INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Four Year B.Tech V Semester End Examinations (Supplementary) - January, 2019

Regulation: IARE – R16

COMPILER DESIGN

Time: 3 Hours   (Common to CSE | IT)   Max Marks: **70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) How to specify the tokens? Differentiate token, lexeme and pattern with suitable examples. **[7M]**

   (b) Design a DFA to accept string of 0's and 1's when interpreted as binary numbers would be multiple of 3. **[7M]**

2. (a) Explain non-recursive predictive parsing with a block diagram and an example. **[7M]**

   (b) Show that the following grammar is an ambiguous or not **[7M]**
   S -> ScS
   S -> d

UNIT – II

3. (a) Demonstrate stack implementation in implementation of shift reduce Parsing? **[7M]**

   (b) Construct LALR Parsing table for following grammar **[7M]**
   S → Aa |aAc | Bc | bBa
   A → d
   B → d

4. (a) State the difference between SLR,CLR and LALR parsers in detail. **[7M]**

   (b) Let us consider the following grammar: **[7M]**
   S -> AaAb | BbBa
   A -> €
   B -> €
   Check the grammar for the parsers SLR

UNIT – III

5. (a) Explain briefly about S-attributed and L- attributed grammar in detail? **[7M]**

   (b) Write production rules and semantic actions for the following grammar along with annotated parse tree for the string 9-5+4 **[7M]**
   expr → expr + term
   | expr - term
   | term
   term→0|1|2|3|4|5|6|7|8|9

6. (a) Explain three address codes and mention its types. How would you implement the three address statements? Explain with suitable examples? **[7M]**

   (b) What is three address code in compiler? Consider the expression a = b * – c + b * – c. Write three address code and quadruples for the expression. **[7M]**

UNIT – IV

7. (a) Discuss various tradeoffs in static and dynamic type checking system. **[7M]**

   (b) Suppose that the type of each identifier is a sub range of integers, for expressions with operators +, -, *, div and mod, as in Pascal. Write typechecking rules that assign to each sub expression. **[7M]**

8. (a) What is the concept of activation record? List and explain all elements related to activation record. Also differentiate call by copy restore and call by name. **[7M]**

   (b) Explain in detail about storage organization and storage allocation strategies. **[7M]**

UNIT – V

9. (a) Explain how loop optimization can be done? How they are different from local optimizations. **[7M]**

   (b) Construct the DAG for the following basic block. **[7M]**
   D:=B*C
   E:=A+B
   B:=B+C
   A:=E-D

10. (a) What are the principle sources of optimization? Give the classification of code optimization. **[7M]**

   (b) What is the concept of directed acyclic graph (DAG)? Draw DAG for the following expression:
   (a-b)+((a-b)+c **[7M]**

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UNIT – I

1. (a) Explain in detail about various phases of compiler construction with neat sketches. **[7M]**

   (b) Draw a deterministic and non-deterministic finite automate which accept 00 and 11 at the end of a string containing 0, 1 in it, e.g., 01010100 but not 000111010. **[7M]**

2. (a) Differentiate the pass and phase in compiler construction? Explain single pass and multi pass compiler with example? **[7M]**

   (b) Prepare the predictive parser for the following grammar:

   S→a|b|(T)

   T →T, S|S

   Write down the necessary algorithms and define FIRST and FOLLOW. **[7M]**

UNIT – II

3. (a) Define bottomup parsing.Explain the common conflicts that can be encountered in a shiftreduce parser? **[7M]**

   (b) Apply your parser to an input 'aaab'. What is the conclusion that you draw from the usage of right-recursive grammars in LR parsers? **[7M]**

   Consider the grammar

   S ->AA

   A -> aA | b

   Construct LR(0) parsing table.

4. (a) Define an augumented grammar? Explain handle pruning in detail with example? **[7M]**

   (b) Let us consider the following grammar:

   S -> Aa | bAC | Bc | bBa

   A -> d

   B -> d

   Check the grammar for the parsers CLR(1) and construct CLR(1) parsing table. **[7M]**

UNIT – III

5. (a) Explain briefly syntax directed translation into three address code with suitable example. **[7M]**

    (b) Discuss the different methods for translating Boolean expressions in detail. **[7M]**

6. (a) Explain 3 address codes and mention its types. How would you implement the three address statements? Explain with suitable examples? **[7M]**

    (b) Generate intermediate code for the following code segment along with the required syntax directed translation scheme:
    if (a > b)
    x = a + b
    else
    x = a - b
    Where a and x are of real and b of int type data **[7M]**

UNIT – IV

7. (a) Write short notes on parameter passing. Write short notes on storage organization. **[7M]**

    (b) Define Activation record. Explain briefly about activation record with block diagram. **[7M]**

8. (a) Explain the various data structures used for implementing the symbol table. **[7M]**

    (b) Write Translation scheme for checking the type of following statements:
    S→if E then S1
    S→While E do S1
    S→id:=E **[7M]**

UNIT – V

9. (a) Explain machine dependent code optimization in detail with an example.

    [7M]

    (b) How to trace data-flow analysis of structure program?Explain with examples. **[7M]**

10. (a) Discuss about the following i) Copy propagation ii) Dead code elimination iii) Code motion **[7M]**

    (b) Write the simple code generation algorithm and generate the code for the statement
    W:=(A-B) +(A-C)+(A-C) **[7M]**

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