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Question Paper Code: AIT004



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

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

Regulation: IARE – R16

COMPILER DESIGN

(Common to CSE | IT)

Time: 3 Hours

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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INSTITUTE OF AERONAUTICAL ENGINEERING

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

Regulation: IARE – R16

COMPILER DESIGN

(Common to CSE | IT)

Time: 3 Hours

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) Explain in detail about various phases of compiler construction with neat sketches. [7M]
- (b) Draw a deterministic and non-deterministic finite automata 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:
 $S \rightarrow a|b|(T)$
 $T \rightarrow T, S|S$
 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 shift-reduce 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
 $S \rightarrow AA$
 $A \rightarrow aA | b$
 Construct LR(0) parsing table.
4. (a) Define an augmented grammar? Explain handle pruning in detail with example? [7M]
- (b) Let us consider the following grammar:
 $S \rightarrow Aa | bAC | Bc | bBa$
 $A \rightarrow d$
 $B \rightarrow d$
 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]

