V-Semester B. E. (Computer Science & Engineering)

Course Code: **CS501**
Title of the Course: Object Oriented Analysis & Design

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	**Introduction:** What is Object-orientation?, Object-Oriented themes, Elements of Object Model, Object Oriented Methodologies. **Object Modeling:** Object, Classes, Attributes, Operations and Methods, Link & association, Advanced link & Association concepts, Generalization & Inheritance, Grouping constructs, Aggregation, abstract classes, generalization as extension & restriction, Multiple inheritance, metadata, candidate key & constraints.	09
II	**Dynamic modeling**: Events & states, operations, nested state diagrams, concurrency, advanced dynamic modeling concepts & simple dynamic model, relation of object & dynamic models. **Functional Modeling**: functional model, data flow diagrams, specifying operations, construction, a simple functional model, relation of functional to object & dynamic model. Methodology Preview: OMT as a Software Engineering Methodology, The OMT Methodology, Impact of an object oriented approach. Analysis: Overview of Analysis, Problem statement, Object Modeling, Dynamic Modeling, Functional Modeling, Adding Operations.	09
III	**Design:** Overview of Object Design, Combining the three models, Designing Algorithms, Design Optimization, Implementation of Control, Adjustment of Inheritance, Design of Associations, Object Representation, Physical Packaging and Documenting Design Decisions. **Basic Structural modeling Using UML:**Importance of Modeling, Principles of Modeling, Object Oriented Modeling, Introducing the UML, Three steps to understanding the UML, Classes, Relationship, Common Mechanisms, Diagrams, Class Diagrams.	09
IV	**Behavioral Modeling:** Interactions, Use Cases, Use Case Diagram, Interaction diagrams, Activity states and action states, Forking and Joining, Activity diagrams, Events & Signals, State, Initial and Final States, transition, guard condition, Entry and Exit Actions, State chart diagrams.	09
V	**Architectural Modeling:** Components, Deployment, Collaboration, Patterns & frameworks, Component diagrams, Deployment diagrams.	09
	Total	45

Text Book/s:
1. Object-orientated Modeling & Design: (Section - I) - James Rambaugh, Michael Blaha, William Premerlani, Frederick Eddy, William Lorensen. (PHI)
2. The Unified Modeling Language User Guide, 2nd Edition, Grady Booch, James Rambaugh, Ivar Jacobson, Addison Wesley Publication.

Reference Books:
1. Object oriented analysis & design using UML- H. Srimathi, H. Sriram, A. Krishnamoorthy (SCITECH PUBLICATION 2nd Edition).
2. Object Oriented Analysis& Design – Andrew High, TMH
3. Object Oriented Analysis & Design – Kahate (TMH)

4. Threat first Object oriented analysis & design - Breet Mclaughline, Garry Police & Devide West. (OREILLY)

V-Semester B. E. (Computer Science & Engineering)

Course Code: CS502
Title of the Course: Computer Network

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
04	01	--	05	04	03	10	10	80	100

Unit	Contents	Hours
I	**Introduction to Computer Networks:** Uses of Computer Networks, Types of Networks, Network Hardware, Network software, network design issues, network design tools. ISO's OSI Reference Model & TCP/IP Reference model, Example Networks: Internet, X.25, Frame Relay, ATM, Ethernet, Wireless LANs, Network standardization, Switching, Buffering and Multicasting, MODEM, cable media. **Data Link Layer:** Design issues, Services, framing, error and flow control, elementary data link protocols: Simplex stop & wait protocol, simplex protocol for noisy channel. Sliding window protocols: Using GO back-N ARQ, using selective repeat ARQ, HDLC. Protocol performance, protocol specification & verification. The Data Link Layer in the Internet & ATM.	09
II	**Point-to-Point-Access (PPP):** Frame format, Transition states, PPP Stack: LCP, NCP **Network Hardware Components:** Connectors, Transceivers and Media Converters, Repeaters, NICs, Bridges and Switches. **The Medium Access Control Sublayer:** Static and dynamic channel allocation, multiple access protocols: ALOHA, CSMA/CD, Collision-free protocols. Limited-contention Protocols, WDMA, wireless LAN protocols. Ethernet: Cabling, encoding, MAC sub-layer protocol, Switched, fast and Gigabit Ethernet, Logical link control, Wireless LANs and Digital Cellular Radio, Broadband Wireless, Virtual LANs, Bluetooth, Virtual Circuit. Switching: Frame Relay and ATM, IEEE 802.3, 802.4, 802.5 standards, FDDI fast Ethernet & satellite networks.	09
III	**Network Layer:** Design Issues, Packet switching, Connectionless and Connection-oriented Services, Virtual Circuits and Datagram Subnets, Router, Configuring Router Routing Algorithms, Internetworking, Firewalls. **Congestion Control and QOS:** General Principals, Congestion prevention policies, Load shading, Jitter Control, Quality of Service, Internetworking **Network layer Protocols:** ARP, IP protocol, IP Addresses, IPV6, ICMP, Unicast Routing Algorithms: RIP, OSPF, BGP, Multicast Routing: IGMP, Mobile IP.	09
IV	**Transport Layer:** Services and service primitives, Concepts of Sockets and Socket programming, Elements of Transport protocol: Addressing, Connection establishment and release, flow control and buffering, Multiplexing, Crash recovery, Simple Transport Protocol, UDP: Introduction, RPC, TCP: Introduction, Model, protocol, header, connection establishment and release, connection management, Transmission policy, congestion control, timer management, Introduction to wireless TCP and UDP, Performance issues.	09

V	**Application Layer:** Domain Name Systems (DNS), and DNS server, Electronic Mail Architecture and services, Message Formats, MIME, message transfer, SMTP, Mail Gateways, Relays, Configuration Mail Servers, DHCP, NetBios, File Transfer Protocol, General Model commands, TFTP. **World Wide Web:** Introduction, Architecture overview, static and dynamic web pages, WWW pages and browsing HTTP, LDAP, Browser Archicture, Caching in Web Browser remote login, Wireless web.	09
	Total	45

Text Books:

1. Tanenbaum Andrew, "Computer Networks", 4th Edition, PHI
2. Fourauzan B., "Data Communications and Networking", 3rd Edition, Tata McGraw Hill

Reference Books:

1. Keshav S., "An Engineering Approach to Computer Networking", Perason Education, ISBN 981-235-986-9
1. Comer D., "Computer Networks and Internet", 2140 Edition, fieatson Education, ISBN 81 -7808-086-9
2. Gallo M., Hancock W., "Computer Communications and networking Technologies", Thomson Brooks/Cole

V-Semester B. E. (Computer Science & Engineering)

Course Code: CS503
Title of the Course: Design and Analysis of Algorithms

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	04	03	10	10	80	100

Unit	Contents	Hours
I	**Introduction:** Analyzing and Designing algorithm, Asymptotic notations: Big Oh, Omega, Theta notation, Average, Best and Worst case analysis of algorithms for Time and Space complexity, Amortized Analysis, Solving Recurrence Equations using Substitution method, Recursion-Tree Method and Master method.	09
II	**Divide-and-Conquer and Greedy Strategy:** Binary Search, Merge and Quick Sort, The maximum-subarray problem, Strassen's algorithm for matrix multiplication. Greedy Method-General Strategy, Knapsack problem, Job sequencing with deadlines problem, minimum cost spanning trees: Prim's algorithm, Kruskal's algorithm, Single source shortest path: Bellman-Ford algorithm, Dijkstra's algorithm, Difference constraints and shortest paths, Huffman Coding etc.	09
III	**Dynamic Programming:** Basic strategy, all pair shortest path: Shortest paths and matrix multiplication, Floyd-Warshall algorithm, Single source shortest paths, optimal binary search trees, Matrix-chain Multiplication, Elements of dynamic programming, traveling salesman problem.	09
IV	**Backtracking and Hash tables:** The general method, 8-Queen's problem, Sum of subsets, Graph Coloring, Hamiltonian Cycle , Graph Coloring , Hash tables, Hash functions, Open addressing.	09
V	**NP-Hard And NP-Complete Problems:** Basic concepts, Non-Deterministic algorithm, The Classes NP-Hard and NP-complete. NP-Complete problems-Satisfiability problem, vertex cover problem. NP-Hard graph problem, scheduling problem, code generation problems, Simplified NP Hard Problems.	09
Total		45

Text Book/s:
1. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", Third Edition, PHI.
2. Ellis Horowitz, Sartaj Sahani, Rajasekaran,"Fundamentals of Computer Algorithms", Second Edition, Universities Press.

References:
1. A. V. Aho and J.D. Ullman, "Design and Analysis of Algorithms", Addison Wesley
2. Brassard, Bratley, "Fundamentals of Algorithms", PHI

V-Semester B. E. (Computer Science & Engineering)

Course Code: CS504
Title of the Course: Software Engineering

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction to Software Engineering, Software, Software Myths, Software Engineering- A Layered Technology, A Process Framework, CMMI, Process Patterns, Process Assessment, Personal and Team Process Models, Process Models: Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models.	09
II	Managing Software Projects: The People, The Product, The Process, W^5HH Principle, Metrics in the Process and Project Domains, Software Measurements, Metrics for Software Quality, Establishing a Software Metrics Program, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimation for Object Oriented Projects, The Make/Buy Decision, Project Scheduling, Risk Management, Quality Management, Software Reengineering: Software Maintenance, A Software Reengineering Process Model, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.	09
III	Software Engineering Practice: The Essence of Practice, Core Principles, Communication Practices, Planning Practices, Modeling Practices, Construction Practice, Deployment, System Engineering: Computer-Based Systems, System Engineering Hierarchy, Business Process Engineering, Product Engineering, System Modeling: Hatley-Pirbhai Modeling and System Modeling with UML.	09
IV	Requirements Engineering: Requirements Engineering Tasks, Initiating the Requirements Engineering process, Eliciting Requirements, Developing Use-Cases, Building the Analysis Model, Requirements Analysis, Analysis Modeling approaches, Data Modeling Concepts, Object-Oriented Analysis, Scenario-Based Analysis, Flow-Oriented Modeling, Class-Based Modeling, Creating a Behavioral Model. Design Engineering: Design Concepts, Design Model, Pattern-Based Software Design.	09
V	**Testing Strategies And Tactics:** A Strategic approach to Software Testing, Strategic Issues, Testing Strategy for Conventional Software and Object-Oriented Software, Validation Testing, System Testing, Validation and Verification **Testing Tactics:** Software Testing Fundamentals, Black Box and White Box Testing, Basis Path Testing, Control Structure Testing, Object-Oriented Software Testing Methods	09

Total	45

Text Books:

1. Software Engineering- A Practitioner's Approach (Sixth Edition)- Roger S. Pressman (TMH)

Reference Books:

1. Software Engineering (Seventh Edition)- Ian Summerville, Pearson Education.
2. Software Engineering Theory and Practice by Pfleeger, Pearson Education.
3. Software Engineering- Schaum's Series (TMH).

V-Semester B. E. (Computer Science & Engineering)

Course Code: CS505
Title of the Course: Operating System

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	01	--	04	04	03	10	10	80	100

Unit	Contents	Hours
I	Introduction What's an operating system, multiprogramming, time sharing real time systems, multiprocessor system, operating system services: Types of the services, the user view, the operating system view. File System: File concept, file support, access methods, allocation methods, directory system, file protection, implementation issues.	09
II	CPU Scheduling: Review of multiprogramming, concept, scheduling concept, scheduling, algorithms, algorithm evaluation, multiple processor scheduling. Disk and drum scheduling Physical characteristics, first come first serve scheduling shortest seek tune first scheduling, SCAN, selecting a disk scheduling algorithm, sector queuing.	09
III	Memory Management: Preliminaries: Bare machine, resident monitor, swapping. Multiple partition, paging, segmentations, combined systems. Virtual Memory: Overlays, demand-paging performance of demand paging page replacement, virtual memory concepts, page replacement algorithms. Allocation algorithm, thrashing, other considerations.	09
IV	Deadlocks. : The deadlock problem, deadlock characterization, deadlock presentation deadlock avoidance, combined approach to deadlock handling Concurrent Processes: Precedence graph, specification, review of process concept, hierarchy of process, the critical section problem, semaphores classical process coordination problem, interprocess communication.	09
V	File management and security: Overview of file management – file organization and access – File directories – File sharing – Record blocking – secondary storage management – example system. Security: Security Threats – Protection – Intruders –Viruses – Trusted Systems.	09
Total		45

Textbooks

1. Silberschatz, Galvin, Gagne, "Operating System Concepts", 6th Edition, John Wiley.

Reference Books

1. Modern Operating Systems – Tanenbaum, Pearson Education, 2nd Edition

2. Stallings William., "Operating Systems", 4th Edition, Prentice Hall India.
3. Operating system with case studies in Unix, Netware and Windows NT – Achyut S. Godbole, Tata McGraw Hill.

V-Semester B. E. (Computer Science & Engineering)

Course Code: CS506
Title of the Course: Object Oriented Analysis & Design

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

Practical: Students are expected to select any case study in a group of 3-4 students and implement following UML diagrams using Rational

List of Practical's:
1. Problem Statement
2. Class Diagram
3. Object Diagram
4. Use Case Diagram
5. Activity Diagram
6. State Diagram
7. Sequence Diagram
8. Collaboration Diagram
9. Component Diagram
10. Deployment Diagram

V-Semester B. E. (Computer Science & Engineering)

Course Code: CS507
Title of the Course: Computer Network

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

Practical: Students should perform 10-12 Experiments from the given list.

List of Practical's:

1. Programs on Error detection and correction: CRC, Hamming Code, Checksum, etc

Use network simulators like NS2 to implement:

2. Monitoring traffic for the given topology
3. Analysis of CSMA and Ethernet protocols
4. Network Routing: Shortest path routing, DVR, LSR.
5. Analysis of congestion control (TCP and UDP).
6. Write a program in C/C++ to implement an Client-Server program, using Socket programming with both TCP and UDP protocols
7. Write a program in C/C++ to implement an Client-Server program, using Socket programming with Stop and Wait protocol.
8. Write a program in C/C++ to implement an Client-Server program, using Socket programming with Sliding Window Protocols.
9. Study of existing LAN and understand the design and various components. Set up a small network of 3 to 4 computers and Hub/Switch as directed by the instructor. Use LAN Card, UTP Cables and Connectors. Install LAN Cards and Crimp the connectors. Assign unique IP addresses and share C drive on each machine. Test the network by using PING command. Use protocol analyzer Software. Repeat the assignment by installing two LAN Cards in one of the machines. Repeat the same assignment by adding a router. Configure the router and use RIP.
10. Study of Network monitoring software like ETHREAL software. Assignment to examine TCP/IP and non-TCP/IP protocols (IPX/SPX) and capture them using protocol analyzer Software
11. Study of Linux and/or Novel Netware Network configurations and commands
12. Installation and configuration of US /PWS/Apache server.
13. File transfer using RS-232
14. File transfer using Stop and Wait Protocol / Go back n / Selective Repeat Protocol
15. Implementation of Shortest Path algorithm
16. File transfer using TCP
17. File Transfer using UDP
18. Data transfer application using TCP/IP protocol suite.

V-Semester B. E. (Computer Science & Engineering)

Course Code: **CS508**
Title of the Course: Software Engineering

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	03	02	25	25	50

Practical: Students should develop a mini project to a group of 3 - 4 students and Perform following Software Engineering principles. Students also required submit a Hard copy of project report.

1. Software Requirements Analysis and Specification
2. ER Diagrams
3. Class Diagrams
4. Apply All Framework Activities
   a. Communication
   b. Planning
   c. Software design
   d. Software implementation
   e. Software testing and maintenance
   f. Communication skills and teamwork
   g. Modeling techniques and CASE tools
   h. Software project planning and management, Study and usage of software project management tools for cost estimation and scheduling
   i. Data modeling using automated tools
   j. Exposure towards test plan generators, test case generators, test coverage and software metrics.
   k. Documentation generators - Study and practice of Documentation generators

V-Semester B. E. (Computer Science & Engineering)

Course Code: **CS509**
Title of the Course: Software Technology Lab

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	02	25	25	50

Practical: Students should develop a mini project to a group of 3 - 4 students based on Database-driven Web based application using ASP, VB .NET, PHP, Mobile Applications etc. and Backend Database and use Software Engineering Principals to develop the project and should deliver necessary documents such as SRS, Design details, User Interface, neatly documented code etc. Students are also required to submit a Hard copy of project report to the department.