INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
DEVI AHILYA UNIVERSITY, INDORE

M. Tech. (IT) 5 ½ Years

X SEMESTER

JANUARY – MAY 2013

Sub. Code	Subject Name	Credit
IT-1001	Formal Language Theory	4
IT-1002	Parallel Processing	4
IT-1003	Research in computing	6
IT-1004	Comprehensive Viva	4
IT-1005	Project	6

INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES, DAVV, INDORE
M. Tech. (IT) 5 ½ Years X SENESTER
IT-1001: Formal Language Theory

Aim of Course: To make students know about the basic concepts of Computation through formal languages and grammars with their implementation in language processing including compilers and Natural Language Processing.

Objectives:

The course is designed to make students:

- Understand regular expressions, which are used to specify string patterns in many contexts, from office productivity software to programming languages.
- Study finite automata, another formalism mathematically equivalent to regular expressions, Finite automata are used in circuit design and in some kinds of problem-solving.
- Learn Context-free grammars that used to specify programming language syntax.
- Understand various phases of compilers theoretically as well as practically so as to have the actually feeling of its working.
- Understand basic concepts of natural language processing.

Course Contents:

UNIT I

Introduction to Formal Languages – Strings, Operations on String, Operations on language. Introduction to Grammars: - Definition, Chomsky classification of grammars, grammars and languages.

Context-Free Languages – Context Free grammars, Leftmost derivations and Rightmost Derivations, Derivation Trees. Parsing – Parsing and Ambiguity, Chomsky Normal Form, Cocke-Kasami-Younger Algorithm.

UNIT II

Theory of Automata: - Finite Automata, Deterministic Finite Automata (DFA), Languages and DFAs. Non-Deterministic Finite Automata - Definition, Equivalence of Deterministic and Nondeterministic Finite Automata. Minimization of Finite Automata – Definition and Construction

UNIT III

Regular Expressions - Definition, Connection between Regular Expressions and Regular Languages, Obtaining regular expressions from finite automata. Regular Grammars - Regular Grammars – Right and Left Linear Grammars, Equivalence between Regular Languages and Regular Grammars.

UNIT IV

Application of Formal Language Theory in Compiler Design: - Language Processors, Types of compilers, and phases of compilation process. Lexical Analysis, Bottom-up parsing and Top down parsing techniques.

UNIT V

Natural Language Processing – Introduction, Morphology and Finite State Transducers, Context Free grammars for English Language, Parsing with Context Free Grammar.

Reference Books:

1. K.L.P. Mishra, N. Chandrasekaran, Theory of Computer Science (Automata, Languages and Computation), Prentice Hall of India.
2. Alfred V. Aho, Ravi Sethi, Jeffery D. Ullman, Compilers: Principles, Techniques, and Tools, Addison Wesley Longman
3. Daniel Jurafsky and James H. Martin, Speech and Language Processing: An Introduction to Natural Language Processing Computational Linguistics, and Speech Recognition, Prentice- Hall, 2000. (http://www.cs.colorado.edu/_martin/slp.html)
4. Hopcraft and Ullman, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House.
5. Moll, Arbib and Kfoury, An Introduction to Formal Language Theory, Springer-Verlag.
6. Peter Linz, An Introduction to Formal Languages and Automata, Narosa Publishing House.

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IT-1002: Parallel Processing

Aim of Course: To make students acquainted with parallel processing machines and programming techniques for effective use of them.

Objectives:

The course is designed to make students:

- Learning fundamental parallel processing concepts
- Learning parallel machine structure.
- Learning parallel algorithm design.
- Learning of interconnecting networks for parallel machine
- Programming using threads.
- Data flow and Wave front system

Course Contents:

UNIT I

Introduction to Parallel Processing: Parallelism in uni-processor System, Parallel Computer Structures, Architectural Classification Schemes, Parallel Processing Applications (Assignment). Program and Network Properties: Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanisms , System Interconnection Architecture

UNIT II

Pipeline Computers and Vectorization Methods: Vector Super Computers , Early Vector Processors, Recent Vector Processors, Vector Processing Requirements.

UNIT III

Structures and Algorithms for Array Processors: SIMD Array Processors , SIMD Interconnection networks, Parallel Algorithms for Array Processors , Associative Array Processors, Massively Parallel Processors, Performance Enhancement Methods

UNIT IV

Multiprocessor Architecture and Programming: Interconnection Networks, Functional Structures, Parallel memory Organization, Multiprocessor Operating System, Exploiting Concurrency for Multiprocessing.

UNIT V

Multiprocessing Control and Algorithms: Interprocesses Communication Mechanisms, System Deadlocks and Protection, Multiprocessor Scheduling Strategies, Parallel Algorithms for Multiprocessors

Reference Books:

1. Kai Hwang & A. Briggs, Computer Architecture and Parallel Processing, McGraw Hill [TB1]
2. Kai Hwang, Advanced computer Architecture-Parallelism, Scalability, Programmability, McGraw Hill [TB2]
3. Michael J. Quinn, Parallel Computing-Theory and Practice, McGraw Hill
4. J.M. Crichlow , An Introduction to Distributed and Parallel computing, Prentice Hall
5. A.S. Tanenbaum, Modern Operating System, Prentice Hall.