Prof. Ram Meghe Institute Of Technology And Research Badnera -444701

An Autonomus College Affiliated to Sant Gadge Baba Amravati University, Amravati, Maharashtra (India)

PROGRAMME SCHEME & SYLLABI

2023-2024

M. Tech.

(Information Technology)

Published By
Principal
Prof. Ram Meghe Institute Of Technology And Research, Badnera - Amravati.

Department Vision :

"Attaining growing needs of industry and society through Information Technology with ethical values".

Department Mission :

1. To become leading education center by inspiring the students to become competent IT Engineers
2. To make students more innovative and research-oriented, to improve their ability to provide appropriate support for industry and society
3. To train students to adapt the life-long learning with ethical values.

Program Educational Objectives :

1. To provide a sustainable foundation in mathematics, science and engineering to enable them to become competent IT Engineers
2. To deliver a comprehensive education in Information Technology and related engineering fields to ensure the core competency to be successful in Industry and in higher studies.
3. To analyze, design and create solutions in alignment with industry and emerging trends in multidisciplinary environments.
4. To communicate effectively as a part of team for self-learning, lifelong learning and career enhancement in industry and society.

Program Outcomes :

On completion of the course a graduate of Information Technology program will be able to :

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions for complex problems.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the the broadest context of technological change.

Program Specific Outcomes :

1. Apply core aspects of Information Technology, Networking, Internet of Things and Security to pursue successful career in IT industry.

2. Develop, analyze and find IT solutions through programming paradigm, Web Designing and Cloud Computing.

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati

(An Autonomous Institute)

Two Year Post Graduate Degree Program in Master of Technology

Choice Based Credit System (Semester Pattern)

Branch : Information Technology

SEMESTER: I																			
Sr. No.	Subject Code	Subject	Teaching Scheme					Examination Scheme											
			Hours/ Week			Total Hours/ Week	Credits	THEORY							PRACTICAL				
			Lecture	Tutorial	P/D			Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Internal		Total	Min. Passing Marks in ESE/	Overall Min Passing Marks	Max. Marks		Total	Min. Passing Marks
										Max. Marks MSE/ MSIE	Max. Marks TA				Int.	Ext.		
Theory																			
01	1SMTN01	Operating System Configuration	3	..	..	3	3	3	60	30	10	100	24	50				
02	1SMTN02	Database System Design	3	..	..	3	3	3	60	30	10	100	24	50				
03	1SMTN03	Net Centric Computing	3	..	..	3	3	3	60	30	10	100	24	50				
04	1SMTN04	Professional Elective I	3	..	..	3	3	3	60	30	10	100	24	50				
05	1SMTN05	Audit Course I	1			1	0				50	50		25				
Practicals																			
06	1SMTN06	Operating System Configuration Lab	..	..	2	2	1								25	25	50	25
07	1SMTN07	Database System Design Lab	..	..	2	2	1								25	25	50	25
08	1SMTN08	Net Centric Computing Lab	..	..	2	2	1								25	25	50	25
09	1SMTN09	Seminar I	..	2	..	2	2								50	0	50	25
			13	2	**6**	**21**	**17**					**450**					**200**	

Seminar I: It will be based on Recent Trends in Technolgy/ Research Methodology related to the program

PE 1 : Software Engineering Methodologies/Intelligent Systems/ Real Time Embedded System Design

Audit Course I : Pedagogy studies / Value Education

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati
(An Autonomous Institute)
Two Year Post Graduate Degree Program in Master of Technology
Choice Based Credit System (Semester Pattern)
Branch : Information Technology

SEMESTER: II																			
Sr. No.	Subject Code	Subject	Teaching Scheme					Examination Scheme											
			Hours/ Week			Total Hours/ Week	Credits	THEORY							PRACTICAL				
										Internal					Max. Marks				
			Lecture	Tutorial	P/D			Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA	Total	Min. Passing Marks in ESE/	Overall Min Passing Marks	Int.	Ext.	Total	Min. Passing Marks
Theory																			
01	2SMTN01	Integrative programming	3	..	..	3	3	3	60	30	10	100	24	50				
02	2SMTN02	Digital Medial Development	3	..	..	3	3	3	60	30	10	100	24	50				
03	2SMTN03	System Security	3	..	..	3	3	3	60	30	10	100	24	50				
04	2SMTN04	Professional Elective II	3	..	..	3	3	3	60	30	10	100	24	50				
05	2SMTN05	Audit Course II	1			1	0				50	50		25				
Practicals																			
06	2SMTN06	Integrative Programming Lab	..	..	2	2	1								25	25	50	25
07	2SMTN07	Digital Medial Development Lab	..	..	2	2	1								25	25	50	25
08	2SMTN08	System Security Lab	..	..	2	2	1								25	25	50	25
08	2SMTN09	Mini- Project	--	..	4	4	2								50	50	100	50
		Total	**13**		**10**	**23**	**17**					**450**					**250**	

Mini-Project: Project should be relevant to current trends in Information Technology and must include innovative element
PE 2 : Software Testing/Wireless Networks and Communication/ Information Technology Management
Audit Course II : Research Paper Writing / I P R

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati

(An Autonomous Institute)

Two Year Post Graduate Degree Program in Master of Technology

Choice Based Credit System (Semester Pattern)

Branch : Information Technology

SEMESTER: III																			
Sr. No.	Subject Code	Subject	Teaching Scheme					Examination Scheme											
			Hours/ Week			Total Hours/ Week	Credits	THEORY							PRACTICAL				
										Internal					Max. Marks				
			Lecture	Tutorial	P/D			Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA	Total	Min. Passing Marks in ESE/	Overall Min Passing Marks	Int.	Ext.	Total	Min. Passing Marks
Theory																			
01	3SMTN01	Professional Elective 3	4	..	..	4	4	3	60	30	10	100	24	50				
02	3SMTN02	Professional Elective 4	4	..	..	4	4	3	60	30	10	100	24	50				
Practicals																			
03	3SMTN03	Seminar II	..	2	..	2	2								50	0	50	25
04	3SMTN04	Seminar & Disserattion Phase I	..	8	..	8	4								100		100	50
		Total					**14**					**200**					**150**	

Seminar II: It will be based on Literature Survey of any Current topic in Information technology

Seminar III: It will be based on Reserch/ Dissertation Topic selected for the Major Project

PE 3 : Data Warhousing and Data Mining / Machine and Deep Learning

PE 4 : Cyber Security and Forensics / Mobile Adhaoc Networks

Prof. Ram Meghe Institute of Technology and Research, Badnera-Amravati

(An Autonomous Institute)

Two Year Post Graduate Degree Program in Master of Technology

Choice Based Credit System (Semester Pattern)

Branch : Information Technology

SEMESTER: IV																			
Sr. No.	Subject Code	Subject	Teaching Scheme					Examination Scheme											
			Hours/ Week			Total Hours/ Week	Credits	THEORY							PRACTICAL				
										Internal					Max. Marks				
			Lecture	Tutorial	P/D			Duration of paper (Hrs)	Max. Marks ESE/ ESSE	Max. Marks MSE/ MSIE	Max. Marks TA	Total	Min. Passing Marks in ESE/	Overall Min Passing Marks	Int.	Ext.	Total	Min. Passing Marks
Practicals																			
07	4SMTN01	Seminar & Dissertation Phase -II			20	20	10								100	200	300	150	
		Total					**10**										**300**		

Exit Option after complition of First Year.: Student has to complete 10 credit online courses (NPTEL/MOOCS/SWAYAM) suitable for Information Technology domain to qualify for the Post-Graduate Diploma in Information Technology

Summary of Marks & Credits					
Year	Semester	Sem Marks	Yearly Marks	Sem Credits	Yrly Credits
First Year	I	600	1300	17	34
	II	700		17	
Second Year	III	350	650	14	24
	IV	300		10	
Total		**1900**		**58**	

Vidarbha Youth Welfare Society's

PROF. RAM MEGHE INSTITUTE OF TECHNOLOGY AND RESEARCH, BADNERA-AMRAVATI

(An Autonomous Institute)

Two Year Post Graduate Degree Program in Master of Technology (M. Tech)

Branch: Information Technology

Semester Pattern

SEMESTER: FIRST

1SMTN01 OPERATING SYSTEM CONFIGURATION

Teaching Scheme : 03 L **Credit : 03**

Unit-I: Introduction to OS Internals. Overview of OS and Kernel, Linux and classic UNIX kernels. Kernel Source tree. Process management in Linux: Process descriptor and task structure, process creation, implementation of threads, process termination, process scheduling. (6 Hours)

Unit-II Process Scheduling in Linux: The Linux Scheduling Algorithm, Preemption and Context Switching, Real-Time, SchedulerRelated System Calls, System Calls: Handler, Implementation and Context. Interrupts and Interrupt Handlers. (6 Hours)

Unit-III Kernel Synchronization in Linux: Critical Regions and Race Conditions, Locking, Deadlocks, Contention and Scalability. Kernel Synchronization Methods: Spin Locks, Semaphores, Completion Variables. Preemption Disabling. (6 Hours)

Unit-IV: Time Management in Linux: Kernel Notion of Time, Hardware Clocks and Timers, The Timer Interrupt Handler, Delaying Execution. Memory Management in Linux: pages, zones, kmalloc, vmalloc, slab layer allocator, statically allocating on the stack, high memory mapping. Per-CPU Allocations. (6 Hours)

Unit-V: The Virtual File System in Linux: common file system interface, file abstraction layer, UNIX file system, VFS, dentry object, Super block object, file object, data structure associated with file systems and with a process. The Block I/O Layer and I/O Scheduler in Linux. (6 Hours)

Unit-VI: The Process Address Space, the Memory Descriptor, Memory Areas, Page Tables. The Page Cache and Page Write back: Page Cache, Radix Tree, Buffer Cache. Linux Kernel Modules: Building, installing, Loading and managing. Portability in Linux. (6 Hours)

Text book:

Robert Love, "Linux Kernel Development" Pearson Education, 2/e.

Reference Books:

i. Daniel Bovet, "Understanding the Linux Kernel" O'Reilly Publications 2/e.

ii. Rubini and J. Corbet . Linux Device Drivers. O'Reilly and Associates, 2001.

iii. D. Mosberger and S. Eranian. IA-64 Linux Kernel: Design & Implementation. Prentice Hall, 2002. iv. M. McKusick and G. Neville-Neil . The Design and Implementation of the FreeBSD Operating System. Addison-Wesley, 2004.

1SMTN02 DATABASE SYSTEM DESIGN

Teaching Scheme : 03 L **Credit : 03**

Unit I: Introduction to Database Processing, File Processing Systems, Definition of Database. The Entity-Relationship(E-R) Model: Element of the E-R Model, E-R Diagrams, Examples, Database as Models of Models. The Semantic Object Model: Semantic Objects, Creating Data Models with Semantic Objects, Types of Objects, Comparison of the Semantic Object and the E-R Model. (6 Hours)

Unit II: The Relational Model and Normalization: The Relational Model, normalization, First through Fifth Normal Forms, Domain Key Normal Forms, The Synthesis of Relations, Multi-Value Dependencies, Iteration, Optimization. (6 Hours)

Unit III: Database Design using Entity-Relationship Models: Transformation of Entity Relationship Models into Relational Database Designs, Example Design. Trees, Networks. Database Design with Semantic Object Models: Transformation of Semantic Objects into Relational Database Design, Sample Objects. (6 Hours)

Unit IV: Foundation of Relational Implementation: Defining Relational Data, Relational Data manipulation, Relational Algebra. SQL: Querying a Single Table, Querying Multiple Tables, Exist and Not Exists, Changing Data. Database Application Design: Creating, Reading, Updating and Deleting View Instances, Form Design, Report Design, Enforcing Constraints, Security and Control, Application Logic. (6 Hours)

Unit V: Managing Multi-User Databases: Database Administration, Concurrency Control, Database Security, and Database Recovery. Managing Database with Oracle: Creating an Oracle Database, Application Logic, Data Dictionary, Concurrency Control, Oracle Security, Oracle Backup and Recovery. (6 Hours)

Unit VI: Networks, Multi-Tier Architecture, and XML: Network Environments, Multi-Tier Architecture, Markup Languages HTML and DHTML, XML-Extensible Markup Language. ODBC, OLE DB, ADO and ASP: The Web Server Data Environment, Open Database Connectivity (ODBC) Standard, JDBC, Java Server Pages, MySQL. (6 Hours)

Text Book:

David M. Kroenke: Database Processing- Fundamentals, Design and Implementation, 8th Edition (PHI).

References:

1. C.J. Date: Database Processing, (Addison Wesley).
2. R. Ramakrishnan: Database Management Systems, (McGraw Hill).
3. Ramez Elmasri and Shamkant B. Navathe: Fundamentals of Database Systems, 2nd Edition.

1SMTN03 NET - CENTRIC COMPUTING

Teaching Scheme : 03 L **Credit : 03**

Unit I: Overview of Computer Communications and Networking, Types of Computer Networks, Network Addressing, Routing, Reliability, Interoperability, and Security, Network Standards, Network Applications and Application Protocols, Computer Communications and Networking Models, Communication Service Methods and Data Transmission Modes, Analog and Digital Communications, Speed and Capacity of a Communications Channel, Multiplexing and Switching, Network Architecture and the OSI Reference Model. (6 Hours)

Unit II: Physical Layer Concepts, Copper Media, Fiber-Optic Media, Wireless Communications, Satellite Communications, structured cabling Systems, Data Link Layer Concepts, LLC Sublayer, MAC Sublayer, Data Prioritization and Quality of Service. (6 Hours)

Unit III: Internetworking Concepts, The Network Layer and Routing Concepts, Routing Protocols, RIP, OSPF, Router and Switches, VPNs, Internet Administration, TCP/IP, TCP/IP Transport and Network Layer Protocols, IP Addresses, IPv6, TCP/IP Application-Level Protocol. (6 Hours)

Unit IV: Ethernet and 802.3 Networks, 10-MBPS Ethernet/802.3 LANS, Switched Ethernet, Full-Duplex Ethernet, and Virtual LANs, Fast Ethernet, Gigabit Ethernet, Token Ring, Frame Formats, Priority and Reservation, Monitor Stations, Second-Generation token Ring, Token Ring versus Token Bus. (6 Hours)

Unit V: Fiber Distributed Data Interface, Physical Layer Specifications, Frame Formats and Medium Access Specifications, Configuration and Design Issues, Integrated services Digital Network, Components, Channel types, BRI, PRI, ISDN Protocols, Frame Relay Circuits, Data link Layer Issues & Information. (6 Hours)

Unit VI: Switched Multimegabit Data Services, Technical Overview, SIP, SMDS Addressing, SMDS versus Other LAN-to-LAN Technologies, ATM, Concepts and Operation, ATM interface Standards, ATM Cells, Virtual Connections, And Addressing, AAL, ATM and Convergence Technology, ATM versus Other Technologies and Services, Dialup Networking, DSL Services. (6 Hours)

TEXT BOOK:

Michael A. Gallo, William M. Hancock : Computer Communications and Networking Technologies. Cengage Learning

REFERENCE BOOKS:

1) Stallings W., "High Speed Networks and Internets : Performance and Quality of Service", Prentice Hall, 2002.
2) Kershenbaum A., "Telecommunications Network Design Algorithms", Tata McGraw Hill.
3) Douglas E. Comer, "Computer Networks and Internet", Pearson Edu. Asia.
4) Andrew Tanenbaum, "Computer Network", PHI.

1SMTN04 Professional Elective-I

(i)SOFTWARE ENGINEERING METHODOLOGIES

Teaching Scheme : 03 L **Credit : 03**

Unit I: Software Process Models : Software Process Framework, Process Patterns, Personal and Team Process Models, Process Models: Waterfall Model, Incremental Models, Evolutionary Models, Iterative Development, The Unified Process, Agile process, Process Assessment, CMMI, Impact of Processes and Outcomes, Process Selection and applicability. (6 Hours)

Unit II: Requirements Engineering: Requirements Engineering Tasks, Requirement Elicitation Techniques, Software Requirements: Functional, Non-Functional, Domain, Requirements Characteristics and Characterization, Requirement qualities, Requirement Specification, Requirement Traceability, System Analysis Model Generation, Requirement Prioritization. (6 Hours)

Unit III: UML Concepts: Programming in Small Versus Programming in Large, UML 2.0 History/ New Features MDA/ MOF/ XMI/ CORBA, Introduction to UML Metamodel, Extensibility Mechanisms and its usage, Introduction to OCL, Specification techniques of diagrams in UML. (6 Hours)

Unit IV: Behavioral Model: Use Cases, Use Case Diagram Components, Use Case Diagram, Actor Generalization, Include and Extend, Template for Use Case Narrative, Using Use Cases Data Dictionary: Finding the Objects, Responsibilities, Collaborators, and Attributes, CRC Cards, Dynamic Behavior : Sequence diagrams, object lifelines and message types, Activity Diagrams : Decisions and Merges, Synchronization. (6 Hours)

Unit V: Design Engineering: Design quality, Design Concepts, The Design Model, Introduction to Pattern-Based Software Design, Architecture styles: Main program with sub program style, Abstract data type style, Repository, Layered. Architectural Design: Software Architecture, Data Design and Architectural Design. (6 Hours)

Unit VI: Object Oriented Design: Design of Objects, Design and Factoring, Design of Software Objects, Features and Methods, Cohesion of Objects, coupling between Objects, Coupling and Visibility, Inheritance, Establishing the Object Model, Refining classes and associations, Analysis model vs. design model classes, categorizing classes: entity, boundary and control, Modeling associations and collections, achieving reusability, Reuse through delegation, Identifying and using service packages. (6 Hours)

TEXT BOOKS:

1. Ian Sommerville, "Software Engineering", 7th Edition, AddisonWesley, 2004
2. Grady Booch, James Rambaugh, Ivar Jacobson, "Unified Modeling Language Users Guide", 2nd Edition, AddisonWesley,.

REFERENCE BOOKS:

1. Jim Arlow, Ila Neustadt, "UML 2 and Unified Process: Practical Object-Oriented Analysis and Design. ", 2nd Edition, Addison- Wesley,
2. Tom Pender, "UML Bible", John Wiley & Sons,.
3. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education,

---

1SMTN04 Professional Elective-I

(ii) INTELLIGENT SYSTEMS

Teaching Scheme : 03 L **Credit : 03**

Unit I: Artificial Intelligence: Intelligence, Artificial intelligence, intelligent systems. Knowledge representation: Reasoning, issue and acquisition: propositional calculus, predicate calculus, Rulebased knowledge representation, Truth Maintenance system. (6 Hours)

Unit II: Expert Systems: introduction, expert systems, stages in the development of expert system, expert system tools, difficulties in developing expert systems, applications of expert systems. (6 Hours)

Unit III: Fuzzy Systems: introduction, foundation of fuzzy systems, fuzzy relations, arithmetic operations of fuzzy numbers, linguistic descriptions and their analytical forms, defuzzification methods, fuzzy logic in control and decision-making applications. (6 Hours)

Unit IV: Artificial Neural Networks: introduction, Neuron physiology, artificial neurons, artificial neural networks, features of artificial neural networks, backpropagation training algorithms, functional link neural networks, cascasde correlation neural networks. (6 Hours)

Unit V: Genetic Algorithms and Evolutionary Programming: introduction, genetic algorithms, procedures of genetic algorithms, the working of genetic algorithms, evolutionary programming, genetic-algorithm-based machine learning classifier system. (6 Hours)

Unit VI: Swarm Intelligent Systems : introduction, importance of the ant colony paradigm, ant colony systems, development of the ant colony systems, application of ant colony intelligence, the

working of ant colony systems : Probabilistic Transition rule, Pheromone Updating ,Types of ant colony models. particle Swarm intelligent systems. (6 Hours)

TEXT BOOK :

N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford.

REFERENCE BOOKS :

1. Hakin, Simon 2003, "Neural Networks : A Comprehensive Foundation", PHI, New Delhi.
2. Kosko B. 1997, "Neural Networks and Fuzzy Systems", PHI, New Delhi.
3. Rajasekaran S. and G.A.Vijayalakshmi Pai, 2003, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, New Delhi.
4. Sriram, Ram D. 1977, "Intelligent Systems for Engineering - A Knowledge-Based Approach", Springer, London.

1SMTN04 Professional Elective-I

(iii)REAL TIME EMBEDDED SYSTEM DESIGN

Teaching Scheme : 03 L **Credit : 03**

UNIT I: Architecture of Embedded System, Hardware Architecture, Software Architecture, RTOS, Architecture of Kernel, Features/ Characteristics of RTOS, Task Scheduling, Signals, Events, Queues, Mail Boxes, Semaphores, Creation of Threads and Inter Thread Communication, Memory Management. (6 Hours)

UNIT II: Detailed study of PIC18 Family Microcontroller Architecture, Pin Description, File Structure, Status Register, PIC data formats, Directives, RISC Architecture in PIC, SFR, PIC18 Hardware Connections, PIC 18 Timers, PIC 18 Serial Port, PIC 18 Interrupts. Features of ATMEL, ARM, AVR Microcontrollers. (6 Hours)

UNIT III: PIC 18 Instruction set, Programming using C / Assembly: Data types, time delays, I/O Programming, Data Conversion, Timer/ Counter, Serial Port, Interrupt programming, ADC, DAC, Sensor Interfacing. (6 Hours)

UNIT IV: Clock-Driven Scheduling: Notation and Assumptions, Static, Timer Driven Scheduler, General structure of Cyclic Schedules, Cyclic Executives, Improving the Average Response Time of periodic Jobs, Scheduling Sporadic Jobs, Practical Consideration and Generalizations, Algorithms for Constructing Static Schedules, Pros and Cons of Clock-Driven Scheduling.

(6 Hours)

UNIT V: Priority-Driven Scheduling of Periodic Tasks: Static Assumption, Fixed-Priority versus Dynamic-Priority Algorithms, Maximum Schedulable Utilization, Optimality of the RM and DM Algorithms, A Schedulability Test for Fixed-Priority Tasks with Short Response Times,

Schedulability Test for Fixed-Priority Tasks with Arbitrary Response Times, Sufficient Schedulability Conditions for the RM and DM Algorithms. (6 Hours)

UNIT VI: Scheduling Aperiodic and Sporadic Jobs in Priority-Driven Systems: Assumption and Approaches, Deferrable Servers, Sporadic Servers, Constant Utilization, Total Bandwidth, and Weighted Fair Queuing Servers, Scheduling of Sporadic Jobs, Real-time Performance for Jobs with Soft Timing Constraints. (6 Hours)

TEXT BOOKS:

1. Dr. K.V. K. K. Prasad "Embedded / Real Time System : Concepts, Design, & Programming -Black Book" Dreamtech Press Publication
2. Mohammad Ali Mazidi, Rolin D. Mckinly,Danny Causey: PIC Microcontroller and Embedded system using Assembly and C for PIC18, Pearson Education
3. Jane W.S. Liu : Real Time System, Pearson Education

REFERENCE BOOKS:

1. Raj Kamal, "Embedded Systems Architecture, Programming and Design", Tata McGraw-Hill
2. John B. Beatman, Design with PIC Microntroller, Prentice Hall
3. Barry B. Brey, Appling PIC18 Microntroller, Architecture, Programming and Interfacing using C and Assembly, Prentice Hall.
4. Phillip A. Laplante: Real-Time Systems Design and Analysis, (Wiley InterScience)

1SMTN05 AUDIT COURSE- I

Teaching Scheme : 02 (L) **Credit : 00**

(i) Pedagogy Studies

(ii) Value Education

Please note : One of these audit course is to be studied in self study mode by registering relevant courses on NPTEL / Swayam.

Practical / Laboratory Courses and Seminar

1SMTN06 OPERATING SYSTEM CONFIGURATION LAB

Teaching Scheme : 02 P **Credit : 01**

Laboratory Experiments based on 1NMT01 Operating System Configuration

1SMTN07 DATABASE SYSTEM DESIGN LAB

Teaching Scheme : 02 P **Credit : 01**

Laboratory Experiments based on 1NMT02 Database System Design

1SMTN08 NET CENTRIC COMPUTING LAB

Teaching Scheme : 02 P **Credit : 01**

Laboratory Experiments based on 1NMT02 Net Centric Computing

1SMTN09 SEMINAR 1

Teaching Scheme : 02 P **Credit : 02**

Seminar - 1: It will be based on Recent Trends in Technology / Research Methodology related to the program.

SEMESTER: SECOND

2SMTN01 INTEGRATIVE PROGRAMMING

Teaching Scheme : 03 L **Credit : 03**

Unit I: Object Oriented Programming: Methodology, features, design patterns and frameworks, Java classes and objects: constructors, finalizers, garbage collector, cloning objects, nested classes and interfaces, inner classes, Java I/O: Byte-oriented streams, File I/ O, Character streams, Object serialization. (6 Hours)

Unit II: Multithreaded Programming: Threads and life cycle of a thread, Creating and running the threads. Thread class and Runnable interface. Service threads, JVM and task scheduling, thread synchronization, synchronizing methods of inner classes. Thread communication, Grouping the threads. (6 Hours)

Unit III: Databases Programming: Model-View-Persistence design pattern, Mapping between Java objects and Data elements, JDBC and drives for RDBMS, SQL to Java type mapping, Java and Javax SQL APIs and their uses in database programming, Transaction coding, Connection pooling. (6 Hours)

Unit IV: XML: Introduction, XML structure, XML DTD creation and Schema creation, well-formed and valid XML documents, XML parsers like SAX & DOM, Parsing XML documents with DOM, JDOM and SAX parsers, XML transformation using XSLT and X Path. (6 Hours)

Unit V: Network Programming: Java approach for URLs, Sockets – TCP/ IP and Datagram sockets, Programming using sockets, Remote method invocation (RMI): server and client development for RMI, RMI registry, JNDI service and its packages, Security: Cryptography, Secure Socket Layer, Security policy definition, Java AAS. (6 Hours)

Unit VI: Web application development: Technology of the web, Servlet and Servlet API, building web application. Java Server Pages, JSP tags and API, JSP processing, Java coding in JSP, Web application frameworks. Robust web application development. (6 Hours)

TEXT BOOK:

Wigglesworth J & McMillan P: Java Programming: Advanced Topics, 3/e, Thomson Course Technology.

REFERENCE BOOKS :

1. Schildt H and Naughton P : Java : The Complete Reference, Osborne, McGraw Hill
2. Dustin R Callaway : Inside Servlet, Pearson Education, LPE
3. Larne Pekowasky : Java Server Pages, Pearson Education, LPE
4. Dietel & Dietel : WWW : How to Program, Pearson Education, LPE.

2SMTN02 DIGITAL MEDIA DEVELOPMENT

Teaching Scheme : 03 L **Credit : 03**

Unit I: Introduction to Multimedia Systems design, Elements, Systems architecture & technologies, Objects for multimedia systems, Multimedia data interface standards, Multimedia Databases, Data Compression need, lossy and lossless compression, binary image compression Schemes, colour, grey and still video image compression, Full motion video compression, audio compression. (6 Hours)

Unit II: Data and file format standards RTF, TIFF,RIFF, MIDI , JPEG ,AVI, MPEG Standards, video and image display systems, image scanners , Digital voice and audio, Digital camera, video images and animation, Full motion video. (6 Hours)

Unit III: Telecommunications considerations for Multimedia, Specialised processors , ISDN, LAN and WAN for Enterprise Multimedia Applications, Distributed Object Model, Multimedia communication protocols (UDP , RTP , RTCP , TELNET) Multimedia Applications and Design issues, Virtual Reality Design, Components of Multimedia Systems,, Application Workflow & Distributed Application Design Issues. (6 Hours)

Unit IV Multimedia Authoring and User Interface, Design Considerations, Hypermedia Applications, Information Access, Object display, Hypermedia Messaging, Integrated document management. (6 Hours)

Unit V Distributed Multimedia Systems, Components, Client-server Operation, Object Server, Network Performance Issues, Distributed Multimedia databases, Managing distributed Objects. (6 Hours)

Unit VI System Design: Design issues, requirements, feasibility, Performance Analysis, Design for performance, Multimedia Systems Design, Extensibility and example. (6 Hours)

TEXT BOOK

1. Prabhat K Andleigh and Kiran Thakrar “Multimedia Systems Design” (PHI Publications).

REFERENCE BOOKS

1. Fred Halsall,” Multimedia Communications by (Pearson Publications).
2. Ze-Nian Li, Mark S.Drew,”Fundamentals of Multimedia” (Pearson Publications).
3. John K.Koegel Buford, “Multimedia Systems” (Pearson Education)

2SMTN03 SYSTEM SECURITY

Teaching Scheme : 03 L **Credit : 03**

UNIT- I Introduction: Security, Attacks, Computer criminals, Method of Defence Cryptography: Substitution ciphers, Transpositions , Symmetric and asymmetric systems , cryptanalysis ,data encryption standard (DES) AES Encryption algorithms Public Key Cryptography, RSA Algorithms , Uses of Encryptions. (6 Hours)

UNIT- II Program Security: Secure programs, non-malicious program errors, Computer Viruses and Other malicious code, Targeted malicious code, controls against program threats. (6 Hours)

UNIT- III Operating System Security: Protected Objects and methods of protection, Memory address protection, Control of access to general objects, File protection Mechanism, User Authentication: Authentication basics, Password, Biometrics. (6 Hours)

UNIT- IV Trusted Operating System, Security Policies, models of Security, Trusted Operating System, Design, Design elements, security features of ordinary and Trusted Operating System, Kernalised design, separation, virtualizations, Layered design, typical OS Flows assurance method , Open Source Evolutions. (6 Hours)

UNIT- V Database Security: Security requirements for Database, Reliability and integrity, sensitive data, interface, multilevel database, Proposals for multilevel security: separations, design of Multilevel secure databases, Trusted Front-end Practical issues. (6 Hours)

UNIT- VI Networks Security: Threats in networks, Network security controls, Firewalls Intrusion detection systems, Secure E-mail. Administrating Security: Planning, Risk Analysis, Organization security policies, Physical security. (6 Hours)

TEXT BOOK:

C.P. Pfleeger and S.L.Pfleeger, “Security in Computing”, Pearson Education (LPE)

REFERENCE BOOKS:

1. Stallings, “Cryptography and Network Security:” Pearson Education (LPE)
2. Matt Bishop, “Computer Security: Art and Science”, Pearson Education
3. Kaufman, Perlman, Speciner, “Network Security” PHI.
4. Eric Malwald, “Network Security: A Beginner’s Guide”, TMH

2SMTN04 Professional Elective-2

(i) SOFTWARE TESTING

Teaching Scheme : 03 L **Credit : 03**

Unit I : Introduction of testing : Goals for testing, phases in a tester's mental life, test design, testing versus debugging, designer versus tester, model for testing : project overview, environment, the program, bugs test, testing & levels, the role of models. (6 Hours)

Unit II: Software testing process: verification & validation, testing team & development team, characteristics of test engineers, level of testing, testing approaches, test plan, manual testing & its limitations / drawbacks. (6 Hours)

Unit III: Flow graphs and path testing: path testing basics, predicates, path predicates and achievable paths, path sensitizing, implementation and application of path testing, transaction flow testing techniques. (6 Hours)

Unit IV: Testing of object-oriented systems: peimer on object-oriented software, differences in OO testing, software test automation: what to automate, steps of automation, design and architecture for automation, process model for automation, selecting a test tool. (6 Hours)

Unit V: Software testing tools overview: WinRunner, testing and application using WinRunner, test script language, data driven testing, silk test, load runner, test director. (6 Hours)

Unit VI: Source code testing utilities in UNIX/LINUX environment: GNU tools, timing of programs, profiler, code optimization, productivity tools, portability testing tool, testing application using QTP. (6 Hours)

TEXT BOOKS :

1) Boris Beizer : Software Testing Techniques, Dreamtech Press, 2nd edition.
2) Srinivasan Desikan, Gopalaswamy Ramesh : Software Testing Principle and Practices, Pearson Education.
3) Dr. K.V.K.K. Prasad : Software Testing Tools, Dreamtech Press, 2006 edition

2SMTN04 Professional Elective-2

(ii) WIRELESS NETWORKS AND COMMUNICATION

Teaching Scheme : 03 L **Credit : 03**

Unit I: Introduction to Wireless Telecommunication Systems and Networks, evolution of modern telecommunications infrastructure, OSI model, FDMA, TDMA, CDMA, Future Wireless Networks, Future Wireless Networks, 1 G to 4 G cellular systems, Wireless Standards Organizations. (6 Hours)

Unit II: Cellular network hardware components, cellular network databases; SS7 signaling, cellular cluster, backhaul networks, mobility management, concepts of power management and network security, GSM network and System architecture, DECT architecture. (6 Hours)

Unit III: CDPD, GPRS and EDGE data networks, network layout, packet data transfer, GPRS protocol reference model, data rates, evolution of GSM and NA-TDMA to 3 G. (6 Hours)

Unit IV: Wireless modulation techniques and hardware: spread spectrum modulation, ultra-wideband radio technology, BSC and RBS hardware, digital modulation techniques : OFDM, subscriber devices. (6 Hours)

Unit V: Wireless LANs / IEEE 802.1x: evolution, architecture, Wi-Fi system, WLAN FHSS and DSSS physical layer, wireless LAN hardware and system deployment strategies. (6 Hours)

Unit VI: PANs and WLANs, IEEE 802.15.1 standard, Bluetooth protocol stack, Bluetooth link controller, Broadband wireless MANs/ IEEE 802.16x, IEEE 802.16 physical layer, WiMax System, Broadband satellite applications, emerging wireless technologies, wireless sensor networks. (6 Hours)

TEXT BOOK :

1. Gary Mullett, Wireless Telecommunications Systems and Networks, Thomson Delmar Learning, 2006.

REFERENCE BOOKS :

1. Jochen Schiller, Mobile Communications.
2. William Stallings, Wireless Communications and Networks.
3. T.S.Rappaport, Wireless Communications.

2SMTN04 Professional Elective-2

(iii) INFORMATION TECHNLOGY MANAGEMENT

Teaching Scheme : 03 L **Credit : 03**

Unit-I IT and Strategy: Information revolution, Business and strategy. IT Strategy, Strategy and Success, Design Parameters, Strategic positioning, Evolution of strategy sequences and getting the right, development of a strategy, types of strategy, context and strategy. (6 Hours)

Unit-II Managing IT: IT management and its roles, It governance, It governance and strategy, Technology management process, Technology selection, Strategic aspects of technology. IT and business alignment, Risk Management, Exploiting IT Capabilities, Deploying IT in strategic manner, Strategic planning for information technology and frameworks, Measuring IT, Performance Measures: Balanced Score Card. (6 Hours)

Unit-III E- strategy: What is e- strategy. E-business and E-strategy, E-business objectives, E-Commerce and E-Business, Making E strategy work, E-strategy and the E-economy. IT strategies for IT companies: Project Vs Product Companies, Strategies aspects for an IT product company,

IT Strategic perspective for product company, IT Strategies for Product company information Technology Strategy development, Product life cycle and project life cycles. (6 Hours)

Unit-IV IT strategies for Knowledge Management Knowledge Management, Knowledge Management and IT strategies, role of Knowledge Management in IT strategies for IT companies, knowledge industry and knowledge strategy knowledge workers, IT strategic services, product and consulting. IT strategies for non –IT companies: Role of IT in non –IT companies, IT Investment decision, measurement of IT, IT strategies for non-IT companies, IT supply chain management and constraint management, IT enabled supply chain management. (6 Hours)

Unit-V IT Strategies in specific scenario, Enterprise resource planning implementation, mapping IT strategies initiatives to ERP, supply chain contribution and business strategy, IT strategies for business process outsourcing, IT strategy implementation: IT strategy implementation, Development and need of it strategic plan, IT strategy implementation to gain competitive advantage, IT strategy and leadership, IT strategy and differentiation, Execution and IT strategy. (6 Hours)

Unit-VI Global dimension of It Strategy: IT strategies in global environment, Global product cycle, Making It global scenario, globalization and competitive strategy, global project management, Mergers and acquisitions, IT compatibility in M&A. (6 Hours)

TEXT BOOK:

Parag Kulkarni, Pradip K Chande “IT Strategy for Business”, OXFORD University Press.

REFERENCE BOOKS :

1. Earl. M, “Management Strategies for Information Technology”, Prentice Hall.
2. Gottschalk , P “ Strategic Knowledge Managements Technology “ IGP USA
3. Hill , C and G Jones “ Strategic management “ Houghton Miffen USA
4. Honeycutt J “ Knowledge management Strategies” , Microsoft Press USA.

2SMTN05 AUDIT COURSE - II

Teaching Scheme : 02 L **Credit : 0**

(i) RESEARCH PAPER WRITING

(ii) I P R

Please note : One of these audit course is to be studied in self study mode by registering relevant courses on NPTEL / Swayam platform.

Practical / Laboratory Courses and Mini Project

2SMTN06 INTEGRATIVE PROGRAMMING LAB

Teaching Scheme : 02 P **Credit : 01**

Laboratory Experiments based on 2NMT01 Integrative Programming

2SMTN07 DIGITAL MEDIAL DEVELOPMENT LAB

Teaching Scheme : 02 P **Credit : 01**

Laboratory Experiments based on 2NMT02 Digital Medial Development

2SMTN08 SYSTEM SECURITY LAB

Teaching Scheme : 02 P **Credit : 01**

Laboratory Experiments based on 2NMT03 System Security

2SMTN09 MINI PROJECT

Teaching Scheme : 04 P **Credit : 02**

Mini-Project: Project should be relevant to current technology and must include innovative element in it.

SEMESTER: THIRD

3SMTN01 Professional Elective 3

(i) DATA WARE HOUSING & DATA MINING

Teaching Scheme : 04 L **Credit : 04**

Unit I: Need for Data Warehousing: Operational Vs. Decisional support system, data warehouse defined, data warehouse users, benefits of data warehousing: tangible benefits, intangible benefits. Features of a data warehouse. Subject oriented data. Integrated data, data cleansing, data transformation, non-volatile data, time varient data, data granularity, benefits of data granularity, data granularity - pros and cons, dual levels of data granularity, the information flow mechanism. (08 Hours)

Unit II: Metadata. Role of metadata, classification of metadata, metadata management. Direct access mode, indirect access mode. Data warehouse architecture, the two-tier architecture, three tier architecture, four tier architecture, data warehouse and data marts, reasons for creating data marts, pushing and pulling data, data warehouse schema, the star schema, the snowflake schema, characteristics of a dimension table, characteristics of a fact table. (08 Hours)

Unit III: Keys in the data warehouse schema: primary keys, surrogate keys, foreign keys. Data clustering, OLAP in the data warehouse, OLAP functions, multi-dimensional analysis, OLAP and multidimensional analysis, OLAP design considerations, OLAP models, data warehouse design stage, security issues in a data warehouse. (08 Hours)

Unit IV: Introduction: fundamentals of data mining, data mining functionalities, classification of data mining systems, major issues in data mining, mining frequent patterns, associations and correlations, classification and prediction, cluster analysis, outlier analysis, evolution analysis.

Unit V: Market basket analysis, frequent itemsets, closed itemsets and association rules, frequent pattern mapping, the Apriori Algorithm, generating association rules from frequent itemsets, mining multilevel association rules, mining multidimensional association rules, constrained based association rules. (08 Hours)

Unit VI: Classification and prediction: preparing data for classification and prediction, comparing classification and prediction methods, decision tree induction, Baye's theorem, rule-based classification using IF-THEN rules, classification by backpropagation, rule extraction from decision tree. (08 Hours)

TEXT BOOKS :

1) Reema Thareja : Data Warehousing, Oxford Unviersity Press.
2) Paulraj Ponniah : Data Warehousing Fundamentals, John Wiley. 3) Vikram Pudi and P. Radha Krishna, Oxford University Press.

REFERENCE BOOKS :

1) M.H.Dunham : Data Mining Introductory and Advanced Topics, Pearson Education, 2.
2) Han, Kamber : Data Mining Concepts and Techniques, Morgan Kaufmann, Pieter Adriaans, Dolf Zantinge.

3SMTN01 Professional Elective 3

(ii) MACHINE AND DEEP LEARNING

Teaching Scheme : 04 L **Credit : 04**

UNIT I: Introduction to Machine Learning: Introduction: What Is Machine Learning? Examples of Machine Learning Applications Supervised Learning: Learning a Class from Examples, Vapnik-Chervonenkis (VC) Dimension, Probably Approximately Correct (PAC) Learning, Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm. Bayesian Decision Theory: Classification, Losses and Risks, Discriminant Functions, Utility Theory, Association Rules. (08 Hours)

UNIT II: Parametric Methods AND Non-Parametric Methods: Parametric Methods: Introduction Maximum Likelihood Estimation, evaluating an Estimator: Bias and Variance, The Bayes' Estimator, Parametric Classification, Regression, Tuning Model Complexity: Bias/Variance Dilemma, Model Selection Procedures, Over fitting and Under fitting. Index /Multivariate Methods: Multivariate Data, Multivariate Normal Distribution, Multivariate Classification, Discrete Features, Multivariate Regression Nonparametric Methods: Introduction, Nonparametric Density Estimation, Generalization to Multivariate Data, Nonparametric Classification. (08 Hours)

UNIT III: Dimensionality Reduction and Clustering: Dimensionality Reduction: Introduction, Subset Selection, Principal Components Analysis, Factor Analysis, Multidimensional Scaling, Linear Discriminant Analysis, Isomap. Clustering: Introduction, Mixture Densities, k-Means Clustering, Expectation-Maximization Algorithm, Mixtures of Latent Variable Models, Supervised Learning after Clustering, Hierarchical Clustering, Choosing the number of clusters. (08 Hours)

UNIT IV: Kernel Machines: Introduction, Optimal Separating Hyperplane, The Non-Separable Case: Soft Margin Hyperplane, ν-SVM, Kernel Trick, Vectorial Kernels, Defining Kernels, Multiple Kernel Learning, Multiclass Kernel Machines, Kernel Machines for Regression, One-Class Kernel Machines, Kernel Dimensionality Reduction. (08 Hours)

UNIT V: Fundamentals of Deep Learning: The Neural Network: Building Intelligent Machines, The Limits of Traditional Computer Programs, The Mechanics of Machine Learning, The Neuron, Expressing Linear Perceptron as Neurons, Feed-forward Neural Networks, Linear Neurons and their Limitations, Sigmoid Tanh and ReLU Networks, Softmax Output Layers. Training Feed-Forward Neural Networks: The Cafeteria Problem, Gradient Descent, The Delta Rule and

Learning Rates, Gradient Descent with Sigmoidal Neurons, The Back propagation Algorithm, Test Sets, Validation Sets, and Over fitting, Preventing Over fitting in Deep Neural Networks.

(08 Hours)

UNIT VI: Convolution Neural Networks: Convolutional Neural Networks: Neurons in Human Vision, The Shortcomings of Feature Selection, Vanilla Deep Neural Networks, Filters and Feature Maps, Full Description of the Convolutional Layer, Max Pooling, Full Architectural Description of Convolution Networks, Closing the Loop on MNIST with Convolutional Networks, Image Preprocessing Pipelines Enable More Robust Models. (08 Hours)

TEXT BOOKS :

1. Ethem Alpaydın, Introduction to Machine Learning, PHI, Third Edition, ISBN No. 978-81-203-5078-6.

2. Nikhil Buduma, Fundamentals of Deep Learning, O'Reilly, First Edition, ISBN No. 978-14-919- 2561-4.

REFERENCE BOOKS:

1. Shai shalev-Shwartz and Shai Ben-David, Understanding Machine Learning(From Theory to Algorithms), Cambridge University Press, First Edition, ISBN No. 978-1-107-51282-5.

2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Mcgraw-Hill, ISBN No. 0-07-115467-1.

3. Tom Mitchell, Machine Learning, Mcgraw-Hill, First Edition, ISBN No. 0-07-115467-1. 4. Ian Goodfellow and Yoshua Bengio, Deep Learning (Adaptive Computation and machine Learning Series), Massachusetts London, England, ISBN No. 9780262035613.

3SMTN02 Professional Elective 4

(i) CYBER SECURITY AND FORENSICS

Teaching Scheme : 04 L **Credit : 04**

UNIT I: Security Fundamentals and Data Encryption Techniques: Introduction to Cyber Security - The dawn of Computer Security, Attacks and Attackers, Introduction to security; Information Security; Security triad: Confidential, Integrity, Availability; Focus of control; Security threats and attacks; Security management, Risk and Threat Analysis. Foundations of Computer Security - The Fundamental Dilemma of Computer Security, Data vs Information, Principles of Computer Security. Identification and Authentication - Username and Password, Bootstrapping Password Protection, Guessing Passwords, Phishing, Spoofing, and Social Engineering, Protecting the Password File, Single Sign-on. Access Control - Authentication and Authorization, Access Control Structures, Ownership, Intermediate Controls, Policy Instantiation, Comparing Security Attributes.

(08 Hours)

UNIT II: Modelling Techniques: Reference Monitors - Operating System Integrity, Hardware Security Features, Protecting Memory, Security Levels and Categories, Lattice Diagram, Security Kernel. Bell–LaPadula Model - State Machine Models, The Bell–LaPadula Model, The Multics Interpretation of BLP. Security Models - The Biba Model, Chinese Wall Model, The Clark–Wilson Model, The Harrison–Ruzzo–Ullman Model, Information-Flow Models, Execution Monitors. (08 Hours)

UNIT III: Cryptography and Security: Cryptography - Modular Arithmetic, Integrity Check Functions, Digital Signatures, Encryption, Strength of Mechanisms, Performance. Key Establishment - Key Establishment and Authentication, Key Establishment Protocols, Kerberos, Public-Key Infrastructures, Trusted Computing – Attestation. Communications Security - Protocol Design Principles, IP Security, IPsec and Network Address Translation, SSL/TLS, Extensible Authentication Protocol. Network Security - Domain Name System (DNS), DNS cache poisoning, Network defense tools: Firewalls, VPNs, Intrusion Detection, and filters, A Security Evaluation of DNSSEC with NSEC3, Distributed Firewalls. Web Security - Authenticated Sessions, Code Origin Policies, Cross-Site Scripting, CrossSite Request Forgery, JavaScript Hijacking, Web Services Security. (08 Hours)

UNIT IV: Forensics Analysis: Forensic Analysis Fundamentals, Applying the Scientific Method to Digital Forensics, Uses of Digital Forensic Analysis, Data Gathering and Observation, Hypothesis Formation, Evaluating Hypotheses, Conclusions and Reporting. Cyber stalking, Violent Crime and Digital Evidence, Digital Evidence as Alibi. (08 Hours)

UNIT V: Electronic Data Discover and Intrusion Investigation: Introduction to Electronic Discovery, Identification of Electronic Data, Forensic Preservation of Data, Data Processing, Production of Electronic Data. Intrusion investigation - Introduction, Methodologies, Preparation, Case Management and Reporting, Common Initial Observations, Scope Assessment, Collection, Analyzing Digital Evidence, Feeding Analysis Back into the Detection Phase. (08 Hours)

UNIT VI: Digital Forensics: Windows Forensic Analysis – NTFS Overview, Forensic Analysis of the NTFS Master File Table (MFT), Metadata, Artifacts of User Activities, Deletion and Destruction of Data, Windows Internet and Communications Activities, Windows Process Memory, BitLocker and Encrypting File System (EFS). UNIX Forensic Analysis – Boot Process, Forensic Duplication Consideration, File Systems, User Accounts, Artifacts of User Activities. Network Investigations - Overview of Protocols, Evidence Preservation on Networks, Collecting and Interpreting Network Device Configuration, Forensic Examination of Network Traffic. Mobile Network Investigations - Mobile Network Technology, Investigations of Mobile Systems, Types of Evidence, Where to Seek Data for Investigations, Interception of Digital Evidence on Mobile Networks. (08 Hours)

TEXT BOOKS:

1. Dieter Gollmann, “Computer Security”, 3rd edition, Wiley Publication.

2. Egohan Casey, “Handbook of Digital Forensics and Investigation”, ELSEVIER-Academic Press, 2010. ISBN 13: 978-0-12-374267-4

REFERENCE BOOKS:

1. Ross J. Anderson, “Security Engineering: A Guide to Building Dependable Distributed Systems”, Wiley Publication.

2. Nina Godbole, Sunit Belapure, “Cyber Security”, Wiley Publication. 3. Bill Nelson, Amelia Phillips, Christopher Steuart, Cengage Learning, “Guide to Computer Forensics & Investigation”, Fourth Edition, ISBN 13 : 978-1-43-549883-9.

3SMTN02 Professional Elective 4

(ii) MOBILE ADHOC NETWORKS

Teaching Scheme : 04 L **Credit : 04**

UNIT I: Introduction of Ad Hoc Network: Introduction-Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum - Radio Propagation Mechanisms - Characteristics of the Wireless Channel - IEEE 802.11a,b Standard – Origin Of Ad hoc: Packet Radio Networks - Technical Challenges - Architecture of PRNETs - Components of Packet Radios – 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. (08 Hours)

UNIT II: Ad Hoc Routing Protocols: Introduction - Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks - Classifications of Routing Protocols -Table-Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV) - Wireless Routing Protocol (WRP) - Cluster Switch Gateway Routing (CSGR) - Source-Initiated OnDemand Approaches - Ad Hoc On-Demand Distance Vector Routing (AODV) - Dynamic Source Routing (DSR) - Temporally Ordered Routing Algorithm (TORA) - Signal Stability Routing (SSR) - Location-Aided Routing (LAR) - Power-Aware Routing (PAR) - Zone Routing Protocol (ZRP). (08 Hours)

UNIT III: Multicast Routing In Ad Hoc Networks: Introduction - Issues in Designing a Multicast Routing Protocol - Operation of Multicast Routing Protocols - An Architecture Reference Model for Multicast Routing Protocols - Classifications of Multicast Routing Protocols - Tree-Based Multicast Routing Protocols- Mesh-Based Multicast Routing Protocols - Summary of Tree-and Mesh-Based Protocols - Energy-Efficient Multicasting - Multicasting with Quality of Service

Guarantees - Application-Dependent Multicast Routing - Comparisons of Multicast Routing Protocols. (08 Hours)

UNIT IV: Transport Layer: Introduction - Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks - Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks - Classification of Transport Layer Solutions - TCP over Ad Hoc Wireless Networks - Other Transport Layer Protocols for Ad Hoc. (08 Hours)

UNIT V: Security Protocols: Wireless Networks - Security in Ad Hoc Wireless Networks - Network Security Requirements - Issues and Challenges in Security Provisioning - Network Security Attacks - Key Management - Secure Routing in Ad Hoc Wireless Networks. (08 Hours)

UNIT VI: QoS and Energy Management: Introduction - 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 - Classification of Energy Management Schemes - Battery Management Schemes - Transmission Power Management Schemes - System Power Management Schemes. (08 Hours)

TEXT BOOKS:

1. Siva Ram Murthy C. and B.S. Manoj "Ad Hoc Wireless Networks: Architectures and Protocols", Prentice Hall PTR,2004

2. Toh C.K., Ad Hoc Mobile Wireless Networks: Protocols and Systems, Prentice Hall PTR ,2001

REFERENCE BOOKS:

1. Charles E. Perkins, Ad Hoc Networking, Addison Wesley, 2000

2. Holger Karl, Andreas Willig, Protocols and Architectures for Wireless Sensor Networks ISBN: 978-0-470-09510-2, Wiley.

3. Kazem Sohraby, Daniel Minoli, Taieb Znati Wireless Sensor Networks: Technology, Protocols, and Applications, Wiley.

3SMTN03 SEMINAR 2

Teaching Scheme : 02 T **Credit : 02**

It will be based on Literature Survey of any Current technology.

3SMTN04 SEMINAR 3

Teaching Scheme : 02 T **Credit : 02**

It will be based on Research/ Dissertation Topic selected for the Major Project.

SEMESTER: FOURTH

4SMTN01: MAJOR PROJECT:DISSERTATION AND VIVA VOCE

Teaching Scheme : 10 P **Credit : 12**

Dissertation, Presentation and Viva Voce based on the Major Project as per given in the scheme.