15 marks)

16. (a) Elaborate on local and loop optimizations. Perform local optimizations for the a sample basic block with atleast ten instructions.

Or

- (b) Construct LR (1) items for the following grammar using LALR parsing and draw the transition diagram representing the transitions among LALR items.

$S \rightarrow E + F \mid F$

$F \rightarrow F * T \mid T$

$T \rightarrow D$

$D \rightarrow 0 \mid 1 \mid 2 \mid 3 \mid 4 \mid 5 \mid 6 \mid 7.$