

**III B. Tech I Semester Regular/Supplementary Examinations, December -2023**  
**COMPILER DESIGN**

CSE(AIML), CSE(AI), CSE(DS), CSE(AIDS), AIDS, AIML & CSD

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**  
 All Questions Carry Equal Marks

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**UNIT-I**

- 1 Illustrate the phases of a compiler indicating the inputs and outputs of each phase in translating the statement “amount = principle + rate \* 36.0”. [14M]  
 (OR)
- 2 a) Explain how Lexical analyzer is generated using LEX? [7M]  
 b) Write short notes on input buffering [7M]

**UNIT-II**

- 3 a) Define parser and discuss the role of parser in compilation process. [7M]  
 b) Explain the term ambiguous grammar with appropriate example. [7M]  
 (OR)
- 4 a) Compare bottom-up approaches of parsing with top-down approaches [7M]  
 b) Discuss how Brute-Force approach operates in top down parsing? [7M]

**UNIT-III**

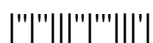
- 5 Construct SLR parsing table for the following grammar [14M]  
 $E \rightarrow E+T/T$   
 $T \rightarrow T * F / F$   
 $F \rightarrow (E) / id .$   
 (OR)
- 6 a) Write short notes on syntax Directed Definition. [7M]  
 b) Discuss the evaluation of semantic rules in SDDs. [7M]

**UNIT-IV**

- 7 a) How symbol table can be managed? Explain. [7M]  
 b) Discuss storage allocation for block structured languages [7M]  
 (OR)
- 8 a) Write the quadruple, triple, indirect triple for the expression  $(a*b) + (c+d) - (a+b+c+d)$ . [7M]  
 b) Write an algorithm for constructing the dependency graph for a given parse tree? [7M]

**UNIT-V**

- 9 List and discuss the issues in the design of a code generator [14M]  
 (OR)
- 10 a) Explain with an example optimization of Basic blocks [7M]  
 b) Describe with suitable example various sources of loop optimization [7M]



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**UNIT-I**

- 1 a) Discuss in detail about the role of Lexical analyzer in compiler construction [7M]  
 b) Elaborate on the issues in Lexical analysis. [7M]

**(OR)**

- 2 a) Define Compiler. What is the importance of Compiler? [7M]  
 b) Write short notes on Finite Automata and its applicability in compilers. [7M]

**UNIT-II**

- 3 a) Explain various types of bottom-up parsers with example. Write the steps to construct LR(0) parsing table. [9M]  
 b) Compare left recursion with left factoring with suitable example. [5M]

**(OR)**

- 4 a) Explain the LR parsing algorithm with an example. [7M]  
 b) Write short notes on Left Factoring. Give its significance in syntax analysis. [7M]

**UNIT-III**

- 5 Find the SLR parsing table for the given grammar and parse the sentence  $(a + b) * c$  [14M]  
 $E \rightarrow E + E / E * E / (E) / id .$

**(OR)**

- 6 a) How do you implement syntax directed definitions? Explain intermediate form of source program with example. [10M]  
 b) Write Short notes on Three address code. [4M]

**UNIT-IV**

- 7 a) What are the various storage allocations in runtime environment? Explain them. [7M]  
 b) Discuss the features of stack memory allocation. [7M]

**(OR)**

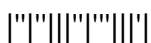
- 8 a) What is an activation record? Explain the role activation record in runtime storage allocation. [7M]  
 b) What is a flow graph? Explain with an example. [7M]

**UNIT-V**

- 9 a) Explain about various levels and types of optimizations. [7M]  
 b) Write short notes on peephole optimization. [7M]

**(OR)**

- 10 a) What is the role of code Optimizer in compiler? Is it a mandatory phase? [7M]  
 b) Explain the role of DAG in optimization with example. [7M]



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**UNIT-I**

- 1 a) What is lexical analysis? List out the functions of a Lexical Analyzer. [7M]  
 b) State the reasons for the Separation of Analyses programs into Lexical, [7M]  
 Syntax, and Semantic Analyses.

(OR)

- 2 a) Write short notes on bootstrapping. [5M]  
 b) Define left recursion. Is the following grammar left recursive? [9M]  
 $E \rightarrow E+E \mid E*E \mid a \mid b .$

**UNIT-II**

- 3 a) What is syntax tree? Draw the annotated parse-tree for the input  $3*5+4n$ . [7M]  
 b) Write Short notes on Recursive Descent Parsing. [7M]

(OR)

- 4 Define a Parser. What is the role of grammars in Parser construction? [14M]  
 Construct the Predictive parsing table for the grammar  $G : E \rightarrow E+T \mid T ,$   
 $E \rightarrow T*F \mid F , F \rightarrow (E) \mid id.$

**UNIT-III**

- 5 a) Construct SLR parsing table for the following grammar: [7M]  
 $R \rightarrow R' \mid R \mid R R' \mid (R) \mid a \mid b .$

- b) Describe the types of LR parsers. [7M]

(OR)

- 6 a) Compare the operating mechanism of LR parser with LL parser. [7M]  
 b) List and Explain the different types of type checking. [7M]

**UNIT-IV**

- 7 a) What is DAG? Explain their role in compilation process. [7M]  
 b) Explain the different storage allocation strategies. [7M]

(OR)

- 8 a) What is code optimization? Give example for any two optimization [9M]  
 techniques.

- b) What is a flow graph? Explain with an example. [5M]

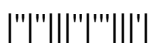
**UNIT-V**

- 9 Write the simple code generation algorithm and generate the code for the [14M]  
 statement

 $W := (A-B) + (A-C) + (A-C) .$ 

(OR)

- 10 a) Explain the three techniques for loop optimization with examples. [7M]  
 b) Write Short notes on Register allocation in Code generation. [7M]



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**UNIT-I**

- 1 Discuss the phases of a compiler with suitable example. [14M]  
 (OR)
- 2 a) What is LEX? Discuss the usage of LEX in Lexical Analyzer generation. [7M]  
 b) Write a note on the parse generator '\_ YACC. [7M]

**UNIT-II**

- 3 a) What do you mean by left factoring the grammars? Explain. [7M]  
 b) List down the conflicts during shift-reduce parsing. [7M]  
 (OR)
- 4 a) List and Explain Pre Processing steps of Top Down Parsing. [7M]  
 b) Explain about Parse tree with suitable example. [7M]

**UNIT-III**

- 5 What is an LR(0) item? Construct an SLR parsing table for the grammar [14M]  
 $G: S \rightarrow L=R \mid R, L \rightarrow *R \mid id, R \rightarrow L$ . Is it SLR(1) grammar?  
 (OR)
- 6 a) Explain bottom up parsing with an example. [7M]  
 b) What is dangling ELSE ambiguity? How to handle it? [7M]

**UNIT-IV**

- 7 a) Define activation records. Explain how it is related with runtime storage allocation. [7M]  
 b) What is Run time Environment? Explain in detail. [7M]  
 (OR)
- 8 a) Obtain the directed acyclic graph for the expression: [9M]  
 $x+x*(y+z)+(y+z)*w$ .  
 b) Write short notes on Basic block focusing on its optimization. [5M]

**UNIT-V**

- 9 a) List and Explain Various possible Outputs of Code Generator. [7M]  
 b) Discuss Global Register Allocation in code generation. [7M]  
 (OR)
- 10 Generate code for the following: [14M]  
 i)  $x=f(a)+f(a)+f(a)$  ii)  $x=f(f(a))$  iii)  $x=++f(a)$   
 iv)  $x=f(a)/g(b,c)$

