| Course code: Course Title | Course Structure | | | Pre-Requisite |
|---|---|---|---|---|
| SE304: Compiler Design | L | T | P | Theory of Computation |
| | 3 | 1 | 0 | |

**Course Objective:** To study the design of all the phases of compiler in detail.

| S. NO | Course Outcomes (CO) |
|---|---|
| CO1 | Demonstrate basic concepts of compiler and compilation of different phases. |
| CO2 | Represent language tokens using regular expressions, context free grammar and finite automata and design lexical analyzer for a language. |
| CO3 | Design syntax directed translation schemes for a given context free grammar. |
| CO4 | Evaluate symbol table structures, runtime memory management strategies, and error detection & recovery methods to enhance compiler efficiency. |
| CO5 | Apply optimization techniques to intermediate code and generate machine code for high level language program. |

| S. NO | Contents | Contact Hours |
|---|---|---|
| UNIT 1 | **Introduction:** Definition, Phases and Passes, FSM & RE's and their application to Lexical Analysis, Implementation of Lexical Analyzers, Lexical- Analyzer Generator, Lex – Compiler. | 6 |
| UNIT 2 | **Syntax Analysis:** Formal Grammar and their application to Syntax Analysis, BNF Notation,. The Syntactic specification of Languages: CFG, Derivation and Parse Trees, Shift Reduce Parsing, Operator precedence parsing, top down Parsing, Predictive Parsers.<br><br>LR Parsers, the canonical collection of LR(0)items, constructing SLR Parsing Tables, Constructing canonical LR Parsing tables and LALR parsing tables, An Automatic Parser Generator, YACC. | 12 |
| UNIT 3 | **Syntax Directed Translation:** Syntax directed Translation Schemes, Implementation of Syntax directed translators, Intermediate Code, Postfix notation, Parse Trees and Syntax Trees, Three address Code, Quadruple & Triples, Translation of Assignment Statements, Boolean expressions, Control Statements, Array references in Arithmetic expressions , Procedure Calls , Declarations and Case statements Translations. | 10 |
| UNIT 4 | **Symbol Tables:** Data Structure for Symbol Tables, representing scope information. Run Time Administration: Implementation of simple Stack allocation scheme, storage allocation in block structured language. | 4 |
| UNIT 5 | **Error detection and Recovery:** Lexical phase errors, syntax phase errors, semantic errors and Error recovery techniques. | 4 |
| UNIT 6 | **Code Optimization**: Loop optimization, the DAG representation of basic blocks, value numbers and Algebraic Laws, Global Data – Flow Analysis and Code generation. | 6 |
| | **TOTAL** | 42 |

**REFERENCES**

| S.No. | Name of Books/Authors/Publishers | Year of Publication / Reprint |
|---|---|---|
| 1 | Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers Principles, Techniques, & Tools", 2nd Edition, Pearson Addison Wesley. | 2007 |