M.Tech. CSE (E. Security) (1ST SEMESTER)
TOTAL CONTACT HRS. = 24, TOTAL CREDITS = 22

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCSE4-101	Advanced Data Structures and Algorithm	**3**	**1**	**0**	**40**	**60**	**100**	**4**
MREM0-101	Research Methodology	**4**	**0**	**0**	**40**	**60**	**100**	**4**
MCSE4-103	Soft Computing	**3**	**1**	**0**	**40**	**60**	**100**	**4**
Departmental Elective-I (Choose any one)		**3**	**1**	**0**	**40**	**60**	**100**	**4**
MCSE4-156	Agile Software Development							
MCSE4-157	Information Security							
MCSE4-158	Emerging Technologies							
MCSE4-159	Cyber Laws							
Departmental Elective-II (Choose any one)		**3**	**1**	**0**	**40**	**60**	**100**	**4**
MCSE4-160	Advanced Computer Networks							
MCSE4-161	Wireless and Mobile Networking							
MCSE4-162	Advanced Operating Systems							
MCSE4-163	Digital Defense							
MCSE4-104	**Practical Lab-I**	**0**	**0**	**4**	**60**	**40**	**100**	**2**
Total 5 Theory & 1 Lab. Courses		**16**	**4**	**04**	**260**	**340**	**600**	**22**

M.Tech. CSE (E. Security) (2nd SEMESTER)
TOTAL CONTACT HRS. = 24, TOTAL CREDITS = 22

Course		Contact Hrs.			Marks			Credits
Code	**Name**	**L**	**T**	**P**	**Int.**	**Ext.**	**Total**	
MCSE4-205	Ethical Hacking	**3**	**1**	**0**	**40**	**60**	**100**	**4**
MCSE4-206	Cryptography & Network Security	**3**	**1**	**0**	**40**	**60**	**100**	**4**
Departmental Elective-III (Choose any one)		**3**	**1**	**0**	**40**	**60**	**100**	**4**
MCSE4-264	Information Retrieval							
MCSE4-265	Computer and Cyber Forensics							
MCSE4-266	Biometric Security							
MCSE4-267	Advanced Databases							
Departmental Elective-IV (Choose any one)		**3**	**1**	**0**	**40**	**60**	**100**	**4**
MCSE4-268	Python Programming							
MCSE4-269	Information Security risk Management							
MCSE4-270	Security Engineering							
MCSE4-271	Open Source Technology							
Open Elective-I		**3**	**1**	**0**	**40**	**60**	**100**	**4**
MCSE4-207	**Practical Lab-II**	**0**	**0**	**4**	**60**	**40**	**100**	**2**
Total 5 Theory & 1 Lab. Courses		**15**	**5**	**04**	**260**	**340**	**600**	**22**

Total Marks = 600 + 600 = 1200
Total Credits = 22 + 22= 44

OPEN ELECTIVES OFFERED TO M.Tech CSE (E-Security) MRSPTU, BATHINDA		
S.No.	**Course Code**	**Course**
OPEN ELECTIVE-I		
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OPEN ELECTIVE-II		
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OPEN ELECTIVES OFFERED BY M.Tech. CSE (E-Security) MRSPTU, BATHINDA		
S.No.	**Course Code**	**Course**
OPEN ELECTIVE-I		
91	MCSE0-F91	Soft Computing
92	MCSE0-F92	BigData Analytics Concepts

F means that this Course can be opted by students of different semesters

ADVANCED DATA STRUCTURES AND ALGORITHMS

Subject Code:	L T P C	Duration – 45 hrs
MCSE1-101, MCSE2-101, MCSE3-101, MCSE4-101	3 1 0 4	

Course Objectives:

To learn the advanced concepts of data structure and algorithms and its implementation. The course has the main ingredients required for a computer science graduate and has all the necessary topics for assessment of data structures and algorithms.

Learning Outcome

CO1: Ability to apply and implement various data structures to algorithms and to solve problems.

CO2: Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.

CO3: Ability to apply various traversing, finding shortest path and text pattern matching algorithm.

CO4: Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems.

Course Content:

Unit I

Introduction to Basics: Significance and need of various data structures and algorithms, Arrays, linked lists, Stacks, Queues, Priority queues, Heaps; Strategies for choosing the appropriate data structures. (6 hrs)

Advanced Data Structures: Binary Search Tree**,** AVL Trees, Red-Black Trees, Splay Trees, B-trees, Fibonacci heaps, Data Structures for Disjoint Sets, Augmented Data Structures. (6 hrs)

Unit II

Algorithms Complexity and Analysis: Probabilistic Analysis, Amortized Analysis, Competitive Analysis, Internal and External Sorting algorithms: Quick Sort, Heap Sort, Merge Sort, Counting Sort, Radix Sort. (10 hrs)

Unit III

Graphs & Algorithms: Representation, Type of Graphs, Paths and Circuits: Euler Graphs, Hamiltonian Paths & Circuits; Cut-sets, Connectivity and Separability, Planar Graphs, Isomorphism, Graph Coloring, Covering and Partitioning, bridges, Depth- and breadth-first traversals, Minimum Spanning Tree: Prim's and Kruskal's algorithms, Shortest-path Algorithms: Dijkstra's and Floyd's algorithm, Topological sort, Max flow: Ford-Fulkerson algorithm, max flow – min cut. (11 hrs)

String Matching Algorithms: Suffix arrays, Suffix trees, Brute Force, Rabin-Karp, Knuth-Morris-Pratt, Boyer-Moore algorithm. (4 hrs)

Unit IV

Approximation algorithms: Need of approximation algorithms: Introduction to P, NP, NP-Hard and NP-Complete; Deterministic, non-Deterministic Polynomial time algorithms; Knapsack, TSP, Set Cover, Open Problems. (5 hrs)

Randomized algorithms: Introduction, Type of Randomized Algorithms, 2-SAT; Game Theoretic Techniques, Random Walks. (3 hrs)

Recommended Books:

1. E. Horowitz, S. Sahni and Dinesh Mehta, ‘Fundamentals of Data Structures in C++’, Galgotia, **1999**.
2. Thomas H. Corman, Charles E. Leiserson, Ronald L. Rivest, ‘Introduction to Algorithms’, 3rd Edn., PHI, **2009**.
3. Adam Drozdex, ‘Data Structures and Algorithms in C++’, 2nd Edn., Thomson Learning– Vikas Publishing House, **2001**.
4. G. Brassard and P. Bratley, ‘Algorithmics: Theory and Practice’, Prentice –Hall, **1988**.

RESEARCH METHODOLOGY

Subject Code – MREM0-101 **L T P C** **Duration – 45 Hours**
4 0 0 4

UNIT–I (11 Hrs)

Introduction to Research: Meaning, Definition, Objective and Process
Research Design: Meaning, Types - Historical, Descriptive, Exploratory and Experimental
Research Problem: Necessity of Defined Problem, Problem Formulation, Understanding of Problem, Review of Literature
Design of Experiment: Basic Principal of Experimental Design, Randomized Block, Completely Randomized Block, Latin Square, Factorial Design.
Hypothesis: Types, Formulation of Hypothesis, Feasibility, Preparation and Presentation of Research Proposal

UNIT–II (10 Hrs)

Sources of Data: Primary and Secondary, Validation of Data
Data Collection Methods: Questionnaire Designing, Construction
Sampling Design & Techniques – Probability Sampling and Non Probability Sampling
Scaling Techniques: Meaning & Types
Reliability: Test – Retest Reliability, Alternative Form Reliability, Internal Comparison Reliability and Scorer Reliability
Validity: Content Validity, Criterion Related Validity and Construct Validity

UNIT–III (13 Hrs)

Data Process Operations: Editing, Sorting, Coding, Classification and Tabulation
Analysis of Data: Statistical Measure and Their Significance, Central Tendency, Dispersion, Correlation: Linear and Partial, Regression: Simple and Multiple Regression, Skewness, Time series Analysis, Index Number
Testing of Hypothesis: T-test, Z- test, Chi Square, F-test, ANOVA

UNIT – IV (11 Hrs)

Multivariate Analysis: Factor Analysis, Discriminant Analysis, Cluster Analysis, Conjoint Analysis, Multi-Dimensional Scaling
Report Writing: Essentials of Report Writing, Report Format
Statistical Software: Application of Statistical Software like SPSS, MS Excel, Mini Tab or MATLAB Software in Data Analysis
**Each Student has to Prepare Mini Research Project on Topic/ Area of their Choice and Make Presentation. The Report Should Consists of Applications of Tests and Techniques Mentioned in The Above UNITs*

Recommended Books

1. R.I. Levin and D.S. Rubin, ‘Statistics for Management’, 7th Edn., Pearson Education New Delhi.

2. N.K. Malhotra, ‘Marketing Research–An Applied Orientation’, 4th Edn., Pearson Education, New Delhi.
3. Donald Cooper, ‘Business Research Methods’, Tata McGraw Hill, New Delhi.
4. Sadhu Singh, ‘Research Methodology in Social Sciences’, Himalaya Publishers.
5. Darren George & Paul Mallery, ‘SPSS for Windows Step by Step’, Pearson Education, New Delhi.
6. C.R. Kothari, ‘Research Methodology Methods & Techniques’, 2nd Edn., New Age International Publishers.

SOFT COMPUTING

Subject Code:	L T P C	Duration – 45 hrs
MCSE1-103, MCSE2-103, MCSE3-103, MCSE4-103	3 1 0 4	

COURSE OBJECTIVES:

The objective of this course is to teach basic neural networks, fuzzy systems, Genetic Algorithms and optimization algorithms concepts and their relations**.**

LEARNING OUTCOMES:

CO1: Able to comprehend techniques and applications of Soft Computing in real world problems.

CO2: Able to follow fuzzy logic methodology and design fuzzy systems for various applications.

CO3: Able to design feed forward Artificial Neural Networks (ANN) and implement various methods of supervised learning.

CO4: Able to design feedback Artificial Neural Networks (ANN) and implement various methods of unsupervised learning

CO5: Able to appreciate the methodology of GA and its implementation in various applications.

COURSE CONTENT:

UNIT – I

Soft Computing: Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, applications of soft computing.

Fuzzy Logic: Fuzzy set versus crisp set, basic concepts of fuzzy sets, membership functions, basic operations on fuzzy sets and its properties. Fuzzy relations versus Crisp relation,

Fuzzy rule base system: Fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, Fuzzy Inference Systems (FIS) – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models, Fuzzification and Defuzzification, fuzzy decision making & Applications of fuzzy logic.

UNIT – II

Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN and its applications. Neural Network architecture: Single layer and multilayer feed forward networks and recurrent networks. Learning rules and equations: Perceptron, Hebb’s, Delta, winner take all and out-star learning rules. Supervised Learning Network: Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neuron, Back Propagation Network, Associative memory networks, Unsupervised Learning Networks: Competitive networks, Adaptive Resonance Theory, Kohnen Self Organizing Map.

UNIT – III

Genetic Algorithm: Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: selection operator, cross over, mutation operator, Stopping Condition and GA flow, Constraints in GA, Applications of GA, Classification of GA.

UNIT – IV

Hybrid Soft Computing Techniques: An Introduction, Neuro-Fuzzy Hybrid Systems, Genetic Neuro-Hybrid systems, Genetic fuzzy Hybrid and fuzzy genetic hybrid systems

Recommended Books:

1. S. Rajasekaran & G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic & Genetic Algorithms, Synthesis & Applications, PHI Publication.
2. S.N. Sivanandam & S.N. Deepa, ‘Principles of Soft Computing’, Wiley Publications.
3. Michael Negnevitsky, ‘Artificial Intelligence’, Pearson Education, New Delhi, **2008**.
4. Timothy J. Ross, ‘Fuzzy Logic with Engineering Applications’, Wiley, **2010**.
5. Bose, ‘Neural Network fundamental with Graph, Algo. & Applications’, TMH.
6. Kosko, ‘Neural Network & Fuzzy System’, PHI Publication.
7. Klir &Yuan, ‘Fuzzy Sets & Fuzzy Logic: Theory & Applications’, PHI Publication.
8. Hagen, ‘Neural Network Design’, Cengage Learning.

AGILE SOFTWARE DEVELOPMENT APPROACHES

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE1-156, **MCSE2-156** **MCSE4-156** **MCSE3-205**	**3 1 0 4**	

COURSE OBJECTIVES:

This course makes student learn the fundamental principles and practices associated with each of the agile development methods. To apply the principles and practices of agile software development on a project of interest and relevance to the student.

LEARNING OUTCOMES:

CO1: To learn the basics concepts of Agile software and their principles design

CO2: To explain different agile development method, project tools requirement, risk and measurements related with different development methods.

CO3: To understand the overview of Agile methods, strategies, requirements and testing.

CO4: Describe and explain agile measurement, configuration and risk management. Principles of Astern and tools.

COURSE CONTENT:

UNIT I

Introduction: Basics and Fundamentals of Agile Process Methods, Values of Agile, Principles of Agile, stakeholders, Challenges.

Agile and Its Significance: Agile development, Classification of methods, the agile manifesto and principles, Practices of XP, Scrum Practices, working and need of Scrum, advanced Scrum Applications, Scrum and the Organization.

UNIT II

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. Quality, Risk, Metrics and Measurements, 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 Requirements: User Stories, Backlog Management. Agile Architecture: Feature-Driven Development. Agile Risk Management: Risk and Quality Assurance, Agile Tools.

UNIT IV

Agile Testing: Agile Testing Techniques, Test-Driven Development, User Acceptance Test.

Agile Review: Agile Metrics and Measurements, The Agile approach to estimating and project variables, Agile Measurement, Agile Control: the 7 control parameters. Agile approach to Risk, The Agile approach to Configuration Management, The Atern Principles, Atern Philosophy, the rationale for using Atern, Refactoring, Continuous integration, Automated Build Tools.

Recommended Books:

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. Robert C. Martin, ‘Agile Software Development, Principles, Patterns, and Practices’, Alan Apt Series, **2011**.
4. Alistair, ‘Agile Software Development Series’, Cockburn, **2001**.
5. ‘Succeeding with Agile: Software Development Using Scrum’, Pearson, **2010**.

INFORMATION SECURITY

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE1-162, **MCSE4-157,** **MCSE2-157**	**3 1 0 4**	

COURSE OBJECTIVES:

It will help the students to understand the various concepts related to network security. The students will learn various techniques/algorithms that can be used to achieve security. They will also learn the security basics for wireless networks.

LEARNING OUTCOMES:

CO1: To understand the concepts of network security

CO2: To learn the techniques for authentication and authorization

CO3: To be able to understand the confidentiality requirement and the ways to achieve it.

CO4: To know about wireless network security.

COURSE CONTENT:

UNIT I

Overview: Computer Security Concepts, Challenges, Requirements, OSI security Architecture: services, mechanism and attacks, network security model, Classical encryption techniques, latest security trends, need of security strategy,

UNIT II

Authentication: Message authentication, message authentication techniques: Hash, MAC, digital Signatures, User Authentication: one-way authentication, mutual authentication, Password-based authentication, token based authentication, Biometric authentication, Remote User authentication.

Authorization: Identification, authorization, Access Control: Principles, Access Rights, Discretionary Access Control, Role Based Access Control, Unix File Access Control, Role Based Access Control Internet Authentication Applications: Kerberos, X.509, PKI, Federated Identity Management.

UNIT III

Confidentiality: Encryption, attacks, Symmetric Encryption: DES, AES, Asymmetric Encryption: RSA, Key Distribution scenario, Email security: S/ MIME, PGP.

Wireless network security: IEEE 802.11 wireless LAN, 802.11i wireless LAN security, Wireless Application Protocol, Wireless transport layer security, WAP End to End security.

UNIT IV

Database Security: The Need for Database Security, Database Management Systems, Relational Databases, Database Access Control, Inference, Statistical Databases, Database Encryption, Cloud Security

RECOMMENDED BOOKS:

1. William Stalling & Lawrie Brown, 'Computer Security: Principles and Practice', Pearson, Indian Edn., **2010**.
2. Chuck Easttom, 'Computer Security Fundamentals', Pearson, **2011**.
3. M. Stamp, 'Information Security: Principles and Practice', 2nd Edn., Wiley, ISBN: 0470626399, **2011**.
4. M.E. Whitman and H.J. Mattord, 'Principles of Information Security, Course Technology', 4th Edn., ISBN: 1111138214, **2011**.
5. M. Bishop, 'Computer Security: Art and Science', Addison Wesley, ISBN: 0-201-44099-7, 2002.

EMERGING TECHNOLOGIES

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE4-158	**3 1 0 4**	

COURSE OBJECTIVES:

The objective of this course is to introduce emerging technologies in the field of Information technology. The security related issues in these technologies will also be discussed.

LEARNING OUTCOMES

CO1: To introduce students to concepts and theories of Grid Computing;
CO2: To understand the benefits and various services of Cloud Computing;
CO3: To introduce students to concept and theories of mobile computing
CO4: To provide an overview of issues and challenges related to Big data

COURSE CONTENT:

UNIT1

Grid Computing: Introduction to GRID Computing, How Grid Computing Works, Grid Middleware, Grid Architecture, Types of Grids, Grid Computing Applications, Technologies for Grid Computing, Clustering and Grid Computing, Issues in Data Grids, Key Functional Requirements in Grid Computing.

UNIT II

Cloud Computing: Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Comparison among SAAS, PAAS, IAAS Cloud security fundamentals, Privacy and Security in cloud, Cloud computing security architecture: Architectural Considerations- General Issues.

UNIT III

Mobile Computing: History of mobile communication, Types of Networks, Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing introduction to GSM system, GSM background, GSM operational and technical requirements. Cell layout and frequency planning, mobile station, base station systems, Security issues in mobile computing, Authentication, encryption.

UNIT IV

Big Data: Introduction to Big Data, Big Data Tools and Techniques, Application of Big Data, Apache Hadoop, Map Reduce, SMAQ Stack.

Recommended Books:

1. Prabhu CSR, 'Grid and Cluster Computing', PHI, **2008**.
2. J. Hurwitz, R. Bloor, M. Kanfman, F. Halper, 'Cloud Computing for Dummies', Wiley India, **2010**.
3. C.Y. William, Lee, 'Mobile Communication Design Fundamentals', John Wily and Sons, **2010**.
4. '2012 Big Data Now', O'Reilly Media, Inc., **2012**.

Suggested Readings:

1. R. Krutz and R.D. Vines, 'Cloud Security', Wiley-India, **2010**.
2. J. Schiller, 'Mobile Communication', Pearson Education Asia, **2008**.

CYBER LAWS

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE4-159	**3 1 0 4**	

COURSE OBJECTIVES: The objective of this course is to provide knowledge about the basic information on cyber law and also provide the basic information about amendment right and copyright issues. To understand ethical laws of computer for different countries this course also will be helpful.

COURSE CONTENT

UNIT I

Introduction: Fundamentals of Cyber Space, Understanding Cyber Space, Interface of Technology and Law Defining Cyber Laws, Jurisdiction in Cyber Space, Concept of Internet Jurisdiction, Indian Context of Jurisdiction, International position of Internet Jurisdiction Cases in Cyber Jurisdiction.

UNIT II

Specific issues: E-commerce- Legal issues, Legal Issues in Cyber Contracts, Cyber Contract and IT Act2000, The UNCITRAL Model law on Electronic Commerce, Intellectual Property Issues and Cyberspace. The Indian Perspective Overview of Intellectual, Property related Legislation in India Copyright law & Cyberspace, Trademark law & Cyberspace, Law relating to Semiconductor Layout & Design.

UNIT III

Understanding Cyber Crimes: Defining Crime, Crime in context of Internet –Actus Rea/Mens Rea, Types of crime in Internet, Computing damage in Internet crime, Frauds: Hacking, Mischief, Trespass, Defamation, Stalking, Spam

UNIT IV

Obscenity and Pornography: Internet and Potential of Obscenity, Indian Law on Obscenity & Pornography, International efforts, Changes in Indian Law. Penalties & Offences: IT Act 2001, Offences under the Indian Penal Code, Investigation & adjudication issues Digital evidence.

Recommended Books:

1. Y. Singh, 'Cyber Laws', 5th Edn., Universal law Publishing Company, **2012**.
2. A. Gupta, 'Commentary on Information Technology Act', 2nd Edn., **2011**.
3. A. Viswanathan, 'Cyber Laws: Indian and International Perspectives on Key Topics including Data Security, E-commerce, Cloud Computing and Cyber Crimes', 1st Edn., LexisNexis, **2012**.

ADVANCED COMPUTER NETWORKS

Subject Code:	L T P C	Duration – 45 hrs
MCSE2-160, MCSE4-160, MCSE1-206	3 1 0 4	

COURSE OBJECTIVES:

This course provides knowledge about computer network related hardware and software using a layered architecture. It is also offer good understanding of the concepts of network security, wireless, Adhoc and various emerging network technologies.

LEARNING OUTCOMES:

CO1: Able to explain the Fundamentals of Computer Networks and their layered architecture. Also acquire knowledge about ATM Layered model and LAN Emulation.

CO2: Able to explain about various Transport and Application Layer Protocols. Also acquire knowledge about various congestion control mechanisms and network management.

CO3: Able to explain Features, advantages and applications of Adhoc Networks, Adhoc versus Cellular networks, Network architecture and Technologies. Evolution with the examples of wireless communication systems other techniques of Cellular Networks like 2G, 2.5G and 3G Technologies. Also able to explain wireless local loop (WLL), Wireless and local Area Networks (WLANs)

CO4: Able to define the Fundamentals of network security, various authentication protocols and E-mail Security.

COURSE CONTENT:

UNIT I

Computer networks and layered architecture, Asynchronous Transfer Mode-ATM layered model, switching and switching fabrics, network layer in ATM, QOS, LAN emulation.

UNIT II

Transport Layer-Elements of transport protocols; Internet transport protocols: TCP and UDP, TCP connection management, congestion control. Application Layer-Network application architectures: Client-server, P2P and hybrid; Application layer protocols: DNS, FTP, TFTP, TELNET, HTTP and WWW, SMTP and electronic mail; Network management and SNMP.

UNIT III

Adhoc and Cellular networks- Features, advantages and applications, Adhoc versus Cellular networks, Network architecture, Protocols: MAC protocols, Routing protocols, Technologies. Wireless Communication Systems- Evolution, examples of wireless communication systems, 2G Cellular networks, Evolution for 2.5G TDMA Standards, IS-95B for 2.5G CDMA. Wireless and Mobile Networks-Wireless links and network characteristics, wireless local loop (WLL), Local Multipoint Distribution System (LMDS), Wireless local Area Networks (WLANs), Bluetooth and Personal Area Networks.

UNIT IV

Introduction to Network Security- Cryptography, symmetric and public-key algorithms, digital signatures, communication security, and authentication protocols, E-mail security, PGP and PEM.

RECOMMENDED BOOKS:

1. B.A. Forouzan, 'Data Communication and Networking', 3rd Edn. Tata McGraw-Hill.
2. A.S. Tanenbaum, 'Computer Networks', 4th Edn., Pearson Education.
3. W. Stallings, 'Network Security and Cryptography', 4th Edn., Prentice-Hall of India.
4. Theodore S. Rappaport, 'Wireless Communication: Principles and Practices', 2nd Edn., Pearson Education.
5. D.E. Comer, and R.E., Computer Networks and Internets, 4th Edn., Prentice-Hall.
6. Sunil Kumar, S. Man Droms, Mahabaleshwar S. Kakkasageri, 'Wireless and Mobile Networks: Concepts and Protocols', Wiley India.

WIRELESS AND MOBILE NETWORKING

Subject Code:	L T P C	Duration – 45 hrs
MCSE4-161	3 1 0 4	

COURSE OBJECTIVES

Students will familiarize themselves with mobile communication networks. They will gain insight into media access control mechanisms dedicated to wireless communication and have a thorough understanding of mechanisms based on the network and the transport layers, with a focus on ad hoc and mesh networks. Moreover, the students will acquire knowledge about the connections between the different protocol layers and will be able to apply the acquired knowledge on methodological analysis of real communication systems.

LEARNING OUTCOMES:

CO1: to familiarize with the fundamentals of wireless and mobile networking

CO2: to understand the issues and management of mobility

CO3: to apprehend the development of cellular and wireless networks

CO4: to outline the advances in wireless and mobile networks

COURSE CONTENT

UNIT-I

Fundamental Concepts: Propagation phenomena, mobile environment, Cellular systems: SIR calculations, reuse, Channel assignment algorithms, power control, Radio Channel Modelling, Digital modulation techniques, FDMA, TDMA, CDMA, comparative capacity calc., Error control, Second Generation, Circuit-Switched, Cellular Systems: D-AMPS(IS-136), GSM, IS-95 Third Generation, Packet-Switched System: IMT-2000, UMTS, GSM+, Fading Mitigation, Intersymbol Interference, Mitigation Error Control.

UNIT-II

Mobile Computing and Communications: Introduction to Mobile Networking, Mobile IP, route optimization, Transport layer issues: interaction with TCP, Ad Hoc Networking, Mobility Management, Mobile Agents, Multimedia and Adaptive Wireless Networking.

UNIT-III

Cellular and Wireless Internet: 2/2.5 G, GSM, GPRS, 3G(IMT-2000),4G Movement (3GPP, 3GIP, etc.), Mobile IP, Wireless TCP, Wireless QOS (Scheduling, adaptive systems).

UNIT-IV

IP-based Mobile Telecommunications Networks: Advances in Mobile IP, Micro Mobility, Services.

Pervasive Networking: Bluetooth, Home RF, Ad Hoc Networking, Sensor Networks.

Recommended Books:

1. Dharma P. Aggrawal, Qing-an Zeng, ‘Introduction to Wireless and Mobile Systems’, 3rd Edn., Cenage Learning Engineering.
2. Istojmenovic, ‘Handbook of Wireless Networks and Mobile Computing’, John Wiley & Sons, Inc.
3. Yi-binglin and Imrichchlamtac, ‘Wireless and Mobile Network Architectures’, 1st Edn., Wiley Publications.
4. Sunil kumar, S. Manvi, ‘Wireless and Mobile Networks: Concepts and Protocols’, Wiley Publications.
5. William Stallings, ‘Wireless Communications & Networks’, 2nd Edn., Pearson.

ADVANCED OPERATING SYSTEM

Subject Code:	L T P C	Duration – 45 hrs
MCSE1-161, MCSE2-161, MCSE4-162, MCSE3-161	3 1 0 4	

COURSE OBJECTIVES:

- To learn the fundamentals of Operating Systems
- To gain knowledge on Distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
- To gain insight on to the distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols
- To know the components and management aspects of Real time, Mobile operating systems.

LEARNING OUTCOMES:

CO1 Discuss the various synchronization, scheduling and memory management issues

CO2 Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating system

CO3 Discuss the various resource management techniques for distributed systems

CO4 Identify the different features of real time and mobile operating systems

COURSE CONTENT

UNIT I

Fundamentals of Operating Systems: Strategies of operating system, Structures of operating system, overview – Synchronization Mechanisms – Processes and Threads - Process Scheduling –Deadlocks: Detection, Prevention and Recovery – Models of Resources – Memory Management Techniques.

Distributed Operating Systems: Issues in Distributed Operating System – Architecture – Communication Primitives – Lamport's Logical clocks – Causal Ordering of Messages – Distributed Mutual Exclusion Algorithms – Centralized and Distributed Deadlock Detection Algorithms – Agreement Protocols.

UNIT II

Distributed Resource Management: Distributed File Systems – Design Issues - Distributed Shared Memory – Algorithms for Implementing Distributed Shared memory–Issues in Load Distributing – Scheduling Algorithms – Synchronous and Asynchronous Check Pointing and Recovery – Fault Tolerance – Two-Phase Commit Protocol – Non blocking Commit Protocol – Security and Protection.

UNIT III

Real Time And Mobile Operating Systems: Basic Model of Real Time Systems - Characteristics- Applications of Real Time Systems –Real Time Task Scheduling - Handling Resource Sharing - Mobile Operating Systems –Micro Kernel Design - Client Server Resource Access – Processes and Threads – Memory Management – File system, Networked file system

UNIT IV

CASE STUDIES: Linux System: Design Principles - Kernel Modules - Process Management Scheduling –Memory Management - Input-Output Management - File System – Interprocess Communication. iOS and Android: Architecture and SDK Framework - Media Layer -Services Layer - Core OS Layer – File System.

Recommended Books:

1. Andrew S. Tanenbaum and Maarten van Steen, 'Distributed Systems: Principles and Paradigms', 2nd Edn., Prentice Hall, **2007**.
2. Mukesh Singhal and Niranjan G. Shivaratri, 'Advanced Concepts in Operating Systems – Distributed, Database, and Multiprocessor Operating Systems', Tata McGraw-Hill, **2001**.
3. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, 'Operating System Concepts', 7th Edn., John Wiley & Sons, **2004**.
4. Daniel P. Bovet and Marco Cesati, 'Understanding the Linux Kernel', 3rd Edn., O'Reilly, **2005**.
5. Rajib Mall, 'Real-Time Systems: Theory and Practice', Pearson Education India, **2006**.
6. Neil Smyth, 'iPhone iOS 4 Development Essentials – Xcode', 4th Edn., Payload Media, **2011**.

DIGITAL DEFENCES

Subject Code:	L T P C	Duration – 45 hrs
MCSE4-163	3 1 0 4	

COURSE OBJECTIVES: The course teaches Cyber Security techniques with a core focus on cellular/mobile devices, computer hardware and software functionality.

LEARNING OUTCOMES:

CO1: Introduction to viruses, worms, malicious codes, etc.
CO2: Understanding the concept of DOS and testbeds
CO3: Get overview of architectures for internet
CO4: Understanding the concept of information security and data management

COURSE CONTENT:

UNIT I

Viruses, worms, malicious codes, Trojan Horses etc.: History, Threats, Components, models of propagation and their epidemic spread, defence against worms, viruses and malicious codes.

UNIT II

DOS attacks, DDOS: Introduction, History, Effects, Evolution, Semantic Levels of DDOS, IP Spoofing, DDOS defence approaches.

Design of Testbeds for simulation of attacks against critical infrastructures: Attack vectors, Attack simulation their analysis and modelling.

UNIT III

Architectures for Internet: Design Principles, Architectural Constraints, Principles of avoiding failures.

UNIT IV

Information Security and Data Management: Information Security, Information Management Technologies, Issues, Discretionary and Mandatory policies for information security, secure distributed and heterogeneous database systems Introduction to secure data warehousing and data mining for security applications.

Recommended Books:

1. Ed Skoudis, Lenny Zeltser, ‘Malware: Fighting Malicious Code’, Prentice Hall, 2007, **2003**.
2. Jelena Mirkovic, Sven Dietrich, David Dittrich and Peter Reiher, ‘Internet Denial of Service: Attack and Defense Mechanisms’, Prentice Hall.
3. Olu Akindeinde, ‘Attack Simulation and Thread Modelling’, **2008**.
4. Barbara van Schewick, ‘Internet Architecture and Innovations’, MIT Press, **2010**.
5. Thoe Schlossnagle, ‘Scalable Internet Architecture’, **2007**.
6. Bhavani Thuraisingham, ‘Database and Applications Security: Integrating Information Security and Data Management’, Auerbach Publications.

PRACTICAL LAB-I

Subject Code:	L T P C	Duration – 60 hrs
MCSE4-104	0 0 4 2	

COURSE CONTENT

- Practical’s should be related to the core subjects of the same semester.

ETHICAL HACKING

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE4-205	**3 1 0 4**	

COURSE OBJECTIVES: This course helps to gain knowledge of a range of computer network security technologies, tools and services related to ethical hacking.

LEARNING OUTCOMES

CO1 To understand various fundamentals of Ethical hacking.
CO2 To understand how to extract information about hosts and networks.
CO3 To develop knowledge of various forms of attacks.
CO4 To understand about judicious and ethical use of various tools.

COURSE CONTENT:

UNIT-I (11 hrs)

Introduction: Security, Functionality and ease of use Triangle, Essential Terminology, Elements of Security, Difference between Penetration Testing and Ethical Hacking, Deliverables ethics and legality, Computer Crimes and Implications.

Reconnaissance and Scanning: Information Gathering Methodology, Locate the Network Range, Active and Passive reconnaissance, Scanning, Elaboration phase, active scanning, scanning tools NMAP, hping2. Enumeration, DNS Zone transfer. Detecting live systems on the target network, discovering services running /listening on target systems, understanding port scanning techniques, Identifying TCP and UDP services running on the target network, Understanding active and passive fingerprinting

UNIT-II (12 hrs)

Trojans and Backdoors: Effect on Business, Trojan, Overt and Covert Channels, Working of Trojans, Different Types of Trojans, Different ways a Trojan can get into a system, Indications of a Trojan Attack, some famous Trojans and ports used by them

Sniffing: Definition of sniffing, Sniffer working, Passive Sniffing, Active Sniffing, Ethreal tool, Man-in-the-Middle Attacks, Spoofing and Sniffing Attacks, ARP Poisoning and countermeasures.

Social Engineering: Social Engineering, Art of Manipulation, Human Weakness, Common Types of Social Engineering, Human Based Impersonation, Example of Social Engineering, Computer Based Social Engineering, Reverse Social Engineering, Policies and Procedures, Security Policies-checklist.

UNIT-III (11 hrs)

Session Hijacking: Understanding Session Hijacking, spoofing vs Hijacking, Steps in Session Hijacking, Types of Session Hijacking, TCP Concepts 3 Way and shake, Sequence numbers

Hacking Web Servers: Types of web server vulnerabilities, Attacks against web servers, IIS Unicode exploits, Patch management techniques, Web Application Scanner, Metasploit Framework, Web server hardening methods

UNIT-IV (11 hrs)

Ethical Hacking: System Hacking and Hacking Wireless Networks: Aspect of remote password guessing, Role of eavesdropping, Various methods of password cracking, Keystroke Loggers, Understanding Sniffers, Comprehending Active and Passive Sniffing, ARP Spoofing and Redirection, DNS and IP Sniffing, HTTPS Sniffing. Introduction to 802.11, Role of WEP, Cracking WEP Keys, Sniffing Traffic, Wireless DOS attacks, WLAN Scanners, WLAN Sniffers, Hacking Tools, Securing Wireless Networks.

RECOMMENDED BOOKS

1. Kimberly Graves, 'Certified Ethical Hacking Expert Study Guide', Wiley Publishing Inc., **2007**.
2. Eric Core, 'Hackers Beware', EC-Council Press, **2003**.
3. William Stallings, 'Network Security Essentials', 5th Edn., Prentice Hall, **2013**.
4. William R. Cheswick and Steven M. Bellovin, 'Firewalls and Internet Security', 2nd Edn., Addison-Wesley Professional, **2003**.
5. W. Stallings, 'Cryptography and Network Security', 5th Edn., Prentice Hall, **2010**.

CRYPTOGRAPHY & NETWORK SECURITY

Subject Code:	L T P C	Duration – 45 hrs
MCSE4-206	3 1 0 4	

COURSE OBJECTIVES

The main objective of this course is to make student able to understand the basic concepts, services, threats and principles in network security, various security services and mechanisms in the network protocol stack.

LEARNING OUTCOMES

After completion of the course, the student should be able to
CO1: Understand security trends.
CO2: Implement various cryptographic algorithms.
CO3: Explain the hash function.
CO4: Understand the network security and system level security used.

COURSE CONTENT

UNIT I (11 hrs)

Security trends, Attacks and services, Classical crypto systems, Different types of ciphers, LFSR sequences, Basic Number theory, Congruences, Chinese Remainder theorem, Modular exponentiation, Fermat and Euler's theorem, Legendre and Jacobi symbols, Finite fields, continued fractions.

UNIT II (11 hrs)

Simple DES, Differential crypto analysis, DES – Modes of operation, Triple DES, AES, RC4, RSA, Attacks – Primality test – factoring.

UNIT III (12 hrs)

Discrete Logarithms, Computing discrete logs, Diffie-Hellman key exchange, ElGamal Public key cryptosystems, Hash functions, Secure Hash, Birthday attacks, MD5, Digital signatures, RSA, ElGamal DSA.

UNIT IV (11 hrs)

Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP, S/MIME – IP security – Web Security – SSL, TLS, SET. Intruders, Malicious software, viruses and related threats, Firewalls, Security Standards.

RECOMMENDED BOOKS:

1. Wade Trappe, Lawrence C. Washington, 'Introduction to Cryptography with Coding Theory', 2nd Edn., Pearson, **2007**.
2. William Stallings, 'Cryptography and Network Security Principles and Practices', 4th Edn., Pearson/PHI, **2006**.
3. W. Mao, 'Modern Cryptography – Theory and Practice', Pearson Education, 2nd Edn., **2007**.

4. Charles P. Pfleeger, Shari Lawrence Pfleeger – ‘Security in Computing’, 3rd Edn., Prentice Hall of India, **2006**.
5. Behrouz Forouzan, ‘Cryptography & Network Security’, McGraw-Hill.

INFORMATION RETRIEVAL

Subject Code:	L T P C	Duration – 45 hrs
MCSE4-264	3 1 0 4	

COURSE OBJECTIVES:

To learn the underlying technologies of modern information retrieval system.

LEARNING OUTCOMES:

1. Able to understand the basic concepts of modern information retrieval system.
2. Able to understand the search engine architecture.
3. Able to learn the retrieval models and apply the algorithms of retrieval algorithms.
4. Able to evaluate the quality of retrieval system.

COURSE CONTENTS:

UNIT I (11 hrs)

Introduction: The nature of unstructured and semi-structured text, Boolean queries, World Wide Web, History of Hypertext, Hypertext systems, Problems due to Uniform accessibility, types of Hypertext data, Text and multimedia data indexing, PageRank, HITS, XML and Semantic web.

UNIT II (11 hrs)

Search engine architecture: the basic building blocks of a modern search engine system, including web crawler, basic text analysis techniques, inverted index, query processing, search result interface.

UNIT III (12 hrs)

Retrieval models: Boolean, vector space, probabilistic and language models, latent semantic indexing, ranking algorithm, Introduction to the most recent development of learning-based ranking algorithms, i.e., learning-to-rank, Relevance feedback, query expansion, link analysis and search applications.

UNIT IV (11 hrs)

Performance Evaluation: Evaluating search engines, User happiness, precision, recall, F-measure.

RECOMMENDED BOOKS:

1. Christopher D. Manning, Prabhakar Raghavan, and Hinrich Schutze, ‘Introduction to Information Retrieval’, 1st Edn., Cambridge University Press, **2008**.
2. Bruce Croft, Donald Metzler and Trevor Strohman, ‘Search Engines: Information Retrieval in Practice’, 1st Edn., Pearson Education, **2009**.
3. Yates Ricardo and Berthier Ribeiro-Neto, ‘Modern Information Retrieval’, 2nd Edn., Addison-Wesley, **2011**.
4. Soumen Chakrabarti, ‘Mining the Web’, 1st Edn., Morgan-Kaufmann, **2002.**

COMPUTER AND CYBER FORENSICS

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE4-265	**3 1 0 4**	

COURSE OBJECTIVES

This course offers a good understanding of network Investigation, web attack and DOS investigation and will prepare students to be in a position to perform network forensics. This course also helps to provide understanding of email system and tracking.

UNIT I (11 hrs)

Introduction to Network Forensics, Need of Cyber Forensics, Cyber Evidence: Incidents and Evident, Search and Seizure, Identification, Preservation, Analysis and Preparation, Documentation and Management of Crime Sense. Data image: Image Capturing and its importance, Partial Volume Image.

UNIT II (12 hrs)

Hidden Data Extraction: Data Hiding Techniques, Recovery of deleted files, Cracking Passwords, Data Extraction tools, Windows Registry Analysis, Network Forensics: Introduction to Network Forensics and Investigating Logs, Wired and Wireless Network Traffic capture and Analysis. Document Forensics: Information in Metadata.

UNIT III (11 hrs)

Web Attack Investigations: Introduction to Investigating Web Attacks, Indication of a Web Attack, Types of Web Attack. Denial of Service Investigations, Internet Crime Investigations: Introduction to Investigating Internet Crimes, Internet Forensics, Steps for Investigating Internet Crime.

UNIT IV (11 hrs)

Email Crime Investigations: Email Structure, Email Addressing, Email Headers Analysis. Malware Forensics: Botnets, Automatic Self Updates, Fast Flux DNS, Network Behavior of Malware: Propagation, Command & Control, Payload Behavior.

RECOMMENDED BOOKS

1. Council, Ec. ‘Computer Forensics: Investigating Network Intrusions and Cyber-Crime’, Cengage Learning, **2009**.
2. Linda Volonino, ‘Computer Forensics for Dummies’, Willey Publishing Inc., **2012.**
3. Sherri Davidoff and Jonathan Ham, ‘Network Forensics Tracking Hackers through Cyberspace’, Prentice Hall, **2012**.
4. Michael G. Solomon, K. Rudolph, Ed Tittel, Neil Broom and Diane Barrett, ‘Computer Forensics Jump Start’, 2nd Edn., Willey Publishing Inc., **2011**.
5. E. Casey, ‘Handbookof Digital Forensics and Investigation’, Academic Press, **2009**.

BIOMETRIC SECURITY

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE4-266	**3 1 0 4**	

COURSE OBJECTIVES:

Cover a broad range of approaches to biometrics reflecting both fundamental principles and the current state-of-the-art practices.

LEARNING OUTCOMES:

After completion of course, student would be able to:

CO1 Modern biometric technologies and the generic components of a biometric system.

CO2 Pattern recognition and feature extraction in biometrics, Voice and face recognition systems.
CO3 Select the most appropriate biometric for a given application.
CO4 Work with signal and image acquisition systems, Deploying biometric systems.

COURSE CONTENTS:

UNIT I (11 hrs)

Biometrics Introduction: Benefits of biometrics over traditional authentication systems, benefits of biometrics in identification systems, comparison of various biometric traits, selecting a biometric for system, Applications. Key biometric terms and processes, biometric verification and identification, how biometric matching works, Accuracy in biometric systems, Metrics for evaluating biometric systems: FAR, FRR, ERR etc.

UNIT II (12 hrs)

Physiological Biometric Technologies: Fingerprints: Technical description, characteristics, Competing technologies, strengths, weaknesses and deployment. Facial scan: Technical description, characteristics, weaknesses and deployment.

Iris scan: Technical description, characteristics, strengths, weaknesses and deployment.

Retina vascular pattern: Technical description, characteristics, strengths, weaknesses and deployment.

Hand scan: Technical description, characteristics, strengths, weaknesses and deployment.

UNIT III (11 hrs)

Behavioral Biometric Technologies: Handprint Biometrics, Signature and handwriting technology: Technical description, classification, keyboard /keystroke dynamics, Voice: data acquisition, feature extraction, characteristics, strengths, weaknesses, deployment.

Multi biometrics: Multi-modal biometric Systems: Face and Hand geometry, Fingerprint and iris recognition etc., Multimodal fusion techniques- score fusion, z-norm fusion etc., Normalization techniques.

UNIT IV (11 hrs)

Biometric Security Modals Sensor level security, database security, template security techniques, Channel level security, various remedial solutions available.

RECOMMENDED BOOKS

1. Anil K. Jain, Michigan State University, USA, Patrick Flynn University of Notre Dame, USA, Arun A. Ross West Virginia University, USA, 'Handbook of Biometrics', **2008**.
2. John Chirillo, Scott Blaul. 'Implementing Biometric Security', Wiley Red Books.

ADAVANCED DATABASES

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE4-267	**3 1 0 4**	

COURSE OBJECTIVES:

The objective of this course is to study principal of database management system, distributed databases, parallel databases and emerging database technologies. To understand the basic principles, concepts and applications of data warehousing and data mining.

LEARNING OUTCOMES:

CO1: Be able to acquire the essential concept of ER Model and object oriented Databases and Schema Designs.

CO2: Be able to understand essential concept of parallel, distributed systems with concurrency control and their recovery.

CO3: Be able to cope up with XML databases and related advance topic.

CO4: Ability to do Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment and Data Mining.

COURSE CONTENT:

UNIT I (12 hrs)

Extended Entity Relationship Model and Object Model: ER model, Subclasses, Super classes, Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization. Relationship Types.

Object−Oriented Databases: Overview of Object−Oriented Concepts. Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance, Type extents and Queries, Complex Objects; Database Schema Design for OODBMS; OQL, Persistent Programming Languages; OODBMS Architecture and Storage Issues; Transactions and Concurrency control. Example of ODBMS.

UNIT II (11 hrs)

Object Relational and Extended Relational Databases: Database Design for an ORDBMS − Nested Relations and Collections; Storage and Access methods, Query processing and Optimization; An Overview of SQL3, Implementation Issues for Extended Type; Systems. Comparison of RDBMS, OODBMS, ORDBMS. Parallel and Distributed Databases and Client−Server Architecture: Architectures for Parallel Databases, Parallel Query Evaluation; Parallelizing Individual Operations, Sorting, Joins; Distributed Database Concepts, Data Fragmentation, Replication, and Allocation techniques for Distributed Database Design; Query Processing in Distributed Databases; Concurrency Control and Recovery in Distributed Databases. An Overview of Client−Server Architecture

UNIT III (11 hrs)

Databases on the Web and Semi Structured Data: Web Interfaces to the Web, Overview of XML; Structure of XML Data, Document Schema, Querying XML Data; Storage of XML Data, XML Applications; The Semi Structured Data Model, Implementation Issues. Indexes for Text Data

Enhanced Data Models for Advanced Applications: Active Database Concepts. Temporal Database Concepts; Spatial Databases, Concepts and architecture; Deductive Databases and Query processing; Mobile Databases, Geographic Information Systems

UNIT IV (11 hrs)

Introduction to Data Warehousing- Creating and maintaining a warehouse. Introduction to Data warehouse and OLAP, Multidimensional data model, Data Warehouse architecture, OLAP and data cubes, Operations on cubes, Data preprocessing need for preprocessing, Multidimensional data model, OLAP and data cubes, Data warehousing Concepts, Study of Data preprocessing need for preprocessing, Simulating and maintaining a Warehouse, Analysis of Data preprocessing. Introduction to data Mining-Data mining functionalities, clustering - k means algorithm, classification - decision tree, Bayesian classifiers, Outlier analysis, association rules - apriori algorithm, Introduction to text mining

RECOMMENDED BOOKS:

1. R. Elmasri, S.B. Navathe, ‘Fundamentals of Database Systems’, 6th Edn., Pearson Education, **2010**.
2. Abraham Silberschatz, Henry. F. Korth and S. Sudharsan, ‘Database System Concepts’, 4th Edn., Tata McGraw Hill, **2004**.
3. Raghu Ramakrishna and Johannes Gehrke, ‘Database Management Systems’, 3rd Edn., Tata McGraw Hill, **2003**.
4. Arihant Khitcha, Neeti /Kapoor, ‘Advance Database Management System’, **2011.**

5. S.S. Khandare, 'Database Management and Oracle Programming', 2nd Revised Edn., S. Chand, N. Delhi, **2010.**

PYTHON PROGRAMMING

Subject Code: MCSE4-268	**L T P C 3 1 0 4**	**Duration – 45 hrs**

COURSE OBJECTIVES

The course is structured to understand fundamentals of Python Programing Language. The course also covers the use of Python Programing in Ethical Hacking/Network Security.

COURSE CONTENT

UNIT I (11hrs)

Python Introduction, Installing and setting Python environment in Windows and Linux, basics of Python interpreter, Execution of python program, Editor for Python code, syntax, variable, types. Flow control: if, ifelse, for, while, range () function, continue, pass, break. Strings: Sequence operations, String Methods, Pattern Matching.

UNIT II (12 hrs)

Lists: Basic Operations, Iteration, Indexing, Slicing and Matrixes; Dictionaries: Basic dictionary operations; Tuples and Files; Functions: Definition, Call, Arguments, Scope rules and Name resolution; Modules: Module Coding Basics, Importing Programs as Modules, Executing Modules as Scripts, Compiled Python files (.pyc), Standard Modules: OS and SYS, The dir() Function, Packages.

UNIT III (11 hrs)

Input output and file handling, Object Oriented Programming features in Python: Classes, Objects, Inheritance, Operator Overloading, Errors and Exceptions: try, except and else statements, Exception Objects, Regular expressions, Multithreading, Networking: Socket module.

UNIT IV (11 hrs)

Role of Python in Hacking and Cyber Forensics, Debugging in python: introduction to PyDBG and immunity debugger; Hooking: Soft Hooking with PyDbg, Hard Hooking with Immunity Debugger, DLL and code injection: Remote Thread Creation, DLL Injection, Code Injection.

RECOMMENDED BOOKS

1. Mark Lutz., 'Learning Python',4th Edn., O'REILLY Media, Inc., **2009**.
2. Justin Seitz, 'Gray Hat Python: Python Programming with Hackers and Reverse Engineers', No Starch Press, Inc., **2009**.
3. Paul Berry, 'Head First Python'. O'REILLY Media, Inc., **2011**.

INFORMATION SECURITY RISK MANAGEMENT

Subject Code: MCSE4-269	**L T P C 3 1 0 4**	**Duration – 45 hrs**

UNIT I (11 hrs)

RISK MANAGEMENT: Definition of Risk, Risk Management, Importance of Risk Management, Integration of Risk Management Into SDLC

RISK ASSESMENT: Risk Assessment Methodologies, System Characterization, Threat identification, Vulnerability identification, Control analysis, Likelihood determination, Impact analysis, Risk determination, Control recommendations.

UNIT II (12 hrs)

RISK MITIGATION: Risk Mitigation Options, Risk Mitigation Strategy, Approach for Control Implementation, Control Categories, Cost-Benefit Analysis, Residual Risk

RISK ANALYSIS: Effective Risk Analysis, Qualitative risk Analysis, Value Analysis, Facilitated Risk Analysis Process, Case Studies of Risk Analysis.

UNIT III (11 hrs)

VULNERABILITY IN INFORMATION SYSTEM: Vulnerability Management, Types of network Vulnerability, Procedure of Vulnerability, Managing Vulnerability, Known Software Vulnerability, Vulnerability Assessment Process. Vulnerability of Critical Infrastructure. Vulnerability Scanning Tools.

THREATS AND ATTACKS: Principles of Security, Understanding the Attackers, Reducing the Risk of attack, Tools used for the attack, Respond to an Attack.

UNIT IV (11 hrs)

POST ASSESSMENT ACTIVITIES: IT Security Architecture and framework, Defining the structure and Hierarchy, Sample IT Security Architecture and Framework, Hierarchical IT Security Architecture and Framework, Security incident Response team.

RECOMMENDED BOOKS:

1. Risk management guide for Information technology systems, Special Publication National institute of Standard and technology, Gaithersburg, MD
2. Thomas R. Peltier, 'Information Security Risk Analysis', Illustrated Edn., Auerbach Publications, **2001**.
3. Michael Gregg and David Kim, 'Inside Network Security Assessment: Guarding Your IT Infrastructure', Sams, **2005**.
4. Douglas J. Landoll and Douglas J. Landoll, 'The Security Risk Assessment Handbook: A Complete Guide for Performing Security Risk Assessments', Auerbach Publications, 1st Edn., **2005**.

SECURITY ENGINEERING

Subject Code:	**L T P C**	**Duration – 45 hrs**
MCSE4-270	**3 1 0 4**	

UNIT I (11 hrs)

Security Engineering: Introduction, Framework and definition

Usability and Psychology: Attacks Based on Psychology: Pretexting; Passwords; and System Issues **Access Control**: Operating System Access Controls; Hardware Protection

UNIT II (12 hrs)

Distributed Systems: Introduction; Concurrency; Fault Tolerance and Failure Recovery; Naming and Types of Name

Multilevel Security: Introduction; The Bell-LaPadula Security Policy Model; Historical Examples of MLS Systems; Future MLS Systems; Broader Implications of MLS

UNIT III (11 hrs)

Multilateral Security: Introduction; Compartmentation, the Chinese Wall and the BMA Model; Inference Control; Residual Problem

Physical Protection: Introduction; Threats and Barriers; Alarms

Monitoring and Metering: Introduction; Prepayment Meters; Taxi Meters, Tachographs and Truck Speed Limiters; Postage Meters

UNIT IV (11 hrs)

Telecom System Security: Introduction; Phone Phreaking; Mobile Phones; Security Economics of Telecomms

Managing the Development of Secure Systems: Introduction; Managing a Security Project; Methodology; Security Requirements Engineering; Risk Management; Managing the Team

RECOMMENDED BOOKS:

1. Ross Anderson, 'Security Engineering: A Guide to Building Dependable Distributed Systems', 1st Edn., Wiley, **2001**.
2. Ross Anderson, 'Security Engineering: A Guide to Building Dependable Distributed Systems' 2nd Edn., Wiley, **2008**.
3. Julia H. Allen, Sean Barnum, Robert J. Ellison, Gary McGraw; Nancy R. Mead, 'Software Security Engineering: A Guide for Project Managers', Addison-Wesley Professional, **2008**.
4. George Coulouris Jean Dollimore Tim Kindberg, 'DISTRIBUTED SYSTEMS: Concepts and Design', 4th Edn., Addison-Wesley, **2005**.

OPEN SOURCE TECHNOLOGIES

Subject Code:	L T P C	Duration – 45 hrs
MCSE4-271	3 1 0 4	

COURSE OBJECTIVES: To give a brief introduction to the open source technology. Through interactive sessions enabling students to enhance their skills in contributing and implementing their technical knowledge.

LEARNING OUTCOMES:

CO1: Open source software history, initiatives and principles. Open standards, Licenses and FOSS.

CO2: Learn about the Open Source Operating system and its distributions like Fedora, Google chrome OS, Ubuntu.

CO3: Study of Web technologies based on open Software's LAMP (Linux Apache MySqland PHP/Python)

CO4: To Learn HTML, XHTML, PHP and JavaScript

COURSE CONTENT

UNIT I (11 hrs)

Introduction: Open Source Definition, Free Software vs. Open Source Software, Public Domain Software, Open Source History, Initiatives, Principle and Methodologies. Open Standards.

Open Source Development Model Licenses and Patents: What Is a License, Important FOSS Licenses (Apache, BSD, GPL, LGPL), copyrights and copy lefts, Patents Economics of FOSS: Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization.

UNIT II (12 hrs)

Open Source Operating Systems: Different open source operating systems. Google Chrome OS, BSD, Linux Distributions – Fedora and Ubuntu, Installation, Disk Partitioning, Boot loader. Using Linux – Shell, File system familiarity, Linux Administration – Managing users, services and software, Network Connectivity, Configurations and Security.

Open Source Web Technologies: Two Tier and Three Tier Web based Application Architecture. LAMP Terminologies, Advantages. Apache, Web server conceptual working, Web browser, HTTP, Installation and Configuration, httpd.conf file, Logging, Security, Running a website, MySQL, Database management system, ER diagram, Relational database, Installation, Configuration, Administration, Common SQL queries.

UNIT III (11 hrs)

Programming on XHTML and XML: Editing XHTML, W3C XHTML validation services, designing XHTML by using XHTML tables, frames, forms and other elements. CSS and its types. XML, XML namespaces, DTD, XML schema, XML vocabularies, DOM and its methods, SOAP.

UNIT IV (11 hrs)

Programming on PHP and JavaScript:
JavaScript: JavaScript variables, control structures, functions, arrays and objects. Cascading Style Sheets, Client Side Scripting - Java Script, PHP: Form processing and business logic, stream processing and regular expressions, viewing client/server environment variables, connecting to database and handling of cookies. SQL, Accessing databases with PHP.

Open Source Ethics: Open source vs. closed source Open source government, Open source ethics. Social and Financial impacts of open source technology, shared software, Shared source.

Case Studies: Mozilla (Firefox), Wikipedia, Joomla, Open Office, GCC.

RECOMMENDED BOOKS:

1. B. Ware, B. Lee J., 'Open Source Development with Lamp: Using Linux, Apache, MySQL, Perl, and PHP', Addison-Wesley Professional.
2. Deitel, 'Internet and World wide web, How to program', 4th Edn., Prentice Hall, **2008.**
3. P. DuBois, 'MySQL', 4th Edn,, Addison-Wesley Professional.
4. M. Zandstra, 'Teach Yourself PHP', 2nd Edn., Sams Publishing,

PRACTICAL LAB-II

Subject Code:	**L T P C**	**Duration – 60 hrs**
MCSE4-207	**0 0 4 2**	

- Practical's should be related to the core subjects of the same semester.