

SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY, GURGAON**SCHEME OF STUDIES AND EXAMINATION****MASTER OF TECHNOLOGY (Computer Science & Engineering)****SEMESTER-I****EFFECTIVE FROM 2018 – 19**

Course No.	Course Title	Teaching Schedule			Marks			Credit	Duration of Exam
		L	T	P	Internal	External	Total		
	Computer system software	4	-	-	50	100	150	3	3
	Mathematical foundation of Computer Science	4	-	-	50	100	150	3	3
	Analysis and Design of Algorithms	4	-	-	50	100	150	3	3
	Internet & Web Technology	4	-	-	50	100	150	3	3
	Internet Lab	-	-	4	50	50	100	2	3
	CSS lab	-	-	4	50	50	100	2	3
	Seminar			2	50		50	1	
Total		16	-	10	350	500	850	17	

Note : L – Lecture, T- Tutorial, P – Practical, C - Credit

MASTER OF TECHNOLOGY (Computer Science & Engineering)

SEMESTER-IV

EFFECTIVE FROM 2018 – 19

Course No	Course Title	Marks			Credits
		Internal	External	Total	
	Dissertation & Viva	100	100	200	20

	COMUTER SYSTEM SOFTWARE	Learning Schedule			
		L	T	P	C
	Pre-requisites: C Programming	3	0	0	3

Object Oriented Programming: Introduction to Object Oriented Programming and Object Oriented Design.

Concepts of classes, objects, abstraction, encapsulation, inheritance, function overloading, virtual functions, function overriding, templates.

Object modeling: Class and object diagrams, association, aggregation, generalization, dynamic modeling and functional modeling.

Introduction to UML : Class diagrams, Use cases, interaction diagrams, collaboration diagrams, deployment diagrams.

Principles of class design : Open close principle, Liskov's substitution principle, dependency inversion principle, package cohesion principle etc.

System Software design issue: Design of assemblers, macro processors, linkers and loaders, dynamic linking.

References :

1. Object Oriented Programming with C++ By Robert Lafore
2. Object Oriented Modeling and Design By James Rumbaugh
3. System Programming By Dhamdhare
4. System Programming By Donovan
5. Object Oriented Analysis & Design By Grady Booch

	ANALYSIS & DESIGN OF ALGORITHMS	Learning Schedule			
		L	T	P	C
Pre-requisites: Programming & Flow Charting		3	0	0	3

COURSE DESCRIPTION

The purpose of this course is to provide basic concepts of analysis and design of algorithms. The main goal of the course is to teach the students how to analyze and design for algorithms for different data structure that are appropriate for problems that they might encounter. This course is also to learn abstracts data types, graphs, tree and its traversal, and different searching and sorting techniques. This also provides knowledge of Hashing techniques.

COURSE OBJECTIVES

The objective of this course is to:

- 1.Introduce the fundamentals and abstract concepts of Data Structures.
- 2.Introduce searching, sorting techniques
- 3.Learn to create algorithm for different problems and data structure.
4. learn to find out the complexities of problem.

COURSE OUTCOMES

At the end of the course student will be able to:

- 1.Use and implement appropriate data structure for the required problems using a programming language such as C/C++.
- 2.Analyze step by step and develop algorithms to solve real world problems.
- 3.Implementing algorithms to solve different problems.
- 4.Understand various kinds of problem.

COURSE CONTENT

Unit 1 : Analyzing Algorithms & Problems

Introduction to algorithms, Time and Space Complexity, Basic elements of data structures like linked, stacks and queues, trees, graphs, recursion. Different types of sorting algorithms and their complexities.

Unit 2 : Dynamic Sets, Searching and Graphs

Introduction, Array, amortized time analysis, red black trees, hashing, heaps, dynamic equivalence relations and union-find programs, priority queues with decrease key operations, traversing graphs, DFS, strongly connected components, biconnected components, minimum spanning tree , single source shortest paths, all pair shortest paths.

Unit 3 : Types of algorithm and problem

Introduction to greedy and dynamic methods, their algorithms, and comparative study. General backtracking and Branch and Bound Methods, 8 queen, sum of subset, graph coloring, Hamilton cycles,0/1 knapsack problem. Basic Concepts, cooks theorem, NP-Hard graph problems, NP hard Scheduling.

Unit 4 : Parallel And Approximation Algorithms

Introduction, parallelism, PRAM and other models, some simple PRAM algorithms, handling write conflicts, Merging and Sorting, finding Connected Components. Introduction, Absolute Approximation, e-approximation, polynomial time approximation schemes, fully polynomial time approximation schemes, String matching algorithms.

TEXT BOOKS

1. Introduction of Algorithms – Thomas H. Coreman.
2. Fundamentals of Computer Algorithms - Sartaj Sahni, Ellis Horowitz.

REFERENCE BOOKS

1. Design and Analysis of Algorithms - AV Aho, E Hoproft,JD Ullman
2. Fundamental Algorithms (The Art of Computer Programming Vol. I) - DE Knuth.

	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	Learning Schedule			
		L	T	P	C
	Pre-requisites: C Programming	3	0	0	3

Regular Grammar and Finite automata, NFA and DFA, NFA to DFA conversion, Pumping Lemma to checking the regularity of regular grammars, Reduction of states and design of equivalent finite automata, Context Free Grammar, possible defects in CFG and their removal, Chomsky and Greibach Normal Form. Push down automata, design of CFG corresponding to PDA and vice versa, Design of parser using PDA, Linear bound automata. Turing machines as language recognizer, computer for positive integers, enumerator, universal Turing machine, halting problem, multi-tape and multi-head turing machine, Post Machine, solvability and undecidability, Rice's theorem, equivalence of general recursive and Turing computable function, primitive recursive function, post correspondence problem. Introduction to complexity theory, space and time complexity of turing machine.

References:

1. Introduction to automata theory, language & computation Hopcroft & O.D. Ullman, R Mothwani, 2001, AW
2. Introduction to formal Languages & Automata-Peter Linz, 2001, Narosa Publ.
3. Fundamentals of the Theory of Computation-Principles and Practice by Ramond Greenlaw and H.James Hoover, 1998, Harcourt India Pvt. Ltd.
4. Elements of theory of computation by H.R. Lewis & Ch. Papaditriou, 1998, PHI. 5. Introduction to languages and the Theory of Computation by John C. Martin 2003, T.M.H.

	INTERNET & WEB TECHNOLOGY	Learning Schedule			
		L	T	P	C
	Pre-requisites: HTML & PHP	3	0	0	3

Unit 1 : Introduction Internet Protocol model, Internet Addresses, IP routing concepts, Table Driven and next hop routing, other routing related protocols, Internet Access through PPP, SLIP, WWW, Web servers, Browsers.

Unit 2 : Router Technology Hubs, Bridges, Routers, Routing Protocols, Routing Security, switch based routing, routing in unicast environment, multicasting, mobile routing.

Unit 3 : Web Server Technology Web's Robot global access to information, HTML, HTTP, Accessing a web server, publishing on web server, secure HTTP, Secure Sockets Layer, WWW Proxies, IIS, Case study of apache web server.

Unit 4 : Browsing Systems Searching and web casting Technique, popular web servers, basic features bookmarks, cookies, progress indicators, customization of browsers, browsing tricks, next generation web browsing, search engines, architecture of search engines, search tools, web crawlers, types of crawlers, scalable web crawler, incremental crawler, parallel crawler, focused crawler, agent based crawler, case study of IE.

Unit 5 : Web site Development HTML, XHTML, DHTML, XML, Structuring data, namespaces, XML schema Documents, Document Object Model, DOM methods, Simple API for XML, XSL, SOAP, ASP. Net. Security and management issues for creating a web site

Reference Books :

1. Fundamentals of the Internet and the World Wide Web, Raymond Greenlaw and Ellen Hepp-2001, TMH.
2. Internet & World Wide Programming, Deitel, Deitel & Nieto, 2000 Pearson Education.
3. Beginning XHTML by Frank Boumpery, Cassandra Greer, Dave Ragett, Jenny Raggett, Subastian Schniten baumer & ted Wugofski, 2000, WROX press (Indian shroff Publ. SPD) Ist edition.

	INTERNET LAB	Learning Schedule			
		L	T	P	C
	Pre-requisites: HTML & PHP	0	0	4	2

LABORATORY WORK:

1. Design of the Web pages using various features of HTML and DHTML
2. Client server programming using servlets, ASP and JSP on the server side and java script on the client side
3. Web enabling of databases
4. Multimedia effects on web pages design using Flash.

Reference Books:

1. Internet and Web Technologies by Raj Kamal, Tata McGraw-Hill
2. Programming the World Wide Web by Robert W. Sebesta, Pearson Education

	CSS LAB	Learning Schedule			
		L	T	P	C
	Pre-requisites: C++	0	0	4	2

Practicals based on theory paper Computer System Software .

	SOFT COMPUTING	Learning Schedule			
		L	T	P	C
	Pre-requisites: C, Discrete maths	4	0	0	3

Neural Networks: History, overview of biological Neuro - system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perception Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Fuzzy Logic : Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function; Fuzzy rule generation.

Operations on Fuzzy Sets : Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Classical Logic, Multi-valued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Uncertainty based Information: Information & Uncertainty, Non specificity of fuzzy & Crisp sets, Fuzziness of Fuzzy Sets.

Reference :

1. Neural Networks – Simon Haykin
2. Neural Networks – Kosko
3. Fuzzy Logic & Fuzzy sets - Klir & Yuan

	Resource Management and Computer System	Learning Schedule			
		L	T	P	C
	Pre-requisites: Computer Architecture	4	0	0	3

Historical perspectives, concurrent processes; mutual exclusion and synchronization, system calls and protection; context switching and the notion of a process and threads; synchronization and protection issues; scheduling; memory management including virtual memory and paging techniques; architecture and device management, process deadlocks-models of deadlocks, resources; graph reduction method, deadlock detection, prevention and avoidance.

Distributed operating systems: Architecture, design issues, Lamport's logical clocks, vector clocks, causal ordering of messages, distributed mutual exclusion, token and non token based algorithms. Distributed file system: Mechanism for building DFS, design issues of DFS, case studies. Protection and security, access matrix model, implementation of access matrix model using the capabilities, access control list, lock key methods.

Advance models: Take grant method, Bell La Padula model.

Case studies. Laboratory experiments on internals of Linux, Windows NT.

References:

- | | |
|--|-------------------|
| 1. Design of the Unix operating system | Maurich Bach |
| 2. Distributed Operating System. | Tanenbaum |
| 3. Principles of Operating Systems | William Stallings |

	MOBILE AND WIRELESS COMMUNICATION	Learning Schedule			
		L	T	P	C
	Pre-requisites: Computer Architecture	4	0	0	3

Introduction:

Applications, history, market, reference model and overview. Wireless Transmission- Frequencies, signals, antennas, signal propagation, multiplexing, modulation, spread spectrum, cellular system

MAC and Telecommunication system:

Specialized MAC, SDMA, FDMA, TDMA- fixed TDM, classical ALOHA, slotted, ALOHA, CSMA, DAMA, PKMA, reservation TDMA. Collision avoidance, polling inhibit sense multiple access.(DMA, comparison, CSM- mobile services, architecture radio interlace, protocol, localization, calling, handover, security, new data services, Introduction to WLL.

Satellite and Broadcast Systems:

History, Applications, GLO, LLO, MLO, routing, localization, handover in satellite system. Digital audio and video broadcasting.

Wireless LAN:

IEEE 802.11-System and protocol architecture, physical layer. MAC layered management. Bluetooth ---- User scenarios, Physical layer, MAC layer, networking, security and link management .

Mobile network Layer:

Mobile IP- goals, assumption, requirement, entities, terminology, IP packet delivery, Agent advertisement and discovery, registration, tunneling, encapsulation, optimization, reverse tunneling, IPV6.

DHCP. Adhoc Networks- Routing, destination sequence distance vector, dynamic source routing, hierarchical algorithm, alternative metric.

Mobile Transport Layer:

Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP fast retransmission recovery, transmission/time out freezing, selective retransmission, Transaction oriented TCP.

Support for Mobility:

File System, WWW-HIT, HTML, system architecture. WAP - architecture, wireless datagram, protocol, wireless transport layer security, wireless transaction protocol, application environment, telephony application.

References:

- 1.Jochen Schiller," Mobile Communication" , Pearson Education,2002
- 2.Lee," Mobile Cellular Telecommunications" McGEA W- WILL, 2nd Edition
- 3.Wireless Communications: Theodore S Rappaport; Pearson.

	SOFTWARE VERIFICATION, VALIDATION AND TESTING	Learning Schedule			
		L	T	P	C
	Pre-requisites: Computer Architecture	4	0	0	3

Unit 1: Introduction

Definition of testing, goals, psychology, model for testing, effective testing, limitations of testing.

Unit 2 : Testing terminology and Methodology

Defs. of Failure, faults or bug, error, incident, test case, test ware, life cycle of bug, bug effects, bug classification, test case design, testing methodology, development of test, strategy, verification, validation, testing life cycle model, testing techniques, testing principles.

Unit 3 : Verification and validation

Verification activities, Verification of requirements, verification of HL design, Verification of data design, verification of architectural design, verification of UI design, verification of LL design, intro. to validation activities.

Unit 4 : Black Box testing

Boundary value analysis, equivalence class partitioning, state table based testing, decision table based, grappling, error guessing.

Unit 5 : White box testing

Logic coverage criteria, basic path testing, graph matrices, loop testing, data flow testing, mutation testing.

Unit 6 Static testing

Types of static testing, technical reviews, inspections, inspection process, structured walk through, walk through process, Adv. of static testing.

Unit 7 Validation Testing

Unit testing, drivers stubs, integration testing, methods, effect of module coupling and cohesion, functional testing, system testing, recovery testing, security testing, stress testing, performance testing, usability testing.

Unit 8 Test Automation and debugging

S/w measurement and testing, testing metrics, tools debugging, design of practical test cases, reducing no. of test cases, regression testing and test case mgmt.

Reference:

1. Software Engg. By Pressman
2. Software Engg. By Dr. K.K. Aggarwal & Yogesh Singh
3. Software Engg. By Jawadeka

	Advanced Microprocessors	Learning Schedule			
		L	T	P	C
	Pre-requisites: Digital Electronics	4	0	0	3

UNIT-I :Architecture of 8086/8088

Introduction, Digital Computers, Microprocessors, 8086/8088 internal Architecture, Memory Organization, Addressing Modes, Assembly directives, Introduction, Symbols, Variables and constants, Data Definition and storage allocation directives, structures, records, Assigning Names to Expressions, Segment Definition, alignment directives, Value Returning Attribute operators.

UNIT-II : The 8086/8088 Instructions-

Introduction, Instruction Formats, Instruction execution Timing, assembler instruction format, Data transfer Instruction, Arithmetic Instruction, Branch Instruction, and conditional and unconditional, loop instructions, NOP and HLT instructions, Flag manipulation instructions, logical instructions, Shift and Rotate Instructions, String Instructions, Assembly Language Programming

UNIT-III: Advanced Processors- Introduction, Intel 80286, Intel 80386, Intel 80486, Intel Pentium and Intel P6 processor- Internal Block Diagram Only.

UNIT-IV: I/O Programming-

Fundamentals, I/O Considerations, Programmed I/O, Interrupt I/O, Block Transfer & DMA. I/O Design Example, Basic 8086/88 Minimum Mode, maximum mode, Interrupt priority Management, based on single 8259A and multiple 8259, I/O interfaces, Asynchronous , Synchronous , 8251A Programmable Communications interface, 8255 A Programmable Peripheral Interface. Micro processor Applications- Data Acquisition System, Temperature Monitoring, Speed Control etc.

References:

1. Yu- Cheng Liu, Glenn A. Gibson, " Microcomputer System: The 8086/8088 Family Architecture, Programming and Design.
2. Douglas V. Hall, " Microprocessors and Interfacing Programming and Hardware" .

	OPERATING SYSTEM LAB	Learning Schedule			
		L	T	P	C
	Pre-requisites: Java , C#	0	0	4	2

COURSE OBJECTIVES: -

To implement the shell of Operating System. - To implement distributed operating system concepts. - To implement virus detection techniques.

LABORATORY WORK:

Note: The following programs can be executed on Java/C#/ any equivalent language or tool with suitable platform.

1. Design and Develop a shell that should support at least 20 commands.
2. Design and develop a program to implement lazy buddy system algorithm.
3. Write a multi-class multithreaded program that simulates multiple sleeping barbers, all in one barbershop that has a finite number of chairs in the waiting room. Each customer is instantiated from a single customer class; each barber is instantiated from a single Barber class.
4. Use ECOS operating system to develop a program for controlling accessing to a pool of resources using mutexes and condition variables.
5. Design and develop a program to realize the virus classification, such as boot sector infector, file infector and macro virus.

Course Outcomes: The students should be able to: -Demonstrate the shell. -Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system. - Understand the various virus detection techniques.

	SOFTCOMPUTING LAB	Learning Schedule			
		L	T	P	C
	Pre-requisites:	0	0	4	2

Practical's based on theory paper Soft computing.

	KNOWLEDGE BASED SYSTEM DESIGN	Learning Schedule			
		L	T	P	C
	Pre-requisites: Programming Language	4	0	0	3

Unit I : Introduction to Knowledge Based Systems – Objectives of KBS , Components, Categories, Difficulties with the KBS. Knowledge Based System Architecture – Source of Knowledge , Types of Knowledge, Basic Structure, Knowledge Bases, Inference Engine, Self Learning, Reasoning, Explanation, Applications. Limitations of Knowledge Based Systems.

Unit II : Developing Knowledge Based Systems – Knowledge Based System development Model, Knowledge Acquisition, Techniques for Knowledge Acquisition, Sharing Knowledge, Updating Knowledge. Knowledge Representation and Reasoning – The propositional calculus and Resolution, Predicate calculus and Resolution, Representing Procedural Knowledge, Reasoning with Uncertain Information, Learning and Acting with Bayes Nets.

Unit III : Knowledge Management - Introduction, Perspectives, Evolution, Elements of Knowledge Management, Knowledge Management Process, Tools and Technologies, Knowledge Management Roles and Responsibilities, Knowledge Management Models. Agent Based Systems – Characteristics, Types of Agents, Agent Communication Language, Multi Agent Systems.

References :

1. Rajendra Akerkar, Priti Sajja, “Knowledge-Based Systems”, Jones & Bartlett Learning, 1 st Ed., 2010.
2. Nils J Nilsson “Artificial Intelligence – A New Synthesis”, Morgan Kaufman Publishers 1 st Ed., 2003.
3. Cornelius T Leondes, “Knowledge-Based Systems: Techniques and Applications”, Academic Press, 1st Ed., 2000.
4. Elias M Awad, Hassan M Ghaziri, “Knowledge Management”, Pearson Education, 1st Ed., 2007.

	ADVANCED DATABASE MANAGEMENT SYSTEM	Learning Schedule			
		L	T	P	C
	Pre-requisites: Programming Language	4	0	0	3

UNIT I: Data Base Fundamentals, SQL Queries, Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF – Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

UNIT II Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL. Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT III Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs. Linear Hashing.

UNIT IV Distributed databases: Introduction to distributed databases, Distributed DBMS architectures, Storing data in a distributed DBMS, Distributed catalog management, Distributed query processing Updating distributed data, Distributed transactions, Distributed concurrency control, Distributed recovery.

REFERENCES:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition. Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.
4. Introduction to Database Systems, C.J.Date, Pearson Education.
5. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.

6. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.
7. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
8. Principles of Distributed Database Systems, M. Tamer Ozsü, Patrick Valduriez , Pearson Education, 2nd Edition.
9. Distributed Database Systems, Chhanda Ray, Pearson.
10. Distributed Database Management Systems, S.K.Rahimi and F.S.Haug, Wiley.

	SYSTEM NETWORK ADMINISTRATION	Learning Schedule			
		L	T	P	C
	Pre-requisites: Programming Language	4	0	0	3

UNIT I: Advanced Socket 1.1) IPV4 and IPV6 interoperability inetd superserver.

2) Advanced I/O functions, unix domain protocols, Nonblocking I/O, ioctl operations

UNIT II: Routing Sockets. Data link socket address structure, Reading and writing, sysctd operations, get-ifi-info function, Interface name & index functions.

Key management Sockets: Reading and writing, Dumping the security association database (SADB), Creating a static security association(SA), Dynamically maintaining SAs

UNIT III: Broadcasting : Broadcast addresses, Unicast verses Broadcast, dg-cli function using broadcasting, Race function,

Multicasting: Multicasting addresses, Multicasting verses Broadcasting on a LAN, Multicasting ona WAN, Source-specified multicast, Multicast socket options, mcast_join and related functions, dg_cli function using multicasting, Receiving IP multicast infrastructure session announcements, sending and receiving, Simple network time protocol

UNIT IV: Advanced UDP sockets : Receiving flags, destination IP addresses, interface index, Datagram truncation, UDP verses TCP,. Adding reliability to UDP application , Binding interface addresses, Concurrent UDP services, IPV6 packet information, IPV6 path MTU control M.Tech. Comp. Sci. Pg No. Shivaji University, Kolhapur 11 Advanced SCTP sockets : Auto closing, Partial delievery, Notification, Unordered data, Binding a subset of addresses, Determining peer and local addresses, Association of ID and IP addresses, Peeling off and association, controlling timing SCTP verses TCP 9) Out_of_Band data : TCP Out_of_Band data, socket:mark function

Raw sockets: Raw sockets creation, Raw socket output, Raw socket input, ping program, traceroute program, ICMP message daemon

REFERENCES:

1. UNIX network programming (3rd Edition) Stevens, fenner, rudoff Pearson education
2. TCP/IP illustrated (V2) Write, Stevens Pearson education
3. Internetworking with TCP/IP (V2) Comer, Stevens Pearson education.

	Information & Security Management	Learning Schedule			
		L	T	P	C
	Pre-requisites: Programming Language	4	0	0	3

UNIT I - MYTHS OF INFORMATION SECURITY MANAGEMENT

The big picture-Learning from experience-Weaknesses in Information Security. The extent of crime in cyberspace- The cyberspace crimoid syndrome-Policies and technologies - A new framework for information security.

UNIT II - INFORMATION SECURITY ASSESSMENTS

Risk Assessment- Richard Baskerville’s risk assessment methodology Generations of risk assessment techniques- Quantitative approach to risk assessment-Problems with Quantitative approach – NIST ALE- Baseline approach.

UNIT III - SECURITY MANAGEMENT CONCEPTS AND PRINCIPLES & CONFIGURATION MANAGEMENT

Measuring ROI on security- Security patch management- Purposes of Information Security management- The building blocks of information security- Human side of information security-Security management- Securing new information technology.

Overview of SSE CMM- SSE CMM relationship to other initiatives- Capability levels- Security Engineering- Security Engineering process overview- Basic process areas- Configuration management- Base practices- Establish configuration management.

UNIT IV - SECURITY MANAGEMENT PLANNING

Maintaining information security during downsizing- Business case for Information Security- Information Security Management in healthcare industryProtecting high tech trade secrets- Outsourcing Security.

REFERENCES

1. Donn Parkers, “ Fighting Computer Crime: “A New Framework for Protecting Information”, John Wiley&Sons, 2003.
2. Micki Krause, Harold F.Tripton, “ Information Security Management Handbook”,Auerbach Publications, 2012.

	SOFTWARE PROJECT MANAGEMENT	Learning Schedule			
		L	T	P	C
	Pre-requisites: Programming Language	4	0	0	3

UNIT I - PROJECT CONCEPTS AND ITS MANAGEMENT

Project life cycle models-ISO 9001 model-Capability Maturity Model-Project Planning-Project tracking-Project closure. Evolution of Software Economics – Software Management Process Framework: Phases, Artifacts, Workflows, Checkpoints – Software Management Disciplines: Planning / Project Organization and Responsibilities / Automation / Project Control – Modern Project Profiles

UNIT II - COST ESTIMATION

Problems in Software Estimation – Algorithmic Cost Estimation Process, Function Points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model) – Estimating Web Application Development – Concepts of Finance, Activity Based Costing and Economic Value Added (EVA) – Balanced Score Card.

UNIT III -SOFTWARE QUALITY MANAGEMENT

Software Quality Factors – Software Quality Components – Software Quality Plan – Software Quality Metrics – Software Quality Costs – Software Quality Assurance Standard – Certification – Assessment.

Software Configuration Management – Risk Management: Risk Assessment: Identification / Analysis / Prioritization

Risk Control: Planning / Resolution / Monitoring

Failure Mode and Effects Analysis (FMEA) ,Defect Management ,Cost Management.

Software Metrics – Classification of Software Metrics: Product Metrics: Size Metrics, Complexity Metrics, Halstead’s Product Metrics, Quality Metrics, and Process metrics.

UNIT IV - PROJECT EVALUATION AND EMERGING TRENDS (12 hours)

Strategic Assessment–Technical Assessment–Cost Benefit Analysis–Cash Flow Forecasting–Cost Benefit Evaluation Technique–Risk Evaluation–Software Effort Estimation. Emerging Trends: Import of the internet on project Management – people Focused Process Models.

REFERENCES

1. Ramesh Gopaldaswamy , “Managing and global Software Projects”, Tata McGraw Hill Tenth Reprint, 2011.
2. Roger S.Pressman, “Software Engineering- A Practitioner’s Approach“, 7th Edition ,McGraw Hill, 2010.
3. Daniel Galin, “Software Quality Assurance: from Theory to Implementation”, Addison-Wesley, 2003.
4. Bob hughes and Mike Cotterell, “Software Project Management” second edition,1999.
5. Royce, W. “Software Project Management: A Unified Framework”, AddisonWesley, 1998.
6. Demarco, T. and Lister, T. “Peopleware: Productive Projects and Teams, 2nd Ed.”, Dorset House,1999.
7. Fenton, N.E., and Pfleeger, S.L.. “Software Metrics: A Rigorous and Practical

Approach, Revised” Brooks Cole, 1998.

8. Kaplan, R.S., Norton, D.P. “The Balanced Scorecard: Translating Strategy into Action”, Harvard Business School Press, 1996.
9. Boehm, B. W. "Software Risk Management: Principles and Practices" in IEEE Software, January 1991, pp32-41.

	AI-Lab	Learning Schedule			
		L	T	P	C
	Pre-requisites: Prolog	0	0	4	2

Practical's based on theory paper AI.

M.Tech Computer Science & Engineering
(Software Engineering)

	SOFTWARE Engineering Principals	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT - I Software Engineering

Introduction, Importance, Evaluation, Characteristics, Components. Software Application, Software Crisis problem and Causes, Layered Technology of Software Engineering.

UNIT - II Software Development Process Models

Waterfall Model, Prototyping Model, Spiral Model, RAD Model, Problem Analysis, Requirement Verification, Requirement Validation, Problem Partitoning, Abstraction, Top Down and Bottom up Approach Cohesiveness, Coupling Modularing.

UNIT - III Software Project Scheduling and Designing

Software Project Management, Cost Estimation Project Scheduling, Project Staffing, Software Configuration Management. Risk Management, Quality Assurance, Project Monitoring.

UNIT - IV Coding and Testing

Coding, Top Down and Bottom up Approach of Programming, Information Hiding, Programming Style, Internal documentation, Verification Static and Dynamic Verification, Monitoring and control of coding, Testing : Level oftesting test Cases, test Criteria and Test Oracle, Black Box testing, White Box testing, test Process Validation, Alpha and Beta testing System testing and Debugging. Software Maintenances : Maintenances Characteristics, Maintainability, Maintenances Tasks, Maintenances Side Effects.

References : 1. Pressman S. Roger, “ Software Engineering “, Tata Mac Graw Hill

2. Jalot Pankaj, “ An Integrated Approach to S/ W Engg, “Narosa Publishing House.

3. Someerville Ian, “Software Engineering 5th Addition”, Addition Wesley 2002.

4. Fairly Richard,” Software Engineering Concepts”, Tata Mc Graw Hill.

5. Software Engg. By Nasib Singh Gill, Khanna Pub.

	SOFTWARE REQUIREMENTS AND ANIMATION	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit 1

Software Requirements types (functional vs non-functional (quality), constraints, business requirements, business rules, user and system requirements);

- The Software Requirements Process (ISO/IEC/IEEE 29148 Standard for Requirements Engineering);
- Business Requirements: vision, scope, context diagram, ecosystem maps, events lists, feature trees, the goal-design scale;

Unit 2

- User Requirements: User Stories & Use cases modelling;
- Requirements elicitation modalities: Stakeholders Analysis, design/brainstorming workshops, prototyping, pilot experiments, cost/benefit & risk analysis;
- Requirements analysis. (C)lass (R)esponsability (C)ollaborators cards. Linking Requirements to UML Analysis Models;

Unit 3

- Requirements Verification & Validation: Consistency checks, CRUD checks, Acceptance Testing;
- Managing requirements prioritization. Analytic Hierarchy (AHP) process, Software Quality Deployment Function (SQFD), the Agile Planning Game;
- Requirements Effort estimation & Project Velocity: Early models of effort estimation (LOCs based). Three modalities of estimation: COCOMO II, k-Nearest Neighbour, Planning Poker;

Unit - 4

- Emergence of the software architecture from requirements. Decomposing system models: abstraction, & different system views. The Attribute-Driven Design (ADD) Method;
- Modelling Non-Functional Requirements (NFR): SQuaRE (Software product Quality Requirements and Evaluation) & ISO/IEC 25010;
- From Lean to Agile Methodologies. Overview of SCRUM, XP, and other agile approaches in relation to Requirements Engineering;

References

1. ddle River, NJ: Addison-Wesley, 2011. xxxv, 518. ISBN 9780321635846. [info](#)
2. BASS, Len, Paul CLEMENTS and Rick KAZMAN. *Software architecture in practice*. 2nd ed. Boston: Addison-Wesley, 2003. xxii, 528. ISBN 0321154959. [info](#)
3. LAUESEN, S. *Software Requirements: Styles & Techniques*. : Addison-Wesley Professional, 2002. ISBN 978-0-201-74570-2. [info](#)

	SOFTWARE DEVELOPMENT METHODOLOGIES	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-1 Overview of the software life cycle, Systems analysis

User and/or market requirements, Project specifications, structured analysis, Decision tables or trees

UNIT II Preliminary design and detailed design

User interface design and prototyping, structured design, Design evaluation, including cohesion and coupling

Detailed design: At least one diagramming technique for detailed design, Algorithm choice and efficiency issues, detailed design standards.

UNIT III Implementation

Language selection, Approaches to implementation: top-down, bottom-up, threads, Coding methods and guidelines.

UNIT IV Testing

Testing Types: unit, integration, system, field, acceptance, testing methods, including black-box and white-box. Software maintenance .

	COMPUTER SYSTEM SOFTWARE	Learning Schedule			
		L	T	P	C
		4	0	0	3

Object Oriented Programming: Introduction to Object Oriented Programming and Object Oriented Design.

Concepts of classes, objects, abstraction, encapsulation, inheritance, function overloading, virtual functions, function overriding, templates.

Object modeling: Class and object diagrams, association, aggregation, generalization, dynamic modeling and functional modeling.

Introduction to UML : Class diagrams, Use cases, interaction diagrams, collaboration diagrams, deployment diagrams.

Principles of class design : Open close principle, Liskov's substitution principle, dependency inversion principle, package cohesion principle etc.

System Software design issue: Design of assemblers, macro processors, linkers and loaders, dynamic linking.

References :

1. Object Oriented Programming with C++ By Robert Lafore
2. Object Oriented Modeling and Design By James Rumbagh
3. System Programming By Dhamdhare
4. System Programming By Donovan
5. Object Oriented Analysis & Design By Grady Booch

	CSS LAB	Learning Schedule			
		L	T	P	C
	Pre-requisites: C++	0	0	4	2

Practicals based on theory paper Computer System Software .

	SOFTWARE ENGINEERING LAB	Learning Schedule			
		L	T	P	C
	Pre-requisites: C++	0	0	4	2

Practicals based on theory paper Software Engineering Principals.

	SOFTWARE TESTING	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT - I

Review of Software Engineering : Overview of software evolution, design models, development life cycle, unit and system testing, project management, maintenance, Concept of Software verification, validation and testing. V & V and their Limitations : Theoretical Foundations : Impracticality of Testing All data; Impracticality of testing All Paths; No Absolute Proof of Correctness.

UNIT - II

The Role of V & V in Software Evolution : Types of Products, Requirements; Specifications, Designs, Implementation, Changes, V & V Objectives, Correctness, Consistency, Necessity Sufficiency, Performance. Software Reliability and Quality Assurance : Software reliability, validation, safety and hazards analysis; features affecting quality of software. Concepts and importance of quality assurance, Software quality assurance strategies, FTR, structured walk through techniques.

UNIT - III

Software V & V Approaches and their Applicability ; Software Technical Reviews, Software Testing : Levels of testing, Module, Integration, System, Regression, Testing techniques and their Applicability, Functional testing and Analysis Structural testing and Analysis, Error Oriented testing and Analysis, Hybrid Approaches, Integration Strategies, Transaction Flow Analysis, Stress Analysis, Failure Analysis, Concurrency Analysis, Performance Analysis Proof of Correctness, Simulation and Prototyping, Requirements Tracing.

UNIT - IV

Software V & V Planning, Identification and Selection techniques : requirements, Specifications, Designs, Implementations, Changes, Organizations Responsibilities, Development Organization Independent test Organization, Software Quality Assurance, Independent V &V contractor, V & V Standards, Integrating V & V Approaches, Problem Tracking Test Activities, Assessment.

References :

1. Effective Methods for Software Testing : William Perry, John Wiley & Sons, 1995.
2. Software Testing; Mare Roper, McGraw Hill Book Co., London, 1994.

3. Testing Computer Software; Cem Kaner, Jack Falk, Nguyen Quoc, 2nd ed. Van Nostrand Reinhold, 1993.
4. Software Testing (2nd Edition) by Ron Patton
5. Software Engineering; Agricultural, K.K. & Yogesh Singh, New Age International, 2001.
6. Handbook of Software Quality Assurance; James Mc Manus I & Gordon Schulmeyer Van Nostrand Reinhold, New York, 1992.
7. Software System testing and Quality Assurance; Ronald Owston, Van Nostrand Reinhold, New York, 1984.
8. Software Verification and Validation : Realistic Project Approach; Michael Deutch Prentice Hall, New Jersey, 1982

	SOFTWARE PROJECT MANAGEMENT	Learning Schedule			
		L	T	P	C
	4	0	0	3	

UNIT I - PROJECT CONCEPTS AND ITS MANAGEMENT

Project life cycle models-ISO 9001 model-Capability Maturity Model-Project Planning-Project tracking-Project closure. Evolution of Software Economics – Software Management Process Framework: Phases, Artifacts, Workflows, Checkpoints – Software Management Disciplines: Planning / Project Organization and Responsibilities / Automation / Project Control – Modern Project Profiles

UNIT II - COST ESTIMATION

Problems in Software Estimation – Algorithmic Cost Estimation Process, Function Points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model) – Estimating Web Application Development – Concepts of Finance, Activity Based Costing and Economic Value Added (EVA) – Balanced Score Card.

UNIT III -SOFTWARE QUALITY MANAGEMENT

Software Quality Factors – Software Quality Components – Software Quality Plan – Software Quality Metrics – Software Quality Costs – Software Quality Assurance Standard – Certification – Assessment.

Software Configuration Management – Risk Management: Risk Assessment: Identification / Analysis / Prioritization

Risk Control: Planning / Resolution / Monitoring

Failure Mode and Effects Analysis (FMEA) ,Defect Management ,Cost Management.

Software Metrics – Classification of Software Metrics: Product Metrics: Size Metrics, Complexity Metrics, Halstead’s Product Metrics, Quality Metrics, and Process metrics.

UNIT IV - PROJECT EVALUATION AND EMERGING TRENDS (12 hours)

Strategic Assessment–Technical Assessment–Cost Benefit Analysis–Cash Flow Forecasting–Cost Benefit Evaluation Technique–Risk Evaluation–Software Effort Estimation. Emerging Trends: Import of the internet on project Management – people Focused Process Models.

REFERENCES

1. Ramesh Gopaldaswamy , “Managing and global Software Projects”, Tata McGraw Hill Tenth Reprint, 2011.
2. Roger S.Pressman, “Software Engineering- A Practitioner’s Approach“, 7th Edition ,McGraw Hill, 2010.
3. Daniel Galin, “Software Quality Assurance: from Theory to Implementation”, Addison-Wesley, 2003.
4. Bob hughes and Mike Cotterell, “Software Project Management” second edition,1999.
5. Royce, W. “Software Project Management: A Unified Framework”, AddisonWesley, 1998.
6. Demarco, T. and Lister, T. “Peopleware: Productive Projects and Teams, 2nd Ed.”, Dorset House,1999.
7. Fenton, N.E., and Pfleeger, S.L.. “Software Metrics: A Rigorous and Practical

Approach, Revised” Brooks Cole, 1998.

8. Kaplan, R.S., Norton, D.P. “The Balanced Scorecard: Translating Strategy into Action”, Harvard Business School Press, 1996.
9. Boehm, B. W. "Software Risk Management: Principles and Practices" in IEEE Software, January 1991, pp32-41.

	ADVANCE DATABASE MANAGEMENT SYSTEM	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT I: Data Base Fundamentals, SQL Queries, Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF – Properties of Decompositions- Loss less- join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form.

UNIT II Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL. Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking. Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT III Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks. Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure, Search, Insert, Delete. Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs. Linear Hashing.

UNIT IV Distributed databases: Introduction to distributed databases, Distributed DBMS architectures, Storing data in a distributed DBMS, Distributed catalog management, Distributed query processing Updating distributed data, Distributed transactions, Distributed concurrency control, Distributed recovery.

REFERENCES:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition. Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.
4. Introduction to Database Systems, C.J.Date, Pearson Education.
5. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson

education.

6. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.
7. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
8. Principles of Distributed Database Systems, M. Tamer Ozsü, Patrick Valduriez , Pearson Education, 2nd Edition.
9. Distributed Database Systems, Chhanda Ray, Pearson.
10. Distributed Database Management Systems, S.K.Rahimi and F.S.Haug, Wiley.

	ADVANCE DATABASE MANAGEMENT SYSTEM LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Practical's based on theory paper ADVANCE DATABASE MANAGEMENT SYSTEM.

	SOFTWARE TESTING LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Practical's based on theory paper SOFTWARE TESTING.

	SECURE SOFTWARE ENGINEERING	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT I

Problem, Process, and Product - Problems of software practitioners – approach through software reliability engineering- experience with SRE – SRE process – defining the product – Testing acquired software – reliability concepts- software and hardware reliability.

Implementing Operational Profiles - Developing, identifying, crating, reviewing the operation – concurrence rate – occurrence probabilities- applying operation profiles.

UNIT II

Engineering “Just Right” Reliability - Defining “failure” for the product - Choosing a common measure for all associated systems. - Setting system failure intensity objectives – Determining user needs for reliability and availability., overall reliability and availability objectives, common failure intensity objective., developed software failure intensity objectives. – Engineering software reliability strategies. Preparing for Test - Preparing test cases. - Planning number of new test cases for current release. -Allocating new test cases. - Distributing new test cases among new operations - Detailing test cases. - Preparing test procedures.

UNIT III

Executing Test - Planning and allocating test time for the current release. - Invoking test identifying identifying failures - Analyzing test output for deviations. – Determining which deviations are failures. Establishing when failures occurred. Guiding Test - Tracking reliability growth - Estimating failure intensity. - Using failure intensity patterns to guide test – Certifying reliability. Deploying SRE - Core material - Persuading your boss, your coworkers, and stakeholders. - Executing the deployment - Using a consultant.

UNIT IV

Using UML for Security - UM L diagrams for security requirement -security business processphysical security - security critical interaction - security state. Analyzing Model - Notation - formal semantics - security analysis - important security opportunities. Model based security engineering with UML - UML sec profile- Design principles for secure systems – Applying security patterns.

Applications - Secure channel - Developing Secure Java program- more case studies. Tool support for UML Sec - Extending UML CASE TOOLS with analysis tools - Automated tools for UML SEC. Formal Foundations - UML machines - Rely guarantee specifications- reasoning about security properties.

References:

1. John Musa D, "Software Reliability Engineering", 2nd Edition, Tata McGraw-Hill, 2005(Units I, II and III).
2. Jan Jürjens, "Secure Systems Development with UML", Springer; 2004 (Unit IV)

	SOFTWARE RELIABILITY	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT - I

Software Reliability Ideas of Software Reliability, Computation of software reliability, Classes of software reliability Models.

UNIT - II

Time Dependent Software Reliability Models : Time between failure reliability Models, Fault Counting Reliability Models.

UNIT - III

Time Independent Software Reliability Models : Fault injection model of Software Reliability, Input Domain Reliability Model, Orthogonal defect classification, Software availability Models.

UNIT - IV

Software Reliability Modeling : A general procedure for reliability modeling.

References :

1. Hoang Pham, Software Reliability, Springer Verlag, New York.
2. Jhon D. Musa, Software Reliability Engineered testing, Mc Graw Hill, New York.
3. Doron Reled, Software Reliability Methods, Springer Verlag, New York.
4. R. Ramkumar, Reliability Engineering :

	DESIGN PATTERNS	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT I-INTRODUCTION TO DESIGN PATTERNS

Design Patterns Arose from Architecture and Anthropology - Architectural to Software Design Patterns - Advantages of Design Patterns - Adapter Pattern - Strategy Pattern - Bridge Pattern - Abstract Factory Pattern

UNIT II-NEW PARADIGM OF DESIGN

Principles and Strategies of Design Patterns - Open-Closed Principle - Designing from Context - Encapsulating Variation. Commonality and Variability Analysis - Analysis Matrix - Decorator Pattern - Open Closed Principle – The Principle of encapsulating variation – Abstract Classes vs Interfaces .Observer Pattern - Categories of Patterns - Template Method Pattern - Applying the Template Method to the Case Study - Using Template Method Pattern to Reduce Redundancy

UNIT III-APPLYING DESIGN PATTERNS

Design Patterns: Factories - Singleton Pattern and the Double-Checked Locking Pattern - Applying Singleton Pattern to Case Study. Object Pool Pattern -Management of Objects. Factory Method Pattern - Factory Method Pattern – Object Oriented Pool Pattern –

UNIT IV-CASE STUDIES

What to Expect from Design Patterns - The Pattern Community An Invitation - A Parting Thought - A Case Study : Designing a Document Editor : Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation.

REFERENCES

1. Jason McC. Smith, “Elemental design Patterns”, Pearson, 2012.
2. Alan Shalloway and James R.Trott, “Design Patterns explained: A new perspective on Object-Oriented Design, 2006.
3. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, “Design Patterns: Elements of Reusable Object-Oriented Software”, Addison-Wesley, 2003.
4. Eric Freeman, Elisabeth Freeman, Kathy Sierra, Bert Bates, “Head First Design Patterns”, O'Reilly Media, Inc., 2004.

	SOFTWARE QUALITY MANAGEMENT	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT I-INTRODUCTION

The Software Quality Challenge - Software Quality Factors - Components of the Software Quality Assurance System. Pre-Project Software Quality Components - Contract Review - Development and Quality .SOFTWARE QUALITY ASSURANCE COMPONENTS IN THE PROJECT LIFE CYCLE (9 hours) Integrating Quality Activities in the Project Life Cycle – Reviews - Software Testing – Strategies - Software Testing –Implementation - Assuring the Quality of Software Maintenance - Assuring The Quality of External Participants' Parts - Case Tools and their Affect on Software Quality.

UNIT II-SOFTWARE QUALITY INFRASTRUCTURE COMPONENTS

Procedures and Work Instructions - Supporting Quality Devices - Staff Training, Instructing and Certification - Preventive and Corrective Actions - Configuration Management - Documentation and Quality Records Controls

UNIT III-SOFTWARE QUALITY MANAGEMENT COMPONENTS

Project Progress Control- Components, Internal & External Participants, Progress control regimes, Computerized tools, Software Quality Metrics – Objective, Classification, Process & Product Metrics, Implementation & Limitation of Software Metrics - Software Quality Costs – Objective, Classification Model of cost, Extended Model and Applications

UNIT IV-STANDARDS, CERTIFICATION AND ASSESSMENT

SQA Standards – ISO9001 Certification - Software Process Assessment. Organizing for Quality Assurance -Management and its Role in Quality Assurance - The Software Quality Assurance Unit - SQA Trustees and Committees

REFERENCE

1. Daniel Galin, “Software Quality Assurance: From Theory to Implementation”, Pearson Addison-Wesley, 2012.
2. Roger S. Pressman, “Software Engineering-A Practitioner’s Approach”, McGraw Hill pub.2010.
3. Allen Gilles “Software quality: Theory and management”, International Thomson, Computer press 1997.
4. Stephen H.Kan, “Metrics and models in software quality Engineering”, Addison –Wesley 2003. 39

5. Humphrey Watts, “Managing the Software Process” Addison Wesley, 1986.

	AGILE SOFTWARE PROCESS	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT I-INTRODUCTION

Software is new product development – Iterative development – Risk-Driven and Client-Driven iterative planning – Time boxed iterative development – During the iteration, No changes from external stakeholders – Evolutionary and adaptive development - Evolutionary requirements analysis – Early “Top Ten” high-level requirements and skilful analysis – Evolutionary and adaptive planning – Incremental delivery – Evolutionary delivery – The most common mistake – Specific iterative and Evolutionary methods.

UNIT II-AGILE AND ITS SIGNIFICANCE

Agile development – Classification of methods – The agile manifesto and principles – Agile project management – Embrace communication and feedback – Simple practices and project tools – Empirical Vs defined and prescriptive process – Principle-based versus Rule-Based – Sustainable discipline: The human touch – Team as a complex adaptive system – Agile hype – Specific agile methods. The facts of change on software projects – Key motivations for iterative development – Meeting the requirements challenge iteratively – Problems with the waterfall. Research evidence – Early historical project evidence – Standards-Body evidence – Expert and thought leader evidence – A Business case for iterative development – The historical accident of waterfall validity

UNIT III-AGILE METHODOLOGY

Method overview – Lifecycle – Work products, Roles and Practices values – Common mistakes and misunderstandings – Sample projects – Process mixtures – Adoption strategies – Fact versus fantasy – Strengths versus “Other” history. Agile – Motivation – Evidence – Scrum – Extreme Programming – Unified Process – Evo – Practice Tips.

UNIT IV-AGILE PRACTICING AND TESTING

Project management – Environment – Requirements – Test – The agile alliances – The manifesto – Supporting the values – Agile testing – Nine principles and six concrete practices for testing on agile teams.

REFERENCES

1. Elisabeth Hendrickson, “Agile Testing” Quality Tree Software Inc 2008.
2. Craig Larman “Agile and Iterative Development – A Manager’s Guide” Pearson Education – 2004.

3. Alistair “Agile Software Development series” Cockburn - 2001.
4. www.agileintro.wordpress.com/2008
5. www.serena.com/docs/repository/solutions/intro-to-agile-devel.pdf

	SOFTWARE CONFIGURATION MANAGEMENT	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT I-OVERVIEW TO SOFTWARE CONFIGURATION MANAGEMENT SCM

Concepts and definitions – SCM Plan – Software development life cycle models – SDLC Phases – Need and importance of Software configuration management – Increased complexity and demand – Changing nature of software and need for change management – Lower maintenance costs and better quality assurance – Faster problem identification and bug fixes - SCM: Basic concepts – Baselines – Check-in and Check-out- Versions and Variants –System Building - Releases

UNIT II-DIFFERENT PHASES OF SOFTWARE CONFIGURATION MANAGEMENT

Different Phases Of Scm – SCM System design - SCM Plan preparation - SCM Team organization – SCM Infrastructure organization – SCM Team training – Project team training – Configuration identification – Configuration Control – Configuration status accounting – Configuration audits

UNIT III-CONFIGURATION AUDITS AND MANAGEMENT PLANS

When, what and who of auditing - Functional Configuration audit – Physical Configuration audit – Auditing the SCM System – Role of SCM Team in configuration audits – SCM plan and the incremental approach – SCM Plan and SCM Tools – SCM Organization

SOFTWARE CONFIGURATION MANAGEMENT TOOLS AND IMPLEMENTATION

Advantages of SCM tools – Reasons for the increasing popularity of SCM tools – SCM Tools and SCM Functions – SCM tool selection – Role of Technology – Selection criteria – Tool implementation – SCM implementation plan – implementation strategy – SCM Implementation team

UNIT IV-TRENDS IN SCM: FUTURE DIRECTIONS

SCM in different scenarios – SCM and project size – SCM in integrated development environments – SCM In distributed environments – SCM and CASE Tools - Trends in SCM - Hardware and Software Management – Better integration with IDE’S and CASE environments – Customization – Better decision making capabilities – Reduction in SCM Team size – Market snapshot

REFERENCES

1. Jessica Keyes, Software Configuration Management, Auerbach Publications, 2008.
2. Alexis Leon, Software Configuration Management Handbook, Artech Print on Demand; 2 edition , 2009.
3. Robert Aiello and Leslie Sachs Configuration Management Best Practices: Practical Methods that work in Real World, , Addison-Wesley Professional; 1 edition, 2010.
4. Stephen P. Berczuk, Brad Appleton and Kyle Brown , “Software Configuration Management Patterns: Effective Teamwork and Practical Integration”, Addison-Wesley , 2003.

	SOFTWARE METRICES	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT - I

Basics of measurement : Measurement in everyday life, measurement in software engineering, scope of software metrics, representational theory of measurement, measurement and models, measurement scales, meaningfulness in measurement, goal- based framework for software measurement, classifying software measures, determining what to measure, software measurement validation empirical investigation, types of investigation, planning and conducting investigations.

UNIT – II

Software-metrics data collection and analysis : What is good data, how to define the data, how to collect the data, how to store and extract data, analyzing software- measurement data, frequency distributions, various statistical techniques. Measuring internal product attributes : Measuring size, aspects of software size, length, functionality and complexity, measuring structure, types of structural measures, control-flow structure, modularity and information flow attributes, data structures.

UNIT - III

Measuring external product attributes : Modeling software quality measuring aspects of software quality, software reliability, basics of software reliability, software reliability problem, parametric reliability growth models, predictive accuracy, recalibration of software reliability growth predictions, importance of operational environment, wider aspects of software reliability. Metrics for object- oriented systems : The intent of objectoriented metrics, distinguishing characteristics of object oriented metrics, various object- oriented metric suites - LK suite, CK suite and MOOD metrics.

UNIT - IV

Metrics for component- based systems : The intent of component based metrics, distinguishing characteristics of componentbased metrics, various component- based metrics. Resource measurement : Measuring productivity, teams tools and methods.

References

1. Norman E. Fenton and Shari Lawrence Pfleeger; Software Metrics - A Rigorous and Practical Approach, Thomson Asia Pte. Singapore.

2. Stephen H. Kan; Metrics and Models in Software Quality Engineering, Addison Wesley, New York.
3. K.H. Moller and D.J. Paulish; Software Metrics - A Practitioner's Guide to Improved Product Development, Chapman and Hall, London.
4. Mark Lorenz and Jeff Kidd; Object- Oriented Software Metrics, Prentice Hall, New York.

	DESIGN PATTERNS LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Practicals based on theory paper Design Patterns .

M.Tech Computer Science & Engineering
(Cyber Security)

	NETWORKS AND INFORMATION SECURITY	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Computer Security Concepts- Introduction to Information Security, Introduction to Data and Network Security, Integrity, and Availability, NIST FIPS 199 Standard, Assets and Threat Models and Examples. Control Hijacking– Attacks and defenses, Buffer overflow and control hijacking attacks.

Unit-II

Dealing with Legacy code- Dealing with bad (legacy) application code: Sandboxing and Isolation. Least privilege, access control, operating system security- The principle of least privilege, Access control concepts, Operating system mechanisms, Unix, Windows, Qmail, Chromium, and Android examples.

Unit-III

Basic web security model- Browser content, Document object model (DOM), Same-origin policy Network Protocols and Vulnerabilities- Overview of basic networking infrastructure and network protocols, IP, TCP, Routing protocols, DNS.

Unit-IV

Malicious Software and Software Security- Malicious Web, Internet Security Issues, Types of Internet Security Issues, Computer viruses, Spyware, Key-Loggers, Secure Coding, Electronic and Information Warfare. Security Risk Management- How Much Security Do You Really Need, Risk Management, Information Security Risk Assessment: Introduction, Information Security Risk Assessment: Case Studies, Risk Assessment in Practice.

References:-

1. Robert Bragg, Mark Rhodes, Network Security The complete Reference, 4th Edition, TMH, 2009.
2. Buchmann, Introduction to Cryptography, 2nd Edition, Springer, 2009.
3. Serge Vaudenay: “Classical Introduction to Cryptography – Applications for Communication Security”, Springer, 2006.
4. A. Manezes, P. Van Oorschot and S. Vanstone: “Hand Book of Applied Cryptography”, CRC Press, 1996.

	INTRODUCTION TO CRYPTOGRAPHY	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations. Algorithms: Triple DES, International Data Encryption algorithm.

Unit-II

Conventional Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation. Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

Unit-III

Number theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primality, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms. Message authentication and Hash functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash function and MACs.

Unit-IV

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload Combining security Associations, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction. Intruders, Viruses and Worms: Intruders, Viruses and Related threats. Fire Walls: Fire wall Design Principles, Trusted systems.

References:-

1. William Stallings, Cryptography and Network Security Principles and Practices, 5th Edition, PHI/Pearson, 2011.
2. William Stallings, Network Security Essentials Applications and Standards, 4th Edition, Pearson Education, 2011.
3. Eric Maiwald, Fundamentals of Network Security, 1 Edition, Dreamtech press, 2008.

4. Charlie Kaufman, Radia Perlman and Mike Speciner, Network Security Private Communication in a Public World, 2nd Edition, Pearson/PHI, 2009. 3. Whitman, Principles of Information Security, 3rd Edition, Thomson, 2008.

	OPERATING SYSTEMS AND SECURITY	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Introduction to Kernel - Architecture of the UNIX operating system, System concepts, Data structures. Buffer Cache: Buffer header, Structure of Buffer pool, Reading and writing disk blocks. Files INODES, Structure of a regular file, Directories, Super block, Inode assignment. System calls - OPEN, Read, Close, Write, Create, CHMOD, CHOWN, Pipes, Mounting and Unmounting.

Unit-II

Process - Layout the system memory, Context, Process control, process creation, signals, Process scheduling, time, clock. Inter-Process Communications - Process tracing, System V IPC, Shared Memory, Semaphores.

Unit-III

Network Communications - Socket programming: Sockets, descriptors, Connections, Socket elements, Stream and Datagram Sockets.

Unit-IV

Windows Operating system - versions, Concepts and tools, Windows internals, System Architecture, Requirements and design goals, Operating system model, Architecture overview. Key system components. - Trap dispatching, object manager, Synchronization, System worker threads, Windows global flags, Local procedural calls System mechanisms, Kernel event tracing.

References:-

1. Maurice J. Bach: "The Design of the Unix Operating System", Prentice Hall of India, 1991.
2. Mark E. Russinovich and David A. Solomon: "Microsoft® Windows® Internals", 4th Edition, Microsoft Press, 2004.
3. W. Stallings: "Operating Systems: Internals and Design Principles", 5th Edition, Prentice Hall, 2005. 4. A. Tanenbaum, A. Woodhull: "Operating Systems Design and Implementation", 3rd Edition, Prentice Hall, 2006.

	DATA COMMUNICATION AND NETWORKS	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit- I

Introduction to Data Transmission: Overview of Data Communication and networking, Analog and Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding, Asynchronous And Synchronous Transmission, Error Detection and correction techniques.

Unit-II

Data Link Control: Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control.

Unit-III

Communication Networking Techniques: Communication Networks, Circuit Switching, Message Switching, Packet Switching, Local Networking Technology, The bus / tree topology, the ring topology, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB).

Unit-IV

Computer Communication Architecture: OSI and TCP/IP Model, Protocol And Architecture, Networking Access protocols, Inter Networking, Transport layer Protocols, Session Service And Protocols, and Presentation, Application protocols

References:

1. Andrew S Tanenbaum: Computer Networks ,6th Edition. Pearson Education/PI, 2012.
2. Behrouz A. Forouzan : Data Communications and Networking, 4 th Edition TMH, 2012.
3. S.Keshav: An Engineering Approach to Computer Networks, 2nd Edition, Pearson Education, 2001. 4. William, A. Shay : Understanding communications and Networks, 3rd Edition, Thomson Publication, 2006.

	OPERATING SYSTEM SECURITY LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Practical will be based on Operating System and Security Course.

	INFORMATION SECURITY LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Practical will be based on Networks and Information Security Course.

	ETHICAL HACKING AND DIGITAL FORENSICS	Learning Schedule			
		L	T	P	C
			4	0	0

Unit-I

Hacking Windows: BIOS Passwords, Windows Login Passwords, Changing Windows Visuals, Cleaning Your Tracks, Internet Explorer Users, Cookies, URL Address Bar, Netscape Communicator, Cookies, URL History, The Registry, Baby Sitter Programs.

Unit-II

Getting Past the Password: Passwords: An Introduction, Password Cracking, Cracking the Windows Login Password, The Glide Code, Windows Screen Saver Password, XOR, Internet Connection Password, Sam Attacks, Cracking Unix Password Files, HTTP Basic Authentication, BIOS Passwords, Cracking Other Passwords.

Unit-III

Introduction & evidential potential of digital devices – Key developments, Digital devices in society, Technology and culture, Comment, Closed vs. open systems, evaluating digital evidence potential. Device Handling & Examination Principles: Seizure issues, Device identification, Networked devices, Contamination, Previewing, Imaging, Continuity and hashing, Evidence locations.

Unit-IV

Introduction to Computer Forensics, Use of Computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources / Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps Taken by Computer Forensics Specialists, Who Can Use Computer Forensic Evidence?, Case Histories, Case Studies.

References:-

1. Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw-Hill Osborne Media, 3 rd edition , 2014.
2. Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback – Import, 2005.
3. John Sammons, The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics Paperback, February 24, 2012.
4. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.

	SYSTEM ADMINISTRATION AND SECURITY	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Security Basics: Principles of Information Security, Authentication: Proof of identity
 Authorization: Limiting System Access and Controlling Using Behavior Restricting Access to Software; Restricting Software Access to Resources Controlling Access to Data.

Unit-II

Network Users, Resources, and Special Server Roles Understanding and configuring Active Directory Domain services Creating Active Directory groups, Organizational Units, and Sites Adding client computers and member servers to the domain Deploying group policy and network access Working with network shares and the distributed file system.

Unit-III

Introduction to Linux Systems Booting and Shutting Down processes Rootly Powers Controlling Processes The File System Adding New Users Periodic Processes. Software and Configuration Management. TCP/IP Networking.

Unit-IV

Introduction to Networking Technologies (DHCP, DNS, NFS/iSCSI, SMTP, SNMP, LAMP) Routing Network Hardware DNS The Network File System Network Management and Debugging. Introduction to Firewall/IDS/SSH Key Certificates, etc. Understanding Exposure Risk.

References:-

1. Aunurag Kumar, D. Manjunath, Joy Kuri, "Communication Networking", MorganKaufmann Publishers, 2011.
2. J.F. Kurose & K.W. Ross, "Computer Networking- A Top Down Approach Featuring the Internet", Pearson, 2nd Edition, 2003.
3. Nader F.Mir, "Computer and Communication Networks", Pearson Education, 2009.
4. Walrand .J. Varatya, "High Performance Communication Network", Morgan Kaufmann – Harcourt Asia Pvt. Ltd., 2nd Edition, 2000.

	HIGH SPEED NETWORKING	Learning Schedule			
		L	T	P	C
			4	0	0

Unit-I

Layered Network Architectures: Review of Open Systems Interconnection (OSI) and Transmission Control Protocol/Internet Protocol, and Internetworking.

Point-To-Point Protocols And Links : Error detection – ARQ: Retransmission strategies – Framing – Point-to-point protocols at the network layer – The Transport layer – Broadband ISDN – Frame Relay – Asynchronous Transfer Mode.

Unit-II

Delay Models In Data Networks: M/M/1, M/M/m, M/M/m/m, M/M/8, M/G/1 queuing models – Networks of Transmission lines - Time reversibility (Burke’s theorem) – Network of Queues (Jackson’s theorem).

Unit-III

Routing In Data Networks And Internet Routing 9 Wide area networking – Interconnected network Routing – Shortest path Routing – Multicast/Broadcast Routing information – Flow models – Optimal Routing and Topological design – Characterization of Optimal Routing – Interior and Exterior Routing protocols.

Unit-IV

Congestion, Traffic Management And Flow Control : Congestion control in data networks and Internets – Link-level flow and error control – TCP traffic control – Traffic and Congestion control in ATM networks – Means of Flow control – Main objectives of flow control – Window flow control – Rate control schemes

References:

1. Dimitri Bertsekas and Robert Gallager , “Data networks” ,Second Edition, Prentice Hall, Inc.,NJ, USA1992
2. William Stalling, “High Speed Networks and Internets”, Second Edition, Pearson EducationInc., New Delhi, India, 2002
3. Leon Garcia and Widjaja ,“ Communication networks: Fundamental concepts and key architectures”, McGraw Hill, Inc., NY, USA, 2006
4. Jean Walrand , “ Communication networks”, McGraw Hill, Inc., NY, USA, 1998.

	NETWORK SIMULATION LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

1. Ethernet LAN protocol. To create Scenario and study the performance of CSMA/CD protocol through simulation
2. Token Bus and Token Ring protocols. To create scenario and study the performance of token bus and token ring protocols through simulation
3. Wireless LAN protocols. To create scenario and study the performance of network with CSMA/CA protocol and compare with CSMA/CD protocols
4. Implementation and study of Stop and Wait protocol
5. Implementation and study of Go back N and Selective Repeat protocols
6. Implementation of Distance Vector Routing algorithm
7. Implementation of Link state routing algorithm
8. Implementation of data encryption and decryption
9. Transfer of files from PC to PC using Windows/ UNIX socket processing

	ETHICAL HACKING LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Practical will be based on Ethical Hacking and Digital Forensics Course.

	MOBILE AND WIRELESS SECURITY	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Introduction: Security, CIA Triad, Viruses, Trojans, and Worms In a Nutshell, Security Concepts- exploit, threat, vulnerability, risk, attack. Malware Terminology: Rootkits, Trapdoors, Botnets, Key loggers, Honeypots. Active and Passive Security Attacks. IP Spoofing, Tear drop, DoS, DDoS, XSS, SQL injection, Smurf, Man in middle, Format String attack. Types of Security Vulnerabilities- buffer overflows, Invalidated input, race conditions, access-control problems, weaknesses in authentication, authorization, or cryptographic practices. Access Control Problems.

Unit-II

Need for secure systems: Proactive Security development process, Secure Software Development Cycle (S-SDLC) , Security issues while writing SRS, Design phase security, Development Phase, Test Phase, Maintenance Phase, Writing Secure Code – Best Practices SD3 (Secure by design, default and deployment), Security principles and Secure Product Development Timeline.

Unit-III

Threat modelling process and its benefits: Identifying the Threats by Using Attack Trees and rating threats using DREAD, Risk Mitigation Techniques and Security Best Practices. Security techniques, authentication, authorization. Defence in Depth and Principle of Least Privilege.

Unit-IV

Testing Secure Applications: Security code overview, secure software installation. The Role of the Security Tester, Building the Security Test Plan. Testing HTTP-Based Applications, Testing File-Based Applications, Testing Clients with Rogue Servers.

References:-

1. Pallapa Venkataram, Satish Babu: “Wireless and Mobile Network Security”, 1st Edition, Tata McGraw Hill, 2010.
2. Frank Adelstein, K.S.Gupta : “Fundamentals of Mobile and Pervasive Computing”, 1st Edition, Tata McGraw Hill 2005.
3. Randall k. Nichols, Panos C. Lekkass : “Wireless Security Models, Threats and Solutions”, 1st Edition, Tata McGraw Hill, 2006.
4. Bruce Potter and Bob Fleck : “802.11 Security” , 1st Edition, SPD O“REILLY 2005.

	SECURITY THREATS AND VULNERABILITIES	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Introduction: Security threats - Sources of security threats- Motives - Target Assets and Vulnerabilities. Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Cyber crimes.

Unit-II

Network Threats: Active/ Passive – Interference – Interception – Impersonation – Worms – Virus – Spam’s – Ad ware - Spy ware – Trojans and covert channels – Backdoors – Bots - IP Spoofing - ARP spoofing - Session Hijacking - Sabotage-Internal treatsEnvironmental threats - Threats to Server security.

Unit-III

Security Threat Management: Risk Assessment - Forensic Analysis - Security threat correlation – Threat awareness - Vulnerability sources and assessmentVulnerability assessment tools - Threat identification - Threat Analysis - Threat Modeling - Model for Information Security Planning.

Unit-IV

Access control, Trusted Computing and multilevel security - Security models, Trusted Systems, Software security issues, Physical and infrastructure security, Human factors – Security awareness, training, Email and Internet use policies

References:

1. Hack I.T. - Security Through Penetration Testing, T. J. Klevinsky, Scott Laliberte and Ajay Gupta, Addison-Wesley, ISBN: 0-201-71956-8
2. Metasploit: The Penetration Tester's Guide, David Kennedy, Jim O'Gorman, Devon Kearns, Mati Aharoni
3. Professional Penetration Testing: Creating and Operating a Formal Hacking Lab, Thomas Wilhelm

	INTRUSION DETECTION SYSTEM	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Overview of intrusions, system intrusion process, dangers of system intrusions, history and state of the art of intrusion detection systems (IDSs): anomaly detection, misuse detection, types of IDS: Network-Based IDS, Host-Based IDS, Hybrid IDS.

Unit-II

Intrusion Prevention Systems (IPS): Network-Based IPS, Host-Based IPS, Intrusion Detection Tools, the limitations and open problems of intrusion detection systems, advanced persistent threats, case studies of intrusion detection systems against real-world threats and malware.

Unit-III

Statistical and machine approaches to detection of attacks on computers - Techniques for studying the Internet and estimating the number and severity of attacks, network based attacks, host based attacks.

Unit-IV

Statistical pattern recognition for detection and classification of attacks, and techniques for visualizing network data, etc.

References:

1. Rafeeq Rehman : “ Intrusion Detection with SNORT, Apache, MySQL, PHP and ACID,” 1st Edition, Prentice Hall , 2003.
2. Christopher Kruegel, Fredrik Valeur, Giovanni Vigna: “Intrusion Detection and Correlation Challenges and Solutions”, 1 st Edition, Springer, 2005.
3. Carl Endorf, Eugene Schultz and Jim Mellander “ Intrusion Detection & Prevention”, 1 st Edition, Tata McGraw-Hill, 2004.
4. Stephen Northcutt, Judy Novak : “Network Intrusion Detection”, 3 rd Edition, New Riders Publishing, 2002.
5. Stephen Northcutt, Judy Novak : “Network Intrusion Detection”, 3 rd Edition, New Riders Publishing, 2002.

	CYBER LAWS AND SECURITY POLICY	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Introduction to Cyber Law Evolution of Computer Technology : Emergence of Cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement, Legal and Technological Significance of domain Names, Internet as a tool for global access.

Unit-II

Information technology Act : Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.

Unit-III

Cyber law and related Legislation : Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act.

Unit-IV

Electronic Business and legal issues: Evolution and development in Ecommerce, paper vs paper less contracts E-Commerce models- B2B, B2C,E security. Application area: Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.

References:

1. Mark F Grady, Fransesco Parisi, “The Law and Economics of Cyber Security”, Cambridge University Press, 2006
2. Jonathan Rosenoer, “Cyber Law: The law of the Internet”, Springer-Verlag, 1997.
3. Sunit Belapure and Nina Godbole, Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives, Wiley India Pvt. Ltd, 2011.

	STEGANOGRAPHY AND DIGITAL WATERMARKING	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Information hiding: Introduction, Background, and Applications of Information hiding: Data hiding, applications of data hiding.

Unit-II

Steganography: Frameworks of secret communication, Security of steganography systems, Information hiding in noisy data, Adaptive & non-adaptive algorithms, Active and malicious attackers, Information hiding in written text, Invisible communication.

Unit-III

Data hiding in still images : LSB encoding, BPCS steganography, Lossless data hiding, Data hiding by quantization, Patchwork, Transform domain methods, Robust data hiding in JPEG images, frequency domain watermarking Detecting malicious tempering, Robust waveletbased watermarking, Kundur-Hatzinakos watermarking, Data hiding in binary images, Zhao-koch method, Wu-Lee method, CPT method, TP method, Data hiding in fax images.

Unit-IV

Watermarking: Introduction, Watermarking principals, Applications, Requirements and algorithmic design issues, Evaluation and standards of watermarking. Fingerprinting: Introduction, Terminology and requirements, Classifications, Research history, fingerprinting schemes, Statistical fingerprinting, and Collusion-secure fingerprinting.

References:

1. I.J.Cox, M.L.Miller, J.A.Bloom, J.Fridrich, T.Kalker, Digital Watermarking and Stegonagraphy, Morgan Kaufman 2008.
2. F.Y.Shih, Digital Watermarking and Stegonagraphy Fundamentals and Techniques, CRC press 2008.
3. Stefon Katzeubeisser, F.A.Petitolos, Information Hiding Techniques for Stegonagraphy and digital watermarking, Aatech House London 2008.

	STEGANOGRAPHY LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Practical will be based on Steganography and Digital Watermarking Course.

	FORENSIC AND INCIDENT RESPONSE	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Forensics Overview: Computer Forensics Fundamentals, Benefits of Computer Forensics, Computer Crimes, Computer Forensics Evidence and the Courts, Legal Concerns and Privacy Issues.

Unit-II

Forensics Process: Forensics Investigation Process, Securing the Evidence and Crime Scene, Chain of Custody, Law Enforcement Methodologies, Forensics Evidence, Evidence Sources. Evidence Duplication, Preservation, Handling, and Security, Forensics Soundness, Order of Volatility of Evidence, Collection of Evidence on a Live System, Court Admissibility of Volatile Evidence.

Unit-III

Acquisition and Duplication: Sterilizing Evidence Media, Acquiring Forensics Images, Acquiring Live Volatile Data, Data Analysis, Metadata Extraction, File System Analysis, Performing Searches, Recovering Deleted, Encrypted, and Hidden files, Internet Forensics, Reconstructing Past Internet Activities and Events, E-mail Analysis, Messenger Analysis: AOL, Yahoo, MSN, and Chats.

Unit-IV

Mobile Device Forensics: Evidence in Cell Phone, PDA, Blackberry, iPhone, iPod, and MP3. Evidence in CD, DVD, Tape Drive, USB, Flash Memory, Digital Camera, Court Testimony, Testifying in Court, Expert Witness Testimony, Evidence Admissibility.

References:

1. John Sammons, The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics Paperback, February 24, 2012.
2. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.
3. Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback – Import, 2005.

	TCP/IP	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Overview of TCP/IP Applications : Web browsers and servers , Telnet , File Transfer Protocol , Electronic Mail, Network Management. TCP/IP Structure and Addressing : Internet Protocol Suite, Internet Protocol Addressing, Creating Subnets, Address Resolution , Domain Name System, Internet Control Message Protocol , Internet Group Management Protocol.

Unit-II

TCP/IP Protocols : Internet Protocol , Internet Protocol Routing , User Datagram Protocol, Transmission Control Protocol and Connection Establishment , Transmission Control Protocol and Data Transmission , Routing Protocols.

Unit-III

How TCP/IP Applications Work, Web browsers and servers, Telnet , File Transfer Protocol , Simple Mail Transfer Protocol , Network Management.

Unit-IV

How TCP/IP Applications Work, Web browsers and servers , Telnet , File Transfer Protocol , Simple Mail Transfer Protocol , Network Management.

References:

1. Andrew S Tanenbaum: Computer Networks ,6th Edition. Pearson Education/PI, 2012.
2. Behrouz A. Forouzan : Data Communications and Networking, 4 th Edition TMH, 2012.
3. S.Keshav: An Engineering Approach to Computer Networks, 2nd Edition, Pearson Education, 2001. 4. William, A. Shay : Understanding communications and Networks, 3rd Edition, Thomson Publication, 2006.

M.Tech Computer Science & Engineering
(Networking)

	DATA COMMUNICATION AND NETWORKS	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit- I

Introduction to Data Transmission: Overview of Data Communication and networking, Analog and Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding, Asynchronous And Synchronous Transmission, Error Detection and correction techniques.

Unit-II

Data Link Control: Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control.

Unit-III

Communication Networking Techniques: Communication Networks, Circuit Switching, Message Switching, Packet Switching, Local Networking Technology, The bus / tree topology, the ring topology, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB).

Unit-IV

Computer Communication Architecture: OSI and TCP/IP Model, Protocol And Architecture, Networking Access protocols, Inter Networking, Transport layer Protocols, Session Service And Protocols, and Presentation, Application protocols

References:

1. Andrew S Tanenbaum: Computer Networks ,6th Edition. Pearson Education/PI, 2012.
2. Behrouz A. Forouzan : Data Communications and Networking, 4 th Edition TMH, 2012.
3. S.Keshav: An Engineering Approach to Computer Networks, 2nd Edition, Pearson Education, 2001. 4. William, A. Shay : Understanding communications and Networks, 3rd Edition, Thomson Publication, 2006.

	COMPUTER NETWORK ADMINISTRATION	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Networking and Administration – The Importance of topology , Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Administration: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.

Unit-II

Basic Foundations: Standards, Models, and Language: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Managed Object Perspectives, Communication Model;

Unit-III

Broadband Network Management: Broadband Access Networks and Technologies: Broadband Access Networks, Broadband Access Technology. DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network in an Overall Network, ADSL Architecture, ADSL Channeling Schemes.

Unit-IV

Network Management Applications: Configuration Management- Network Provisioning, Inventory Management, Network Topology, Fault Management- Fault Detection, Fault Location and Isolation Techniques, Performance Management – Performance Metrics, Protection of Networks from Virus Attacks, Accounting Management, Report Management, Policy- Based Management, Service Level Management

References:-

1. William Stallings, "Data and Computer Communication", PHI, 4th Ed.
2. Forouzan, "Data communications and networking", TMH
3. Andrew Tanenbaum, "Computer Networking", PHI
4. Godbole, "Data communications and network", TMH

	WIRELESS COMMUNICATIONS	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit -I

Introduction to mobile radio systems: Paging systems, cordless telephone system, Cellular telephonesystems- Cellular concept, frequency reuse, channel assignment strategies, Interference and systemcapacity, trunking and grade of service, cell splitting, sectoring, microcell zone concept, HO Strategies.

Unit -II

Mobile radio propagation: mechanism, free space path loss, log-distance path loss models, Okumaramodel, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake'schannel model, Multi path characteristics of radio waves, signal fading, Time dispersion, Dopplerspread, coherence time LCR, fading statistics, diversity techniques.

Unit-III

Introduction to spread spectrum communication, multiple access techniques used in mobile wirelesscommunication: FDMAFFDMA/CDMA, Cellular CDMA, packet radio protocols, CSMA,reservation protocols, capacity of cellular CDMA, soft HO.

Unit -IV

Wireless systems and standards: GSM standards, signaling and call control, mobility management,location tracing, wireless data networking, packet error modeling on fading channels, Performanceanalysis of link and transport layer protocols over wireless channels, mobile data networking(mobile IP), wireless data services, IS-95, GPRS.

References:-

1. Kaveh Pahlavan & Allen H. Levesque, "Wireless Information Networks", Wiley series inTelecommunications and signal processing.
2. Kamilo Feher: Wireless Digital communications, Modulation and Spread SpectrumApplications PHI 2001.

	NETWORK SECURITY	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit -I

Introduction: Security trends, The OSI security architecture, Security attacks, Security services, Security mechanisms, Models of Internetwork security.

Unit -II

Symmetric Encryption and Message Confidentiality: Symmetric encryption principles, Algorithms, Stream ciphers and RC4, Clipher block modes of operation, Location of encryption devices, Key distribution.

Unit -III

Public Key Cryptography and message Authentication: Different approaches to message authentication, HMAC, public key cryptography principles and algorithm, Digital signature, Key management.

Unit -IV

Network Security Application: Electronic Mail Security, IP security overview, Architecture, Authentication Header, Encapsulating Security payload, Combining Security Association, Key management.

References:-

1. Robert Bragg, Mark Rhodes, Network Security The complete Reference, 4th Edition, TMH, 2009.
2. Buchmann, Introduction to Cryptography, 2nd Edition, Springer, 2009.
3. Serge Vaudenay: “Classical Introduction to Cryptography – Applications for Communication Security”, Springer, 2006.
4. A. Manezes, P. Van Oorschot and S. Vanstone: “Hand Book of Applied Cryptography”, CRC Press, 1996.

	NETWORK PROGRAMMING AND INTERNET LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

1. Configuration of LAN using Router, switches (Hardware)
2. Configuration of VLAN- Tunneling using Router, switches (Hardware)
3. Configuration of WLAN using Layer 3 switches, routers, Wifi Access Point, PDA (Hardware)
4. Write a program to transfer the contents of a requested file from server to the client using TCP/IP Sockets (using TCP/IP Socket programming).
5. Write a program to archive Traffic management at Flow level by implementing Closed Loop Control technique. (Leaky Bucket Algorithm)
6. Write a program to implement dynamic routing strategy in finding optimal path for data transmission. (Bellman ford algorithm).
7. Write a program to implement Link State Routing (Dijkstra Algorithm).

	INFORMATION SECURITY LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Note: Use C/C++/Java or equivalent tool to implement the following experiment

1. Consider a file with composite data, substitute the content and transpose the ciphers.
2. Consider an alphanumeric data, encrypt and Decrypt the data using advanced encryption standards and verify for the correctness.
3. Apply the RSA algorithm on a text file to produce cipher text file.
4. Develop a mechanism to setup a security channel using Diffie-Hellman Key Exchange between client and server
5. Implementation of Message Authentication Code using cryptography VMAC function.
6. Implement secure hash algorithm for Data Integrity. Implement MD5 and SHA-1 algorithm, which accepts a string input, and produce a fixed size number - 128 bits for MD5; 160 bits for SHA-1, this number is a hash of the input. Show that a small change in the input results in a substantial change in the output
7. Using any simulation tool: demonstrate packet filtering firewalls, create the ACL, create VLAN [Subnetting].
8. Develop a mechanism to setup(configure) a port scanner and identify the intrusion.

	WIRELESS SENSOR AND ADHOC NETWORKING	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Introduction, Overview and Applications of Wireless Sensor Networks Introduction, Basic overview of the Technology, Applications of Wireless Sensor Networks: Introduction, Background, Range of Applications, WSN Applications.

Unit-II

Basic Wireless Sensor Technology and Systems: Introduction, Sensor Node Technology, Sensor Taxonomy, WN Operating Environment, WN Trends, Wireless Transmission Technology and Systems: Introduction, Radio Technology Primer, Available Wireless Technologies.

Unit-III

Ad hoc Wireless Networks – What is an Ad Hoc Network? Heterogeneity in Mobile Devices –Wireless Sensor Networks – Traffic Profiles – Types of Ad hoc Mobile Communications – Types of Mobile Host Movements – Challenges Facing Ad hoc Mobile Networks – Ad hoc wireless Internet .Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks.

Unit-IV

Issues and Challenges in Providing QoS in Ad hoc Wireless Networks – Classifications of QoS Solutions – MAC Layer Solutions – Network Layer Solutions – QoS Frameworks for Ad hoc Wireless Networks Energy Management in Ad hoc Wireless Networks – Introduction – Need for Energy Management in Ad hoc Wireless Networks

References:-

1. Stevens R. “TCP/IP Illustrated, Volume 1: The Protocols”, Pearson India
2. Forouzan B.A., “TCP/IP protocol suite”, Tata McGraw-Hill (TMH)
3. Goralski Walter, “The Illustrated Network”, Morgan Kauffman
4. Kurose J., Ross K., “Computer Networking – A Top Down Approach”, Pearson Education
5. Donahoo M., Calvert K., “TCP/IP Sockets in C – Practical Guide for Programmers”, Morgan Kauffman

	ROUTING TECHNOLOGY	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Networking and Network Routing: An Introduction: Addressing and Internet Service: An Overview, Network Routing: An Overview, IP Addressing, On Architectures, Service Architecture, Protocol Stack Architecture, Router Architecture, Network Topology Architecture.

Unit-II

Routing Algorithms: Shortest Path and Widest Path: Bellman–Ford Algorithm and the Distance Vector Approach, Dijkstra’s Algorithm, Comparison of the Bellman–Ford Algorithm and Dijkstra’s Algorithm, Shortest Path Computation with Candidate Path Caching, Widest Path Computation with Candidate Path Caching, Widest Path Algorithm, kShortest Paths Algorithm.

Unit-III

Routing Protocols: Framework and Principles: Routing Protocol, Routing Algorithm and Routing Information, Representation and Protocol Messages, Distance Vector Routing Protocol, Link State Routing Protocol, Path Vector Routing Protocol, Link Cost.

Unit-IV

Router Architectures: Functions of a Router, Types of Routers, Elements of a Router, Packet Flow, Packet Processing: Fast Path versus Slow Path, Router Architectures.

References:-

1. William Stallings, "Data and Computer Communication", PHI, 4th Ed.
2. Forouzan, "Data communications and networking", TMH
3. Andrew Tanenbaum, "Computer Networking", PHI
4. Godbole, "Data communications and network", TMH

	HIGH SPEED NETWORKING	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Layered Network Architectures: Review of Open Systems Interconnection (OSI) and Transmission Control Protocol/Internet Protocol, and Internetworking.

Point-To-Point Protocols And Links : Error detection – ARQ: Retransmission strategies – Framing – Point-to-point protocols at the network layer – The Transport layer – Broadband ISDN – Frame Relay – Asynchronous Transfer Mode.

Unit-II

Delay Models In Data Networks: M/M/1, M/M/m, M/M/m/m, M/M/8, M/G/1 queuing models – Networks of Transmission lines - Time reversibility (Burke’s theorem) – Network of Queues (Jackson’s theorem).

Unit-III

Routing In Data Networks And Internet Routing 9 Wide area networking – Interconnected network Routing – Shortest path Routing – Multicast/Broadcast Routing information – Flow models – Optimal Routing and Topological design – Characterization of Optimal Routing – Interior and Exterior Routing protocols.

Unit-IV

Congestion, Traffic Management And Flow Control : Congestion control in data networks and Internets – Link-level flow and error control – TCP traffic control – Traffic and Congestion control in ATM networks – Means of Flow control – Main objectives of flow control – Window flow control – Rate control schemes

References:

1. Dimitri Bertsekas and Robert Gallager , “Data networks” ,Second Edition, Prentice Hall, Inc.,NJ, USA1992
2. William Stallng, “High Speed Networks and Internets”, Second Edition, Pearson EducationInc., New Delhi, India, 2002
3. Leon Garcia and Widjaja ,“ Communication networks: Fundamental concepts and key architectures”, McGraw Hill, Inc., NY, USA, 2006
4. Jean Walrand , “ Communication networks”, McGraw Hill, Inc., NY, USA, 1998.

	NETWORKING SIMULATION LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

1. Ethernet LAN protocol. To create Scenario and study the performance of CSMA/CD protocol through simulation
2. Token Bus and Token Ring protocols. To create scenario and study the performance of token bus and token ring protocols through simulation
3. Wireless LAN protocols. To create scenario and study the performance of network with CSMA/CA protocol and compare with CSMA/CD protocols
4. Implementation and study of Stop and Wait protocol
5. Implementation and study of Go back N and Selective Repeat protocols
6. Implementation of Distance Vector Routing algorithm
7. Implementation of Link state routing algorithm
8. Implementation of data encryption and decryption
9. Transfer of files from PC to PC using Windows/ UNIX socket processing

	ROUTING AND SWITCHING LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

The Practical will be based on the Routing Technology Course.

	ANALYTICAL APPROACH IN DATA NETWORKING	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Introduction: Two examples of analysis: Efficient transport of packet voice calls, Achievable throughput in an input queuing packet switch; the importance of quantitative modeling in the Engineering of Telecommunication Networks.

Unit-II

Multiplexing: Network performance and source characterization; Stream sessions in a packet network: Delay guarantees; Elastic transfers in a packet network; Packet multiplexing over Wireless networks.

Unit-III

Stream Sessions: Deterministic Network Analysis: Events and processes in packet multiplexer models: Universal concepts; Deterministic traffic models and Network Calculus; Scheduling; Application to a packet voice example; Connection setup: The RSVP approach; Scheduling (continued).

Unit-IV

Stream Sessions: Stochastic Analysis: Deterministic analysis can yield loose bounds; Stochastic traffic models; Additional notation; Performance measures; Little's theorem, Brumelle's theorem, and applications; Multiplexer analysis with stationary and ergodic traffic; The effective bandwidth approach for admission control; Application to the packet voice example; Stochastic analysis with shaped traffic; Multihop networks; Long-Range-Dependent traffic.

References:-

1. Andrew S Tanenbaum: Computer Networks ,6th Edition. Pearson Education/PI, 2012.
2. Behrouz A. Forouzan : Data Communications and Networking, 4 th Edition TMH, 2012.
3. S.Keshav: An Engineering Approach to Computer Networks, 2nd Edition, Pearson Education, 2001. 4. William, A. Shay : Understanding communications and Networks, 3rd Edition, Thomson Publication, 2006.

	ANALYSIS, ARCHITECTURE AND DESIGN OF NETWORKS	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Introduction to network Design: Overview of Analysis, Architecture and Design Process, Systems Methodology, System Description, Service Characteristics, Performance Characteristics, Network Supportability.

Unit-II

Requirement Analysis – Concepts & Process: Need for Requirement Analysis, User Requirements, Application Requirements, Device Requirements, Network Requirements, Other Requirements, Requirement Specification and Map Gathering & Listing Requirements, Developing Service Metrics, Characterizing Behavior, Developing RMA Requirements, Developing Delay Requirements, Developing Capacity Requirements, Developing Supplemental Performance Requirements, Environment-Specific: Performance Requirements , Thresholds and Limits, Requirements for Predictable and Guaranteed Performance.

Unit-III

Flow Analysis: Overview and types of Flows, Identifying and Developing Flows, Data Sources and Sinks, Flow Models, Flow Prioritization and Specification, Applications of Flow Analysis

Unit-IV

Network Architecture: Introduction, Component Architecture, Reference Architecture, Architectural Models, Systems and Network Architecture. Addressing and Routing Architecture: Addressing Mechanisms, Routing Mechanisms, Addressing Strategies, Routing Strategies, Architectural Considerations

References:

- 1) McCabe James, “Network Analysis, Architecture, and Design”, Morgan Kaufmann Publishers.
- 2) Priscilla Oppenheimer, “Top-Down Network Design”, Pearson Education India
3. Stallings W., “Computer Networking with Internet Protocols and Technology”, Pearson Education

	ADVANCED NETWORKING	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Routing in Packet Networks; Shortest Path Routing; Traffic Management at packet level; Traffic management at flow level.

Unit-II

Advanced Network Architecture: Integrated Services in Internet, RSVP, Differentiated Services, MPLS, Real-time Transport Protocol.

Unit-III

Evolution of Switches and Control Planes, Cost, SDN Implications for Research and Innovation, Data Center Innovation, Data Center Needs, The Genesis of SDN: Abstract, The Evolution of Networking Technology, Forerunners of SDN, Software Defined Networking is Born, Sustaining SDN Interoperability, Open Source Contributions, Legacy Mechanisms Evolve Toward SDN, Network Virtualization, May I Please Call My Network SDN? How SDN Works: Abstract, Fundamental Characteristics of SDN, SDN Operation, SDN Devices, SDN Controller, SDN Applications, Alternate SDN Methods.

Unit-IV

SDN in the Data Center, Abstract, Data Center Definition, Data Center Demands, Tunneling Technologies for the Data Center, Path Technologies in the Data Center, Ethernet Fabrics in the Data Center, SDN Use Cases in the Data Center, Open SDN versus Overlays in the Data Center, Real-World Data Center Implementations

References:-

- 1) Comer D. "Internetworking with TCP/IP, Volume 1: Principles, Protocols and Architecture, Prentice Hall India (PHI)
- 2) Hassan M, Jain R., "High Performance TCP/IP Networking: Concepts, Issues and Solution", Prentice Hall India (PHI)
- 3) Stevens R. "TCP/IP Illustrated, Volume 1: The Protocols", Pearson India
- 4) Forouzan B.A., "TCP/IP protocol suite", Tata McGraw-Hill (TMH)
- 5) Goralski Walter, "The Illustrated Network", Morgan Kauffman
- 6) Kurose J., Ross K., "Computer Networking – A Top Down Approach", Pearson Education
- 7) Donahoo M., Calvert K., "TCP/IP Sockets in C – Practical Guide for Programmers", Morgan Kauffman

	WIRELESS NETWORKING AND MOBILE COMPUTING	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Modern Wireless Communication Systems: Second Generation(2G) Cellular Networks, Third Generation (3G) Wireless Networks, Wireless Local Loop (WLL) and LMDS, Wireless Local Area Networks (WLANs), Bluetooth and Personal Area Networks (PANs), The Cellular Concept- System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems.Short range wireless Technologies –Bluetooth ,LiFi... introduction to 4G and 5G.

Unit-II

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanism , Reflection, Ground Reflection(Two Ray) Model, Diffraction, Scattering, Practical Link Budget Design Using Path Loss Models, Outdoor Propagation Models, Indoor Propagation Models, Signal Penetration into Buildings, Ray Tracing and Site Specific Modeling.

Unit-III

Mobile Radio Propagation: Small –Scale Fading and Multipath: Small Scale Multipath Propagation, Impulse Response Model of a Multipath Channel, Small-scale Multipath Measurements, Parameter of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions, Statistical Models or Multipath Fading Channels, Simulation of Clarke and Gans Fading Model, Level Crossing and Fading Statistics, Two-ray Rayleigh Fading Model, Saleh and Valenzuela Indoor Statistical Model, SIRCIM and SMRCIM indoor and outdoor Statistical models , Theory of Multipath Shape Factors for Small-Scale fading wireless channels

Unit-IV

Wireless Networking: Introduction to Wireless Networks, Difference Between Wireless and Fixed Telephone Networks, Development of Wireless Networks, Fixed Network Transmission Hierarchy, Traffic Routing in Wireless Networks, Wireless Data Services, Common Channel Signaling (CCS), Integrated Services Digital Network(ISDN) Signaling System No.7 (SS7), An Example o f SS7-Global Cellular Network Interpretability, Protocols for Network Access, Network Databases, Universal Mobile Telecommunication System (UMTs), Multiple Input Multiple output(MIMO) IMS,VOLET Technologies.

References:-

1. Kaveh Pahlavan & Allen H. Levesque, "Wireless Information Networks", Wiley series in Telecommunications and signal processing.
2. Kamilo Feher: Wireless Digital communications, Modulation and Spread Spectrum Applications PHI 2001.
3. Wireless Communications Principles and Practice 2nd Edition by Theodore S Rappaport

	SYSTEM AND NETWORK ADMINISTRATION	Learning Schedule			
		L	T	P	C
		4	0	0	3

UNIT I: Advanced Socket 1.1) IPV4 and IPV6 interoperability inetd superserver.

2) Advanced I/O functions, unix domain protocols, Nonblocking I/O, ioctl operations

UNIT II: Routing Sockets. Data link socket address structure, Reading and writing, sysctl operations, get-if-Info function, Interface name & index functions.

Key management Sockets: Reading and writing, Dumping the security association database (SADB), Creating a static security association(SA), Dynamically maintaining SAs

UNIT III: Broadcasting : Broadcast addresses, Unicast verses Broadcast, dg-cli function using broadcasting, Race function,

Multicasting: Multicasting addresses, Multicasting verses Broadcasting on a LAN, Multicasting on a WAN, Source-specified multicast, Multicast socket options, mcast_join and related functions, dg_cli function using multicasting, Receiving IP multicast infrastructure session announcements, sending and receiving, Simple network time protocol

UNIT IV: Advanced UDP sockets : Receiving flags, destination IP addresses, interface index, Datagram truncation, UDP verses TCP,. Adding reliability to UDP application , Binding interface addresses, Concurrent UDP services, IPV6 packet information, IPV6 path MTU control M.Tech. Comp. Sci. Pg No. Shivaji University, Kolhapur 11 Advanced SCTP sockets : Auto closing, Partial delivery, Notification, Unordered data, Binding a subset of addresses, Determining peer and local addresses, Association of ID and IP addresses, Peeling off and association, controlling timing SCTP verses TCP 9) Out_of_Band data : TCP Out_of_Band data, socket:mark function

Raw sockets: Raw sockets creation, Raw socket output, Raw socket input, ping program, traceroute program, ICMP message daemon

REFERENCES:

1. UNIX network programming (3rd Edition) Stevens, fenner, rudoff Pearson education
2. TCP/IP illustrated (V2) Write, Stevens Pearson education
3. Internetworking with TCP/IP (V2) Comer, Stevens Pearson education.

	WIRELESS NETWORKING LAB	Learning Schedule			
		L	T	P	C
		0	0	4	2

Practical based on Wireless Networking and Mobile Computing Course

	HIGH PERFORMANCE COMPUTING	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Switching Networks : – Packet switching - Ethernet, Token Ring, FDDI, DQDB, Frame Relay, SMDS, Circuit Switched – SONET, DWDM, DSL, Intelligent Networks – CATV, ATM – Features, Addressing, Signaling & Routing, Header Structure, ATM Adaptation layer, Management control, BISDN, Internetworking with ATM.

Unit-II

Multimedia Networking Applications: Streaming stored Audio and Video, Best effort service, protocols for real time interactive applications, Beyond best effort, scheduling and policing mechanism, integrated services, RSVP- differentiated services.

Unit-III

Advanced Networks Concepts: VPN-Remote-Access VPN, site-to-site VPN, Tunneling to PPP, Security in VPN.MPLSoperation, Routing, Tunneling and use of FEC, Traffic Engineering, and MPLS based VPN, overlay networksP2P connections.-IPv4vs V6.

Unit-IV

Network Security And Management: Principles of cryptography – Elliptic-AES- Authentication – integrity – key distribution and certification– Access control and: fire walls – DoS-attacks and counter measures – security in many layers. Infrastructure for network management – The internet standard management framework – SMI, MIB,SNMP, Security and administration – ASN.1

References:-

- 1) Hassan M, Jain R., “High Performance TCP/IP Networking: Concepts, Issues and Solution”, Prentice Hall India (PHI)
- 2) Stevens R. “TCP/IP Illustrated, Volume 1: The Protocols”, Pearson India
- 3) Forouzan B.A., “TCP/IP protocol suite”, Tata McGraw-Hill (TMH)
- 4) Goralski Walter, “The Illustrated Network”, Morgan Kauffman
- 5) Kurose J., Ross K., “Computer Networking – A Top Down Approach”, Pearson Education

	NETWORK MANAGEMENT	Learning Schedule			
		L	T	P	C
		4	0	0	3

Unit-I

Network Management Overview : Analogy of Telephone Network Management, Communications protocols and Standards, Case Histories of Networking and Management, Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

Unit-II

Network Management Tools And Systems: Network Management Tools, Network Statistics Measurement Systems, History of Enterprise Management, Network Management systems, Commercial Network management Systems, System Management, Enterprise Management Solutions.

Unit-III

Web-Based Management: NMS with Web Interface and Web-Based Management, Web Interface to SNMP Management, Embedded Web-Based Management, Desktop management Interface, Web-Based Enterprise Management, WBEM: Windows Management Instrumentation, Java management Extensions, Management of a Storage Area Network.

Unit-IV

Snmpv1 Network Management: The SNMP Communication Model, Functional model. SNMP MANAGEMENT: SNMPv2 Major Changes in SNMPv2, SNMPv2 System architecture, SNMPv2 Structure of Management Information, The SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1.

References:-

1. Andrew S Tanenbaum: Computer Networks ,6th Edition. Pearson Education/PI, 2012.
2. Behrouz A. Forouzan : Data Communications and Networking, 4 th Edition TMH, 2012.
3. S.Keshav: An Engineering Approach to Computer Networks, 2nd Edition, Pearson Education, 2001. 4. William, A. Shay : Understanding communications and Networks, 3rd Edition, Thomson Publication, 2006.

**M.Tech Computer Science & Engineering
(Mobile Computing)**

SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY, GURGAON

**SCHEME OF STUDIES AND EXAMINATION
MASTER OF TECHNOLOGY (Mobile Computing)**

SEMESTER-I

EFFECTIVE FROM 2018- 19

Course No.	Course Title	Teaching Schedule			Marks			Credit	Duration of Exam
		L	T	P	Internal	External	Total		
	Mobile Computing	3	1	0	50	100	150	3	3
	Database Management System & .NET	3	1	0	50	100	150	3	3
	Mobile System Programming I – Android Programming	3	1	0	50	100	150	3	3
	Advanced JAVA Programming	3	1	0	50	100	150	3	3
	DBMS Lab	0	0	4	50	50	100	1	3
	MSP-I Lab	0	0	4	50	50	100	1	3
	JAVA Lab	0	0	4	50	50	100	1	3
	Seminar			2	50	-	50	1	
	Total	12	4	14	400	550	950	16	

Note : L – Lecture, T- Tutorial, P – Practical, C - Credit

MASTER OF TECHNOLOGY (Mobile Computing)

SEMESTER-II

EFFECTIVE FROM 2018 – 19

Course No	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam
		L	T	P	Internal	External	Total		
	Data Communication and Network	3	1	0	50	100	150	3	3
	LINUX and Shell Programming	3	1	0	50	100	150	3	3
	Wireless Networks	3	1	0	50	100	150	3	3
	(Elective – II) (i)Cryptography and Wireless Network security (ii) Mobile Cellular and Network security	3	1	0	50	100	150	3	3
	Data Communication and Network Lab	0	0	4	50	50	100	1	
	Linux Lab	0	0	4	50	50	100	1	
	Elective – II Lab	0	0	4	50	50	100	2	
	Student Seminars/Quizzes	2	0	0	50		50	1	
	Total	14	4	12	400	550	950	17	

MASTER OF TECHNOLOGY (Mobile Computing)**SEMESTER-III****EFFECTIVE FROM 2018- 19**

Course No	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam
		L	T	P	Internal	External	Total		
	Digital Signal Processing	3	1	0	50	100	150	3	3
	Data Mining	3	1	0	50	100	150	3	3
	Mobile Adhoc Network	3	1	0	50	100	150	3	3
	Elective-III 1. Web Programming(HTML 5& PHP) 2. Human Computer Interaction	3	1	0	50	100	150	3	3
	DSP Lab	0	0	4	50	50	100	2	3
	Elective-III Lab	0	0	4	50	50	100	2	3
	Dissertation & VIVA Phase I	-	-	-				1	
	Total	12	4	8	300	500	800	17	

MASTER OF TECHNOLOGY (Mobile Computing)

SEMESTER-IV

EFFECTIVE FROM 2018 – 19

Course No	Course Title	Marks			Credits
		Internal	External	Total	
	Dissertation & Viva Phase -II	100	100	200	20

Mobile Computing

Unit -I

Introduction to mobile radio systems: Paging systems, cordless telephone system, Cellular telephonesystems- Cellular concept, frequency reuse, channel assignment strategies, Interference and systemcapacity, trunking and grade of service, cell splitting, sectoring, microcell zone concept, HO Strategies.

Unit -II

Mobile radio propagation: mechanism, free space path loss, log-distance path loss models, Okumaramodel, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake'schannel model, Multi path characteristics of radio waves, signal fading, Time dispersion, Dopplerspread, coherence time LCR, fading statistics, diversity techniques.

Unit-III

Introduction to spread spectrum communication, multiple access techniques used in mobile wirelesscommunication: FDMAFFDMA/CDMA, Cellular CDMA, packet radio protocols, CSMA,reservation protocols, capacity of cellular CDMA, soft HO.

Unit -IV

Wireless systems and standards: GSM standards, signaling and call control, mobility management,location tracing, wireless data networking, packet error modeling on fading channels, Performanceanalysis of link and transport layer protocols over wireless channels, mobile data networking(mobile IP), wireless data services, IS-95, GPRS.

References:-

1. Kaveh Pahlavan & Allen H. Levesque, "Wireless Information Networks", Wiley series inTelecommunications and signal processing.
2. Kamilo Feher: Wireless Digital communications, Modulation and Spread SpectrumApplications PHI 2001.

Database Management System & .NET

Unit-I

Database Management System – Concepts and Architectures, Database Storage Structures, Relational Database design, Transaction Management, Backup and Recovery Techniques, SQL/PL, Emerging Databases and Case Studies, Database Security and Authorization

Unit-II

Data Definition Commands, Data Manipulation Commands, Advanced Data Definition Commands, Advanced SQL, Subqueries, Where Subqueries, In Subqueries, Multirow Subquery Operators: Any and All, From Subqueries, Attribute list Subqueries, Correlated Subqueries

Unit-III

The Common Language Runtime (C.L.R.) CLR Architecture and Services, The .Net Intermediate Language (IL), Just- In- Time Compilation and CLS, Disassembling .Net Application to IL, Strict Type Checking, .NET FRAMEWORK CLASS LIBRARY System Namespace, System .Object Namespace, System .Collection Namespace, System .Type, Exception.

Unit-IV

Syntax & Data Types of .NET, Language Fundamental: Data type and Control Constructs Value and Reference Types, Declaring and Initializing Variables, Conditional Syntax C# Operator, Looping Syntax, Array & String.

References:-

1. Database System Concepts (First Edition: 2008) Publisher: Cengage Learning By Peter Rob and Carlos Coronel.
2. Introduction to Database Management Systems (First Edition 2006) Publisher: Tata McGraw-Hill By ISRD Group
3. An Introduction to Database Systems (Eighth Edition 2006) Publisher : Pearson By C. J. Date, A. Kannan & S. Swamynathan
4. An Introduction to Database Systems Publisher: Pearson By ITL Education Solutions Limited.
5. Microsoft .NET: Architecting Applications for the Enterprise.
6. Programming .NET Compact Framework 3.5 By Paul Yao, David Durant, 2nd , Kindle Edition, 2009

Mobile System Programming I- Android Programming

Unit-I

Mobile Networks : Cellular Network Concepts - Frequency and Interface in Cells - Access Channels - Mobile Network Architecture - Mobile Station - Base Station Subsystems - Network Switching Subsystems - Mobile Network Protocol Stacks - Core Networks - PLMN (Public Land Mobile Network) - Mobile Network Fundamentals - Mobility - Registration - Handoff - Roaming - Mobile Network Fundamentals (SMS) - SMS (Short Message Service) - SMS Network Architecture - SMS Network Elements - SMS Protocols - SMS Applications & Short Codes.

Unit-II

Introduction To Networks : The GSM Network - Services - The architecture of the network - Communication management - The GPRS Network - Services - Network architecture - Radio interface - The UMTS Network - services - architecture of the network - HSPA evolutions - The NGN - Network architecture - The EPS Network - Network architecture.

Unit-III

GSM and CDMA NETWORKS (15Hours) GSM History - GSM RF Channels - GSM Protocol Stack - GPRS Standards - CS and PS Domains - GPRS Architecture - GPRS Network Architecture - GPRS Protocols - CDMA Evolution - 3GPP2 Network Architecture - Mobile IP - UMTS Spectrum - UMTS Radio Access Network - UMTS Protocol Stacks - UMTS Multiple Access Network Architecture.

Unit-IV

Framework And Application In Android : Java for Android - Type System - Scope - Idioms - Android components - Eclipse for Android software development - About the Android framework: Building a view - Fragments and Multiplatform support - A Framework for a well-behaved application - Using and exploring Content providers - Multimedia - Location and Mapping.

References:-

1 Mobile Networks Architecture by Andre Perez, Wiley, March 2012

2 Wireless and Mobile Network Architectures by Yi-Bang Lin and ImrichChlamtac, Wiley-India, 2008
3 Programming Android by ZigurdMednieks, Laird Dornin, G. Blake Meike, and Masumi Nakamura, Published by O'Reilly Media, Inc. 2011

4 Programming .NET Compact Framework 3.5 By Paul Yao, David Durant, 2nd , Kindle Edition, 2009

5 Mobile Computing – Technology, Application & Service Creation by Asoke. K Talukder, Roopa R. Yavagal, Asoke K. Talukder, Tata McGraw-Hill, 2005

Advanced Java Programming

Unit-I

Introduction to Java: Programming language Types and Paradigms, The Java Environment, Basic Language Elements, Object Oriented Programming, Extending Classes and Inheritance, Package: Organizing Classes and Interfaces in Packages , Package as Access Protection , Defining Package ,CLASSPATH Setting for Packages

Unit-II

Exception Handling: The Idea behind Exception ,Exceptions & Errors ,Types of Exception ,Control Flow In Exceptions, JVM reaction to Exceptions ,Use of try, catch, finally, throw, throws in Exception Handling ,In-built and User Defined Exceptions, Checked and Un-Checked Exceptions.

Array & String : Defining an Array, Initializing & Accessing Array, Multi –Dimensional Array, Operation on String, Mutable & Immutable String, Using Collection Bases Loop for String, Tokenizing a String, Creating Strings using StringBuffer .

Unit-III

Thread : Understanding Threads , Needs of Multi-Threaded Programming ,Thread Life-Cycle, Thread Priorities ,Synchronizing Threads, Inter Communication of Threads ,Critical Factor in Thread –DeadLock. A Collection of Useful Classes: Utility Methods for Arrays ,Observable and Observer Objects , Date & Times ,Using Scanner Regular Expression, Input/Output Operation in Java(java.io Package),Streams and the new I/O Capabilities

Unit-IV

GUI Programming Designing Graphical User Interfaces in Java, Components and Containers, Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components. Event Handling. Database Programming using JDBC: Introduction to JDBC,JDBC Drivers & Architecture, CRUD operation Using JDBC, Connecting to non-conventional Databases.

References:-

DBMS Lab

Practical will be based on Course Database Management System & .NET

MSP-I lab

Practical will be based on Course Mobile System Programming I- Android Programming

Java Lab

Practical will be based on Course Advanced Java Programming

Data Communication and Networking

Unit -1: Introduction to Data Communication and Networking, physical and data link layer:

Uses of Computer Networks, Network Hardware, Network Software Internet Reference Models (OSI and TCP/IP), Basis for Data Communication, Guided Transmission Media, Wireless Transmission Medium, Circuit Switching and Telephone Network, High Speed Digital Access, Data Link Layer Design Issues, Error Detection and Correction, Data Link Control and Protocols, Example Data Link Protocol

Unit -2: Medium Access Layer, Local Area Network:

Channel Allocation Problem, Multiple Access, CSMA, CSMA/CD, CSMA/CA, Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LAN, Blue tooth, Connecting devices:-Repeaters, Hub, Bridges, Switch, Router, Gateways, Virtual LAN, Example Networks: X.25, Frame Relay, ATM, ISDN

Unit- 3: Network Layer, Transport layer:

Network Layer Design Issues, Routing Algorithms (Optimality principle, Static Routing Algorithms, Shortest Path, Flooding, Dynamic routing Algorithms, Distance Vector, Link State routing.), Congestion control Algorithms (Principles, Policies, Algorithms), Quality of Service (Requirements, Techniques, Integrated Services & Differentiated Services), Network Layer Protocols (IP Addressing , CIDR & NAT, IP layer protocols (ICMP, ARP, RARP, DHCP, BOOTP), IPv6), Transport Layer Service, Elements of Transport protocols, Internet protocols (UDP and TCP)

Unit -4: Application Layer, Network Security:

DNS- Domain Name System, Electronic Mail, World Wide Web, Multimedia (Audio Compression, Streaming Audio, Voice over IP, Video Compression, Video on Demand), Cryptography, Symmetric key Algorithms (DES, AES), Public key Algorithms-RSA, Digital Signatures, IPsec ,Firewall

References:

1. DATA COMMUNICATIONS AND NETWORKING, by Behrouz A. Forouzan
2. Data Communications and Networking - 5th Edition by McGraw-Hill

LINUX PROGRAMMING

Objectives:

- **To understand and make effective use of Linux utilities and Shell scripting language (bash) to solve problems.**
- **To implement in C some Standard Linux utilities such as ls, mv, cp, etc. using system calls.**
- **To develop the skills necessary for systems programming including file system programming, process and signal management and inter process communication.**
- **To develop the basic skills required to write network programs using sockets.**

UNIT I:

Linux Utilities: File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text Processing utilities and backup utilities.

sed- scripts, operation, address, commands, applications, awk- execution, fields and records, scripts, operations, patterns, actions, associative arrays, string and mathematical functions, system commands in awk, applications.

Shell programming with the Bourne again shell(bash): Introduction, shell responsibilities, pipes and Redirection, Here documents, Running a shell scripts, The shell as a programming language, Shell meta characters, File name substitution, Shell variables, Command substitution, Shell commands, The environment, Quoting, Test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts

UNIT II

Files and Directories: File Concept, File types ,File system Structure, File meta data – Inodes, Kernel support for files, System calls for I/O operations – open, create, read, write, lseek, dup2. File status information – stat family, file and record locking, fcntl function, Links – Soft links & hard links – symlink, link, unlink. Directories – creating, removing, changing directories – mkdir, rmdir, chdir, obtaining current working directory – getcwd, directory contents, scanning directories – opendir, readdir, closedir, rewinddir functions

UNIT III

Process : Process concepts, layout of C program image in main memory, process environment –environment list, environment variables, getenv, setenv, Kernel support for process, process identification, process control- process creation.

Replacing a process image, Waiting for a process, process termination, zombie process, orphan process, system call interface form process management – fork, vfork, exit, wait, waitpid, exec family, process groups, session and controlling terminal, difference between threads and processes

Signal- Introduction to signals, Signal generation and handling, Kernel support for signal, Signal function, unreliable signals, reliable signals, Kill, raise, alarm, pause, abort, sleep functions.

Inter Process Communications:- Introduction to IPC, IPC between processes on a single computer, IPC between processes on different systems, pipes – creating, IPC between related processes using Unnamed Pipes, FIFOs – creation, IPC between unrelated processes using FIFO (named pipes), difference between named and unnamed pipes, popen and pclose library functions.

Message Queues – kernel support for messages, APIs for Message Queues, client/server examples.

Semaphores – Kernel support for semaphores, APIs for semaphores, FILE locking with semaphores.

UNIT IV

Shared Memory:- Kernel support for Shared memory, APIs for shared memory, shared memory examples.

Sockets:- Introduction to Berkeley Sockets, IPC over a network, client/server model, Sockets Address Structure(UNIX Domain & Internet Domain), Socket System calls for connection oriented Protocol and connectionless protocol, Example client/server programs – single server-client connection, multiple simultaneous clients, socket options – setsockopt and fcntl system calls, comparison of IPC mechanisms.

TEXT BOOKS:-

1. Unix System Programming using C++, T. Chan, PHI,(UNIT III to UNIT VIII)
2. Unix concepts and Applications, 4th Edition, Sumitabha Das, TMH.
3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Willey India Edition.

REFERENCE BOOKS:

1. Linux System Programming. Robert Love, O'Reilly, SPD.
2. Advanced Programming in the Unix environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. Unix Network Programming, W.R.Steven, PHI.
4. UNIX for Programming and users, 3rd Edition, Graham Glass, King Aables, Pearson Edition.
5. UNIX and shell Programming, B.A.Forouzan and R.F.Koretsky, S.A.Sarawar, Pearson edition.
6. Unix The Text book, 2nd edition, S.M.Sarawar, Koretsky, S.A.Sarawar, Pearson Edition
7. UNIX Internals, U.Vahalia, Pearson Education.
8. UNIX shell Programming. S.G.Kochan and P.Wood, 3rd edition, Pearson Education.

Wireless Networks

OBJECTIVES:

- To study about Wireless networks, protocol stack and standards.
- To study about fundamentals of 3G Services, its protocols and applications.
- To study about evolution of 4G Networks, its architecture and applications.

UNIT I : WIRELESS LAN

Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security – IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX

UNIT II : MOBILE NETWORK LAYER

Introduction – Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6-Network layer in the internet- Mobile IP session initiation protocol – mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing

UNIT III : MOBILE TRANSPORT LAYER

TCP enhancements for wireless protocols – Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility – Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP – TCP over 3G wireless networks.

UNIT IV : WIRELESS WIDE AREA NETWORK [

Overview of UTRAN Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IW MSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

4G NETWORKS

Introduction – 4G vision – 4G features and challenges – Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio.

TEXT BOOKS:

- Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education 2012.(Unit I,II,III)
- Vijay Garg , "Wireless Communications and networking", First Edition, Elsevier 2007.(Unit IV,V)

REFERENCES:

- Erik Dahlman, Stefan Parkvall, Johan Skold and Per Beming, "3G Evolution HSPA and LTE for Mobile Broadband", Second Edition, Academic Press, 2008.
- Anurag Kumar, D.Manjunath, Joy kuri, "Wireless Networking", First Edition, Elsevier 2011.
- Simon Haykin , Michael Moher, David Koilpillai, "Modern Wireless Communications", First Edition, Pearson Education 2013

Cryptography and Wireless Network Security

UNIT – I CRYPTOGRAPHY AND ITS APPLICATIONS

Introduction: Secure communications - Cryptographic applications - Different types of ciphers: - shift ciphers - affine ciphers- vignere cipher- substitution ciphers- Block ciphers, binary numbers and ASCII, one time pads. LFSR sequences - Basic Number theory, Congruence. Chinese Remainder theorem, Modular exponentiation- Fermat and Euler's theorem, Legendre and Jacobi symbols.

UNIT – II PUBLIC KEY CRYPTOGRAPHY

Simple DES - Differential cryptanalysis- DES - Modes of operation – AES – Primality test –RSA - Pseudorandom number generation and stream ciphers - Elliptic curve Arithmetic – Elliptic curve cryptography.

HASH FUNCTIONS

Discrete Logarithms - Computing discrete logs - Diffie-Hellman key exchange - ElGamal Public key cryptosystems - Hash functions - Secure Hash Algorithm – SHA3 - Birthday attacks – HMAC – HMAC- Digital Signature Algorithm.

UNIT – III SECURITY ISSUES IN MOBILE COMMUNICATION

Mobile communication History - Security issues in wireless and mobile communications - Security for mobile applications - Advantages and disadvantages of application – level security - Mobile devices security requirements, mobile wireless 3G network level security- Applications of WLANs, wireless threats- Security for 2g Wi-Fi applications - Recent Security Schemes for Wi-Fi Applications.

UNIT – IV SECURITY FOR MOBILE COMMERCE APPLICATIONS

M-commerce applications - Security challenges in mobile e-commerce - Types of attacks on mobile e-commerce - A secure M-commerce model based on wireless local area network - Some of M-commerce security solutions.

REFERENCES

1. Wade Trappe, Lawrence C Washington, “Introduction to Cryptography with codingtheory”, 2nd edition, Pearson, 2007.
2. Wireless & Mobile Network Security: Pallapa Venkataram, Satish Babu, TMH, 2010.
3. William Stallings, “Cryptography and network security principles and practice”, 6th edition 2014.
4. AtulKahate “Cryptography and Network Security”, Tata McGraw Hill Publication Company Limited, 2006.
5. Charlie Kaufman et al “Network Security – Private Communication in a Public World”, Second Edition, PHI Learning Private Limited, 2011.
6. Charles P. Pfleeger et al “Security in Computing “, Third Edition, Pearson Education, 2004.

Mobile Cellular and Network security

UNIT - I INTRODUCTION TO CELLULAR MOBILE SYSTEM

A basic cellular system - Performance criteria - Uniqueness of mobile radio environment - Operation of cellular systems - Concept of Frequency reuse channels Different cellular systems.

UNIT - II APPLICATION LEVEL SECURITY IN CELLULAR NETWORKS

Generations of Cellular networks - Security issues and attacks in cellular networks - GSM security for applications - GPRS, UMTS security for applications, - 3G security for applications- Some of security and authentication solutions.

UNIT – III MOBILE HTML SECURITY & Wireless LAN Security

Mobile HTML Basics - Authentication on Mobile HTML sites – Encryption - Application attacks on mobile HTML sites - Mobile browser weakness - Enterprise security on Mobile OS – Wireless LAN Security.

UNIT – IV MOBILE MALWARE AND TESTING TOOLS

Mobile malware - Threat scenarios - Mitigating mobile malware mayhem-Mobile platform attack tools and utilities - Browser extensions - Networking tools -Web application tools.

MOBILE SECURITY FRAMEWORK

Security framework for mobile environment - Mobile agents and its application - Mobile web security, Security of mobile VOIP communications - Emerging trends in mobile security.

REFERENCES

1. C. Y. Lee and William, “Mobile Cellular Telecommunications”, 3rd Ed, McGraw Hill. 2001.
2. Wireless & Mobile Network Security: Pallapa Venkataram, Satish Babu, TMH, 2010.
3. Mobile Application Security, Himanshu Dviwedi, Chris Clark and David Thiel, 1st Edition 2010.
4. Wireless LAN Security - http://www.cisco.com/c/en/us/products/collateral/wireless/aironet-1200-accesspoint/prod_white_paper09186a00800b469f.html

Data Communication and Networking Lab

Practicals will be based on Course Data Communication and Networking

Linux Lab

Practicals will be based on Course Linux.

Digital Signal Processing syllabus

UNIT I SIGNALS AND SYSTEMS

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution– Correlation.

UNIT II FREQUENCY TRANSFORMATIONS

Introduction to DFT – Properties of DFT – Circular Convolution – Filtering methods based on DFT – FFT Algorithms – Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT – Use and Application of DCT.

UNIT III IIR FILTER DESIGN

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation.

FIR FILTER DESIGN

Structures of FIR – Linear phase FIR filter – Fourier Series – Filter design using windowing techniques (Rectangular Window, Hamming Window, Hanning Window), Frequency sampling techniques

UNIT IV FINITE WORD LENGTH EFFECTS IN DIGITAL FILTERS

Binary fixed point and floating point number representations – Comparison – Quantization noise – truncation and rounding – quantization noise power- input quantization error- coefficient quantization error – limit cycle oscillations- dead band- Overflow error- signal scaling.

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis. Pearson Education / PHI. 2007.
2. Discrete Time Signal Processing-A. V. Oppenheim and R.W. Schaffer. PHI, 2009
3. Fundamentals of Digital Signal Processing - Loney Ludeman. John Wiley, 2009

REFERENCE BOOKS:

1. Digital Signal Processing - Fundamentals and Applications - Li Tan, Elsevier. 2008
2. Fundamentals of Digital Signal Processing using Matlab - Robert J. Schilling. Sandra L, Harris, Thomson. 2007
3. Digital Signal Processing - S.Salivahanan. A.Vallavaraj and CGnanapriya.TMH.2009
4. Discrete Systems and Digital Signal Processing with MATLAB -Taan S.EIAlI.CRC press. 2009.

Data Mining

UNIT I INTRODUCTION TO DATA MINING

Introduction to Data Mining – Data Mining Tasks – Components of Data Mining Algorithms – Data Mining supporting Techniques – Major Issues in Data Mining – Measurement and Data – Data Preprocessing – Data sets

OVERVIEW OF DATA MINING ALGORITHMS

Overview of Data Mining Algorithms – Models and Patterns – Introduction – The Reductionist viewpoint on Data Mining Algorithms – Score function for Data Mining Algorithms- Introduction – Fundamentals of Modeling –Model Structures for Prediction – Models for probability Distributions and Density functions – The Curse of Dimensionality – Models for Structured Data – Scoring Patterns – Predictive versus Descriptive score functions – Scoring Models with Different Complexities – Evaluation of Models and Patterns – Robust Methods.

UNIT II CLASSIFICATIONS

Classifications – Basic Concepts – Decision Tree induction – Bayes Classification Methods – Rule Based Classification – Model Evaluation and Selection – Techniques to Improve Classification Accuracy –Classification: Advanced concepts – Bayesian Belief Networks- Classification by Back Propagation – Support Vector Machine – Classification using frequent patterns.

UNIT III CLUSTER ANALYSIS

Cluster Analysis: Basic concepts and Methods – Cluster Analysis – Partitioning methods – Hierarchical methods – Density Based Methods – Grid Based Methods – Evaluation of Clustering – Advanced Cluster Analysis: Probabilistic model based clustering – Clustering High – Dimensional Data – Clustering Graph and Network Data – Clustering with Constraints.

UNIT IV ASSOCIATION RULE MINING AND VISUALIZATION

Association Rule Mining – Introduction – Large Item sets – Basic Algorithms – Parallel and Distributed Algorithms – Comparing Approaches – Incremental Rules – Advanced Association Rule Techniques – Measuring the Quality of Rules – Visualization of Multidimensional Data – Diagrams for Multidimensional visualization – Visual Data Mining – Data Mining Applications – Case Study: WEKA.

REFERENCES:

1. Jiawei Han, Micheline Kamber , Jian Pei, “Data Mining: Concepts and Techniques”, Third Edition (The Morgan Kaufmann Series in Data Management Systems), 2012.
2. David J. Hand, Heikki Mannila and Padhraic Smyth “Principles of Data Mining” (Adaptive Computation and Machine Learning), 2005
3. Margaret H Dunham, “Data Mining: Introductory and Advanced Topics”, 2003
4. Soman, K. P., Diwakar Shyam and Ajay V. “Insight Into Data Mining: Theory And Practice”, PHI, 2009.

Web Programming

NOTE: Ten questions are to be set in all by the examiners by taking three questions from each unit and one compulsory question having 05 short answer type questions from all the units. Students will be required to attempt six questions in all including compulsory Question i.e. question No. 1 and by selecting not more than two questions from each unit.

Objectives: After going through this course a student should be able to: Use XHTML tags to create simple static web pages; format a simple Web page using Cascading Style sheets; state the concepts applicable to web programming; create an interactive and dynamic Web site using JavaScript; represent data over the Web using XML; appreciate the use of Ajax and Rich Internet Applications, and perform server side scripting using Java Server Pages (JSP).

UNIT – I HTML & CSS

HTML :- Basics of HTML, formatting and fonts, hyperlink, tables, images, forms, XHTML, Meta tags, Browser architecture and Web site structure. Overview and features of HTML5.

Style Sheets: Introduction to CSS, Need for CSS, basic syntax and structure using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS.

UNIT – II Java Script:-

Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators, Statements, Document and its associated objects, Events and Event Handlers, Core JavaScript (Properties and Methods of Each)

UNIT – III

PHP (Hypertext Preprocessor): Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form, mail, file upload, session, error, exception, filter, PHP ODBC. **MYSQL:** Introduction to Database and MYSQL, RDBMS-Understanding Tables, Records & Fields, SQL language, MYSQL queries.

Working with MYSQL Admin: Working with PHP My admin, data types, creating Database and tables, dropping Database and tables, adding fields, selecting table, Altering fields properties.

Books Recommended (1 Text Book + 2 Reference Books)

1. Ullman, “PHP for the Web: Visual QuickStart Guide”, Pearson Education
2. PHPMYSQL Fundamental learning Book, Kent Elchuk
3. Beginning HTML5 with CSS3, Apress publisher
4. Charlie Collins, Michael Galpin and Matthias Kappler, “Android in Practice”, DreamTech

Human Computer Interaction

UNIT I FOUNDATIONS OF HCI

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

UNIT II DESIGN & SOFTWARE PROCESS

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III MODELS AND THEORIES

Cognitive models –Socio-Organizational issues and stake holder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

MOBILE HCI

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games-Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

UNIT IV WEB INTERFACE DESIGN

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004 (UNIT I , II & III).
2. Brian Fling, “Mobile Design and Development”, First Edition , O’Reilly Media Inc., 2009 (UNIT –IV).
3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O’Reilly, 2009.(UNIT-V).

DSP Lab

Practicals will be based on Course Digital System Processing.

Web Programming

Practicals will be based on Course Web Programming.

**M.Tech Computer Science & Engineering
(Data Analytics)**

**SHREE GURU GOBIND SINGH
TRICENTENARY UNIVERSITY, GURGAON
SCHEME OF STUDIES AND EXAMINATION**

MASTER OF TECHNOLOGY -Computer Science & Engineering (Data Analytics)

SEMESTER-I

EFFECTIVE FROM 2018 – 19

Course No.	Course Title	Teaching Schedule			Marks			Credit	Duration of Exam
		L	T	P	Internal	External	Total		
	Database System: Design and Implementation	4	-	-	50	100	150	3	3
	Algorithm: Design and Implementation	4	-	-	50	100	150	3	3
	Computer Network and management	4	-	-	50	100	150	3	3
	Research Methodology for Engineers	4	-	-	50	100	150	3	3
	Advance Database Lab	-	-	4	50	50	100	2	3
	Advance Network Management lab	-	-	4	50	50	100	1	3
	Seminar			2	50		50	1	
Total		16	-	10	350	500	850	16	

Note : L – Lecture, T- Tutorial, P – Practical, C - Credit

**MASTER OF TECHNOLOGY (Computer Science &
Engineering)**

SEMESTER-IV

EFFECTIVE FROM 2018 – 19

Course No	Course Title	Marks			Credits
		Internal	External	Total	
	Dissertation & Viva	100	100	200	20

Database System: Design and Implementation

Unit-I

Database Users And Architecture: Characteristics – Data model – Schemas – Instances - Three-Schema architecture – Data Independence – Centralized and client/Server Architecture – Relational model concept.

Unit-II

Basic SQL : SQL data definition and Data types – Specifying Constraints – Basic Retrieval Queries – INSERT, DELETE, and UPDATE Statements – Additional Features.

Relational Algebra And Calculus : Unary Relational Operations: SELECT and PROJECT - Binary Relational Operations: JOIN and DIVISION – Tuple Relational Calculus – Domain Relational Calculus – Entity Types, Entity Sets, Attributes and Keys.

Unit-III

Enhanced Entity-Relationship Model: Subclasses, Super classes, and Inheritance – Specialization and Generalization - Data Abstraction, Knowledge Representation, and Ontology Concepts – Relational Database Design Using ER-to- Relational Mapping - Mapping EER model Constructs to Relations.

Unit-IV

Security Issues : Security - Encryption - Digital signatures - Authorization - Authenticated RPC - Integrity - Consistency - Database tuning - Optimization and research issues.

Current Issues Rules - Knowledge Bases - Active and Deductive Databases – Multimedia Databases – Multimedia Data Structures – Multimedia Query languages - Spatial Databases.

References:-

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", 6th Edition, Pearson Education, 2010.
2. Philip M. Lewis, Arthur Bernstein and Michael Kifer, "Databases and Transaction Processing: An Application Oriented Approach", Addison Wesley, 2002.
3. Abraham Silberschatz, Henry. F. Korth and S.Sudharsan, "Database System Concepts", 4th Edition, Tata McGraw Hill, 2004.
4. Raghu Ramakrishna and Johannes Gehrke, "Database Management Systems", 3rd Edition, Tata McGraw Hill, 2003.

Algorithm: Design and Implementation

Unit-I

Introduction: The Need for Data Structures - Costs and Benefits - Abstract Data Types and Data Structures - Mathematical Preliminaries - Sets and Relations - Miscellaneous Notation - Logarithms - Summations and Recurrences - Recursion - Mathematical Proof Techniques - Direct Proof - Proof by Contradiction - Proof by Mathematical Induction – Algorithm Analysis – Best, Worst, and Average Cases - Asymptotic Analysis - Upper Bounds - Lower Bounds - Notation - Calculating the Running Time for a Program - Analyzing Problems - Empirical Analysis.

Unit-II

Elementary Data Structures: List – Stacks – Queues – Binary Trees – Binary Search Trees – Huffman Coding Trees – Non – Binary Trees.

Sorting And Searching: Internal Sorting Techniques – Heap Sort – Quick sort – Merge Sort – Bin Sort and Radix Sort – Multi Way Merging - Time complexity Analysis of Sorting Techniques – Searching Unsorted and Sorted Arrays – Self – Organizing Lists – Hashing.

Unit-III

Advanced Data Structures: Elementary Graph Algorithms – Minimum Spanning Tree – Single Source Shortest Path – All-Pairs shortest Path – Balanced Trees – AVL Trees- RedBlack Trees – Splay Trees – B-Trees – 1-2-3 Trees.

Unit-IV

Algorithmic Techniques: Dynamic Programming – Greedy Algorithms – Number-Theoretic Algorithms – String Matching algorithms.

Limits To Computation: Reductions - Hard Problems - The Theory of NP -Completeness – NP - Completeness Proofs - Coping with NP -Complete Problems - Impossible Problems – Uncountability.

References:-

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, 3rd Edition, PHI Learning, 2009.
2. Clifford A. Shaffer, “Data Structures and Algorithm Analysis in C++”, 3rd Edition, Dover Publications, 2011.
3. Mark Allen Weiss, “Data Structure and Algorithm Analysis in C++”, 3rd Edition, Prentice Hall, 2006.

Computer Network and Management

Unit-I

Fundamentals Of Computer Network Technology: Network Topology, LAN, Network node components- Hubs, Bridges, Routers, Gateways, Switches, WAN, ISDN Transmission Technology, Communications protocols and standards.

OSI Network Management: OSI Network management model- Organizational model -Information model, Communication model. Abstract Syntax Notation - Encoding structure, Macros Functional model CMIP/CMIS.

Unit-II

Internet Management: SNMP-Organizational model-System Overview - The information model - Communication Model - Functional model - SNMP proxy server- Management information, protocol remote monitoring.

Unit-III

Broadband Network Management: Broadband networks and services - ATM Technology-VP, VC - ATM Packet - Integrated service - ATMLAN emulation - Virtual LAN - ATM Network Management- ATM Network reference model, integrated local management Interface- ATM Management Information base-Role of SNMD and ILMI in ATM Management- M1, M2, M3, M4 Interface- ATM Digital Exchange Interface Management.

Unit-IV

Network Management Applications: Configuration management - Fault management - Performance management - Event Correlation Techniques security Management - Accounting management - Report Management- Policy Based Management Service Level Management.

Applied Network Management: The Need for Management Integration- Management Integration challenge - Approaches to Management Integration.

References:-

1. Mani Subramanian, "Network Management: Principles and Practices", 2nd Edition, Prentice Hall, 2012.
2. Alexander Clemm, "Network Management Fundamentals", 1st Edition, Cisco Press, 2006.
3. Adrian Farrell, "Network Management Know It All", 1st Edition, Elsevier India, 2008.
4. Richard Burke, "Network Management: Concepts & Practice, A Hands on Approach", 1st Edition, Prentice Hall, 2003.

Research Methodology for Engineers

Unit-I

Research Problem: The research problem – Sources of research problem – Information, how to deal with it – Criteria / characteristics of a good research problem – Errors in selecting a good research problem – Types of research – Nature and use of arguments.

Unit-II

SAMPLING DESIGN AND SCALING TECHNIQUES: Census and Sample survey – Steps in Sampling Design – Different types of Sample Designs – Complex Random Sampling Designs – Measurement scales – Techniques of Developing Measurement Tools – Scaling – Important Scaling Techniques.

Unit-III

METHODS OF DATA COLLECTION AND ANALYSIS OF DATA: Collection of Primary Data – different types – Some other methods of Data Collection – Collection of Secondary Data – Processing Operations – Types of Analysis – Measures of Central tendency – Measures of Dispersion.

Unit-IV

LINEAR PROGRAMMING: Basic of Operations Research(OR): Characteristics of Operations Research – OR and Decision making- Linear programming – Stimulation and Graphical solution of canonical and standard forms of Linear programming problem – Algebraic solution – Simplex method – Charne's method of penalties – Concept of duality – Properties of duality.

TRANSPORTATION AND ASSIGNMENT MODELS: Transportation Problem – Assignment Problem – Travelling Salesman Problem.

CASE STUDIES: Presentation by students on their area of research.

References:-

1. Kothari, C.R., "Research Methodology: Methods and Techniques", 2nd Edition, New Age International, New Delhi, 2012.
2. Nicholas Walliman, "Your Research Project", 2nd Edition, Vistaar Publication, New Delhi, 2005.
3. Taha H.A., "Operations Research: An Introduction", 7th Edition, Pearson Education Edition, Asia, New Delhi, 2002.
4. Richard A. Johnson, "Miller and Freund's Probability and Statistics for Engineers", 8th Edition, Pearson Education, Asia, 2011.

Advance Database Lab

Practical will be based on the course Database System: Design and Implementation.

Advance Network Management Lab

LIST OF EXPERIMENTS

1. Analyzing physical layer properties (Band width, power).
2. Analyzing MAC Layer properties (IEEE 802.3, IEEE 802.4, IEEE 802.5, IEEE 802.11).
3. Analyzing various queuing models (FIFO, FAIR, RED).
4. Analyzing Routing layer protocol properties (Distance Vector, Link State).
5. Analyzing Transport Layer Protocol (TCP, UDP).
6. Analyzing Application Layer protocol (TELNET, FTP, Multimedia Applications).
7. Analyzing various security mechanisms.
8. Implementation of algorithms such as RSA, Diffie Hellman.
9. Analyzing wireless properties.
10. Comparison of performance of protocols in wired and wireless environments.
11. Mini project.

Statistics for Business Analysis

Unit-I

Introduction: Data -Data Tables - Categorical and Numerical Data - Recoding and Aggregation - Time Series - Describing Categorical Data - Charts of Categorical Data -The Area Principle - Mode and Median - Describing numerical data - Summaries of Numerical Variables -Histograms and the Distribution of - Numerical Data - Boxplot - Shape of a Distribution.

Unit-II

Association In Categorical And Numerical Data: Contingency Tables -Lurking Variables and Simpson's Paradox - Strength of Association - Scatterplots - Association in Scatterplots - Measuring Association - Summarizing Association with a Line - Spurious Correlation.

Probability: Probability - Conditional Probability - Random Variables - Association between Random Variables - Probability models for Counts - Normality - Managing Financial Risk -Modeling Sampling Variation.

Unit-III

Inference: Samples and Surveys - Sampling Variation and Quality - Confidence Intervals - Hypothesis Tests - Alternative Approaches to Inference - Data for Comparisons -Two-sample T-test - Confidence Interval for the Difference - Rare Events -Testing Association.

Unit-IV

Regression Models - I: Linear Patterns - Curved Patterns - Simple Regression - Regression Diagnostics - Multiple Regressions.

Regression Models – II: Building Regression Models - Categorical Explanatory Variables - Analysis of Variance - Time Series - Analyzing Experiments - Automated Regression Modeling.

References:-

1. Robert Stine, Dean Foster, "Statistics for Business: Decision Making and Analysis", Pearson Education, 2nd edition, 2013.
2. Paul Newbold, William L. Carlson, Betty Thorne, "Statistics for Business and economics", Pearson Education, 6th edition.
3. Keller Gerald, "Statistics for Management and Economics", Cengage Learning, 10th edition, 2014.

Data Mining and Data Analysis

Unit-I

Introduction To Data Mining: Data mining-KDD versus data mining, Stages of the Data Mining Process Task primitives, Data Mining Techniques -Data mining knowledge representation – Data mining query languages- Integration of a Data Mining System with a Data Warehouse – Issues, Data preprocessing – Data cleaning Data transformation- Feature selection- Dimensionality reduction Discretization and generating concept hierarchies-Mining frequent patterns association-correlation.

Unit-II

Classification And Clustering: Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Clustering techniques – Partitioning methods- k-means- Hierarchical Methods – Distance based agglomerative and divisible clustering - Density-Based Methods – Expectation maximization -Grid Based Methods – Model-Based Clustering Methods – Constraint

Unit-III

Data Mining Software And Applications: Mining complex data objects - Spatial databases, temporal databases, Multimedia databases- Time series and Sequence data - Text Mining –Graph mining-Web mining-Application and trends in data mining.

Prediction Of Quantitative Variables: Prediction of quantitative variables – Non Parametric estimation – Logical regression – Projection pursuit – Inferential aspects – Regression trees – Neural networks.

Unit-IV

Methods Of Internal Analysis: Methods of Internal analysis – Cluster analysis – Association among variables – Web mining analysis.

Data Analytics: Data Analytics – Simulated data – Mathematical statistic analysis – Applications of probability theory – Linear models.

References:-

1. Adelchi Azzalini, Bruno Scapa, “Data Analysis and Data mining”, 2nd Edition, Oxford University Press Inc., 2012.
2. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques”, 3rd Edition, Morgan Kaufmann Publishers, 2011.
3. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, 10th Edition, TataMc Graw Hill Edition, 2007.
4. G. K. Gupta, “Introduction to Data Mining with Case Studies”, 1st Edition, Easter Economy Edition, PHI, 2006.

Soft Computing

Unit-I

Neuro Fuzzy And Soft Computing: Soft computing constituents and Conventional Artificial Intelligence - Neuro fuzzy and soft computing characteristics - Fuzzy sets - Basic definitions - Fuzzy union, intersection and complement - Introduction to Classical Sets and Fuzzy sets – Classical Relations and Fuzzy Relations – Tolerance and Equivalence Relations –Membership Functions: Fuzzification – Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods.

Unit-II

Artificial Neural Network: Introduction – Machine Learning Basics - Fundamental concept – Evolution of Neural Networks – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Supervised Learning Network: – Multiple Adaptive Linear Neurons – Back-Propagation Network – Radial Basis Function Network.

Unit-III

Artificial Neural Network- II: Associative Memory Networks: Training Algorithms for Pattern Association – Auto associative Memory Network – Hetero associative Memory Network – Bidirectional Associative Memory – Hopfield Networks – Iterative Auto associative Memory Networks – Temporal Associative Memory Network. Unsupervised Learning Networks: Fixed weight Competitive Nets – Kohonen Self-Organizing Feature Maps – Learning Vector Quantization – Counter propagation Networks – Adaptive Resonance Theory Networks – Special Networks.

Unit-IV

GENETIC Algorithm: Introduction – Basic Operators and Terminologies in GAs – Traditional Algorithm vs. Genetic Algorithm – Simple GA – General Genetic Algorithm – The Scheme Theorem –Classification of Genetic Algorithm – Holland Classifier Systems – Genetic Programming.

Applications Of Soft Computing: A Fusion Approach of Multispectral Images with SAR Image for Flood Area Analysis – Optimization of Travelling Salesman Problem using Genetic Algorithm Approach.

References:-

1. Simon O Haykin, “Neural Networks and Learning Machines”, 3rd Edition, Pearson Higher Education, 2008.
2. S.N. Sivanandan and S.N. Deepa, “Principles of Soft Computing”, 1st Edition, Wiley India, 2007.
3. S.N. Sivanandam, S. Sumathi and S. N. Deepa, “Introduction to Fuzzy Logic using MATLAB”, 8th Edition, Springer, 2007.
4. S. Rajasekaran and G.A.V.Pai, “Neural Networks, Fuzzy Logic and Genetic Algorithms”, 1st Edition, PHI 2003.
5. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, 2nd Edition, PHI, 2004.

Data Mining and Data Analysis Lab

Practical will be based on Data Mining and Data Analysis Course.

Soft Computing Lab

Practicals will be based on course Soft Computing

XML and Web Services

Unit-I

Web Services: Introduction: SOAP WSDL UDDI – Origin of web services - Web Technology stack - Web services in reality - Limitations of web services.

Xml Fundamentals: XML Fundamentals - XML Documents-XML namespaces Explicit and Default namespaces - Inheriting namespaces and not inheriting namespaces - Attributes and namespaces - XML Schema XML schema and namespaces - A first schema - Implementing XML schema types.

Unit-II

Overview Of Soap: Overview of SOAP – HTTP – XML-RPC – SOAP: Protocol – Message Structure – Intermediaries – Actors – Design Patterns And Faults – SOAP With Attachments.

UDDI: UDDI at a glance- The UDDI Business registry- UDDI under the covers – Accessing UDDI- How UDDI is playing out.

Unit-III

Semantics And Meta Data: Role of semantics and meta data: Web 1.0, 2.0 and 3.0 - Types of semantics: Implicit, formal and Soft semantics - Application and Types of semantics - Models of semantics - Ontology and ontology development.

Unit-IV

Semantics And Applications: Semantics for services: Nature of web services - Role of semantics in web services - Creation of Semantic meta data models and annotations – Example applications - Semantics for social data: Nature of social data -Role of semantics - Creation of semantic meta data models and annotations - Semantics for cloud computing.

References:-

1. Glenn Hostetler, Sandor Hasznos and Christine Heron, “Web Service and SOA Technologies, Practicing Safe Techs”, 1st Edition, Practicing Safe Techs publishers, 2009.
2. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services”, 1st Edition, Pearson Education, 2004.
3. Amit Sheth and Krishnaprasad Thirunarayanan, “Semantics Empowered Web 3.0: Managing Enterprise, Social, Sensor, and Cloud-based Data and Services for Advanced Applications”, 1st Edition, Morgan and Claypool publishing, 2012.

Big Data

Unit-I

Introduction To Big Data: Big Data and its Importance – Four V's of Big Data – Drivers for Big Data – Introduction to Big Data Analytics – Big Data Analytics applications.

Big Data Technologies: Hadoop's Parallel World – Data discovery – Open source technology for Big Data Analytics – cloud and Big Data – Predictive Analytics – Mobile Business Intelligence and Big Data – Crowd Sourcing Analytics – Inter- and Trans-Firewall Analytics - Information Management.

Unit-II

Processing Big Data: Integrating disparate data stores - Mapping data to the programming framework - Connecting and extracting data from storage - Transforming data for processing - Subdividing data in preparation for Hadoop Map Reduce.

Unit-III

Hadoop Mapreduce: Employing Hadoop Map Reduce - Creating the components of Hadoop Map Reduce jobs - Distributing data processing across server farms -Executing Hadoop Map Reduce jobs - Monitoring the progress of job flows - The Building Blocks of Hadoop Map Reduce - Distinguishing Hadoop daemons - Investigating the Hadoop Distributed File System Selecting appropriate execution modes: local, pseudo-distributed, fully distributed.

Unit-IV

Advanced Analytics Platform: Real-Time Architecture – Orchestration and Synthesis Using Analytics Engines – Discovery using Data at Rest – Implementation of Big Data Analytics – Big Data Convergence – Analytics Business Maturity Model.

Big Data Tools And Techniques: Installing and Running Pig – Comparison with Databases – Pig Latin – UserDefine Functions – Data Processing Operators – Installing and Running Hive – Hive QL – Tables – Querying Data – User-Defined Functions – Oracle Big Data.

References:

1. Michael Minelli, Michehe Chambers, “Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Business”, 1st Edition, Ambiga Dhiraj, Wiely CIO Series, 2013.
2. Arvind Sathi, “Big Data Analytics: Disruptive Technologies for Changing the Game”, 1st Edition, IBM Corporation, 2012.
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, 1st Edition, Wiley and SAS Business Series, 2012.
4. Tom White, “Hadoop: The Definitive Guide”, 3rd Edition, O'reilly, 2012.

Knowledge Discovery Technologies

Unit-I

Introduction: Data Mining-Knowledge Discovery Process–Data Understanding –Data – Concepts of Learning-Classification-Summary –Knowledge representation— Cate-set and interval-Fuzzy sets.

Data Preprocessing: Subverting Knowledge discovery-Effects of technology properties-Sense making and situational awareness.

Unit-II

Risk Prediction And Anomaly Detection: Goals-Problems-Human variability-Computational difficulty- Rarity- Justifiable preemption-Hindsight Bias-Outline of prediction-attributes - Missing values - Reason – Errors - Ranking-Technologies.

Unit-III

Similarity Clustering: Goals-Clustering technology- Distance based-density based- Distribution based-Decomposition based-Hierarchical-biclustering-clusters and predictionSymbiotic clustering E-Health perspectives-Ehealth records-EHealth-EPublic health Information system.

Unit-IV

Relationship Discovery: Goals-Outline of Textual analysis-Technologies-Discovery - Public textual data.

Knowledge In Private Communication: Concealment Opportunities –Technologies-Tactics and Process-Discovery of mental and Emotional state-Sentiment Analysis

REFERENCES:

1. David Skillicorn, “Knowledge Discovery for Counterterrorism and Law Enforcement”, 1st Edition, Chapman & Hall/CRC Data Mining and Knowledge Discovery Series, 2008.
2. Krzysztof J. Cios, Witold Pedrycz, Roman W. Swiniarski, Lukasz Andrzej Kurgan, “Data Mining: A Knowledge Discovery Approach”, 1st Edition, Springer Science & Business Media LLC, 2007.

Web Analytics

Unit-I

Introduction To Web Analytics: A Brief history of Web Analytics –Web Analytics Terminology – Traditional Web Analytics – Web Analytics 2.0 – Capturing Data- Tools Selection – Quality Aspects – Implementing Best Practices.

Unit-II

Web Data Collection: Web Traffic Data – Web Transactional Data – Web Server Data – Page Weights – Usability Studies – User Submitted Information – Integrating Form based data – Web Data Sources – Server Log Files – Page Tags – Clickstream Data –Outcomes Data – Research Data –Competitive Data.

Unit-III

Web Analytics Strategy: Component of Web Analytics Strategy – Customer Centric Focus – Business Problem Solving Focus – Reporting vs Analysis – IT and Business Strength – Clickstream vs Web 2.0 – Vendor Specific Options and Issues.

METRICS AND KPIs : Measuring Reach – Measuring Acquisition – Measuring Conversion – Measuring Retention – Focus on ‘Critical Few’- Key Performance Indicators – Case Studies.

Unit-IV

Data Analysis: Customer centricity – Lab Usability Studies – Usability Alternatives – Surveys – Heuristic Evaluations - Web enabled user research options – Competitive Intelligence Analysis.

Web Analytics Tools: Content organization tool – Process measurement tools- Visitor Segmentation Tools- Campaign Analysis – Commerce Measurement Tools -Google Analytics – Piwik Web Analytics – Yahoo Web Analytics – Emerging Analytics: Social, Video, Mobile.

References:

1. Avinash Kaushik, “Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity”, 1st Edition, Sybex, 2009.
2. Brian Clifton, “Advanced Web Metrics with Google Analytics”, 3rd Edition, Sybex , 2012.
3. Eric Peterson, “Web Analytics Demystified:A Marketer's Guide to Understanding How Your Web Site Affects Your Business” ,1st Edition, Celilo Group Media, 2004.
4. Avinash Kaushik, “Web Analytics: An Hour a Day”, 6th Edition, Sybex, PAP/ CDR Edition, 2007.
5. Justin Cutroni, “Google Analytics”, 2nd Edition, O'Reilly Media, 2010.

Cluster Analysis

Unit-I

Classification And Clustering: Reasons for classification - Defining a cluster -Examples of use of clusters: Market research - Astronomy - Psychiatry - Weather classification - Archaeology - Bioinformatics and genetics.

Unit II

Extraction Feature Extraction - Distance Measure - Euclidean distance - Mahalanobis distance - Manhattan distance.

Classification : – Decision Tree Induction – Bayesian Classification – Prediction –Back Propagation.

Unit-III

Optimization Clustering Techniques: Clustering criteria derived from the dissimilarity matrix - Clustering criteria derived from continuous data - Optimization algorithms - Choosing the number of clusters - Applications of optimization methods.

Unit-IV

Cluster Analysis: Types of data – Clustering Methods – K-Means clustering-KMedoid clustering-Hierarchical clustering-agglomerative clustering- Partitioning methods – Model based clustering methods – Outlier analysis

Applications: Cluster analysis applications in image processing-Data mining and warehousing-Neural networks-Genetic algorithms.

References:-

1. Sugato Basu, Ian Davidson, Kiri L.wagsstaff, “Constrained Clustering: Advances in Algorithms, Theory, and Applications”, 1st Edition, Chapman and Hall/CRC press, 2008.
2. Paulraj Ponnaiah,” Data Warehousing Fundamentals”, 1st Edition, Wiley Publishers, 2004.
3. Brian S. Everitt, Sabine Landau, Morven Leese, and Daniel Stah, “Cluster Analysis”, 5th Edition ,Wiley, 2011.
4. Mark Nixon, Alberto S Aguado, “Feature Extraction & Image Processing”,2nd Edition, Academic Press, 2008.

Social Media Mining

Unit-I

Introduction To Social Networks and SNA: Connected World – Networks: Actors, Relations and Attributes - Networks as Information Maps - Networks as Conduits – Leaders and Followers – Psychological foundations of social networks – Basic building Blocks - Brief history of Social Network Analysis.

Unit-II

Network Concepts : Individual Members of the Network – Sociological Questions about Relationships – Whole Social Networks- Distributions – Multiplexity – Roles and Positions – Network Segmentation – Graph Theory – Notations for Social Network Data.

Unit-III

Social Network Analysis Fundamentals : Points, Lines and Density – Centrality and Centralization – Components, Cores and Cliques – Positions, Roles and Clusters – Dimensions and Displays.

Methods Of Social Network Analysis Graphs – Matrices – Relationship Measures – Centrality and Prestiges – Cliques – Structural Equivalence – Visual Displays – Bookmodels – Network Position Measures – Logit Models – Affiliation networks – Lattices.

Unit-IV

Levels Of Analysis: Actor Level In Complete Networks – Actor Level in Ego Networks – Dyad Level – Triad Level – Subgroups Level – Network Levels – Positions and Roles Analysis. MODULE VI TOOLS AND TECHNOLOGIES Twitter Analytics – Facebook Analytics – Google+ Analytics – Google+ Ripples – R for Social Network Analysis – Pajek – Network Visualization Tools - Analyzing Social Media Networks with NodeXL.

REFERENCES:

1. Charles Kadushin, “Understanding Social Networks: Theories, Concepts, and Findings”, Oxford University Press, USA, 2011.
2. David Knoke, Song Yang, “Social Network Analysis”, 2nd Edition, SAGE Publications, 2007.
3. Christina Prell , “Social Network Analysis: History, Theory and Methodology”, 1st Edition, SAGE Publications Ltd, 2012

Natural Language Processing

Unit I

Introduction: Knowledge in speech and language processing - Ambiguity - Models and Algorithms - Language, Thought and Understanding- Regular Expressions and automata: Regular expressions - Finite-State automata. Morphology and Finite-State Transducers: Survey of English morphology - Finite-State Morphological parsing - Combining FST lexicon and rules - LexiconFree FSTs: The porter stammer - Human morphological processing.

Unit-II

SYNTAX: Word classes and part-of-speech tagging: English word classes - Tagsets for English - Part-of-speech tagging - Rule-based part-of-speech tagging - Stochastic part-of-speech tagging - Transformation-based tagging - Other issues - Context-Free Grammars for English: Constituency - Context-Free rules and trees - Sentence-level constructions - The noun phrase - Coordination - Agreement - The verb phrase and sub categorization - Auxiliaries - Spoken language syntax - Grammars equivalence and normal form - FiniteState and Context-Free grammars - Grammars and human processing. Parsing with Context-Free Grammars: Parsing as search - A Basic Top-Down parser - Problems with the basic Top-Down parser - The early algorithm - Finite-State parsing methods.

Unit- III

Advanced Features And Syntax: Features and Unification: Feature structures - Unification of feature structures - Features structures in the grammar - Implementing unification - Parsing with unification constraints - Types and Inheritance. Lexicalized and Probabilistic Parsing: Probabilistic context-free grammar - Problems with PCFGs - Probabilistic lexicalized CFGs - Dependency Grammars - Human parsing.

Representing Meaning: Computational desiderata for representations - Meaning structure of language - First order predicate calculus - Some linguistically relevant concepts - Related representational approaches - Alternative approaches to meaning. Semantic Analysis: Syntax-Driven semantic analysis - Attachments for a fragment of English - Integrating semantic analysis into the early parser - Idioms and compositionality - Robust semantic analysis. Lexical semantics: relational among lexemes and their senses - WordNet: A database of lexical relations - The Internal structure of words - Creativity and the lexicon.

Unit-IV

Applications: Word Sense Disambiguation and Information Retrieval: Selectional restrictionbased disambiguation - Robust word sense disambiguation - Information retrieval - Other information retrieval tasks. MODULE VI NATURAL LANGUAGE GENERATION 7 Introduction to language generation - Architecture for generation - Surface realization - Discourse planning - Other issues- Machine Translation: Language similarities and differences - The transfer metaphor - The interlingua idea: Using meaning - Direct translation - Using statistical techniques - Usability and system development.

REFERENCES:

1. Daniel Jurafsky & James H.Martin, "Speech and Language Processing", 2nd Edition, Pearson Education, 2009.

2. James Allen, "Natural Language Understanding", 2nd Edition, Pearson Education, 2008.
3. Manning, Christopher D and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", Cambridge, 1st Edition, MA: MIT Press, 1999.

Web Analytics Lab

Practicals will be based on course Web Analytics

**M.Tech Computer Science & Engineering
(Animation and Game Design)**

SHREE GURU GOBIND SINGH TRICENTENARY UNIVERSITY, GURGAON

SCHEME OF STUDIES AND EXAMINATION

MASTER OF TECHNOLOGY (Computer Science & Engineering)

Animation & Game Design SEMESTER-I

EFFECTIVE FROM 2018 – 19

Course No.	Course Title	Teaching Schedule			Marks			Credit	Duration of Exam
		L	T	P	Internal	External	Total		
	Introduction to Web Technology	4	-	-	50	100	150	3	3
	Multimedia Fundamentals	4	-	-	50	100	150	3	3
	Game Art and Design	4	-	-	50	100	150	3	3
	Introduction to Graphics	4	-	-	50	100	150	3	3
	Graphics Lab	-	-	4	50	50	100	2	3
	Introduction to Programming – Lab			4	50	50	100	1	
	Seminar			2	50	-	50	1	
Total		16	-	10	350	500	850	16	

Note : L – Lecture, T- Tutorial, P – Practical, C - Credit

**MASTER OF TECHNOLOGY (Computer Science &
Engineering)
Animation & Game Design
SEMESTER-II**

EFFECTIVE FROM 2018 – 19

Course No	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam
		L	T	P	Internal	External	Total		
	Vector Animation Techniques	4	–	–	50	100	150	3	3
	Scripting for Animation & Games	4	–	–	50	100	150	3	3
	Game Development Process	4	–	–	50	100	150	3	3
	Elective II	4			50	100	150	3	3
	Vector Animation - Lab	–	–	4	50	50	100	2	
	Game development Process - Lab	–	–	4	50	50	100	2	
	Seminar	–	–	2	50	–	50	1	–
	Elective II								
	1: Software Project Management								
	2: AI for Games								
Total		16	–	10	350	500	850	17	

**MASTER OF TECHNOLOGY (Computer Science &
Engineering)
Animation & Game Design
SEMESTER-III**

EFFECTIVE FROM 2018 – 19

Course No	Course Title	Teaching Schedule			Marks			Credits	Duration of Exam
		L	T	P	Internal	External	Total		
	Mobile Technology	4	–	–	50	100	150	3	3
	Experience Design for New Media	4	–	–	50	100	150	3	3
	Real – Time 3D design	4	–	–	50	100	150	3	3
	Elective III	4			50	100	150	3	3
	Mobile Technology - Lab	–	–	4	50	50	100	2	
	Minor Project	–	–	4	100	0	100	2	
	Seminar	–	–	2	50	–	50	1	–
	Elective III								
	1: Web Layout Design 2: Front – End Development 3: Responsive Web Design								
Total		16	–	10	400	450	850	17	

**M MASTER OF TECHNOLOGY (Computer Science &
Engineering)
Animation & Game Design**

SEMESTER-IV

EFFECTIVE FROM 2017 – 18

Course No	Course Title	Marks			Credits
		Internal	External	Total	
	Dissertation & Viva	100	100	200	20

Introduction to Web Technology

NOTE: Ten questions are to be set in all by the examiners by taking three questions from each unit and one compulsory question having 05 short answer type questions from all the units. Students will be required to attempt six questions in all including compulsory Question i.e. question No. 1 and by selecting not more than two questions from each unit.

Objectives:

After going through this course a student should be able to: Use XHTML tags to create simple static web pages; format a simple Web page using Cascading Style sheets; state the concepts applicable to web programming; create an interactive and dynamic Web site using JavaScript; represent data over the Web using XML; appreciate the use of Ajax and Rich Internet Applications, and perform server side scripting using Java Server Pages (JSP).

UNIT – I HTML & CSS

HTML :- Basics of HTML, formatting and fonts, hyperlink, tables, images, forms, XHTML, Meta tags, Browser architecture and Web site structure. Overview and features of HTML5.

Style Sheets: Introduction to CSS, Need for CSS, basic syntax and structure using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS.

UNIT – II Java Script:-

Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, Operators, Statements, Document and its associated objects, Events and Event Handlers, Core JavaScript (Properties and Methods of Each)

UNIT – III

PHP (Hypertext Preprocessor): Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form, mail, file upload, session, error, exception, filter, PHP-ODBC.

MYSQL: Introduction to Database and MYSQL, RDBMS-Understanding Tables, Records & Fields, SQL language, MYSQL queries.

Working with MYSQL Admin: Working with PHP My admin, data types, creating Database and tables, dropping Database and tables, adding fields, selecting table, Altering fields properties.

Books Recommended (1 Text Book + 2 Reference Books)

1. Ullman, "PHP for the Web: Visual QuickStart Guide", Pearson Education
2. PHPMYSQL Fundamental learning Book, Kent Elchuk
3. Beginning HTML5 with CSS3, Apress publisher
4. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech

Multimedia Fundamentals

Unit 1. Introduction to Multimedia

What is multimedia, Components of multimedia, Web and Internet multimedia applications, Transition from conventional media to digital media.

Computer Fonts and Hypertext

Usage of text in Multimedia, Families and faces of fonts, outline fonts, bitmap fonts International character sets and hypertext, Digital fonts techniques.

Unit 2. Audio fundamentals and representations

Digitization of sound, frequency and bandwidth, decibel system, data rate, audio file format, Sound synthesis, MIDI, wavetable, Compression and transmission of audio on Internet, Adding sound to your multimedia project, Audio software and hardware.

Unit 3. Image fundamentals and representations

Colour Science , Colour, Colour Models, Colour palettes, Dithering, 2D Graphics, Image Compression and File Formats :GIF, JPEG, JPEG 2000, PNG, TIFF, EXIF, PS, PDF, Basic Image Processing [Can Use Photoshop], Use of image editing software, White balance correction, Dynamic range correction, Gamma correction, Photo Re 89

Unit 4. Video and Animation

Video Basics , How Video Works, Broadcast Video Standards, Analog video, Digital video, Video Recording and Tape formats, Shooting and Editing Video (Use Adobe Premier for editing), Video Compression and File Formats. Video compression based on motion compensation, MPEG-1, MPEG-2, MPEG-4, MPEG-7, MPEG-21, Animation: Cell Animation, Computer Animation, Morphing.

Multimedia Authoring Basics, Some Authoring Tools, Macromedia Director & Flash.

References

1. Tay Vaughan, "Multimedia making it work", Tata McGraw-Hill, 2008.
2. Rajneesh Aggarwal & B. B Tiwari, "Multimedia Systems", Excel Publication, New Delhi, 2007.
3. Li & Drew, "Fundamentals of Multimedia", Pearson Education, 2009.
4. Parekh Ranjan, "Principles of Multimedia", Tata McGraw-Hill, 2007
5. Anirban Mukhopadhyay and Arup Chattopadhyay, "Introduction to Computer Graphics and Multimedia", Second Edition, Vikas Publishing House.

Game Art and Design

Unit - 1 INTRODUCTION

THE PROCESS OF 3D CHARACTER

3D Model Sheet
3D Modeling
UV Unwrapping and Texturing
Rigging a Character for Animation

Unit - 2 THE STRUCTURE OF A GOOD CHARACTER MODEL

Polygon Count
The Default Position
Clean
The structure of the joints
Good practices: World, Naming Conventions, Version control

Unit - 3 THE BASICS OF BLENDER

Setup
The interface
Hotkeys
Modifiers

Unit - 4 3D CHARACTER CREATION STEP BY STEP

Creating the 3D model sheet
Creating the 3D Model
Unwrapping
Texturing
Rigging

Introduction to Graphics

COURSE DESCRIPTION This course focuses on 2D and 3D interactive and non-interactive graphics. This course studies the principles underlying the generation and display of 2D and 3D computer graphics. In this course topics include geometric modeling, 3D viewing and projection, lighting and shading, color, and the use of one or more technologies and packages such as OpenGL, and Blender. Course requirements usually include exam and several programming or written homework assignments.

COURSE CONTENT

Unit I: Introduction and Line Generation

Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Midpoint circle generating algorithm, and parallel version of these algorithms.

Unit II: Transformations

Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms-Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against nonrectangular clip windows; Polygon clipping – Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.

Unit III: Three Dimensional

3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.

Curves and Surfaces

Quadric surfaces, Spheres, Ellipsoid, Blobby objects, introductory concepts of Spline, Bspline and Bezier curves and surfaces.

Unit IV: Hidden Lines and Surfaces

Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models – Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.

TEXT BOOKS

1. Computer Graphics C Version - Donald Hearn and M Pauline Baker, Pearson Education

REFERENCE BOOKS

1. Computer Graphics - Amrendra N Sinha and Arun D Udai, TMH Publications
2. Computer Graphics: A Programming Approach - Steven Harrington, TMH Publications
3. Procedural Elements of Computer Graphics - Rogers, McGraw Hill

Graphics Lab

Practicals will be based on course Introduction to Graphics

Introduction to Programming Lab

Practicals will be based on Introduction to web Technology

VECTOR ANIMATION TECHNIQUES

UNIT – 1

Drawings with the help of basic shapes, Animal study, Human anatomy, Shading techniques, Live model study, Introduction- Importance of confidence, Difference between “looking at the drawing” and “seeing the drawing”, What is observation, Procedure- How to approach, Importance of Guideline- Line of action, Overcome the fear, Drawing for animation,

UNIT – 2

An Introduction on how to make drawings for animation, Shapes and forms, About 2d and 3d drawings, Caricaturing – fundamentals, Exaggeration, Attitude, Silhouettes, Boundary-breaking exercises and warm ups, gesture drawing, Line drawing and quick sketches, Drawing from observation, memory and imagination.

UNIT – 3

Drawing for Animation, Exercises and warm ups on pegging sheet, Quick Studies from real life, Sequential movement drawing, Caricaturing the Action. Thumbnails, Drama and psychological effect, Motion Studies, Drawing for motion,

UNIT – 4

The Body language, Re-defining the drawings, Introduction to animation production process, Basic Principles in animation, Squash and stretch, Anticipation, Staging, Straight ahead and pose to pose, Follow through and overlapping action, Slow in and slow out, Arcs, Secondary action, Timing, Exaggeration, Solid drawing, Appeal, Mass and weight, Character acting, Volume, Line of action, Path of action, Walk cycles-animal and human.

References:

1. GRAPHICS & ANIMATION BASICS , by SUZANNE WEIXEL / CHERYL MORSE
2. BASIC ANIMATION HT25 - WALTER FOSTER , by WALTER FOSTER
3. CARTOONING BASIC ANIMATION HT25 - WALTER FOSTER , by WALTER FOSTER
4. COMPUTER GRAPHICS & ANIMATION , by PRAJAPATI AK
5. INTRODUCTION TO 3D GRAPHICS & ANIMATION USING MAYAW/CD ,by ADAM WATKINS
6. DRAW ANIMATION ,by PAUL HARDMAN

Scripting for Animation and Games

UNIT – 1 Creating Your First Flash Animation – how to create a new blank movie file in Flash MX – and the tools and steps involved in making your first simple animation using motion twining – basic shapes – Flash Animation 2 - Shape Twining – pick up at the end of where we left off – Shape twining in Flash MX.

UNIT – 2 Flash Lesson 8 -Adding Simple Audio – add a looping audio background to our Flash character animation to complete it – Lip-Synching For Animation: Basic Phonemes – add actual expression and realistic mouth-movements to your animation – it helps to study how the shape of the mouth changes with each sound – these ten basic phonemes shapes can match almost any sound of speech – in varying degrees of expression.

UNIT – 3 Flash Animation – Fireworks E-card – using Flash’s drawing tools to set a scene for an animation – creating the scene for a Fourth of July exploding fireworks E-card – a future lesson will demonstrate how to animate it – Flash Animation 4 - Animating E-card – set the stage for our E-card – use a new kind of symbol called a Movie Clip. Flash Tip – Tools of the Trade – Drawing in Flash With a Graphics Tablet – frame-by-frame vector animation with this high-tech – but inexpensive – plug and playtool – Animation Tip – Tools of the Trade – Light Tables – 2D animation for cell painting – computer animation – a light table.

UNIT – 4 Animating the limbs – add speech bubbles – about adding actual audio tracks later – to learn about working with text in Flash – and to give our characters a “voice” to communicate with the viewer – so to animate our facial features and give them expression and lip movements. Modeling with Deformers and Subdivisions Surfaces – The Lattice – Creating a Base Poly Model, Converting it to a subdivision Surface and Converting Back to Polygons – Human Hand and Character’s Head, Basic Animation – Creating Keys – Setting Breakdown Keys – Bouncing a Ball – Creating and Editing Keys Using the Graph Editor – Adding “Whiz Bang”, Squash and Stretch – Converting Cycled Animation to Curves

References:

1. Adam Watkins : Maya A Professional Guide, Published by Dreamtech,first edition – 2003.
2. Joey Lott and Robert Reinhardt. : Flash 8 Action Script Bible. Published by Wiley India (P) Ltd.2006.
3. Tom Meade and Shinsaka Anima : The Complete Reference Maya 6
Published by Tata MC.Graw –Hill Publishing Company Limited edition 2004.
4. Robert Reinhardt and Snow Dowd : Macromedia Flash 8 Bible.
Published by Wiley India Pvt Ltd.2006

GAME DEVELOPMENT PROCESS

UNIT-1:

Pong on 6/25

Lua, LOVE2D, Basic OOP (Object-Oriented Programming), Drawing Shapes, Drawing Text, DeltaTime and Velocity, Game State, Box Collision (Hitboxes), Sound Effects (with bfxr)

Flappy Bird on 7/2: Images (Sprites), Infinite Scrolling, "Games are Illusions", Procedural Generation, State Machines, Music, Mouse Input

UNIT-2:

Match 3 on 7/9: Sprite Sheets (Quads), Anonymous Functions, Tweening, Timers, Solving Matches, Procedural Grids, Sprite Art and Palettes

Super Mario Bros. on 7/16, Tile Maps, 2D Animation, Procedural Level Generation, Platformer Physics, Intro to AI, Powerups

Unit 3:

Legend of Zelda on 7/23

Top-Down Perspective, Infinite Dungeon Generation, Events, Hurtboxes, Screen Scrolling, Data-Driven Design

Unit 4:

Angry Birds on 7/30

Box2D, Mouse Input

Pokémon on 8/6

Vector Animation Lab

Practicals will be according to Course Vector Animation Technique

Game Development Lab

Practicals will be according to Game Development Process

Software Project Management

UNIT I - PROJECT CONCEPTS AND ITS MANAGEMENT

Project life cycle models-ISO 9001 model-Capability Maturity Model-Project Planning-Project tracking-Project closure. Evolution of Software Economics – Software Management Process Framework: Phases, Artifacts, Workflows, Checkpoints – Software Management Disciplines: Planning / Project Organization and Responsibilities / Automation / Project Control – Modern Project Profiles

UNIT II - COST ESTIMATION

Problems in Software Estimation – Algorithmic Cost Estimation Process, Function Points, SLIM (Software Life cycle Management), COCOMO II (Constructive Cost Model) – Estimating Web Application Development – Concepts of Finance, Activity Based Costing and Economic Value Added (EVA) – Balanced Score Card.

UNIT III -SOFTWARE QUALITY MANAGEMENT

Software Quality Factors – Software Quality Components – Software Quality Plan – Software Quality Metrics – Software Quality Costs – Software Quality Assurance Standard – Certification – Assessment.

Software Configuration Management – Risk Management: Risk Assessment: Identification / Analysis / Prioritization

Risk Control: Planning / Resolution / Monitoring

Failure Mode and Effects Analysis (FMEA) ,Defect Management ,Cost Management.

Software Metrics – Classification of Software Metrics: Product Metrics: Size Metrics, Complexity Metrics, Halstead’s Product Metrics, Quality Metrics, and Process metrics.

UNIT IV - PROJECT EVALUATION AND EMERGING TRENDS (12 hours)

Strategic Assessment–Technical Assessment–Cost Benefit Analysis–Cash Flow Forecasting–Cost Benefit Evaluation Technique–Risk Evaluation–Software Effort Estimation. Emerging Trends: Import of the internet on project Management – people Focused Process Models.

REFERENCES

1. Ramesh Gopaldaswamy , “Managing and global Software Projects”, Tata McGraw Hill Tenth Reprint, 2011.
2. Roger S.Pressman, “Software Engineering- A Practitioner’s Approach“, 7th Edition ,McGraw Hill, 2010.
3. Daniel Galin, “Software Quality Assurance: from Theory to Implementation”, Addison-Wesley, 2003.
4. Bob hughes and Mike Cotterell, “Software Project Management” second edition,1999.
5. Royce, W. “Software Project Management: A Unified Framework”, AddisonWesley, 1998.
6. Demarco, T. and Lister, T. “Peopleware: Productive Projects and Teams, 2nd Ed.”, Dorset House,1999.
7. Fenton, N.E., and Pfleeger, S.L.. “Software Metrics: A Rigorous and Practical Approach, Revised” Brooks Cole, 1998.
8. Kaplan, R.S., Norton, D.P. “The Balanced Scorecard: Translating Strategy into Action”, Harvard Business School Press, 1996.
9. Boehm, B. W. "Software Risk Management: Principles and Practices" in IEEE Software, January 1991, pp32-41.

AI for Games

UNIT-1

Introduction, course overview, artificial stupidity, intelligent mistakes, models of game AI, data structures, representations, complexity, and constraints

UNIT-2

Movement: steering, jumping, coordinated movement, motor control ,Pathfinding: pathfinding graphs, Dijkstra, A*, hierarchical pathfinding, motion planning Decision making: decision trees, state machines,

UNIT-3:

Behavior trees, goaloriented behavior, scripting Tactics and Strategy: waypoint tactics, tactical analyses, tactical pathfinding, coordinated action , Learning: decision tree learning, naive bayes, reinforcement learning, artificial neural networks

UNIT-4:

Game Playing: game theory, minimax, transposition tables, opening books and set plays, turn-based strategy games , Project Presentations

Mobile Technology

Unit-1-Mobile Network Layer: Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP).

Mobile Transport Layer I: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP.

Mobile Transport Layer II: Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.

Unit-2- Data processing and mobility: Effect of mobility on the management of data: Data Categorization; Location Dependent Data Distribution-Effect of Connectivity on Transaction Processing. Transaction Management in Mobile Database Systems: Mobile Database System; Transaction Execution in MDS; Mobile Transaction Model; Execution Model based on ACID Transaction Framework; Execution Model with Reporting Transactions; Two-Level Consistency Model; Pro-Motion: Proactive management of Mobile; Pre-write Transaction Execution Model; Pre-write Execution in Mobile Database Systems; Mobile Transaction Model- HiCoMo: (High Commit Mobile Transaction Model, Moflex Transaction Model, Kangaroo Mobile Transaction Model, MDSTPM Transaction Execution Model.)

Unit-3-Mobile Ad hoc Networks (MANETs): Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

Unit-4-4G Technology: The basics of 4G, What is 4G, 4G capable phone, ITU, Three Flavours of 4G: WiMax, LTE, Difference between LTE and WiMax, HSPA+.

Experience design for New Media

01. UX Introduction

User Interaction with the products, applications and services – Cognitive Model/Mental Model Why User Experience Design What is User Experience (UX) Design?

Elements of UX Design

Core elements of User Experience. How these elements work together.

02. UX Design Process

Defining the UX Design Process and Methodology

UX Design Process: RESEARCH & DEFINE Why Research is critical? Research methods and tools. Understanding the User Needs and Goals Understanding the Business Goals Deliverables of the Research & Define phase Insight on User Goals and Business Goals Hands-on assignments and Quiz

UX Design Process: IDEATE/DESIGN Visual Design Principles Information Design and Data Visualization Interaction Design Information Architecture Wireframing & Storyboarding UI Elements and Widgets Screen Design and Layouts

Unit 03.

PROTOTYPE & TEST Why Test your Design? What is Usability Testing? Types of Usability Testing Usability Testing Process How to prepare and plan for the Usability Tests? Prototype your Design to Test? Introduction of prototyping tools How to conduct Usability Test? How to communicate Usability Test Results? Hands-on Assignments and Quiz

Unit 04.

UX Design Process: ITERATE/ IMPROVE Understanding the Usability Test findings Applying the Usability Test feedback in improving the design

References:

1. The Elements of User Experience: User-Centred Design for the Web by Jesse James
2. Observing the User Experience: A Practitioner's Guide to User Research by Mike Kuniavsky
3. Sketching User Experiences: Getting the Design Right and the Right Design Book by Bill Buxton
4. Handbook of Usability Testing: How to Plan, Design, and Conduct Effective Tests (Paperback) by Jeffrey Rubin.

Real Time 3D design

Unit –I. Introduction to 3D

Overview, Types of 3D Models, Navigating and Displaying 3D Models, Orbiting 3D Model

Changing the Model Display,Setting Viewport Display

Creating Solid Primitives

Overview, About Solid Primitive, Creating a Solid Box,Creating a Solid Sphere,Creating a Solid Cylinder, Creating a Solid Cone, Creating a Solid Wedge, Creating a Solid Torus, Creating a Solid Pyramid

Unit II Creating Models from 2D Profiles

Overview· Choosing a Model Creation Method· Creating a Model Using the Planar Surface Command· Creating a Model Using the Polysolid Command· Creating a Model Using the Extrude Command· Creating a Model Using the Presspull Command· Creating a Model Using the Revolve Command· Creating a Helical Path· Creating a Model Using the Sweep Command· Creating a Model Using the Loft Command

Unit III Creating Composite Solids

Overview· About Composite Solids· Creating Solids Using Union· Creating Solids Using Subtract· Creating Solids Using Intersect· Checking Interference

Working in 3D

Overview· About the Cartesian Coordinate System· Changing the Coordinate System· Changing the UCS Icon Display· Changing the Coordinate System Dynamically· Acquiring Points in 3D Space

Unit IV Editing Models

Adding Detail to Your Solid Models, Filletting Solid Models,Chamfering Solid Models,Slicing a Solid Model

Converting Objects , About Converting 2D Objects to Solids or Surfaces

Web Layout Design

Unit-I

Web Design Principles: Basic principles involved in developing a web site, Planning process , Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design Concept.

Basics in Web Design: Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

Unit-II

Introduction to HTML: What is HTML , HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Elements of HTML: Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

Unit-III

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties, CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) CSS Color, Creating page Layout and Site Designs.

Unit-IV

Introduction to Web Publishing or Hosting: Creating the Web Site ,Saving the site , Working on the web site , Creating web site structure , Creating Titles for web pages , Themes-Publishing web sites.

References:-

1. Kogent Learning Solutions Inc. "HTML 5 in simple steps" Dreamtech Press.
2. Murray, Tom/Lynchburg "Creating a Web Page and Web Site" College, 2002.
3. "A beginner's guide to HTML" NCSA, 14th May, 2003.

Responsive Web Design

Unit-I

Intro to Mobile First , Structuring Your Files (& File Naming Cheatsheet) , Working with Browser Inspectors, Adding Media Queries to Your Project , Setting Up Breakpoints , Responsive Typography & Google Web Fonts.

Unit-II

Getting Started with a Boilerplate, Making Your Project Fluid, Responsive Grids in Action , Coding Your Style Tiles , Adding Responsive Images , Responsive IFrames , Intro to Icon Fonts & Font Awesome.

Unit-III

Intro to the Command Line , Intro to Git & How to Install Git , Your First Repository & Git Commands ,Branches, Merging, and Errors , Getting Started with GitHub & GitHub Basics.

Introducing JavaScript , JavaScript & HTML , The DOM: Objects in the Browser ,Conditionals & Control Flow , Repetitive Code.

Unit-IV

Finishing Your Project , Testing Your Website , Intro to Flexbox , Using Flexbox Grids , Using Flexbox Layouts

References:-

1. “Web Designing & Architecture”Educational Technology Centre University of Buffalo
2. Steven M. Schafer “HTML, XHTML, and CSS” Bible, 5ed Wiley India
3. John Duckett, “Beginning HTML, XHTML, CSS, and JavaScript” Wiley India

Front End Development

Unit-I

Intro to HTML , All About HTML Tags , Making Ordered and Unordered Lists , Images, Attributes, and Links , Organizing HTML with Divs & HTML5 , Embedding Objects with iFrames , Head, Body, and Meta Tags , HTML Best Practice

Unit-II

Intro to CSS, Styling Text, Font Files & Web Fonts, Backgrounds, Colors, and Borders, Height, Width, and the Box Model, Differentiating Between Elements: Classes & Ids, Layouts & Floating.

Unit-III

Coding & Launching a Site, Setting Up Your HTML Structure, Checking Your Code, Styling Your Layout with CSS, All About Domains & Hosting, Customizing Your Website.

Unit-IV

Introduction to Web Publishing or Hosting: Creating the Web Site, Saving the site , Working on the web site , Creating web site structure , Creating Titles for web pages , Themes-Publishing web sites.

References:-

1. Ian Pouncey, Richard York “Beginning CSS: Cascading Style Sheets for Web Design” Wiley India
2. Kogent Learning ,”Web Technologies: HTML, Javascript” Wiley India

Mobile Technology Lab

Practicals will be according to course Mobile Technology