B. Tech (Computer Science & Engineering)

SEMESTER –V

Sl No.	Course Code	Course Title	Hours Per Week			Total Credits
			Lecture	Tutorial	Practical	
1.	100508	**Professional Skill Development**	**3**	**0**	**0**	**3**
2.	105501	**Artificial Intelligence**	**3**	**0**	**0**	**3**
3.	105502	**Database Management Systems**	**3**	**0**	**0**	**3**
4.	105503	**Formal Language & Automata Theory**	**3**	**1**	**0**	**4**
5.	105504	**Software Engineering**	**3**	**0**	**0**	**3**
6.	105505	**Seminar**	**1**	**0**	**0**	**1**
7.	100510P	**Summer Entrepreneurship-II**	**-**	**-**	**-**	**6**
8.	100511P	**NPTEL Courses-2**	**0**	**0**	**4**	**2**
9.	105502P	**Database Management Systems Lab**	**0**	**0**	**4**	**2**
		TOTAL				**27**

SEMESTER –V
Course Code-   Professional Skill Development   3 0 0 3

Unit- 1.0:   **7 hrs**
Communication skills: Public speaking, Group discussion, Gestures and body language & professional presentation skills.
Unit- 2.0   **7 hrs**
Interpersonal skills: Group dynamics, Negotiation skills, Leadership, Emotional intelligence.
Unit- 3.0   **7 hrs**
Employability and Corporate Skills: Time management and effective planning, Stress management, People skills, Team work,
Unit- 4.0   **7 hrs**
development of leadership qualities, Decision making and Negotiation skills,
Unit- 5.0   **7 hrs**
Positive attitude, Self-motivation, Professional ethics, Business etiquettes, balancing board room.
Unit- 6.0   **7 hrs**
Business writing skills, Resume Writing. Interview Skills, Technical Presentation, Guest Lecture, Professional Ethics, Project Management, Entrepreneurship.

Text/ Reference:-
1. "Personality Development and Soft Skills", Barun Mitra, Oxford University Press
2. "Managing Soft Skills for Personality Development", B.N. Ghosh, McGraw Hill
3. "Communication Skills and Soft Skills: An Integrated Approach", E. Suresh Kumar, Pearson.
4. "Communication to Win", Richard Denny, Kogan Page India Pvt. Ltd

Course Code-   Artificial Intelligence   3 0 0 3

Unit-1.0: Introduction: **7 hrs**
Overview, Turing test, Intelligent agents.

Unit-2.0: Problem Solving: **7 hrs**
Solving Problems by Searching: Uninformed search - Depth First Search, Breadth First Search, DFID, Heuristic search - Generate and Test, Best First Search, Beam Search, Hill Climbing, A*,

Unit-3.0:   **7 hrs**
Problem reduction search – AND/OR Graphs, AO*, Constraint satisfaction, Means-ends analysis, Stochastic search methods - Simulated Annealing, Particle Swarm Optimization, Game Playing - Minimax algorithm, Alpha-beta pruning.

Unit-4.0: Knowledge and Reasoning: **7 hrs**
Building a knowledge base - Propositional logic, first order logic,
Inference in first order logic, Resolution – refutation proofs, Theorem Proving in First Order Logic; Planning, partial order planning, Uncertain Knowledge and Reasoning, Probabilities, Bayesian Networks.

Unit-5.0: Learning: **7 hrs**
Overview of different forms of learning: unsupervised, supervised, semi-supervised, K-means clustering algorithm, Decision Trees, Neural Networks, Deep Learning.

Unit-6.0: Advanced topics: **7 hrs**
Introduction to Computer Vision, Natural Language Processing, Expert Systems, Robotics, Genetic Algorithm,

Text/ Reference:-
1. S. Russell and P. Norvig, "Artificial Intelligence: A Modern Approach," Prentice Hall
2. E. Rich, K. Knight and S. B. Nair, "Artificial Intelligence," TMH.
3. C. Bishop,"Pattern Recognition and Machine Learning," Springer
4. D. W. Patterson, "Introduction to artificial intelligence and expert systems," Prentice Hall
5. A. C. Staugaard, Jr., "Robotics and AI: An Introduction to Applied Machine Intelligence," Prentice Hall
6. I. Bratko, "Prolog Programming for Artificial Intelligence," Addison-Wesley
7. S. O. Haykin, "Neural Networks and Learning Machines," Prentice Hall
8. D. Jurafsky and J. H. Martin, "Speech and Language Processing," Prentice Hall.

Course Code-   Database Management Systems   3 0 0 3

Unit 1.0- Database system architecture   8 hrs
Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).
Data models: Entity-relationship model, network model, relational and object oriented data models, integrity constraints, data manipulation operations.

Unit 2.0- Relational query languages: 10 hrs
Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.
Relational database design: Domain and data dependency, Armstrong's axioms, Normal forms, Dependency preservation, Lossless design.
Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms.

Unit 3.0 – Storage strategies: 4 hrs
Indices, B-trees, hashing.

Unit 4.0- Transaction processing: 8 hrs
Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp based schedulers, Multi-version and optimistic Concurrency Control schemes, Database recovery.

Unit 5.0 – Database Security: 6 hrs
Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.

Unit 6.0- Advanced topics: 6 hrs
Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.

Text/ Reference:-
1. "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.
2. "Principles of Database and Knowledge – Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.
3. "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education
4. "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison -Wesley.

Course Code-   Formal Language & Automata Theory   3 1 0 4

Unit- 1.0: Introduction: 5 hrs
Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

Unit- 2.0: Regular languages and finite automata   9 hrs
Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, pumping lemma for regular languages, minimization of finite automata

Unit- 3.0: Context-free languages and pushdown automata: 8 hrs
Context-free grammars (CFG) and Context-free languages (CFL), Chomsky and Greibach normal forms, nondeterministic pushdown automata (PDA) and equivalence with CFG, parse trees, ambiguity in CFG, pumping lemma for context-free languages, deterministic pushdown automata, closure properties of CFLs.

Unit- 4.0: Context-sensitive languages: 5 hrs
Context-sensitive grammars (CSG) and Context-sensitive languages, linear bounded automata and equivalence with CSG.

Unit- 5.0: Turing machines: 8 hrs
The basic model for Turing machines (TM), Turing recognizable (Recursively enumerable) and Turing-decidable (recursive) languages and their closure properties, variants of Turing machines, nondeterministic TMs and equivalence with deterministic TMs, unrestricted grammars and equivalence with Turing machines, TMs as enumerators.

Unit-6.0: Undecidability: 7 hrs
Church-Turing thesis, universal Turing machine, the universal and diagonalization languages, reduction between languages and Rice's theorem, undecidable problems about languages.

Text/ Reference:-
1. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages, and Computation, Pearson Education Asia.
2. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson EducationAsia.
3. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
4. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
5. John Martin, Introduction to Languages and the Theory of Computation, Tata McGraw Hill.

Course Code-   Software Engineering   3 0 0 3

Unit- 1.0: Introduction: **8 hrs**
What is Software Engineering and its history, software crisis, Evolution of a Programming System Product, Characteristics of Software, Brooks' No Silver Bullet, and Software Myths, Software Development Life Cycles: Software Development Process, The Code-and-Fix model, The Waterfall model, The Evolutionary Model, The Incremental Implementation, Prototyping, The Spiral Model, Software Reuse, Critical Comparisons of SDLC models, An Introduction to Non-Traditional Software Development Process: Rational Unified Process, Rapid Application Development, Agile Development Process.

Unit- 2.0 Requirements: **8 hrs**
Importance of Requirement Analysis, User Needs, Software Features and Software Requirements, Classes of User Requirements: Enduring and Volatile, Sub phases of Requirement Analysis, Functional and Nonfunctional requirements, Barriers to Eliciting User requirements, The software requirements document and SRS standards, Requirements ngineering, Case Study of SRS for a Real Time System. Tools for Requirements Gathering: Document Flow Chart, Decision Table, Decision Tree, Introduction to nontraditional Requirements.

Unit- 3.0 Software Design: **6 hrs**
Goals of good software design, Design strategies and methodologies, Data oriented software design, Coupling, Cohesion, Modular structure, Packaging, Structured Analysis: DFD, Data Dictionary, Structured Design: Structure chart, Object oriented design, Top-down and bottom-up approach, UML, UML Diagrams, Design patterns.

Unit- 4.0 Software Project Management: **6 hrs**
Overview of Project Manager Responsibilities & project planning, Software Measurement and Metrics: Line of Code (LOC), Function Point (FP) based measures, Various Size Oriented Measures: Halstead's software science, Project Size estimation Metrics Project Estimation, Techniques, COCOMO, Staffing Level Estimation, Scheduling, Organization & Team Structures Staffing, Risk Management.

Unit- 5.0 Software Coding & Testing: **7 hrs**
Development: Selecting a language, Coding guidelines, Writing code, Code documentation. Testing process, Design of test cases, Functional Testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing, Cyclomatic Complexity Measures: Control flow graphs, Path testing, Data flow and mutation testing, Unit testing, Integration and system testing, Debugging, Alpha & beta testing, testing tools & standards.

Unit- 6.0 Software Maintenance: **7 hrs**
Management of maintenance, Maintenance process, Maintenance models, Regression testing, Reverse engineering, Software reengineering, Configuration management, documentation. Software Reliability & Quality Management: Introduction to reliability and metrics to reliability measure, Overview of S/W Quality management System ISO 9000, SEI CMM

Text/ Reference:-
1. Software Engineering: A Practitioner's Approach, R. S. Pressman, McGraw Hill
2. Fundamental of Software Engg. By Rajib Mall 4th edition PHI
3. A Concise Introduction to Software Engineering By Pankaj Jalote.
4. Zero Defect Software, G. G. Schulmeyer, McGraw-Hill
5. Object Oriented Modeling and Design, J. Rumbaugh, Prentice Hall
6. Software Engineering, K.K. Aggarwal, Yogesh Singh, New Age International Publishers.

Course Code-   Database Management Systems Lab   0 0 4 2

Hands-on experiments related to the course contents of Database Management Systems theory.