# 20CS41E1 - COMPILER DESIGN

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| Course Category: | Professional Elective | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Basics of Programming Languages and Theory of Computation. | Sessional Evaluation:  Univ. Exam Evaluation:  Total Marks: | 40  60  100 |
| Objectives: | * To make the student to understand the process involved in compilation. * Creating awareness among students on various types of bottom up parsers. * Understand the syntax analysis, intermediate code generation, type checking, and the role of symbol table etc. | | |

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| Course Outcomes | Upon successful completion of the course, the students will be able to: | |
| CO1 | Understand the basics of Compiler Design and the role of Lexical Analyzer. |
| CO2 | Study various Syntax analyzers, grammar rules, SLR parsing techniques. |
| CO3 | Get exposure on syntax translation mechanisms to develop interpreters or compilers. |
| CO4 | Identify various storage allocation strategies, intermediate code generation and techniques of accessing non-local data. |
| CO5 | Acquire knowledge on code generation and Run-time storage Management. |
| CO6 | Explore the techniques for code optimization. |
| Course Content | UNIT-I  **Introduction to Compiling:** Language Processors, Phases of a compiler, Cousins of the Compiler. Grouping of phases, Compiler construction tools.  **Lexical Analysis:** Role of the Lexical analyzer, Input buffering, Specification of tokens, Recognition of tokens, The Lexical analyzer Generator Lex.  UNIT-II  **Syntax Analysis:** Role of the parser, Context-free grammars, Writing a grammar, Top-down parsing, Bottom-up parsing.  UNIT-III  **LR Parsers:** Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using ambiguous grammars, Parser generators.  **Syntax-Directed Translation:** Syntax-Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes.  UNIT-IV  **Intermediate Code generation:** Variants of Syntax Trees, Three-Address Code, Types and Declarations, Type Checking.  **Run-Time Environments:** Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack.  UNIT-V  **Code Generation:** Issues in the Design of a code generator, The target Language, Addresses in the target code, Basic blocks and flow graphs, A simple code generator, Register allocation and assignment.  UNIT-VI  **Code Optimization:** The principal sources of optimization, Peephole Optimization, Introduction to Data flow Analysis, Loops in flow graphs- Dominators, Depth-First Ordering, Edges in a Depth-First Spanning Tree, Depth of a Flow Graph, Natural Loops. | |
| Text Books &  Reference  Books | **TEXT BOOKS:**   1. Compilers, Principles Techniques and Tools.Alfred V Aho, Monical S. Lam, Ravi Sethi Jeffery D. Ullman,2nd edition, pearson,2007   **REFERENCE BOOKS:**   1. Alfred V.Aho, Jeffrey D.Ullman, Principles of Compiler Design,Publications. 2. Compiler Design K.Muneeswaran, OXFORD 3. Principles of compiler design,2nd edition,Nandhini Prasad,Elsevier 4. Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning | |
| E-Resources | 1. <https://nptel.ac.in/courses> 2. [https://freevideolectures.com/university//iitm](https://freevideolectures.com/university/iitm) | |