**ICFAI Foundation for Higher Education, Hyderabad**

**Faculty of Science and Technology (IcfaiTech)**

**Second Semester, 2018-19**

**Course Handout**

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| **Course No** | **Course Title** | **L** | **P** | **U** |
| CS325 | Programming Languages and Compiler Construction | **3** | **0** | **3** |

**Instructor-in-charge : 1.MADHU.BANDARI ,** 2. DR. SANDEEP KUMAR PANDA

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| **Learning Outcomes:**  After successful completion of the course student will be able to  **1.** Ability to design, develop and implement a compiler for any language.  **2.** Able to use lex and yacc tools for developing a scanner and a parser.  **3.** Gain the knowledge about symbol tables and generating intermediate code.  **4.** Ability to design algorithms to generate machine code.  **5**. Able to design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity. |

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| Text Book T | Compilers Principles, Techniques and Tools, Alfred V. Aho, Monica S Lam, Ravi Sethi, Jefferey D. Ullman, Second edition, Pearson, 2012 |
| Reference book(s) R1 | Principles of Compiler Design, V. Raghavan, Tata Mc Graw Hill, Fourth print, 2012 |
| Reference book(s) R2 | Compilers Principles and Practice, Parag H. Dave, Himanshu B. Dave, Pearson, 2012 |
| SWAYAM | https://swayam.gov.in/courses/5408-jan-2019-compiler-design |
| NPTEL | https://nptel.ac.in/courses/106108113/ ( NPTEL ) |
| MOOC | \*\*\*\* |

**Lecture-wise plan:**

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| **Lecture**  **No.** | **Learning Objective** | **Topics to be covered** | **(Ch/Sec/Pg**  **Text Book** |
| 1 | Overview | |  | | --- | | * Computability & Programming, * Machine Programming Language(s). | | Class Notes |
| 2 | Brief History of Programming Languages | |  | | --- | | * Execution models, * Compilation V/S, Interpretation. * Intermediate languages, * Virtual Machines. | | Class Notes |
| 3-4 | Structure of a compilers | |  | | --- | | * Components of a compiler, * Phase’s V/S Passes, * Compile-time V/S, Run-time. | | T, Ch 1 |
| 5-8 | Lexical Analysis | |  | | --- | | * Input Buffering * Tokens, patterns, lexemes, * Transition Diagram * based Lexical Analysis | | T, Ch 3  R1, Ch 2 |
| 9-10 | Syntax Analysis Top Down Parsing | |  | | --- | | * Types of parsing * LL(1) Grammars, * Recursive Descent Parsing, | | T, Ch 4  R1, Ch 3 |
| 11-12 | Top down Parsing | * Recursive Predictive parsing | T, Ch 4  R1, Ch 3 |
| 13-19 | Syntax Analysis Bottom Up Parsing | |  | | --- | | * LR parsing, * LR(0), * SLR, * LR(1), * LALR Parsers | | T, Ch 4  R1, Ch 3 |
| 20-21 | Syntax Directed Translation | |  | | --- | | * Parse Tree, * Abstract Syntax, * Static Analyses | | T, Ch 2,  T, Ch 5 |
| 22-24 | Intermediate Code Generation | * Variants of Syntax Tree, * Three Address code, * Types and declaration and evaluation | T, Ch 6  R1, Ch 5 |
| 25-27 | Type Checking | * Rules, Control flow, * Back patching, * Switch statements | T, Ch 6 |
| 28-30 | Run Time Environment | * Stack allocation, * Access to non local Data, * Heap management | T, Ch 7 |
| 31-36 | Techniques of Optimization | * Simple code generator, * peephole optimization, * Register allocation | T, Ch8  R1, Ch 7 |
| 37-38 | Code Generation | * Design issues, * Target Language, * Basic blocks and flow graphs, * Optimization of basic block | T, Ch 8  R1, Ch 6 |
| 39-40 | Machine Independent optimization | * Principal sources, * Data-Flow analysis, * DAG representation of Basic Blocks | T, Ch 9 |
| 41-46 | Loops in flow graphs | * Introduction to Data Flow analysis * Reaching definition * Use Definition chains * Live variable analysis | T, Ch 9 |

**Chamber Consultation Hour**:

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| S.No | Faculty Name | Day | Timings |
| 1 | Madhu.Bandari | Wednesday | 9:30 - 11:15 |
| 2 | Dr.Sandeep Kumar Panda | Thursday | 9:30 - 11:15 |

**Evaluation Scheme:**

Student evaluation is based on the series of tests and quizzes conducted during the course of semester followed by a comprehensive examination.

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| **Evaluation Component** | **Duration** | **Weightage** | **Date** | **Syllabus (Lec.No.)** | **Remarks** |
| Test1 | 50 Minutes | 25 | 12/01/19 | 1-12 | CB |
| Test2 | 50 Minutes | 25 | 16/02/19 | 13-25 | CB |
| Test3 | 50 Minutes | 25 | 16/03/19 | 26-38 | OB |
| Unannounced Quizzes (2) | 20 Minutes | 5+5=10 |  |  |  |
| Comprehensive Exam | 3 Hours | 40 | 15/04/19 A.N | 1-46 | CB |

**Make-up Policy**: Refer to student Handbook section 6.5 for the Makeup Policy. Prior and proper information to the concerned instructor is a must and the student should maintain a minimum attendance.

**General:** All students are advised to attend classes regularly and strictly maintain an attendance of 75% at least. Students failing to maintain the required percentage of theory/practical attendance will not be permitted to appear for the tests and examinations.

***It is expected that students refrain from using cell phones during lectures and in the labs. The cell phone must be kept switched off and used only during recess or outside class hours.***

**Madhu.Bandari**

**Instructor-In-charge**