

I M.TECH I SEMESTER SYLLABUS

ADVANCED DATA STRUCTURES

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
B45801	L	T	P	C	CIE	SEE	Total
	3	-	-	3	25	75	100
<p>COURSE OBJECTIVES: The student should be able to</p> <ol style="list-style-type: none"> 1. Choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem. 2. Understand the necessary mathematical abstraction to solve problems. 3. To familiarize students with advanced paradigms and data structure used to solve algorithmic problems. 4. Come up with analysis of efficiency and proofs of correctness. <p>COURSE OUTCOMES: Understand the implementation of symbol table using hashing techniques.</p> <ol style="list-style-type: none"> 1. Develop and analyze algorithms for red-black trees, B-trees and Splay trees. 2. Develop algorithms for text processing applications. 3. Identify suitable data structures and develop algorithms for computational geometry problems 4. Implement the concepts of trees in various applications. 							
UNIT-I	DICTIONARIES AND HASHING						
<p>Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries. Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.</p>							
UNIT-II	SKIP LISTS						
<p>Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists.</p>							
UNIT-III	TREES						
<p>Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees</p>							
UNIT-IV	TEXT PROCESSING						
<p>Text Processing: Sting Operations, Brute-Force Pattern Matching, The BoyerMoore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.</p>							
UNIT-V	COMPUTATIONAL GEOMETRY						
<p>Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad trees, k-D Trees. Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem.</p>							
<p>Text Books:</p> <ol style="list-style-type: none"> 1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004. 2. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002. 							

Reference Books:

1. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and D.Mount, Seventh Edition Wiley student edition, John Wiley and Sons.
2. Data Structures and Algorithms in C++, Third Edition, Adam Drozdek, Thomson
3. Problem solving with C++, The OOP, Fourth edition, W.Savitch, Pearson education.
4. C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.
5. Data structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI/Pearson Education.

CLOUD COMPUTING

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P		C	CIE	SEE
B45802	3	-	-	3	25	75	100
COURSE OBJECTIVES:							
<ol style="list-style-type: none"> The student will learn how to apply trust-based security model to real-world security problems. An overview of the concepts, processes, and best practices needed to successfully secure information within Cloud infrastructures. Students will learn the basic Cloud types and delivery models and develop an understanding of the risk and compliance responsibilities and Challenges for each Cloud type and service delivery model. 							
COURSE OUTCOMES:							
After completion of course, students would be able to:							
<ol style="list-style-type: none"> Identify security aspects of each cloud model Develop a risk-management strategy for moving to the Cloud Implement a public cloud instance using a public cloud service provider Apply trust-based security model to different layer 							
UNIT-I	INTRODUCTION TO CLOUD COMPUTING						
Introduction to Cloud Computing							
Online Social Networks and Applications, Cloud introduction and overview, Different clouds, Risks, Novel applications of cloud computing.							
UNIT-II	CLOUD COMPUTING ARCHITECTURE						
Cloud Computing Architecture							
Requirements, Introduction Cloud computing architecture, On Demand Computing Virtualization at the infrastructure level, Security in Cloud computing environments, CPU Virtualization, A discussion on Supervisors Storage Virtualization Cloud Computing Defined, The SPI Framework for Cloud Computing, The Traditional Software Model, The Cloud Services Delivery Model.							
Cloud Deployment Models							
Key Drivers to Adopting the Cloud, The Impact of Cloud Computing on Users, Governance in the Cloud, Barriers to Cloud Computing Adoption in the Enterprise.							
UNIT-III	SECURITY						
Security Issues in Cloud Computing							
Infrastructure Security, Infrastructure Security: The Network Level, The Host Level, The Application Level, Data Security and Storage, Aspects of Data Security, Data Security Mitigation Provider Data and Its Security.							
Identity and Access Management							
Trust Boundaries and IAM, IAM Challenges, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud, Cloud Authorization Management.							
UNIT-IV	SECURITY MANAGEMENT						
Security Management in the Cloud							
Security Management Standards, Security Management in the Cloud, Availability Management: SaaS, PaaS, IaaS.							
Privacy Issues							
Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications, U.S. Laws and Regulations, International Laws and Regulations.							
UNIT-V	AUDIT AND COMPLIANCE						
Audit and Compliance							
Internal Policy Compliance, Governance, Risk, and Compliance (GRC), Regulatory/External Compliance, Cloud Security Alliance, Auditing the Cloud for Compliance, Security-as-a-Cloud							
Advanced Topics							
Recent developments in hybrid cloud and cloud security.							

Text Books:

1. Cloud Computing Explained: Implementation Handbook for Enterprises, John Rhoton, PublicationDate: November 2, 2009.
2. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance (Theory inPractice), Tim Mather, ISBN-10: 0596802765,O'Reilly Media, September 2009.

ADVANCED DATABASE ENGINEERING

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P		C	SEE	Total
B45803	3	-	-	3	25	75	100
COURSE OBJECTIVES:							
<ol style="list-style-type: none"> 1. To understand the significance of integrity constraints 2. To normalize the database schema 3. To improve the query performance 4. To gain knowledge about advanced databases and applications 							
COURSE OUTCOMES:							
After completion of course, students would be able to:							
<ol style="list-style-type: none"> 1. Design a database for an organization. 2. Construct and execute optimized queries 3. Apply proper security policies to data 4. handle E-Commerce transactions 5. Apply object oriented features to DBMS 							
UNIT-I	Relational Model						
Relational Model: Constraints: update operations, transactions, and dealing with constraint violations. Relational database design algorithms, MVDs and 4NF, JD and 5NF, inclusion dependencies, other dependencies and normal forms.							
UNIT-II	Query Processing & Optimization						
Query Processing & Optimization: Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation Plans, Materialized Views, Advanced Topics in Query Optimization.							
UNIT-III	Object & Object-Relational Databases						
Object & Object-Relational Databases: Concepts of Object databases, Object database standards, languages and design Object-relational and Extended-Relational Systems.							
UNIT-IV	Security, Advanced Modeling						
Security, Advanced Modeling: Database Security Enhanced data models for advanced applications – active databases, temporal databases, spatial and multimedia databases, deductive databases.							
UNIT-V	Advanced Transaction Processing						
Advanced Transaction Processing: Transaction-Processing Monitors, Transactional Workflows, E-Commerce, Main-Memory Databases, Real-Time Transaction Systems ,Long- Duration Transactions Case studies: PostgreSQL, IBM DB2, Oracle, Microsoft SQL server.							
Text Books:							
<ol style="list-style-type: none"> 1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education, V edition 2. Data base System Concepts, Silberschatz, Korth, McGraw hill, VI edition. 							
Reference Books:							
<ol style="list-style-type: none"> 1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition. 2. Introduction to Database Systems, C.J.Date Pearson Education 							

3. Oracle for Professionals, The X Team,S.Shah and V.Shah,SPD.
4. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL,Shah,PHI.
5. Fundamentals of Database Management Systems,M.L.Gillenson,Wiley Student Edition

PROFESSIONAL ELECTIVE - I

WEB SERVICES AND SERVICE ORIENTED ARCHITECTURE

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
B45804	L	T	P	C	CIE	SEE	Total
	3	-	-	3	25	75	100
COURSE OBJECTIVES:							
<ol style="list-style-type: none"> 1. To provide fundamental concepts of Service Oriented Architecture. 2. To inculcate knowledge about SOAP, UDDI and XML to create web services. 3. To teach Cloud Computing architecture and services with respect to SOA 							
COURSE OUTCOMES:							
At the end of this course students will be able to:							
<ol style="list-style-type: none"> 1. Apply the principles of service oriented architecture 2. Adopt the standards and technologies of modern web services implementations 3. Effectively use market-leading development tools to create and consume web services 4. Identify and select the appropriate framework components in the creation of web service solutions 5. Apply object-oriented programming principles to the creation of web service solutions 							
UNIT-I	EVOLUTION AND EMERGENCE OF WEB SERVICES						
Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, Challenges in Distributed Computing, role of J2EE and XML in distributed computing, emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services.							
UNIT-II	WEB SERVICE ARCHITECTURE						
Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, and basic steps of implementing web services. Describing Web Services – WSDL introduction, non functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.							
UNIT-III	BRIEF OVER VIEW OF XML						
XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation. SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging, The enterprise Service Bus, SOA Development Lifecycle, SOAP HTTP binding, SOAP communication model, Error handling in SOAP.							
UNIT-IV	REGISTERING AND DISCOVERING SERVICES						
The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation, UDDI with WSDL, UDDI specification, Service Addressing and Notification, Referencing and addressing Web Services, Web Services Notification.							
UNIT-V	SOA AND WEB SERVICES SECURITY CONSIDERATIONS						
Network-level security mechanisms, Application- level security topologies, XML security standards, Semantics and Web Services, The semantic interoperability problem, The role of metadata, Service metadata, Overview of .NET and J2EE, SOA and Web Service Management, Managing Distributed System, Enterprise management Framework, Standard distributed management frameworks, Web service management, Richer schema languages, WS-Metadata Exchange.							

Text Books:

1. Web Services & SOA Principles and Technology, Second Edition, Michael P.Papazoglou.
2. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.
3. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.
4. Thomas Erl (2005), Service Oriented Architecture – Concepts, Technology and Design, Pearson Education, South Asia.

Reference Books:

1. Jeff Davies & others (2008), The Definitive guide to SOA, Dreamtech, India.
2. N. M. Josuttis (2007), SOA in Practice, SPD, O'Reilly Media, Inc, India.
3. Shankar. K (2008), SOA for Enterprise Applications, Wiley India Edition, India.
4. Eric Newcomes, Greg Lomow (2005), Understanding SOA with Web Services, Pearson Education, India.

E-Text Books:

1. http://ptgmedia.pearsoncmg.com/imprint_downloads/informit/promotions/LearnSOA/SOA_eBook-InformIT.pdf

MOOC Course

1. <https://www.coursera.org/learn/service-oriented-architecture>
2. <https://www.learnquest.com/course-detail-v3.aspx?cnum=wsoa-320>

PROFESSIONAL ELECTIVE - I
DATA MINING ALGORITHMS

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
B45805	L	T	P	C	CIE	SEE	Total
	3	-	-	3	25	75	100
<p>COURSE OBJECTIVES: At the end of the course, the students will be able to: I. Understand and implement classical models and algorithms in data warehouses and data mining. II. Analyze the kinds of patterns that can be discovered by association rule mining, classification and clustering. III. Apply data mining techniques in various applications like social, scientific and environmental context. IV. Develop skill in selecting the appropriate data mining algorithm for solving practical problems and understand the process of data analysis, identifying the problems, and choosing the relevant models and algorithms to apply.</p> <p>COURSE OUTCOMES: After completion of course, students would be able to:</p> <ol style="list-style-type: none"> 1. Build the knowledge of data pre-processing, storing data and apply data pre-processing techniques like data cleansing on diverse datasets to explore the task relevant knowledge. 2. Apply the knowledge of data mining and warehousing concepts for analytical processing. 3. Examine datasets like Super market data and generate rules for decision making using Association rule mining approaches. 4. Categorize the data clustering and classification methods to solve real time problems. 5. Solve the real time data problems to get desired solutions using data mining methods. 							
UNIT-I	INTRODUCTION TO DATA MINING and WAREHOUSING						
<p>Introduction To Data Mining: Definition of Data Mining, Data Mining Functionalities, Classification of Data Mining Systems, Data Mining Task Primitives, Major Issues In Data Mining, Supervised and Unsupervised Learning. Data Warehouse and Data Modeling: Data warehouse Architecture and its components, Schema Design, Star and show-Flake Schema, Fact Consultation, Fact Table, Fully Addictive, Semi-Addictive, Non Addictive Measures; OLAP Cube, OLAP Operations.</p>							
UNIT-II	DATA PREPROCESSING, DATA QUALITY AND TRANSFORMATION						
<p>Data Preprocessing, Data Quality and Transformation: Major Tasks in Data Preprocessing, Data Reduction, Data Cleaning and Data Integration, Data Munging, Wrangling, Data imputation, Data Transformation (Min-Max, log transform, z-score transform etc.), Normalization, Concept hierarchy generation, Binning, Outliers, Outlier Detection Methods, Treatment Methods.</p>							
UNIT-III	MINING FREQUENT,ASSOCIATION AND FEATURE EXTRACTION METHODS						
<p>Association Rule Mining: Market Basket Analysis, Frequent itemsets, Closed itemsets, and Association Rules; The Apriori Algorithm, FP Growth Algorithm, Introduction to Mining Multilevel Association Rules and Multidimensional Association Rules, Constraint-Based Association Mining. Feature Selection/ Extraction Methods: Principal components analysis, LDA, Wavlet Transformations.</p>							
UNIT-IV	CLASSIFICATION AND REGRESSION						
<p>Classification Techniques: Introduction, Naïve Bayes Classifier, Bayesian Belief Network, K-Nearest Neighbors, Support Vector Machines, Decision Trees (J48, CART). Ensembles methods: Bagging & boosting, Random forest, Gradient Boosting Machines and XGBoost.</p>							

Regression: Linear Regression: Relationship between attributes using Covariance and Correlation multi-collinearity, Homoscedasticity and Heteroscedasticity, Hypothesis testing of Regression Model, R-square and goodness of fit, Multiple Linear Regression, Non-Linear Regression	
UNIT-V	CLUSTER ANALYSIS
Cluster Analysis: Basic Concepts; <i>Partitioning Methods:</i> K-Means, K-Medoids; <i>Hierarchical Methods:</i> Agglomerative, Divisive, BIRCH; <i>Density-Based Methods:</i> DBSCAN, Grid Based Clustering, Fuzzy Clustering, Model based clustering	
Text Books:	
<ol style="list-style-type: none">1. Data Mining – Concepts and Techniques – Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers, Elsevier, 2 Edition, 2006.2. Introduction to Data Mining, Pang – Ning Tan, Vipin Kumar, Michael Steinbach, Pearson Education	
Reference Books:	
<ol style="list-style-type: none">1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.2. Data Warehouse Fundamentals, Pualraj Ponnaiah, Wiley Student Edition.3. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press4. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.	
Web References:	
<ol style="list-style-type: none">1. https://www.igi-global.com/book/data-warehousing-mining/2362. https://www.scribd.com/doc/46962399/Data-Warehousing-and-Data-Mining3. https://www.wileyindia.com/data-warehousing-data-mining.html	
E-Text Books:	
<ol style="list-style-type: none">1. https://www.wileyindia.com/data-warehousing-data-mining.html2. https://www.quora.com/What-are-the-best-resources-to-learn-data-warehousing3. https://cs.wmich.edu/~yang/teach/cs595/han/ch01.pdf	
MOOC Course	
<ol style="list-style-type: none">1. https://www.mooc-list.com/tags/data-warehouse2. https://www.mooc-list.com/tags/data-mining	

PROFESSIONAL ELECTIVE - I

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P		C	CIE	SEE
B45806	3	-	-	3	25	75	100
<p>COURSE OBJECTIVES:</p> <p>The course should enable the students to:</p> <ol style="list-style-type: none"> 1. To introduce the concepts of mathematical logic. 2. To introduce the concepts of sets, relations, and functions. 3. To perform the operations associated with sets, functions, and relations. 4. To relate practical examples to the appropriate set, function, or relation model, and interpret the associated operations and terminology in context. 5. To introduce generating functions and recurrence relations. 6. To use Graph Theory for solving problems. <p>COURSE OUTCOMES:</p> <p>After completion of course, students would be able to:</p> <ol style="list-style-type: none"> 1. Understand the basic notions of discrete and continuous probability. 2. Understand the methods of statistical inference, and the role that sampling distributions play in those methods. 3. Perform correct and meaningful statistical analyses of simple to moderate complexity. 4. Apply concepts of Graph theory for problem solving. 							
UNIT-I	MATHEMATICAL LOGIC						
<p>Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus.</p>							
UNIT-II	SET THEORY						
<p>Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions. Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monodies, Groups, Lattices as Partially Ordered Sets, Boolean algebra.</p>							
UNIT-III	ELEMENTARY COMBINATORY						
<p>Elementary Combinatory: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion Exclusion.</p>							
UNIT-IV	RECURRENCE RELATIONS:						
<p>Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of generating functions, Recurrence relations, Solving recurrence relations by substitution and Generating functions, The method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.</p>							
UNIT-V	GRAPHS						
<p>Graphs: Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.</p>							

Text Books:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay,R. Manohar, McGraw Hill education (India) Private Limited. (UNITS – I ,II).
2. Discrete Mathematics for Computer Scientists & Mathematicians, Joe L. Mott, Abraham Kandel, Theodore P. Baker, Pearson , 2nd ed. (Units – III, IV, V).

Reference Books:

1. Discrete Mathematics and its Applications, Kenneth H. Rosen, 7th Edition, McGraw Hill education (India) Private Limited.
2. Discrete Mathematics, D.S. Malik & M.K. Sen, Revised edition Cengage Learning.
3. Elements of Discrete Mathematics, C. L. Liu and D.P.Mohapatra,4th edition, McGraw Hill education(India) Private Limited.
4. Discrete Mathematics with Applications, Thomas Koshy, Elsevier.
5. Discrete and Combinatorial Mathematics, R. P. Grimaldi, Pearson.

PROFESSIONAL ELECTIVE – II

ETHICAL HACKING

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P		C	CIE	SEE
B45807	3	-	-	3	25	75	100
<p>COURSE OBJECTIVES: The course should enable the students to: Introduces the concepts of Ethical Hacking and gives the students the opportunity to learn about different tools and techniques in Ethical hacking and security and practically apply some of the tools.</p> <p>COURSE OUTCOMES: After completion of course, students would be able to:</p> <ol style="list-style-type: none"> 1. Evaluate where information networks are most vulnerable 2. Perform penetration tests into secure networks for evaluation purposes 3. Identifying tools for vulnerability in windows 4. Develop an ongoing security strategy 							
UNIT-I	ETHICAL HACKING OVERVIEW						
Ethical Hacking Overview: Introduction to Ethical Hacking, overview of TCP/IP, IP Addressing, and Overview of numbering systems, Network and computer Attacks: malicious software (malware), viruses, macro viruses, worms, Trojan programs, spyware, adware, Protecting against malware attacks.							
UNIT-II	INTRUDER ATTACKS						
Intruder attacks on networks and computers, Addressing Physical Security, Foot printing and social Engineering: using web tools for foot printing, conducting competitive Intelligence, using domain name system zone transfers, introduction to social engineering.							
UNIT-III	INTRODUCTION TO PORT SCANNING						
Introduction to port scanning, using port scanning tools, conducting ping sweeps, understanding scripting, Enumeration: Introduction to enumeration, enumerating windows operating systems, enumerating the NetWare operating systems							
UNIT-IV	PROGRAMMING FOR SECURITY PROFESSIONALS						
Programming for security professionals: Introduction to computer programming, Anatomy of a C Program, Understanding HTML basics, Understanding Perl, understanding Object oriented programming concepts, Windows OS vulnerability, tools for identifying vulnerability in windows, Best practices for handling windows systems.							
UNIT-V	HACKING WIRELESS NETWORKS						
Hacking Wireless Networks: Understanding Wireless Technologies, Wireless Network Standards, Authentication, war driving, Wireless hacking. Network Protection Systems: Understanding Routers, Firewalls, Intrusion Detection and Prevention System, Honey pots.							
Text Books:							
<ol style="list-style-type: none"> 1. Michael T. Simpson, Kent Backman, James E. Corley, “HandsOn Ethical Hacking and 2. Network Defence”, Second Edition, CENGAGE Learning, 2010. 							

Reference Books:

1. Steven DeFino, Barry Kaufman, Nick Valenteen, "Official Certified Ethical HackerReview Guide", CENGAGE Learning, 2009.
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy", Syngress Basics Series – Elsevier, August 4, 2011.
3. Whitaker & Newman, "Penetration Testing and Network Defence", Cisco Press,Indianapolis, IN, 2006.

PROFESSIONAL ELECTIVE – II
MOBILE COMPUTING

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P		C	CIE	SEE
B45808	3	-	-	3	25	75	100
COURSE OBJECTIVES:							
The course should enable the students to:							
<ol style="list-style-type: none"> 1. To explore both theoretical and practical issues of mobile computing; 2. To develop skills of finding solutions and building software for mobile computing applications 3. Implement the concepts of mobile computing in solving problems in Manets. 							
COURSE OUTCOMES:							
At the end of this course the student should be able to							
<ol style="list-style-type: none"> 1. Solve various MAC issues in data link layer and networking principles that support connectivity to cellular networks 2. Use the protocols for network layer and transport layer in mobile environment. 3. Apply push and pull based data dissemination techniques and to solve database issues in mobile computing. 4. Work in mobile computing environment to address various issues in MANETs. 							
UNIT-I	INTRODUCTION						
<p>Mobile Computing: Introduction, history, architecture, devices and applications, limitations. Global System for Mobile Communications (Gsm): Mobile services, system architecture, radio interface, protocols, localization and calling, handover, security, and new data services. Medium Access Control: Motivation for a specialized MAC (Hidden and exposed terminals, near and far terminals), SDMA, FDMA, TDMA, CDMA.</p>							
UNIT-II	MOBILE NETWORK LAYER						
<p>Mobile Network Layer: Mobile IP (goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, Rrk registration, tunneling and encapsulation, optimizations), dynamic host configuration protocol (DHCP). Mobile Transport Layer: Traditional TCP, indirect TCP, snooping TCP, mobile TCP, fast retransmit/ fast recovery, transmission /time-out freezing, selective retransmission, and transaction oriented TCP.</p>							
UNIT-III	DATA DISSEMINATION, DATABASE ISSUES						
<p>Data Dissemination: Push based mechanisms, pull based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques. Database Issues: Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.</p>							
UNIT-IV	MULTIMEDIA						
<p>Putting It All Together : Packaging and Deploying, Performance Best Practices, Android Field Service App, Location Mobility and Location Based Services Android Multimedia: Mobile Agents and Peer-to-Peer Architecture, Android Multimedia</p>							

UNIT-V	PROTOCOLS AND TOOLS
Protocols and Tools: Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.	
Text Books:	
<ol style="list-style-type: none">1. “Mobile Communications”, 2nd Edition, Jochen Schiller, PHI/Pearson Education, 2003.2. Mobile Computing, 2nd edition, Raj kamal, Oxford University Press, USA, 2007.	
Reference Books:	
<ol style="list-style-type: none">1. “Wireless Communications and Networks”, William Stallings, Pearson Education, 20022. “Handbook of Wireless Networks and Mobile Computing”, Stojmenovic and CacuteWiley, 2002,.3. “Mobile Computing Principles: Designing and Developing Mobile Applications with UMLand XML”, Reza Behravanfar, Cambridge University Press, October 2004,	

PROFESSIONAL ELECTIVE – II
ADVANCED COMPUTER ARCHITECTURE

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
B45809	L	T	P	C	CIE	SEE	Total
	3	-	-	3	25	75	100
<p>COURSE OBJECTIVES: The course should enable the students to:</p> <ol style="list-style-type: none"> 1. To impart basic concepts of computer architecture and theory of parallelism 2. To explain key skills of constructing cost-effective computer systems. 3. To familiarize program and network properties 4. To help students in understanding various architectures and hardware technologies 5. To facilitate students in analyzing scalability and performance issues in various architectures. <p>COURSE OUTCOMES: On successful completion of this course you will be able to:</p> <ol style="list-style-type: none"> 1. Describe the principles of computer design. 2. Compare the performance of different architectures. 3. Improve application performance for different cpu architectures. 4. Develop applications for high performance computing systems. 							
UNIT-I	THEORY OF PARALLELISM						
<p>THEORY OF PARALLELISM: State of computing, Multiprocessors and Multi computers, Multi vector and SIMD computers. PRAM and VLSI models, Architectural Development tracks. Program and Network properties.</p>							
UNIT-II	PRINCIPLES OF PERFORMANCE AND HARDWARE TECHNOLOGY						
<p>Performance Metrics and Measures, Parallel Processing Applications, Speedup Performance Laws, Scalability Analysis and Approaches, Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology.</p>							
UNIT-III	BUS CACHE AND SHARED MEMORY, PIPELINING						
<p>BUS CACHE AND SHARED MEMORY: Bus Systems, Cache Memory Organizations, Shared-Memory Organizations.</p> <p>PIPELINING AND SUPERSCALAR TECHNIQUES: Linear Pipeline Processors, Nonlinear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design.</p>							
UNIT-IV	PATENT RIGHTS						
<p>PARALLEL AND SCALABLE ARCHITECTURES: Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message-Passing Mechanisms , Vector Processing Principles, Multifactor Multiprocessors, implementation Models</p>							

UNIT-V	NEW DEVELOPMENTS IN IPR
SCALABLE, MULTITHREADED, AND DATAFLOW ARCHITECTURES: Interprocessor Communications, Latency hiding technique Case study: CM 5	
Text Books:	
1. Kai Hwang, Naresh Jotwani, ADVANCED COMPUTER ARCHITECTURE- Parallelism, Scalability, Programmability, Second Edition, Tata McGraw Hill.	
Reference Books:	
1. William Stallings, Computer Organization And Architecture - Designing for performance, Pearson. 2. Richard Y Kain, Advanced Computer Architecture: A Systems Design Approach, PHI.	

ADVANCED DATA STRUCTURES LAB

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
B45810	L	T	P	C	CIE	SEE	Total
	-	-	3	1.5	25	75	100
COURSE OBJECTIVES:							
The course should enable the students to:							
<ol style="list-style-type: none"> 1. Develop skills to design and analyze simple linear and non linear data structures. 2. Strengthen the ability to the students to identify and apply the suitable data structure for the given real world problem. 3. Gain knowledge in practical applications of data structures . 							
COURSE OUTCOMES:							
After the successful completion of the course student will be able to:							
<ol style="list-style-type: none"> 1. Understand the concept of ADT using Hashing techniques. 2. Develop recursive algorithms as they apply to trees and graphs. 3. Understand and implement different algorithms in various areas 4. Perform insertion and deletion like operations in m-way B-Tree 							
LIST OF EXPERIMENTS							
Week-1	DICTIONARY ADT						
Write a program to implement Dictionary ADT using hashing.							
Week-2	HASHING						
Write a program to store k keys into an array of size n at the location computed using a hash function, $loc = key \% n$, where $k \leq n$ and k takes values from [1 to m], $m > n$. To handle the collisions use the following collision resolution techniques,							
<ol style="list-style-type: none"> a. Linear probing b. Quadratic probing c. Random probing d. Double hashing/rehashing e. Chaining 							
Week-3	BINARY SEARCH TREE IMPLEMENTATION						

Write a program for Binary Search Tree to implement following operations:	
a. Insertion	
b. Deletion	
i. Delete node with only child	
ii. Delete node with both children	
c. Finding an element	
d. Finding Min element	
e. Finding Max element	
f. Left child of the given node	
g. Right child of the given node	
h. Finding the number of nodes, leaves nodes, full nodes, ancestors, descendants.	
Week-4	AVL TREE
Write a program for AVL Tree to implement all cases (LL, RR, RL, LR rotation)	
Week-5	RED-BLACK TREES
Write a program to implement Red-Black trees with insertion and deletion operation for the given input data as Strings	
Week-6	BST TO AVL TREE
Write a program to transform BST into AVL trees and also count the number rotations performed.	
Week-7	B-TREE IMPLEMENTATION
Write a program to implement insertion, deletion, display and search operation in m-way B tree (i.e. a non-leaf node can have almost m children) for the given data as integers (Test the program for m=3, 5, 7).	
Week-8	KNUTH-MORRIS-PRATT ALGORITHM
Write a program to perform string matching using Knuth-Morris-Pratt algorithm	
Week-9	BOYER-MOORE ALGORITHM
Write a program to perform string matching using Boyer-Moore algorithm.	
Week-10	HUFFMAN CODING
Write a program to implement Huffman Coding.	

CLOUD COMPUTING LAB

M.TECH I YEAR – I SEM							
Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P		C	CIE	SEE
B45811	-	-	3	1.5	25	75	100
COURSE OVERVIEW:							
To impart hand on experience of Google Apps, simulation of cloud environment using Virtualization. Creating virtual machines and provisioning. Also the simulation of data centres is introduced.							
COURSE OBJECTIVES:							
<ol style="list-style-type: none"> 1. To inculcate the concepts of distributed computing 2. To familiarize the concepts of cloud computing and services 3. To explain cloud platform and types of cloud IV. To explain resource management in cloud 							
COURSE OUTCOMES:							
Student who successfully completes this course should be able to							
<ol style="list-style-type: none"> 1. Understand the fundamental principles of distributed computing 2. Create virtual machines and virtual templates. 3. Create Cloud platform using Virtual machines 4. Identify suitable business models of cloud computing. 							
LIST OF EXPERIMENTS							
Week-1	Create a Collaborative learning environment for a particular learning topic using Google Apps. Google Drive, Google Docs and Google Slides must be used for hosting e-books, important articles and presentations respectively.						
Week-2	Install Virtual box and create a windows/linux virtual image and analyze the virtual configuration						
Week-3	Register with Amazon AWS and create a windows/linux instance and connect with RDP and create S3 buckets.						
Week-4	A case study on Amazon Elastic Cloud Services						
Week-5	A case study on Azure						
Week-6	Installation and Configuration of Just cloud.						
Week-7	Working in Cloud9 to demonstrate different language.						
Week-8	Installation and Configuration of Hadoop						
Week-9	Running Hadoop Map reduce						
Week-10	Working with Mangrasoft Aneka Software						