SEMESTER-I

Paper No.	Title of the Paper/s	End Semester Examination		Internal Assessment		Total Maximum Marks	Total Minimum Marks
		Max.	Min.	Max.	Min.		
1	Digital Electronics and Microprocessor	80	29	20	7	100	36
2	Advance Computer Network	80	29	20	7	100	36
3	OOPs using JAVA	80	29	20	7	100	36
4	Advanced Operating System	80	29	20	7	100	36
5	Lab 1: Digital Electronics	100	36	--	--	100	36
6	Lab 2: Java Programming	100	36	--	--	100	36
					Total Marks	600	

SEMESTER-II

Paper No.	Title of the Paper/s	End Semester Examination		Internal Assessment		Total Maximum Marks	Total Minimum Marks
		Max.	Min.	Max.	Min.		
1	Analysis and Design of Algorithm	80	29	20	7	100	36
2	Relational Database Management System (RDBMS)	80	29	20	7	100	36
3	Data Structure using C++	80	29	20	7	100	36
4	Software Engineering	80	29	20	7	100	36
5	Lab 3: RDBMS	100	36	--	--	100	36
6	Lab 4: Data Structure using C++	100	36	--	--	100	36
					Total Marks	600	

Note: Internal assessment of 20 marks will consist of two parts -
1. Unit Test (10 Marks): Two tests will be conducted and average of these tests will be the marks of Unit Test.
2. Seminar/Assignment (10 Marks): To be conducted by the Department concerned.

SEMESTER-III

Paper No.	Title of the Paper/s	End Semester Examination		Internal Assessment		Total Maximum Marks	Total Minimum Marks
		Max.	Min.	Max.	Min.		
1	Theory of Computation and Compiler Design	80	29	20	7	100	36
2	Artificial Intelligence and Expert System	80	29	20	7	100	36
3	Soft Computing	80	29	20	7	100	36
4	. NET Technology	80	29	20	7	100	36
5	Lab 5: MATLAB	100	36	--	--	100	36
6	Lab 6:Programming through .NET	100	36	--	--	100	36
					Total Marks	**600**	

SEMESTER-IV (In paper-2, Student have to choose any one Elective out of four)

Paper No.	Title of the Paper/s	End Semester Examination		Internal Assessment		Total Maximum Marks	Total Minimum Marks
		Max.	Min.	Max.	Min.		
1	Advance trends and Technology in Computer Science	80	29	20	7	100	36
2	Elective: I Data Mining and Data Ware Housing	80	29	20	7	100	36
2	Elective: II Computer Graphics and Multimedia	80	29	20	7	100	36
2	Elective: III Embedded System Network	80	29	20	7	100	36
2	Elective: IV Security and Cryptography	80	29	20	7	100	36
3	Major Project	400	144	--	--	400	144
					Total Marks	**600**	
					GRAND TOTAL	**2400**	

SEMESTER-I
PAPER-I
DIGITAL ELECTRONICS AND MICROPROCESSOR

UNIT–I
Evolution of Digital System & Logic Families
Semiconductor Materials, Types of Solids, Imperfections and Impurities in Solids, pn Junction Diodes, BJTs and other junction Devices, FET and MOSFET, Digital Electronic Signals and Switches, Diode and Transistor as a Switch, Logic Families – Significance and Types, Electrical characteristics of logic families, Comparison of Different Logic Families.

UNIT–II
Boolean concepts and Design of Combinational Circuits
Fundamentals of Logic Gates: AND Gate, OR Gate, Inverter, NAND Gate, NOR Gate. Boolean Algebra and Simplification Techniques: Introduction to Boolean Algebra, Simplification Techniques: Sum-of-Products Boolean Expressions, Product-of-Sums Expressions, Karnaugh Maps for Multi-Output Functions, Karnaugh Map Method, Karnaugh Map for Boolean Expressions with a Larger Number of Variables.

UNIT–III
Design of Combinational Circuits
Implementing Combinational Circuits using K-Map: Half-Adder, Full Adder, Half-Subtractor, Full Subtractor, BCD Adder, Design of code converters, comparators and various Circuits: BCD to excess- 3 code and excess-3 to BCD converters, Binary to Gray Code and Gray Code to Binary Code converter, One & Two Bit Comparator, BCD to 7-segment decoder, BCD to 84-2-1 code converter and other code converter, Carry Propagation–Look-Ahead Carry Generator, Multipliers. Design of Multiplexers, Demultiplexers, Decoder and Encoder.

UNIT–IV
Design of Sequential Circuit
Introduction to sequential circuits: Moore and Mealy machines, Introduction to flip-flops like SR, JK, D & T with truth tables, logic diagrams, and timing relationships, Conversion of Flip-Flops, Excitation table, State tables, and realization of state stables, Design of shift registers, Counters: Ripple (Asynchronous) Counter, Synchronous Counter, UP/DOWN Counters, Design of Different Synchronous Counter using K-Map, Design of sequence generators and detectors, Introduction to Programmable Devices, Architecture of PLDs.

UNIT–V
Microprocessors System
Introduction to Microprocessors, Evolution of Microprocessors and family of microprocessor, Architecture of Microprocessor, Microprocessor Instructions, Addressing Modes and needs, Absolute or Memory Direct Addressing Mode, Immediate Addressing Mode, Register Direct Addressing Mode, Register Indirect Addressing Mode, Indexed Addressing Mode, Implicit Addressing Mode and Relative Addressing Mode.

Text Books:
1. Digital Electronics, William H. Gothmann, PHI
2. Introduction to Digital Systems, Palmer and Perlman,Tata Mc Graw-Hill
3. A Systematic Approach to Digital Design, Fletcher, Prentice Hall.
4. Digital Design, M. Mano, PHI
5. Microprocessors; Principal and Application, Gilmore, Tata Mc Graw-Hill
6. Circuit Design and Simulation with VHDL, V. Pedroni, MIT Press

Reference Book:
1. Digital Design , Samuel Lee, Pearson
2. The Intel Microprocessor- Architecture, Programming and Interfacing, Brey, PHI.
3. Introduction to Microprocessor for Engineers and Scientists, Hosh and Sridhar, PHI.

SEMESTER-I
PAPER-II
ADVANCE COMPUTER NETWORK

UNIT–I
Basics of Data Communication
Introduction to Computer Networks, Network Hardware and Software, OSI and TCP/IP Reference Models, Network topology ,Data Communications, Communication System, transmission modes.

UNIT–II
Physical layer and Media
Data and Signal, Transmission Impairment, Digital and Analog Transmission, Transmission media: Guided media, Wireless transmission: Electromagnetic spectrum, Radio and Micro Waves, Infrared, Light wave, Spread Spectrum Systems, Multiplexing, and Switching: Circuit Switched Network, Datagram Network, and Virtual Circuit Network.

UNIT–III
Data Link Layer
Data link layer design issues: Services, Framing, Error detection and correction, Error and flow control, Stop-and-Wait protocol, Sliding Window protocol, HDLC, Channel allocation: Static and Dynamic allocation, Multiple Access Protocols: ALOHA, CSMA, Collision-free and limited-contention protocols, Virtual LAN, LAN and MANs: IEEE Standards for LAN and MAN, High Speed LAN, Bluetooth, Cellular telephony, Broadband wireless technologies, Wireless LAN, Transmission in ISDN, Broad Band ISDN , ATM Networks.

UNIT–IV
Upper Layers
Network Layer: Design Issues in Networks, Routing Algorithms, Congestion Control Algorithms, Internet Protocol (IP), ICMP, IGMP, Delivery, Forwarding and routing, IP Address, Need of Subnetting, and Internetworking, Transport Layer: Services of transport layer , TCP, UDP and SCTP Protocols, Quality of Service, Services of presentation layer, Overview of application layer protocol: Telnet, DNS, SNMP, SMTP, FTP, TFTP, BOOTP, HTTP Protocols, Firewalls.

UNIT–V
Advanced Concept and Network Security
Over View of Cellular Networks, Adhoc Networks, Mobile Adhoc Networks, Wireless Medium Access Control, Properties of a MANET, Sensor Networks, Virtual Private Networks, Mobile Network Layer: Mobile IP. Network Security: Cryptography, Symmetric key and Asymmetric key cryptography, Security services: Confidentiality, Integrity and authentication, Digital signature, IP security.

Text Books:
1. Data Communication and Networking, Behrouz A. Forouzan, Tata McGraw-Hil, Fourth edition, 2006.
2. Computer Networks, Andrew S. Tanenbaum, PHI / Pearson Education Inc.,

3. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W. Ross, Pearson Education Inc., New Delhi.
4. Data and computer Network Communication, Firewall Media, Shashi Manjal,First Edition, 2007.
5. Network Security and Management, Brijendra Singh, PHI Learning Private limited.
6. Computer Network, Udit Agarwal, Dhanpat Rai and Co., 2013.
7. Cryptography and Network Security By William Stallings, 4th Edition Pearson Publication
8. Introduction to Data Communications and Networking, Wayne Tomasi, Pearson Education Inc., New Delhi.
9. Network Security and Cryptography, Bernard Menezes, Cengage Learning, 2010.

Reference Books:

1. Data and Computer Communication, William Stallings, Pearson Education.
2. Computer and Communication Networks, Nader F. Mir, Pearson Education, 2007.
3. Data & Computer Communication, Black, PHI.
4. Communication Networks, Walrand, TMH.
5. Internetworking with TCP/IP, Douglas E. Comer, and Prentice Hall India.

SEMESTER-I
PAPER-III
OOPs USING JAVA

UNIT–I
An overview of Java
Object-Oriented Programming: Classes and Objects, Variables, Constants, and Data Types, Primitive Data Types, Variable Scope, Wrappers, Conditional Statement if, switch Statement, Inheritance, Method Overriding, Class Methods: Method Arguments, Method Overloading, Constructors, Keyword super, this, final, static, Passing by Value, passing by Reference, Variable Scopes, Life Cycle of a Java Program, JDK and JRE, Java Editions, Polymorphism, Dynamic method dispatch.

UNIT-II
Package, Applet, Swing and JDBC
Packages, Interfaces, and Encapsulation, Abstract Classes, , Graphic User Interface, Event Handling , Java Applets: Writing Applets Using Swing, Error Handling, Java Exceptions, Databases Using JDBC: JDBC Driver Types.

UNIT–III
Network-Socket Programming and JDBC
Introduction to Collections and Introduction to Generics, Java Serialization, Network Programming, Socket Programming, and Processing E-Mails with Java: Protocols and Servers, Creating Mailer, Required Supporting Classes, Writing the Mail Sender, Introduction to Multi-Threading, Swing with J-Table: J-Table and the MVC Paradigm, Remote Method Invocation (RMI), Writing RMI Clients, Finding Remote Objects. Java Enterprise Edition Overview: JCP, JSR, and Other Acronyms, Tiers of Java EE Applications.

UNIT–IV
Servlet, Java Beans and JNDI
What is Servlet?, Deploying a Servlet, Installing Glass Fish Plug-In for Eclipse, creating Servlet with Eclipse, Browser-Servlet Data Flow, HTTP Get and Post Requests, Cookies, Server-Side http Session, Filters, Event Listeners, Asynchronous Servlets. Java Server Pages (JSP): Embedding Java Code into HTML, Implicit JSP Objects, Overview of the JSP Tags, Directives, Declarations, Expressions, JavaBeans, JSTL. Developing Web Applications with servlet and JSP.

UNIT–V
Enterprise JavaBeans (EJB) and other APIs
Overview of EJB, Types of EJB, Stateless and Stateful Session Beans, Singleton Beans, Deploying EJB, Message-Driven Beans, Timer Service. Introduction to the Java Persistence API: Mapping Objects to Database Tables, JPQL, Overview of Spring MVC, Introduction to Hibernate Framework

Text Books:
1. The Complete Reference – Java, Herbert Schildt, Tata McGraw Hill.
2. Introduction to Programming with JAVA – A Problem Solving Approach , John Dean, Raymond Dean, Tata Mc Graw Hill

3. Java Programming, Joyce Farrell, Cengage Learning.
4. Java Programming: A Practical Approach, C. Xavier, Tata McGraw Hill,
5. Introduction to Java programming: comprehensive version, Y. Daniel Liang, Pearson Education

Reference Books:

1. Java Fundamentals – A Comprehensive Introduction, Herbert Schildt, Dale Skrien, Tata McGraw Hill.
2. Java Programming: From the Ground Up, Ralph Bravaco, Shai Simonson, and Tata McGraw Hill Edition.
3. Java Programming, D.S.Malik, Cengage Learning.
4. Core Java for Beginners, Rashmi Kanta Das, Vikas Publishing House Pvt. Ltd.
5. Using JAVA 2, Joseph L weber, PHI
6. JSP Java Server Pages, Barry Burd, IDG Books India(p) Ltd
7. Java2, swing, servlets, JDBC & JAVA Beans Programming Black Book Steven Holzner, Dreamtech press.

SEMESTER-I
PAPER-IV
ADVANCED OPERATING SYSTEM

UNIT–I
Operating System Basics

Processor Registers, Instruction Execution, Interrupts, Interrupts and the Instruction Cycle, Interrupt Processing, Multiple Interrupts, Multiprogramming, The Memory Hierarchy, Cache Memory, I/O Communication Techniques, Programmed I/O, Interrupt-Driven I/O, Direct Memory Access, Operating System Objectives and Functions, Types of Operating system.

UNIT–II
Processes and Process Control Strategy

Process States, Process Description, Process scheduling Process Control block, Execution of the Operating System, Security Issues, Processes and Threads, Multithreading, Thread Functionality, Windows Thread and SMP Management, Solaris Thread and SMP Management, Linux Process and Thread Management, Principles of Concurrency, Mutual Exclusion: Hardware Support, Semaphores, Monitors, Message Passing, Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Integrated Deadlock Strategy.

UNIT–III
Memory Management and Scheduling

Memory Partitioning, Paging, Segmentation, swapping, Security Issues. Virtual Memory concept, Algorithms, Locality and Virtual Memory, Operating System Software, UNIX and Solaris Memory Management, Linux Memory Management, Windows Memory Management, Types of Professor Scheduling, Scheduling Algorithms, Traditional UNIX Scheduling, Multiprocessor Scheduling, Real-Time Scheduling, Linux Scheduling, Windows Scheduling, Process and Thread Priorities, Multiprocessor Scheduling.

UNIT–IV
I/O Management and File Management

Disk Scheduling, I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling, LINUX I/O, Windows I/O, File Organization and Access, File Directories, File Sharing, Record Blocking, Secondary Storage Management, File System Security, UNIX File Management, LINUX Virtual File System, Windows File System.

UNIT–V
Advance Topics of Operating System

Embedded Operating Systems, eCos, Tiny OS, Computer Security Concepts, Threats, Attacks, and Assets, Intruders, Malicious Software Overview, Viruses, Worm, Authentication, Access Control, Intrusion Detection, Malware Defense, Dealing With Buffer Overflow Attacks, Distributed Process Management, Process Migration, Distributed Global States, Distributed Mutual Exclusion, Distributed Deadlock.

Text Books:
1. Operating System Concepts, Silbersachatz and Galvin, Pearson Education Pub.
2. Operating Systems, Madnick E., Donovan J., Tata McGraw Hill,
3. Operating Systems, A. S. Tannenbaum, PHI

Reference Books:

1. Operating Systems Internals and Design Principle, William Stallings, Prentice Hall Publishers
2. Operating Systems- AConcept-Based Approach, Dhananjay M. Dhamdhere, McGraw-Hill

SEMESTER-I
LAB 1: DIGITAL ELECTRONICS

SEMESTER-I
LAB 2: JAVA PROGRAMMING

S. No.	Argument	Maximum Marks	Minimum Passing Marks
Break-up of marks for External Practical Examination			
1	Lab Record	20	36
1.	Viva-voce	40	
2.	Program Development and Execution	40	
	Total Marks	100	36

**************************First Semester**************************

SEMESTER-II
PAPER-I
ANALYSIS AND DESIGN OF ALGORITHM

UNIT-I
Introduction:
Analysis of algorithms, asymptotic notations, Standard notations and common functions, Recurrence solution: Substitution method, iteration method and the master method, algorithm design techniques: basic

UNIT-II
Divide and Conquer
Binary search, Min-Max Problem, merge sort, quick sort, and Matrix Multiplication.
Introduction to NP-Completeness
The class P and NP, Polynomial reduction, NP-Completeness Problem, NP-Hard Problems

UNIT-III
Graph Algorithms
Undirected Graph, Directed Graph, Traversing Graphs, Representation of graphs, Breadth-first search, Depth-first search, strongly connected components, topological sort.
String Matching: Introduction, The naïve string matching algorithm, Rabin-Karp algorithm, String Matching with finite automata.

UNIT-IV
Greedy Method
Knapsack problem, Huffman codes, job sequencing with deadlines, Minimum Spanning trees: Prim's and Kruskal's algorithms, Single Source Shortest path: Dijkstra's algorithm and Bellman Ford algorithms.

UNIT-V
Dynamic Programming
O/1 Knapsack problem, all Pair's shortest paths: Warshal's and Floyd's algorithms, Single source shortest paths, Backtracking, Branch and Bound: Travelling Salesman Problem.

Text Books:
1. Introduction to Algorithms, T.H.Cormen, C.E.Leiserson, R.L.Rivest, and C.Stein, PHI Pvt.Ltd./ Pearson Education.
2. Computer Algorithms: Introduction to Design & Analysis, Basse, Addision Wesley.
3. Fundamental of Computer Algorithm, Horowitz & Sahani, Galgotia.
4. Introduction to the Design and Analysis of Algorithms, Anany Levitin, Pearson Education.

Reference Books:
1. A practical guide to data Structures and algorithms Using JAVA, Sally Goldman & Kenneth Goldman, CRC Press
2. Data Structures and Algorithms, V. Aho, J. E. Hopcroft, and J. D. Ullman, Pearson Education.
3. Fundamentals of Data structures in C++, E. Horowitz, S.Sahni and Dinesh Mehta, University Press.

SEMESTER-II
PAPER-II
RELATIONAL DATABASE MANAGEMENT SYSTEM

UNIT–I
Fundamentals of Relational DBMS
Data Models, Schemas and Instances, Data Abstraction, Data Independence, Codd's 12 rules, Overview & Architecture of commercial RDBMSs: Oracle, SQL Server, My SQL etc.,

UNIT–II
Entity - Relationship (ER) Model, Relational data model concepts, Database Language: SQL, SQL Programming Techniques: DDL, DML, DCL query statements, Constraints and Triggers, Views and Indexes, SQL in Server Environment. Data dependency, Functional dependencies and Normalization of Relational Databases, First, Second and Third Normal forms, Boyce-Codd Normal form (BCNF),

UNIT–III
Transaction Processing
ACID Properties of Transactions, Concurrency control, Serializability and Recoverability, Transaction support in SQL, Locking Techniques, Time Stamp ordering, Validation Techniques, Granularity of Data Items, Database recovery techniques - Shadow paging, Log Based Recovery. Database Security: Access control, Statistical Database Security, Deadlock: Detection, Avoidance and Recovery.

UNIT–IV
Object Model and Object-Oriented Databases
User defined abstract data types and structured types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Overview of Object-Oriented concepts, Database schema design for OODBMS; OQL, Persistent programming languages; OODBMS architecture and storage issues; Transactions and Concurrency control, Example of ODBMS, Query processing and Optimization.

UNIT–V
Parallel and Distributed Databases and Client-Server Architecture
Architectures for parallel databases, Parallel query evaluation; Parallelizing individual operations, Sorting, Joins; Distributed database concepts, Data fragmentation, Replication, and allocation techniques for distributed database design; Query processing in distributed databases; Concurrency control and Recovery in distributed databases. An overview of Client-Server architecture.

Text Books:
1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, Pearson Education Inc., New Delhi.
2. Database Systems Concepts, Abraham Silberschatz, Henry F. Korth and S. Sudarshan, McGraw-Hill Education , New Delhi
3. Fundamentals of Database Management Systems, Mark L. Gillenson, Wiley India
4. Introduction To Database Systems, C.J.Date, Longman, Pearson Education

Reference Books:
1. Database Systems: A Complete Book, Hector Garcia-Molina, Jeffret D. Ullman, Jenniffer Widom, Pearson Education Inc., New Delhi.
2. Database Systems: Design, Implementation, and Management, Peter Rob & Carlos Coronel, CENGAGE Learning India Pvt. Ltd., New Delhi.
3. Database Systems Using Oracle, Nilesh Shah, PHI Learning Pvt. Ltd., New Delhi.

SEMESTER-II
PAPER-III
DATA STRUCTURE USING C++

UNIT-I
Introduction
Data structure, Data types: primitive, non-primitive data types, ADT, Linear and non linear data structure, Complexity and its Notation, List Structures:

Arrays
One dimensional, Multidimensional arrays, allocation methods, address calculations, sparse arrays.

Linked List
Singly and Doubly Linear link lists, singly and doubly circular linked list: Definitions, operations (INSERT, DELETE, TRAVERSE) on these list. (Insertion operation includes – insertion before a given element, insertion after a given element, insertion at given position, insertion in sorted linked list)

UNIT-II
Stack
Definition, Operations PUSH, POP, TRAVERSE, implementations using array and linked list, Applications of stack: Infix, Prefix, Postfix representation and conversion using stack, Postfix expression evaluation using stack, use of stack in recursion, Stacks in C++ Using Templates

Queue
Introduction, and Types of Queues: Priority Queue, Circular queue, Double Ended Queue, operations (INSERT, DELETE, TRAVERSE), implementation using array and linked list and applications.

UNIT-III
Tree
Definition of trees and their types, Binary trees, Properties of Binary trees and Implementation operation (Insertion, deletion, searching and traversal algorithm: preorder, post order, in-order traversal), Binary Search Trees, Implementations, Threaded trees, AVL Trees, Balanced multi way search trees: 2-3 tree, Red Black tree, B tree, B+ tree, their applications.

UNIT-IV
Sorting
Types of sorting, Sequential Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Heap Sort, Radix sort, complexity analysis of sorting techniques SEARCHING: Linear or sequential search, Binary search, Hashing, collision resolution methods.

UNIT-V
Graph
Definition of Graph, Basic Terminology types of Graph, adjacency and incident (matrix & linked list) representation of graphs, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Connected components of graphs, Weighted Graphs, Shortest path Algorithm, spanning tree, Minimum Spanning tree, Krushkal and prims algorithms.

Text Book:
1. Data Structures using C, A. M. Tenenbaum, Langsam, Moshe J. Augentem, PHI Pub.
2. Data Structures using C by A. K. Sharma, Pearson Education
3. Data Structures and Algorithms, A.V. Aho, J.E. Hopcroft and T.D. Ullman, Addison-Wesley, Low Priced Edition.
4. Fundamentals of Data structures, Ellis Horowitz & Sartaj Sahni, AW Pub.
5. Fundamentals of computer algorithms, Horowitz Sahni and Rajasekaran, Pearson Edu.
6. Data Structures and Program Design in C, Robert Kruse, PHI.

Reference Books:
1. Theory & Problems of Data Structures, Jr. Symour Lipschetz, Schaum's outline by TMH
2. Introduction to Computers Science -An algorithms approach , Jean Paul Tremblay, Richard B. Bunt, 2002, T.M.H.
3. Data Structure and the Standard Template library – Willam J. Collins, 2003, T.M.H
4. Classical Data Structure, D. Samanta, PHI
5. Data Structures, schaum's Outlines, Adapted by G A PAI

SEMESTER-II
PAPER-IV
SOFTWARE ENGINEERING

UNIT–I
Fundamentals of Software Engineering and Process models
Software myths, Software engineering- A layered technology, Software Development Life Cycle, Capability Maturity Model Capability Maturity Model CMM, Process models: waterfall model, Incremental process models, Evolutionary process models, Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, software requirements document.

UNIT–II
S/W Requirements and Design Engineering
Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management, System models: Context Models, Behavioral models, Data models, Object models, Design process and Design quality, Design concepts, the design model, software architecture, Fundamental issues in software design: Goodness of design, cohesions, coupling. Function-oriented design: structured analysis and design.

UNIT–III
Testing Strategies and Product metrics
A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging, Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

UNIT–IV
Testing Plan and Maintenance
Snooping for information, Coping with complexity through teaming, Testing plan focus areas, Testing for recoverability, Planning for troubles, Preparing for the tests: Software Reuse, Developing good test programs , Data corruption, Tools, Test Execution ,Testing with a virtual computer, Simulation and Prototypes, Managing the Test, Customer's role in testing, Software maintenance issues and techniques. Software reuse. Client-Server software development.

UNIT–V
Software Reengineering and Project Management
Software Reengineering, Evolution of Software Economics, Life Cycle Phases and Process artifacts, Model based software architectures, Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments, Process Planning, Project Control and process instrumentation: Seven core metrics, management indicators, quality indicators, life-cycle expectations

Text Books:
1. Fundamentals of Software Engineering, Rajib Mall, PHI Learning Pvt. Ltd.
2. Software Engineering, Ian Somerville, Pearson Education Inc., New Delhi.
3. Software Engineering: A Practitioner's Approach, Roger S. Pressman, TMH
4. Software Project Management, Walker Royce, Pearson Education.

Reference Books:
1. Software Engineering, Shari Lawrence Pfleeger, Joanne M. Atlee, Pearson Education, Inc. New Delhi.
2. Software Engineering, Pankaj Jalote, Wiley India Pvt. Ltd., New Delhi.
3. Software Engineering, Dines Bjørner, Springer India Pvt. Ltd., New Delhi.
4. Managing the Software Process, *Watts S. Humphrey*, Pearson Education.
5. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH.
6. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.

SEMESTER-II
LAB 1: RDBMS

SEMESTER-II
LAB 2: DATA STRUCTURE

Break-up of marks for External Practical Examination			
S. No.	Argument	Maximum Marks	Minimum Passing Marks
1	Lab Record	20	36
1.	Viva-voce	40	
2.	Program Development and Execution	40	
	Total Marks	100	36

***********************Second Semester***********************

SEMESTER-III
PAPER-I
THEORY OF COMPUTATION AND COMPILER DESIGN

UNIT-I
Automata, Regular Expressions and Languages
Principles of mathematical induction ,Finite Automata(FA), Deterministic Finite Automata(DFA), Non-deterministic Finite Automata(NFA). Regular Expression, FA and Regular Expressions, Proving languages not to be regular, Closure properties of regular languages, Equivalence and minimization of Automata.

UNIT-II
Context-Free Grammars and Languages
Context-Free Grammar (CFG), Parse Trees, Ambiguity in grammars and languages Definition of the Pushdown automata, Languages of a Pushdown Automata, Equivalence of Pushdown automata and CFG, Deterministic Pushdown Automata.

UNIT-III
Properties of Context-Free Languages, Undecidabality

Normal forms for CFG, Pumping Lemma for CFL, Closure Properties of CFL, Turing Machines, A language that is not Recursively Enumerable (RE), An undecidable problem that is RE, Undecidable problems about Turing Machine, Post's Correspondence Problem.

UNIT- IV
Introduction to Compiling & Syntax Analysis
Compilers − Analysis of the source program, Phases of a compiler, Compiler construction tools Lexical analysis , Role of lexical analyzer ,Role of the parser, Writing grammars, Context-free grammars ,Top down parsing, Bottom-up parsing, Shift reduce parsing, Operator precedence parsing, LR parsers **,** SLR parser.

UNIT-V
Code Generation & Optimization, Run Time Environments
Issues in the design of code generation, Basic blocks and flow graphs ,A simple code generator − DAG representation of basic blocks , Peephole optimization. Principal sources of optimization, Optimization of basic blocks, Introduction to global data flow analysis, Runtime environments.

TEXT BOOK:
1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.
2. J. Martin, "Introduction to Languages and the Theory of computation" Third Edition, Tata Mc Graw Hill, 2007
3. Principles of Compiler Design by Aho, D. Ullman, Lam and Ravi Sethi, Pearson Education.
4. Compiler Design and Implementation, Steven Muchnic, Elsevier Publications.
5. Alfred Aho, Ravi Sethi and Ullman, J.D., "Compilers Principles, Techniques and Tools", Pearson Education, 2003.

Reference Books:
1. Theory of Computing by K L P Mishra.
2. Compiler Design, A.A. Pentambekar, Technical Publications.
3. Modern Compiler Design, Grune.D,Van R., Bal H.E, Jacobs C J H, Lang.K Springer.

SEMESTER-III
PAPER-II
ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEM

UNIT -I
Introduction
Overview of Artificial Intelligence (AI), Foundations of A.I., History of AI, Areas and state of the art in A.I. ,Knowledge: Introduction ,Knowledge Based system ,Knowledge representation techniques.

UNIT II
A.I. Programming Languages
Introduction to LISP, Basic list manipulation functions, Input/output and local variables, Lists and Arrays, simple program in LISP, Introduction to PROLOG.

UNIT III
Problems And Heuristic Search Techniques
Problem solving as state space search, production system, control strategies and problem characteristics; Search techniques: Breadth First , Depth-first search, Hill-climbing, Heuristics search, Best-First search.

UNIT IV
Knowledge Representation
Approaches and Issues ,Frame, Conceptual dependency , Semantic Net ,Scripts etc. ,Propositional Logic , First order Propositional Logic (FOPL), Conversion to clausal form, Inference rules, Resolution principal.

UNIT V
Expert System
Introduction, Application, Existing Expert systems. Components of typical expert system, Rule based system architecture,

Text Book:
1. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI Publication.
2. Elaine Rich and Kevin Knight , Artificial Intelligence ,TMH publication.
3. Ravi Bhusan Mishra , Artificial Intelligence , PHI learning privet limited.
4. V.S. Jankiraman ,K. Sarukesi and P.Gopalakrishnan ,Foundations of Artificial Intelligence and Expert Systems , Macmillan Series in Computer Science.
5. Artificial Intelligence: A Modern Approach, Stuart Russell and Peter Norvig, Pearson Publi.
6. Principles of Artificial Intelligence, Nils J. Nilsson, Narosa Publication.

Reference Books:
1. AI-Structures and Strategies for Complex Problem Solving, George Lugar, Pearson Educations.
2. Artificial Intelligence: an Engineering approach, Robert J. Schalkolf, McGraw Hill.
3. Artificial Intelligence, Patrick H. Winston, 3rd edition, Pearson Educations.
4. Decision Support Systems and Intelligent Systems, Efraim Turban Jay E.Aronson, PHI.
5. Artificial Intelligence – A System Approach, M. Tim Jones, Infinity Science Press - Firewall Media.

SEMESTER-III
PAPER-III
SOFT COMPUTING

UNIT–I
Introduction

What is soft computing? Different tools of soft computing and its comparison, Area of application.

UNIT-II
Artificial Neural Network (ANN)

Architecture, Introduction, Evolution of Neural Network, Biological Neural Network Vs ANN, Basic Model of ANN, Different types of ANN, Single layer Perceptron, Solving XOR problem, Activation function, Linear severability, Supervised and unsupervised learning, perceptron learning, delta learning, Feed-forward and Feedback networks, Error Back Propogation Network (EBPN), Associative memories and its types, Hopefield Network, Kohenen self organizing Map.

UNIT-III
Fuzzy Logic

Introduction to Classical Sets and Fuzzy Sets, Membership Function, properties and operations of classical set and Fuzzy set, a-cuts, Properties of a-cuts, Linguistic Variables, Membership function, Classical relation and Fuzzy Relation and its properties and operations, Defuzzification and its methods, Fuzzy rule base.

UNIT–IV
Genetic Algorithm

What is Optimization?, Introduction, Application, GA operators: selection, crossover and mutation ,different techniques of selection ,crossover and mutation, different types of chromosomes, Application of GA.

UNIT-V
Hybrid Soft Commuting

Design of Neuro-Fuzzy model like ANFIS , Neuro-Genetic, Fuzzy-Genetic Neuro-Fuzzy-Genetic model, MATLAB environment for soft computing.

Text Books:
1. Principles of soft computing, S.N. Shivanandan and S.N Deepa , Wiley publication, Wiley India Edition.
2. Neural network and Learning Machines, Simon Haykin, Pearson Education, 2011.
   Artificial Neural Networks, Robert J. Scholkoff, Mc Graw Hill Education(India) Pvt. Limited,1997.
3. Neural Networks and Fuzzy Systems, A dynamical Systems Approach to Machine Learning, Bart Kosko, PHI learning private limited.
4. Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, S. Rajsehkaran, G.A. Vijayalakshmi Pai, PHI learning private limited, 14th Edition. 2003.
5. Neural Networks and Fuzzy Logic, K. Vinoth Kumar, R. Saravana Kumar, S. K. Kataraia and Sons publication.
6. Fuzzy Sets, Uncertainty and Information, G. J. Klir and T.A. Folger, PHI learning private limited.
7. Fuzzy sets and Fuzzy Logic: Theory and Applications, George J. Klir and Bo Yuan, PHI learning private limited .
8. Genetic Algorithms: In search, Optimization and Machine Learning, David E. Goldberg, Pearson education, 15th Edition.

9. Multi Objective Optimization Using Evolutionary Algorithms, Kalyanmoy Deb, Wiley Publication, Wiley student Edition, 2013.

Reference Books:
1. Fuzzy Logic and Fuzzy Decision Making: Concepts and Applications, G. Kannan, Galgotia Publication.
2. Intelligent hybrid System : Neural Network, Fuzzy Logic and Genetic Algorithm by Da Ruan, Kluwer Academics publisher.
3. Introduction to Neural Networks using MATLAB 6.0, S.N. Shivanandan, S. Sumathi and S.N Deepa, Mc Graw Hill Education(India) Pvt. Limited, 22nd Edition, 2015.
4. Artificial Neural Networks, B. Yegnanarayana Prentice Halll of India P Ltd.
5. Neural networks in Computer intelligence, Li Min Fu, TMH.
6. Neural networks, James A Freeman & David M S kapura, pearson education

SEMESTER-III
PAPER-IV
.NET TECHNOLOGY

UNIT–I
Introduction
Introduction to .NET Technology, .NET Framework, and its evolutions, Components of .NET CLR and Class Library Importance of MSIL, CTS etc., Class Libraries, Introduction to Visual Studio.NET, IDE, Menu Bar, Toolbox, Output Windows, Code editor, Visual Studio Debugging.

UNIT–II
C# Language
Basic, variable and Data Types, Arrays, Strings, type conversion operation, statement, conditional statements, loop statements, Methods, class, object, properties, static member, overloading, inheritance, constructor, events, partial class, namespace and assemblies, Generics Collections, Threading.

UNIT–III
ASP.NET
Creating Websites, Designing Web form, Anatomy of a Web Form, Writing Code, ASP.NET page life cycle,. Page class, Application events, ASP.NET configuration; Web controls: Textbox, Picture, File Upload, Button Controls, List Controls, Input Validation Controls etc, Master Page Basics, Website Navigation: Site Maps, Tree View Control, Menu Control.

UNIT–IV
Error Handling
Common Error, Exception Handling, Handling Exceptions, Creating and Throwing Your Own Exceptions, ADO.NET Fundamentals: ADO.NET architecture, Connection class, Command class, Data reader class, DataSet, DataAdopter class, DataView class.
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UNIT–V
Data Binding
Basic Data Binding, Data Source Controls, SqlDataSource, ObjectDataSource; Rich Data Controls: GridView, Formatting the GridView, GridView Row Selection, Sorting the GridView, Paging the GridView, GridView Templates, ListView, DetailsView and FormView.

Text Books:
1. Professional Visual Studio 2013, Bruce Johnson, Wrox Publication
2. Beginning ASP.NET 4.5.1: in C# and VB, Imar Spaanjaars, Wrox Publication
3. Professional C# 5.0 and .NET 4.5.1, Christian Nagel, Jay Glynn, Morgan Skinner, Wrox Publication
4. Pro ASP.NET 3.5 in C# 2008, Matthew MacDonald and Mario Szpuszta, Wrox Publication
5. Pro ASP.NET MVC 3 Framework, Adam Freeman; Steven Sanderson, Apress
6. Professional ASP.NET MVC 3, Jon Galloway; Phil Haack; Brad Wilson; K. Scott Allen, Wrox
7. The Complete reference, ASP.NET, M M Donald, TMH

Reference Books:
1. Pro ASP.NET 4 in C# 2010, Matthew MacDonald; Adam Freeman; Mario Szpuszta, Apress
2. Microsoft® ASP.NET 4 Step by Step, George Shepherd, Microsoft Press
3. Programming Microsoft® ASP.NET 4, Dino Esposito, Microsoft Press.

SEMESTER-III
PAPER-V
LAB-I
.NET LAB

SEMESTER-III
PAPER-VI
LAB-II
MATLAB

Break-up of marks for External Practical Examination			
Sr. No.	Argument	Maximum Marks	Minimum Marks
1	Lab Record	20	
1.	Viva-voce	40	
2.	Program Development and Execution	40	36
Total Marks		100	36

************************Third Semester************************

SEMESTER-IV
PAPER-I
ADVANCED TRENDS AND TECHNOLOGY IN COMPUTER SCIENCE

UNIT–I
Big Data Analytics
Applications: Product Selection, Design and Engineering, Location-Based Services, Online Advertising; Architecture Components: Massively Parallel Processing (MPP) Platforms, Unstructured Data Analytics and Reporting : Search and Count, Context-Sensitive and Domain-Specific Searches, Categories and Ontology, Qualitative Comparisons, Data Privacy Protection, Real-Time Adaptive Analytics and Decision Engines.

UNIT–II
Cloud Computing
Cloud Computing Overview, Applications, Intranets and the Cloud, Cloud Computing Services, Business Applications and Examples, Benefits & Limitations of Cloud Computing, Accessing the Cloud - Platforms, Web Applications, Web APIs, Web Browsers. Cloud Storage - Overview, Cloud Storage Providers, Standards.

UNIT–III
Grid Computing
Grid Architecture and Service modeling, Grid resource management, Grid Application trends, Characterization of Grids, Organizations and their Roles, Grid Computing Road Maps, Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems. Grid Middleware: List of globally available Middle wares.

UNIT–IV
Cluster Computing
Role of Clusters, Definition and Taxonomy Of Parallel Computing, Hardware System Structure, Node Software, Cluster Planning, Architecture , Node Hardware and Node Software, Design Decisions, Network Hardware: Internet technologies, Ethernet, System Access Models, Assigning Names, Node Software, Cluster Workload Management Activities, Queuing, scheduling and monitoring, Virtualization technologies.

UNIT–V
Pervasive Computing
Introduction: Pervasive Computing, Evolution of Pervasive Computing, Pervasive Computing Principles, Pervasive Computing Characteristics, Pervasive Information Technology, Pervasive Architecture: Background, Scalability and Availability, Pervasive Web Application Architecture, Implementation Issues, Pervasive Devices : Device Categories, Device Characteristics, Software Components in the Device, Information Access Devices, Smart Identification and Embedded Controls, Pervasive Applications.

Text Books:
1. Big Data Analytics: Disruptive Technologies for Changing the Game, Dr. Arvind Sathi, IBM Corporation.
2. Mining of Massive Datasets, Anand Rajarama, Jure Leskovec, Jeffrey D. Ullman. E-book, 2013.
3. Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGraw Hill.
4. Grid Computing, Joshy Joseph and Craig Fellenstein, Pearson Education 2004.

5. The Grid Core Technologies, Maozhen Li, Mark Baker, John Wiley and Sons, 2005.
6. Beowulf Cluster Computing with Linux, William Gropp, Ewing Lusk, Thomas Sterling, MIT Press, 2003.
8. Pervasive Computing: The Mobile World, Uwe Hansmann, Lothar Merk.
9. Pervasive Computing: Technology And Architecture Of Mobile Internet Applications, Jochen Burkhardt , Horst Henn , Stefan Hepper , Klaus Rindtorff , Thomas Schaeck

Reference Books:
1. Big Data Imperatives, Soumendra Mohanty, Madhu Jagadeesh, Harsha Srivatsa, Apress, e-book of 2012.
2. The Grid 2 - Blueprint for a New Computing Infrastructure, Ian Foster and Carl Kesselman, Morgan Kaufman - 2004.
3. Grid Computing: Making the Global Infrastructure a reality, Fran Berman, Geoffrey Fox, Anthony J.G. Hey, John Wiley and sons.

<u>**SEMESTER-IV**</u>
<u>**PAPER-II**</u>
(Elective–I)
<u>**DATA MINING AND DATA WAREHOUSING**</u>

UNIT-I
Introduction
What is data mining, why it is important? Mining on what kind of data, Data mining Functionalities, steps of data mining, Knowledge discovery.

UNIT-II
Data Pre-processing and Data Warehouse
Why data pre-processing? Data Cleaning, Data Integration and Transformation, Data Reduction. Data Warehouse: Meaning, Definition, OLTP vs. OLAP, Data warehouse architecture, Data cube and OLAP technology

UNIT-III
Classification and prediction
What is classification and prediction?, Issue regarding classification and prediction, Classification by decision tree induction: CART, ID3 C4.5, CHAID etc. , Naive Bayesian classification, Rule based classification, Classification by backpropagation, Support vector machine, Association classification and other classification methods, Prediction using Linear and multiple regression and Neural Network methods, Accuracy measures, Ensemble methods.

UNIT-IV
Association Rule
Basic concept, Market Basket analysis, frequent item set mining: Apriori algorithm-Finding frequent iteamsets using candidate generation, mining various kind of association rules: Mining Multilevel association rules, mining multidimensional association rules

UNIT-V
Cluster analysis and Data mining Tool
What is cluster analysis?, Partitioning method, Hierarchical methods, K-means clustering, Introduction of Data Mining tools, Experiments with WEKA data mining tool for data pre-processing, feature selection, classification, prediction, clustering and Association rule mining with experimental data of various domains.

Text Books
1. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishes (Elsevier, 2nd edition), 2006
2. Data mining techniques, Arun K Pujari, Universities Press (India) Pvt Ltd, 2007.

Reference Books
1. Data Mining Methods for Knowledge Discovery , Cios, Pedrycz, Swiniarski,Kluwer Academic Publishers, London – 1998
2. Data Mining, Data Warehousing and OLAP, Gajendra Sharma, S.K. Kateria and Sons, 2010.

SEMESTER-IV
PAPER-II
(Elective–II)
COMPUTER GRAPHICS AND MULTIMEDIA

UNIT-I
Introduction
Introduction to Computer Graphics, Application of Graphics, Display Devices: Refresh Cathode-Ray Tubes, Raster Scan Displays, Random Scan Displays, Color CRT Monitors and Flat Panel Displays. Video cards/display cards. Graphic Software, Graphics Software Standard and Software Packages

UNIT-II
Various Algorithms
Line Generation Algorithms: DDA algorithm, Bresenham's algorithm; Circle Generation Algorithms: Midpoint Circle algorithm
Polygon filling Algorithms: Scan Line Polygon fill algorithm, Inside - Outside Tests, Boundary-Fill algorithm, Flood - Fill algorithm. Fundamentals of aliasing and Ant aliasing Techniques.

UNIT-III
Two Dimensional Viewing and Clipping
Window to Viewport coordinates transformation, Clipping operations, Point clipping, Line clipping: Cohen Sutherland Algorithm, Liang Barsky Algorithm, Nicholl-Lee-Nicholl Algorithm, Polygon clipping: Sutherland- Hodgeman Algorithm, Weiler Atherton Algorithm, Text clipping, Exterior clipping
Two Dimensional Transformations: Translation, Scaling, Rotation, Reflection, Shear

UNIT IV
Three Dimensional Viewing and Color Application
3D Geometry, 3D display techniques, transformations. Projections: Parallel Projection, Perspective Projection. Orthogonal Projection
Color Models and Color Application: Color Model, Standard Primaries and the Chromaticity Diagram, XYZ Color Model, CIE Chromaticity Diagram. RGB Color Model, YIQ Color Model, CMY Color Model, HSV Color Model. Conversion between HSV and RGB Models. HLS Color Model, Color Selection and Application.

UNIT V
Multimedia Technology
Framework for multimedia systems; multimedia devices; Multimedia Presentation and Authoring; professional development tools; Multimedia servers & databases; vector graphics; Animation techniques; Shading; Anti Aliasing; Morphing; Video on demand, Image Compression & Standards: Making still images; editing and capturing images; scanning images; JPEG-objectives and architecture; JPEG-DCT encoding and quantization, Overview of other image file formats as GIF, TIFF, BMP, PNG etc., Introduction to MPEG, MP3, MP4 etc.

Text Books:
1. Computer Graphics Principles and Practices second edition by James D. Foley, Andeies van Dam, Stevan K. Feiner and Johb F. Hughes, 2000, Addision Wesley.
2. Computer Graphics by Donald Hearn and M.Pauline Baker, 2nd Edition, 1999, PHI
3. Procedural Elements for Computer Graphics, D.F. Rogers, Tata McGraw Hill

4. An introduction, Villamil & Molina, Multimedia Mc Milan.
5. Multimedia: Sound & Video, Lozano, 1997, PHI, (Que)

Reference Books:

1. Mathematical Elements for Computer Graphics,, Rogers and Adam, Tata McGraw Hill.
2. Principles of Interactive Computer Graphics, Newman, Tata McGraw Hill.
3. Graphics, GUI, Games & Multimedia Projects in C, Pilania & Mahendra, Standard Publ.
4. Computer Graphics Secrets and solutions, Corrign John, 1994, BPB.
5. Introduction to Computer Graphics By N. Krishanmurthy T.M.H 2002

SEMESTER-IV
PAPER-II
(Elective–III)
EMBEDDED SYSTEM

UNIT–I
Introduction to Embedded Systems
Embedded System Design Process, Formalisms for System Design, Processor technology, IC technology, Design technology, Trade-offs-Custom Single Purpose Processor Hardware, General-Purpose Processor: Introduction, Basic Architecture, Operation, Super-Scalar & VLIW Architecture, Application Specific Instruction Set Processors, Microcontrollers, Digital Signal Processors, Selecting a Microprocessor, Memory: Introduction, Memory write ability, Storage performance, Tradeoff s, Common memory types Memory hierarchy and cache.

UNIT–II
AVR 8515 microcontroller
Architecture and Programming in assembly and C, Interfacing Analog and digital blocks: Analog-to-Digital Converters (ADCs), Digital-to-Analog, Converters (DACs). Microprocessor interfacing: I/O addressing, Port and Bus based, I/O, Memory mapped I/O, Standard I/O interrupts, Direct memory access, Advanced communication principles parallel, serial and wireless, Serial protocols I2C, Parallel protocols PCI bus, Wireless protocol IrDA, blue tooth.

UNIT-III
The 8051 Micro controller & Embedded System Programming
8051 Micro controller Architecture, Input / Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts. Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts. Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, Multiple Interrupts, Serial Data Communication.

UNIT–IV
Embedded System Software
Design tradeoffs due to thermal considerations and Effects of EMI/ES etc., Software aspect of embedded systems: Challenges and issues in embedded software development, Co-design, Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Embedded software development environments: Real time operating systems, Kernel architecture: Hardware, Task/process control subsystem, Device drivers, File subsystem, system calls, Embedded operating systems, Task scheduling in embedded systems: task scheduler, first in first out, shortest job first, round robin, priority based scheduling.

UNIT–V
Development for embedded systems
Embedded system development process, Determine the requirements, Design the system architecture, Choose the operating system, Choose the processor, Choose the development platform, Choose the programming language, Coding issues, Code optimization, Efficient input/output, Testing and debugging, Verify the software on the host system.

Text Books:
1. The 8051 Microcontroller Architecture, Programming & Applications, Kenneth J. Ayala, Penram International.
2. An Embedded Software Primer, David E. Simon, Pearson Education, 2005.

3. Embedded Systems: Architecture , Programming and Design, Raj Kamal, Tata McGraw-Hill Education, 2008
4. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
5. Embedded System Design- A unified Hardware/software Introduction, Frankvahid/Tony Givargis, Pearson Education
6. Embedded Systems, Raj Kamal, TMH.

Reference Books:
1. Programming for Embedded Systems, Dreamteach Software team.
2. AVR 8515 manual.
3. Embedded Microcomputor System: Real Time Interfacing, J.W. Valvano.
4. The Art of Designing Embedded Systems, Jack Ganssle, Newnes.
5. Embedding system building blocks, Labrosse, via CMP publishers.
6. Micro Controllers, Ajay V Deshmukhi, TMH.
7. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.

SEMESTER-IV
PAPER-II
(Elective–IV)
NETWORK SECURITY AND CRYPTOGRAPHY

UNIT-I
Classical Encryption Technique
Basics of computer network, TCP/IP model, Foundations of Cryptography and security trends, Secret key Vs public key cryptography, Symmetric cipher model, substitution techniques, Transportation techniques, Mathematical tools for cryptography: modular arithmetic, Euclidean algorithm, finite fields, polynomial arithmetic.

UNIT-II
Symmetric cipher
Symmetric cipher model, Traditional block cipher: Stream and block cipher, Feistel cipher network structure, Design Principles of Block Ciphers, Data Encryption Standard (DES), Strength of DES Triple DES, Block cipher design principal, Block cipher operation, Advance encryption Standard (AES), Evaluation criteria of AES,AES transformation function, key distribution.

UNIT-III
Public Key cryptography and Hash Function
Principles of public key cryptosystem, requirement, RSA algorithm. Hash function, Key management: Diffie-Helman Key exchange, Man in the middle attack, elliptic curve arithmetic, elliptic curve cryptography, Application of cryptographic hash function, Hash and Message authentication Code (MAC), Hash and MAC algorithms, MAC based on hash function, Digital signature and Authentication protocol. Key management and distribution: Distribution of symmetric key and public key, Public key Infrastructure (PKI).

UNIT-IV
IP and Web security protocols
User authentication: principle, Remote user authentication using symmetric and asymmetric encryption, Kerberos, E-mail security: Pretty Good Privacy (PGP), S/MIME, IP security: IPsec, transport layer Security: Secure Socket layer (SSL), Secure Electronic Transaction (SET).

UNIT-V
System Security
Firewall, Intrusion Detection and prevention system (IDPS), Malicious Software.

Text Books
1. Cryptography and Network Security By William Stallings, 4th Edition Pearson Publication.
2. Applied cryptography - protocols and algorithm By Buce Schneier, Springer Verlag 2003.
3. Cryptography and Network Security By Atul Kahate , TMH Publication.
4. Cryptography and Network Security By Behrouz A. Forouzan, First Edition, TMH Publication.

Reference Books
1. Network security and cryptography by Bernard Menezes, Cenage Learning India Pvt. Ltd. First edition 2010.
2. Network Security: Private Communication in Public World By Charlie Kaufman ,Radia Perlman and Mike Speciner, PHI Publication.

<u>**SEMESTER-IV**</u>
<u>**PAPER-III**</u>
<u>**MAJOR PROJECT**</u>

Important Guidelines for Major Project
A project report has to be submitted as per the rules described below:
1. **Number of Copies:** The student should submit one hard bound copy of the Project Report with one RW/CD/DVD.
2. **No of students:** Every student has to submit separate project.
3. **Acceptance / Rejection of Project Report:** The student must submit a project report to the Head of Department/Project Guide for approval. The Head of Department/Project Guide holds the right to accept the project or suggest modifications for resubmission.
4. **Format of the Project Report :**The student must adhere strictly to the following format for the submission of the Project Report
    a. **Paper:** The report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The report to be submitted to the University must be original and subsequent copies may be photocopied on any paper.
    b. **Typing:** The typing shall be of standard letter size, double-spaced and on one side of the paper only, using black ribbons and black carbons.
    c. **Margins:** The typing must be done in the following margins
       Left ----- 35mm, Right ----- 20mm
       Top ----- 35mm, Bottom ----- 20mm
       i. **Binding:** The Report shall be Rexene bound in black, Plastic, spiral bound Project Reports not be accepted.
       ii. **Front Cover:** The front cover should contain the following details:
          TOP: The title in block capitals of 6mm to 15mm letters.
          CENTER: Full name in block capitals of 6mm to 10mm letters.
          BOTTOM: Name of the University, year of submission- all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and centring.
       iii. **Blank Sheets:** At the beginning and end of the report, two white black bound papers should be provided, one for the purpose of binding and other to be left blank.
5. **Abstract:** Every report should have an abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters, section, subsection etc.
6. **Certificates etc:** The report should contain the following:
    a. Certificate from Company
    b. Institute Certificate: Successful completion of project by competent authority.
    c. Acknowledgment
    d. List of Figures
    e. Tables
    f. Nomenclature and Abbreviations
7. **Contents of the Project Report:** The project report must contain following in form of chapter, however student may include any other relevant chapter(s):
    a. **Company Profile:** This chapter should highlight the company details. This would be chapter 1 and should include the main stream activity of the company, the product

line of the company and the details of the department where the student has carried out his/her project work. This should not exceed two pages or 800 words.

b. **Introduction to the project:** This chapter shall highlight the purpose of project work, it will also define the chapters to be followed in the Project Report.

c. **Scope of work:** Brief scope of the project work done

d. **Existing System and Need for proposed System:** If there is some system already in use, then give brief detail of it in order to help to understand the enhancements carried out by the student in the existing system.

e. **Operating Environment**: Hardware and Software required and used

f. **Proposed System:** Which may contain following**:**
   i. **Objectives to be fulfilled**: clearly define the objective(s) of the system.
   ii. **User Requirements**: State the requirements of the use in an unambiguous manner.
   iii. **Requirements Determination Techniques and Systems Analysis Methods Employed:** Use the formal methods to describe the requirements of the use like Fact Finding Methods, Decision Analysis, Data Flow Analysis etc.
   iv. **Prototyping:** If the prototypes has been developed prior to the detailed design, then give details of the prototype.
   v. **System Feature**: Which includes as follows:
      - Module specifications
      - D.F.D. and ER
      - System flow charts
      - Data Dictionary
      - Structure charts
      - Database /File layouts
      - Design of Input Design of Output screens and reports
      - User Interfaces
      - Design of Control Procedures

8. **Testing procedures and Implementation phase**
9. **Problems encountered, Drawbacks and Limitations**
10. **Proposed Enhancements/ Future enhancement**
11. **Conclusions**
12. **Bibliography**
    Annexure
    The break-up of marks for forth semester's Major Project will be as under:

Sr. No.	Argument	Maximum Passing Marks	Minimum Passing Marks
1.	Project Record	100	144
2.	Presentation and Viva-voce	200	
3.	Program Development and Execution	100	
	Total Marks	400	

************* **Fourth Semester**************