

**COURSE STRUCTURE  
AND  
DETAILED SYLLABUS  
For**

**M. Tech Two Year Degree Course**

**2015-2016**

**COMPUTER SCIENCE AND ENGINEERING  
(CSE)**



*Because, Life is all about taking the right decisions*

**A U T O N O M O U S**

**SREENIDHI INSTITUTE OF SCIENCE & TECHNOLOGY**

**(An Autonomous Institution approved by UGC and affiliated to JNTUH)**

**Yamnapet, Ghatkesar Mandal, Hyderabad - 501 301.**

**Department of Computer Science and Engineering**  
**M.Tech (Computer Science and Engineering)**  
**Course Structure and Syllabus**  
Academic Regulations: 2015-2016

I Year		COURSE STRUCTURE				I Semester		
S. No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1	5P101	Advanced Computer Architecture	3	1	-	3	25	75
2	5P102	Advanced Data Structures and Algorithms	3	1	-	3	25	75
3	5P103	Advanced Databases	3	1	-	3	25	75
4	5P104	Object Oriented Programming with Java	3	1	-	3	25	75
5		<b>PROFESSIONAL ELECTIVE I</b>	3	1	-	3	25	75
6		<b>PROFESSIONAL ELECTIVE II</b>	3	1	-	3	25	75
7	5P118	Research Methodology	2	-		2	25	75
8	5P171	Advanced Data Structures and Algorithms using Java lab	-	-	4	2	25	75
9	5P172	Literature Review and Seminar-1	-	-	3	1	100	-
10	5P173	Comprehensive Viva – Voce -1	-	-	-	1	100	-
		<b>Total</b>	<b>20</b>	<b>6</b>	<b>7</b>	<b>24</b>	<b>400</b>	<b>600</b>

PROFESSIONAL ELECTIVE I		PROFESSIONAL ELECTIVE II	
Subject Code	Subject Name	Subject Code	Subject Name
5P105	Natural Language Processing	5P112	Advanced Computer Networks
5PC06	Cloud Computing	5P113	Artificial Intelligence
5P107	Advanced Network Programming	5PC14	Semantic Web and Social Networking
5P108	Advanced Operating Systems	5P115	Scripting Languages
5P109	Human Computer Interaction	5P117	Mobile Computing
5P110	Information Retrieval Systems	5RC16	Big Data Analytics
5P111	Software metrics and Quality Assurance	5P119	Software Reuse
5P140	Java Programming (EEE)	5P141	Computer Networks (EEE)

I Year		COURSE STRUCTURE				II Semester		
S. No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1		<b>OPEN ELECTIVE</b>	3	1	-	3	25	75
2	5PC20	Network Security and Cryptography	3	1	-	3	25	75
3	5P221	Mobile Application Development	3	1	-	3	25	75
4	5P222	Web Technologies & Services	3	1	-	3	25	75
5	5PC23	Data warehousing and Data Mining	3	1	-	3	25	75
6		<b>PROFESSIONAL ELECTIVE III</b>	3	1	-	3	25	75
7	5P274	Web Technologies and Informatica Lab	-	-	4	2	25	75
8	5P275	Literature Review and Seminar-2	-	-	3	1	100	-
9	5P276	Project Seminar – I (Abstract)	-	-	3	2	100	-
10	5P277	Comprehensive Viva – Voce-2	-	-	-	1	100	-
		<b>Total</b>	<b>18</b>	<b>6</b>	<b>10</b>	<b>24</b>	<b>475</b>	<b>525</b>

PROFESSIONAL ELECTIVE III		OPEN ELECTIVE	
Subject Code	Subject Name	Subject Code	Subject Name
5S207	Software Architecture and Design Patterns	5ZC03	Banking Operations, Insurance and Risk Management
5PC24	Image Processing and Pattern Recognition	5QC33	Intellectual Property Rights
5P225	Machine Learning	5T217	Embedded Systems
5P226	Wireless Networks	5ZC13	Entrepreneurship and Innovation
5P227	Ad hoc and Sensor Networks	5H233	Ethics, Morals, Gender Sensitization and Yoga
5P228	Software Risk Management And Maintenance	5QC47	Bio-informatics
5S202	Software Process and Project Management		

II Year		COURSE STRUCTURE	I Semester					
S. No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1	5P378	Project Seminar - II (Design & Development)	-	-	-	4	100	-
3	5P379	Project Work ( PART- I ) (Project Status Report) ( Excellent/ Good/ Satisfactory/ Un-Satisfactory )	-	-	-	20	grading	-
<b>Total</b>			-	-	-	<b>24</b>	<b>100</b>	-

II Year		COURSE STRUCTURE	II Semester					
S. No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1	5P480	Project Seminar - IV (Execution)	-	-	-	2	100	-
2	5P481	Pre – Project Submission Seminar (Final)	-	-	-	2	100	-
2	5P482	Project Work and Dissertation ( Excellent/ Good/ Satisfactory/ Un-Satisfactory )	-	-	-	20	-	grading
<b>Total</b>			-	-	-	<b>24</b>	<b>200</b>	-

**L - Lectures; T = Tutorial; P = Practical; C = Credits**

**Syllabus for M. Tech I Year I Semester  
Computer Science and Engineering  
ADVANCED COMPUTER ARCHITECTURE**

**Code: 5P101**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives :**

At the end of this course students should be able to:

- Know the classes of computers, and new trends and developments in computer architecture.
- Understand pipelining, instruction set architectures, memory addressing.
- Understand the performance metrics of microprocessors, memory, networks, and disks
- Understand the various techniques to enhance a processor's ability to exploit Instruction-level parallelism (ILP), and its challenges.
- Understand exploiting ILP using dynamic scheduling, multiple issue, and speculation.
- Understand multithreading by using ILP and supporting thread-level parallelism (TLP).
- Understand the performance and efficiency in advanced multiple-issue processors.
- Understand symmetric shared-memory architectures and their performance.
- Understand multiprocessor cache coherence using the directory based and snooping class of protocols.
- Understand the various models to achieve memory consistency.
- Understand the performance of multi-core processors using SPEC benchmarks.
- Understand the several advanced optimizations to achieve cache performance.
- Understand virtual memory and virtual machines
- Understand storage systems, RAID, I/O performance, and reliability measures.

**UNIT - I**

Fundamentals of Computer design- Technology trends- cost- Instruction set principles and examples- classifying instruction set- memory addressing- type and size of operands- addressing modes -operations in the instruction set- instructions for control flow- encoding an instruction set.-the role of compiler

**UNIT - II**

Instruction level parallelism (ILP)- overcoming data hazards- reducing branch costs –high performance instruction delivery- hardware based speculation- limitation of ILP

**UNIT - III**

ILP software approach- compiler techniques- static branch protection - VLIW approach - H.W support for more ILP at compile time- H.W verses S.W Solutions

**UNIT - IV**

Memory hierarchy design- cache performance- reducing cache misses penalty and miss rate – virtual memory- protection and examples of VM.

**UNIT - V**

Multiprocessors and thread level parallelism- symmetric shared memory architectures- distributed shared memory- Synchronization- multi threading.

**UNIT - VI**

Storage systems- Types – Buses - RAID- errors and failures- bench marking a storage device- designing a I/O system.

interconnection network media – practical issues in interconnecting networks.

**TEXT BOOKS**

1. Computer Architecture A quantitative approach 3rd edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elsevier)

**REFERENCES**

1. "Computer Architecture and parallel Processing" Kai Hwang and A.Briggs International Edition McGraw-Hill.
2. Advanced Computer Architectures, Dezso Sima, Terence Fountain, Peter Kacsuk, Pearson.
3. Parallel Computer Architecture, A Hardware / Software Approach, David E. Culler, Jaswinder Pal singh with Anoop Gupta, Elsevier

**Syllabus for M.Tech I Year I Semester**  
**Computer Science and Engineering**  
**ADVANCED DATA STRUCTURES AND ALGORITHMS**

**Code: 5P102**

L	T	P	C
3	1	-	3

**Course Objectives:**

1. The fundamental design, analysis, and implementation of basic data structures.
2. Basic concepts in the specification and analysis of programs.
3. Principles for good program design, especially the uses of data abstraction.
4. Significance of algorithms in the computer field
5. Various aspects of algorithm development
6. Qualities of a good solution

**UNIT I**

Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples.

Data structures-Linear and non linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation, Vector representation, singly linked lists -insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists. Representation of single, two dimensional arrays, Sparse matrices and their representation.

**UNIT II**

Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack, implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, java.util package-ArrayList, Linked List, Vector classes, Stacks and Queues in java.util, Iterators in java.util.

**UNIT III**

Searching-Linear and binary search methods, Hashing-Hash functions, Collision Resolution methods-Open Addressing, Chaining, Hashing in java.util-HashMap, HashSet, Hashtable.

**UNIT IV**

Sorting -Bubble sort, Insertion sort, Quick sort, Merge sort, Heap sort, Radix sort, comparison of sorting methods.

**UNIT V**

Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non recursive traversals, Java code for traversals, Threaded binary trees.

Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods-dfs and bfs, Java code for graph traversals, Applications of Graphs-Minimum cost spanning tree using Kruskal's algorithm, Dijkstra's algorithm for Single Source Shortest Path Problem.

**UNIT VI**

Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees - Definition and examples only, B-Trees-definition, insertion and searching operations, Trees in java.util- TreeSet, Tree Map Classes, Tries(examples only),Comparison of Search trees.

Text compression-Huffman coding and decoding, Pattern matching-KMP algorithm.

**TEXT BOOKS:**

1. Data structures, Algorithms and Applications in Java, S.Sahni, Universities Press.
2. Data structures and Algorithms in Java, Adam Drozdek, 3rd edition, Cengage Learning.
3. Data structures and Algorithm Analysis in Java, M.A.Weiss, 2nd edition, Addison-Wesley (Pearson Education).

**REFERENCE BOOKS:**

1. Java for Programmers, Deitel and Deitel, Pearson education.
2. Data structures and Algorithms in Java, R.Lafore, Pearson education.
3. Java: The Complete Reference, 8th editon, Herbert Schildt, TMH.
4. Data structures and Algorithms in Java, M.T.Goodrich, R.Tomassia, 3rd edition, Wiley India Edition.
5. Data structures and the Java Collection Frame work,W.J.Collins, Mc Graw Hill.
6. Classic Data structures in Java, T.Budd, Addison-Wesley (Pearson Education).
7. Data structures with Java, Ford and Topp, Pearson Education.
8. Data structures using Java, D.S.Malik and P.S.Nair, Cengage learning.
9. Data structures with Java, J.R.Hubbard and A.Huray, PHI Pvt. Ltd.
10. Data structures and Software Development in an Object-Oriented Domain, J.P.Tremblay and G.A.Cheston, Java edition, Pearson Education.



**Syllabus for M.Tech I Year I Semester**  
**Computer Science and Engineering**  
**ADVANCED DATABASES**

**Code: 5P103**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives:**

1. History and Structure of databases
2. How to design a database
3. How to convert the design into the appropriate tables
4. Handling Keys appropriately
5. Enforcing Integrity Constraints to keep the database consistent
6. Normalizing the tables to eliminate redundancies
7. Querying relational data
8. Optimizing and processing the queries
9. Storage Strategies for easy retrieval of data through index
10. Triggers, Procedures and Cursors ,Transaction Management
11. Distributed databases management system concepts and Implementation

**UNIT I**

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL,DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, ER diagrams,.

**UNIT II**

Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views –Altering Tables and Views, Relational Algebra, Basic SQL Queries, Nested Queries, Complex Integrity Constraints in SQL, Triggers

**UNIT III**

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

**UNIT IV**

Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking –Transaction Support in SQL.

Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking.

Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, and Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

**UNIT V**

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing

Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM)

B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendable vs. Linear Hashing.

## **UNIT VI**

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

### **TEXT BOOKS:**

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition, 2003.
2. Data base System Concepts, A.Silberschatz, H.F. Korth, S.Sudarshan, McGraw hill, VI edition, 2006.
3. Fundamentals of Database Systems 5th edition. Ramez Elmasri, Shamkant B.Navathe, Pearson Education, 2008.

### **REFERENCE BOOKS:**

1. Introduction to Database Systems, C.J.Date,Pearson Education.
2. Database Management System Oracle SQL and PL/SQL, P.K.Das Gupta, PHI.
3. Database System Concepts, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
4. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
5. Database-Principles, Programming, andPerformance, P.O'Neil&E.O'Neil, 2nd ed., ELSEVIER
6. Fundamentals of Relational Database Management Systems, S.Sumathi, S.Esakkirajan, Springer.
7. Introduction to Database Management, M.L.Gillenson and others, Wiley Student Edition.
8. Database Development and Management, Lee Chao, Auerbach publications, Taylor & Francis Group.
9. Distributed Databases Principles & Systems, Stefano Ceri, Giuseppe Pelagatti, TMH.
10. Principles of Distributed Database Systems, M. Tamer Ozsü, Patrick Valduriez , Pearson Education, 2nd Edition.
11. Distributed Database Systems, Chhanda Ray, Pearson.
12. Distributed Database Management Systems, S.K.Rahimi and F.S.Haug, Wiley.

**Syllabus for M. Tech. I Year I semester  
Computer Science and Engineering  
OBJECT ORIENTED PROGRAMMING with JAVA**

L	T	P	C
3	1	-	3

**Code : 5P104**

**Course Objectives Unit Wise :**

**UNIT I**

History of Java, Java buzzwords, data types, variables, simple java program, scope and life time of variables, operators, expressions, control statements, type conversion and costing, arrays,, classes and objects – concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, recursion, string handling, StringTokenizer.

Objective: On the completion of the unit, a student should be able to: i) Write ,compile and execute simple java programs ii) Understand the syntax of classes and objects creation in java iii) Explain the differences between classes and objects iv) differentiate methods and constructors v) Understand constructor and method overloading vi) Understand how to handle strings in java

**UNIT II**

Inheritance –Definition, single inheritance, benefits of inheritance, Member access rules, super class, polymorphism- method overriding, Dynamic method dispatch, using final with inheritance, abstract classes, Base class object.

Interfaces: definition, variables and methods in interfaces, differences between classes and interfaces, usage of implements and extends keyword, an application using interfaces, uses of interfaces.

Applications using interface

Applications using packages

Objective:

On the completion of the unit, a student should be able to: i) Explain the benefits of inheritance ii) Understand how to access members of super class from subclass iii) Differentiate static and dynamic polymorphism iv) Understand the usage of final keyword in inheritance v) Understand the use of abstract class vi) Understand how to implement multiple inheritance in java vii) Explain the difference between classes and interfaces viii) Create and import packages ix) Understand different streams

**UNIT III**

Packages: Definition, types of packages, Creating and importing a user defined package.

Introduction to I/O programming: DataInputStream, DataOutputStream, FileInputStream, FileOutputStream, BufferedReader, serializable interface .

Generic : Auto boxing & unboxing in java

On the completion of the unit, a student should be able to: i) Understand uses of packages and Collections ii) To study and implement various classes and interfaces of Java Collections Framework.

#### **UNIT IV**

Exception handling -exception definition, benefits of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Multi-Threading:-Thread definition, types of multitasking, uses of multitasking, thread life cycle, creating threads using Thread class and Runnable interface, synchronizing threads, daemon thread. Applications of multithreading.

Objective:

On the completion of the unit, a student should be able to: i) Understand benefits of exception handling ii) Handle built-in and user defined exceptions iii) Understand the uses of multi-threading iv) Create multi-threaded programs using either Thread class or Runnable interface v) Know how to synchronize threads

#### **UNIT V**

Advantages of GUI over CUI ,The AWT class hierarchy, Introduction to Swings, Swings Elements:- JComponent, JFrame, user interface components- JLabels, JButton, JScrollbar, text components, check box, check box groups, choices, lists panels – scrollpane, menubar, graphics, layout, managers –border, grid, flow, card and grid bag.

Event handling: Delegation event model, closing a Frame, mouse and keyboard events, Adapter classes.

Applications: developing calculator, developing feedback form, developing bio data.

Objective:

On the completion of the unit, a student should be able to: i) Understand the advantages of GUI over CUI ii) Write GUI programs iii) Able to handle events using delegation event model iv) Use Swings elements in programs

#### **UNIT VI**

Applets – Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameters to applets.

Applications: Developing of simple advertisements.

Networking – Basics of network programming, addresses, ports, sockets, simple client server program, multiple clients, sending file from server to client.

Applications: One to one Chat application

Objective:

On the completion of the unit, a student should be able to: i) Write applet programs ii) Understand the concepts of networking iii) Understand socket programming iv) Write client-server applications

#### **TEXT BOOKS:**

1. Java; the complete reference, 6th edition, Herbert Schildt, TMH.
2. Introduction to Java programming 6th edition, Y. Daniel Liang, Pearson education.

#### **REFERENCES:**

1. Core Java 2, Vol 1, Fundamentals, Cay. S. Horstmann and Gary Cornell, seventh Edition, Pearson Education.
2. Core Java 2, Vol 2, Advanced Features, Cay. S. Horstmann and Gary Cornell, Seventh Edition, Pearson Education

**Syllabus for M. Tech I Year I Semester**  
**Computer Science and Engineering**  
**NATURAL LANGUAGE PROCESSING**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 5P105**

L	T	P	C
3	1	-	3

**Objectives:**

- To acquire basic understanding of linguistic concepts and natural language complexity, variability.
- To acquire basic understanding of machine learning techniques as applied to language.
- To implement N-grams Models.
- To understand the probabilistic version of CYK.

**UNIT I**

**Introduction and Overview** What is Natural Language Processing, hands-on demonstrations. Ambiguity and uncertainty in language. The Turing test.

**Regular Expressions** Chomsky hierarchy, regular languages, and their limitations. Finite-state automata. Practical regular expressions for finding and counting language phenomena. A little morphology. Exploring a large corpus with regex tools.

**UNIT II**

**Programming in Python** An introduction to programming in Python. Variables, numbers, strings, arrays, dictionaries, conditionals, iteration. The NLTK (Natural Language Toolkit)

**String Edit Distance and Alignment** Key algorithmic tool: dynamic programming, a simple example, use in optimal alignment of sequences. String edit operations, edit distance, and examples of use in spelling correction, and machine translation.

**UNIT III**

**Context Free Grammars** Constituency, CFG definition, use and limitations. Chomsky Normal Form. Top-down parsing, bottom-up parsing, and the problems with each. The desirability of combining evidence from both directions **Non-probabilistic Parsing** Efficient CFG parsing with CYK, another dynamic programming algorithms. Early parser. Designing a little grammar, and parsing with it on some test data.

**Probability** Introduction to probability theory Joint and conditional probability, marginals, independence, Bayes rule, combining evidence. Examples of applications in natural language. **Information Theory** The "Shannon game"--motivated by language! Entropy, crossentropy, information gain. Its application to some language phenomena.

**UNIT IV**

**Language modeling and Naive Bayes**

Probabilistic language modeling and its applications. Markov models. N-grams. Estimating the probability of a word, and smoothing. Generative models of language. Part of Speech Tagging and Hidden Markov Models, Viterbi Algorithm for Finding Most Likely HMM Path Dynamic programming with Hidden Markov Models, and its use for part-of-speech tagging, Chinese word segmentation, prosody, information extraction, etc.

**UNIT V**

**Probabilistic Context Free Grammars**

Weighted context free grammars. Weighted CYK. Pruning and beam search.

**Parsing with PCFGs**

A tree bank and what it takes to create one. The probabilistic version of CYK. Also: How do humans parse? Experiments with eye-tracking. Modern parsers.

**Maximum Entropy Classifiers**

The maximum entropy principle and its relation to maximum likelihood. Maximum entropy classifiers and their application to document classification, sentence segmentation, and other language tasks

## **UNIT VI**

### **Maximum Entropy Markov Models & Conditional Random Fields**

Part-of-speech tagging, noun-phrase segmentation and information extraction models that combine maximum entropy and finite-state machines. State-of-the-art models for NLP.

**Lexical Semantics** Mathematics of Multinomial and Dirichlet distributions, Dirichlet as a smoothing for multinomial's.

**Information Extraction & Reference Resolution**- Various methods, including HMMs. Models of anaphora resolution. Machine learning methods for co reference.

### **TEXT BOOKS:**

1. "Speech and Language Processing": Jurafsky and Martin, Prentice Hall
2. "Statistical Natural Language Processing"- Manning and Schutze, MIT Press
3. "Natural Language Understanding". James Allen. The Benajmins/Cummings Publishing Company

### **REFERENCES BOOKS:**

1. Cover, T. M. and J. A. Thomas: Elements of Information Theory. Wiley.
2. Charniak, E.: Statistical Language Learning. The MIT Press.
3. Jelinek, F.: Statistical Methods for Speech Recognition. The MIT Press.
4. Lutz and Ascher - "Learning Python", O'Reilly

**Syllabus for M. Tech I Year I Semester**  
**Computer Science and Engineering**  
**CLOUD COMPUTING**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 5PC06**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives:****Prerequisite:** Computer Networks and Operating Systems**Course Description:**

Cloud computing has evolved as a very important computing model, which enables information, software, and shared resources to be provisioned over the network as services in an on-demand manner. This course provides an insight into what is cloud computing and the various services cloud is capable.

At the end of the course, the student shall be able to:

- Understand the current cloud computing technologies, including technologies for Infrastructure as a Service, Platform as a Service, Software as a Service, and Physical Systems as a Service.
- Understand the different layers of the cloud technologies, practical solutions such as Google, Amazon, Microsoft, Salesforce.com, etc. as well as theoretical solutions are introduced.
- The course helps to understand the technologies and applications of cloud computing and its virtualization foundation used in servers, desktops, embedded devices and mobile devices.

In this course students will learn the cloud components to construct, scale, and operate efficient and highly scalable systems. During the course, students will build a small but functional and scalable application using these essential components

**UNIT - I**

Introductory Concepts & overview: Distributed Systems - Parallel Computing Architectures: Vector Processing, Symmetric Multi Processing and Massively parallel processing systems - High Performance Computing - Grid Computing - Service Oriented Architecture Overview - Virtualization.

**UNIT - II**

Overview of Cloud Computing : Meaning of the terms Cloud and cloud computing - cloud based service offerings - Grid Computing Vs Cloud Computing - Benefits of Cloud Model - limitations - legal issues - key characteristics of cloud computing - challenges for the cloud - the evolution of cloud computing.

**UNIT - III**

Web services delivered from the cloud: Infrastructure as a service - platform as a service - software as a service. Building Cloud networks: Evolution from the MSP model to cloud computing and software as a service - the cloud data center - SOA as step toward cloud computing - basic approach to a data center based SOA.

**UNIT - IV**

Federation Presence, Identity & Privacy in the Cloud: Federation in the cloud - presence in the cloud - privacy in the cloud - Privacy and its relation to cloud based information system. security in the cloud: cloud security challenges - software as a service security.

**UNIT - V**

Common Standards in cloud computing: the open cloud consortium - the distributed management task force - standards for application developers - standards for messaging - standards for security.

**UNIT - VI**

Mobile internet devices and the cloud: smartphone - mobile operating systems for smartphones - mobile platform virtualization - Collaboration Applications for mobile platforms - future trends.  
Casestudies: Map Reduce, HDFS.

**TEXT BOOKS:**

1. Cloud Computing Implementation, Management and Security by John W. Rittinghouse, James F. Ransome, CRC Press, Taylor & Francis group, 2010.
2. Cloud Computing a practical approach by Anthony T. Velte, Toby J. velte Robert Elsenpeter, Tata McGrawHill edition, 2010.

**REFERENCES:**

1. Cloud Application Architectures by George Reese, Oreilly publishers.
2. Cloud Computing and SOA convergence in your enterprise, David S. Linthicum, Addison- Wesley.
3. George Coulouris, JeanDollimore and Tim Kindberg. Distributed Systems:Concepts and Design (Edition 3 ).Addison-Wesley2001 .



**Syllabus for M.Tech I Year I Semester**  
**Computer Science and Engineering**  
**ADVANCED NETWORK PROGRAMMING**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 5P107**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives:**

Computer network programming involves writing computer programs that enable processes to communicate with each other across a computer network

**Network programming is client-server programming**

Inter-process communication, even if it is bidirectional, cannot be implemented in a perfectly symmetric way: to establish a communication channel between two processes, one process must take the initiative, while the other is waiting for it. Therefore, network programming unavoidably assumes a client-server model: The process initiating the communication is a client, and the process waiting for the communication to be initiated is a server. The client and server processes together form a distributed system. In a peer-to-peer communication, the program can act both as a client and a server.

**UNIT – I**

Linux Utilities- File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking utilities, Filters, Text processing utilities and Backup utilities.

Bourne again shell(bash) - Introduction, pipes and redirection, here documents, running a shell script, the shell as a programming language, shell meta characters, file name substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, shell script examples.

**UNIT - II**

Review of C programming concepts-arrays, strings (library functions), pointers, function pointers, structures, unions, libraries in C.

Files- File Concept, File types File System Structure, Inodes, File Attributes, file I/O in C using system calls, kernel support for files, file status information-stat family, file and record locking-lockf and fcntl functions, file permissions- chmod, fchmod, file ownership-chown, lchown , fchown, linkssoft links and hard links – symlink, link, unlink.

**UNIT - III**

File and Directory management – Directory contents, Scanning Directories- Directory file APIs.

Process- Process concept, Kernel support for process, process attributes, process control – process creation, replacing a process image, waiting for a process, process termination, zombie process, orphan process.

**UNIT - IV**

Signals- Introduction to signals, Signal generation and handling, Kernel support for signals, Signal function, unreliable signals, reliable signals, kill, raise , alarm, pause, abort, sleep functions. Interprocess Communication - Introduction to IPC mechanisms, Pipes- creation, IPC between related processes using unnamed pipes, FIFOs-creation, IPC between unrelated processes using FIFOs(Named pipes), differences between unnamed and named pipes, popen and pclose library functions, Introduction to message queues, semaphores and shared memory.

Message Queues- Kernel support for messages, UNIX system V APIs for messages, client/server example.

Semaphores-Kernel support for semaphores, UNIX system V APIs for semaphores.

**UNIT – V**

Shared Memory- Kernel support for shared memory, UNIX system V APIs for shared memory, client/server example.

Network IPC - Introduction to Unix Sockets, IPC over a network, Client-Server model ,Address formats(Unix domain and Internet domain), Socket system calls for Connection Oriented -

Communication, Socket system calls for Connectionless-Communication, Example-Client/Server Programs- Single Server-Client connection, Multiple simultaneous clients, Socket options – setsockopt, getsockopt, fcntl.

**UNIT-VI**

Network Programming in Java-Network basics, TCP sockets, UDP sockets (datagram sockets), Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI)-Basic RMI Process, Implementation details-Client-Server Application.

**TEXT BOOKS:**

1. Unix System Programming using C++, T.Chan, PHI.(Units II,III,IV)
2. Unix Concepts and Applications, 4th Edition, Sumitabha Das, TMH.(Unit I)
3. An Introduction to Network Programming with Java, Jan Graba, Springer, rp 2010.(Unit V)
4. Unix Network Programming ,W.R. Stevens, PHI.(Units II,III,IV)
5. Java Network Programming,3rd edition, E.R. Harold, SPD, O'Reilly.(Unit V)

**REFERENCE BOOKS:**

1. Linux System Programming, Robert Love, O'Reilly, SPD.
2. Advanced Programming in the UNIX environment, 2nd Edition, W.R.Stevens, Pearson Education.
3. UNIX for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.
4. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones, Wrox, Wiley India Edition.
5. Unix Network Programming The Sockets Networking API, Vol.-I,W.R.Stevens, Bill Fenner, A.M.Rudoff, Pearson Education.
6. Unix Internals, U.Vahalia, Pearson Education.
7. Unix shell Programming, S.G.Kochan and P.Wood, 3rd edition, Pearson Education.
8. C Programming Language, Kernighan and Ritchie, PHI

**Syllabus for M.Tech I Year I Semester**  
**Computer Science and Engineering**  
**ADVANCED OPERATING SYSTEMS**  
**PROFESSIONAL ELECTIVE- I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

Code: **5P108**

Course Outcomes:

On successful completion of the course, the student should be able to

1. Study and explore the internals of different types of operating system.
2. Explain advanced concepts in distributed operating systems.
3. Identify advanced topics such as multimedia operating systems, real-time operating systems and mobile computing.
4. To understand different memory management techniques.
5. Identify the methods used in defining and assessing criteria for measuring the extent to which a computer system is appropriate for its current deployment and future evolution

**UNIT – I:**

Operating System Introduction, Structures-Simple Batch, Multi Programmed, time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System Services, System Calls, Virtual Machines, System Design and Implementation, Microsoft Windows Overview, Modern UNIX Systems Overview, Linux Overview .

**UNIT – II:** Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Inter process Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling, Windows XP Thread and SMP Management , Linux Process and thread Management , Linux Scheduling , Windows XP Scheduling.

**UNIT – III:** Memory Management and Virtual Memory, Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing, Linux Memory Management, Windows XP Memory Management.

**UNIT – IV:** File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free space Management, Directory Management, Directory Implementation, Efficiency and Performance. Deadlocks – System Model, Dead locks Characterization, Methods for Handling Dead locks, Dead lock, Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

**UNIT – V:** Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors, UNIX Concurrency Mechanism, Linux Kernel Concurrency Mechanism, Windows XP Concurrency Mechanism.

**UNIT – VI :** Introduction to Distributed systems: Goals of distributed system, hardware and software concepts, design issues. Communication in Distributed systems: remote procedure call and group communication. Synchronization in Distributed systems: Clock synchronization, Mutual exclusion, Election algorithms, the Bully algorithm, a ring algorithm, atomic transactions, Deadlocks: deadlock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection. Shared Memory, page based Distributed shared memory, shared variable distributed shared memory.

**Text Books:**

- 1 Abraham Silberchatz, Peter B. Galvin, Greg Gagne : Operating System Principles, 7th Edition, John Wiley, 2006. ( I, II, III, IV, V).
- 2 Andrew. S.Tanenbaum : Distributed Operating Systems, 1st Edition, PHI, 1995. (VI, VII, VIII).  
Reference Books: 1. Stallings : Operating Systems – Internals and Design Principles, 6th Edition, Pearson Education/PHI, 2009. 2. Charles Crowley : Operating System - A Design Oriented Approach, 1st Edition, TMH, 1998.
3. Andrew S Tanenbaum : Modern Operating Systems, , 3rd Edition, Pearson/PHI,2008. 18
4. Dhamdhare : Operating Systems – A concept based approach, 2nd Edition, TMH, 2006. 5. Daniel P Bovet and Marco Cesati : Understanding the Linux Kernel, 3rd Edition, O’Reilly, 2005. 6. Distributed Operating Systems – Concepts and Design – Pradeep K. Sinha, IEEE 1997.

**Syllabus for M. Tech. I Year I semester  
Computer Science and Engineering  
HUMAN COMPUTER INTERACTION  
(PROFESSIONAL ELECTIVE –I)**

<b>Code : 5P109</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives:**

After completing this course students must be able to understand and make use of:

1. The human components functions, the importance of User Interface.
2. The Computer components functions.
3. The Interaction between the human and computer components.
4. Paradigms, Interaction design basics, HCI in the software process, Design rules, Implementation supports, Evaluation techniques, Universal design (Optional).

**UNIT I**

Introduction: Importance of user Interface – definition, importance of good design. Benefits of good design - A brief history of Screen design.

**UNIT II**

The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

**UNIT III**

Design process – Human interaction with computers, importance of human characteristics human consideration in Design, Human interaction speeds, understanding business functions.

**UNIT IV**

Screen Designing: Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

**UNIT V**

Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls.

Components – text and messages, Icons and increases – Multimedia, colours, uses problems, choosing colors.

Case studies: windows GUI.

**UNIT VI**

Software tools – Specification methods, interface – Building Tools.

Interaction Devices – Keyboard and function keys – pointing devices - speech recognition digitization and generation – image and video displays – Printers.

**TEXT BOOKS:**

1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamaTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann , Pearson Education Asia.

**REFERENCES:**

1. Human – Computer Interaction. ALAN DIX, JANET FINCAY, GRE GORYD, ABOWD, RUSSELL BEALG, PEARSON.
2. Interaction Design PRECE, ROGERS, SHARPS. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education

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**Syllabus for M.Tech I Year I semester**  
Computer Science and Engineering  
**INFORMATION RETRIEVAL SYSTEMS**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 5P110**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives:**

On completion of this course you should have gained a good understanding of the foundation concepts of information retrieval techniques and be able to apply these concepts into practice. Specifically, the student should be able to:

- To use different information retrieval techniques in various application areas
- To apply IR principles to locate relevant information large collections of data
- To analyze performance of retrieval systems when dealing with unmanaged data sources
- To implement retrieval systems for web search tasks.

**UNIT I**

Boolean retrieval. The term vocabulary and postings lists. Dictionaries and tolerant retrieval. Index construction. Index compression.

**UNIT II**

Scoring, term weighting and the vector space model. Computing scores in a complete search system. Evaluation in information retrieval. Relevance feedback and query expansion.

**UNIT III**

XML retrieval. Probabilistic information retrieval. Language models for information retrieval. Text classification.

**UNIT IV**

Vector space classification. Support vector machines and machine learning on documents

**UNIT V**

Flat clustering, Hierarchical clustering, Matrix decompositions and latent semantic indexing.

**UNIT VI**

Web search basics, Web crawling and indexes, Link analysis.

**TEXT BOOKS:**

1. Introduction to Information Retrieval , Christopher D. Manning and Prabhakar
2. Raghavan and Hinrich Schütze, Cambridge University Press, 2008.

**REFERENCE BOOKS:**

1. Information Storage and Retrieval Systems: Theory and Implementation, Kowalski, Gerald, Mark T Maybury, Springer.
2. Modern Information Retrieval, Ricardo Baeza-Yates, Pearson Education, 2007.
3. Information Retrieval: Algorithms and Heuristics, David A Grossman and Ophir Frieder, 2<sup>nd</sup> Edition, Springer, 2004.
4. Information Retrieval Data Structures and Algorithms, William B Frakes, Ricardo Baeza- Yates, Pearson Education, 1992.
5. Information Storage & Retrieval, Robert Korfhage , John Wiley & Sons.



**Syllabus for M. Tech I Year I semester**  
**Computer Science and Engineering**  
**Software Metrics and Quality Assurance**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 5P111**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives:**

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

- Understand quality management processes
- Distinguish between the various activities of quality assurance, quality planning and quality control.
- Understand the importance of standards in the quality management process and their impact on the final product.

**UNIT I : INTRODUCTION TO SOFTWARE METRICS**

Fundamentals of measurement, Scope of software metrics, Measurement theory, Software measurement validation software metrics data collection, Analysis methods.

**UNIT II PRODUCT AND QUALITY METRICS**

Measurement of internet product attributes, size and structure, external product attributes, measurement of quality, Software quality metrics, product quality-process quality, metrics for software maintenance.

**UNIT III MANAGEMENT METRICS**

Quality Management Models - Rayleigh Model, Problem Tracking Report (PTR) Model, Reliability Growth Model, Model Evaluation, Orthogonal Classification.

**UNIT IV FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE**

SQA basics, Software quality in business context, planning for software quality assurance , Product quality and process quality, Software process models, Total Quality Management, QC Tools and Modern Tools.

**UNIT V QUALITY ASSURANCE MODELS**

Models for Quality Assurance, ISO-9000 – Series CMM, CMMI, Test Maturity Models, SPICE, Malcolm ,Baldrige Model- P-CMM.

**UNIT VI SOFTWARE QUALITY ASSURANCE TRENDS**

Software Process PSP and TSP , OO Methodology, Clean-room software engineering, Defect injection and prevention -Internal Auditing and Assessments-Inspections & Walkthroughs

**TEXTBOOKS:**

1. Norman E-Fentor and Share Lawrence Pflieger.” Software Metrics”. International Thomson Computer Press, 1997.
2. Stephen H.Kan,”Metric and Models in software Quality Engineering”, Addison QWesley 1995.
3. S.A.Kelkar,”Software quality and Testing, PHI Learning, Pvt, Ltd., New Delhi 2012.

**Syllabus for M. Tech I Year I Semester**  
**Computer Science And Engineering**  
**ADVANCED COMPUTER NETWORKS**  
**(PROFESSIONAL ELECTIVE –II)**

**Code: 5P112**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objective:**

Features of advanced computer networks are deeply rooted to concepts of computer networks. One should have very good understanding of computer networks which may help in learning advanced computer networks in an easy manner. This course handles the networking concepts in detail to a greater extent which is very important as per the growing business of this area. The student is trained with the networking essentials such as standards and protocols in establishing successful communication between two ends over a vast network space.

**UNIT I**

**Computer Networks and the Internet:** What is the Internet, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones, Delay and Loss in Packet-Switched Networks, History of Computer Networking and the Internet – **(Chapter 1) of T1.**

**Foundation of Networking Models:** 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM - **(Chapter 2) of T2.**

**UNIT II**

**The Link Layer and Local Area Networks:** Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques, Multiple Access Protocols, Link Layer Addressing, Ethernet – **(Chapter 5) of T1**

**Unit - III**

**Routing and Internetworking:** Network-Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer – **(Chapter 7) of T2**

**UNIT IV**

**Logical Addressing:** IPv4 Addresses, IPv6 Addresses - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – **(Chapter 19, 20) of T3**

**Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control – **(Chapter 8) of T2**

**Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing – **(Chapter 2) of T1**

**UNIT V**

**Wireless Networks and Mobile IP:** Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - **Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks – **Wireless Sensor Networks and Protocol Structures - (Chapter 6, 19, 20) of T2**

**UNIT VI**

**VPNs, Tunneling and Overlay Networks:** Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony – **(Chapters 16, 18) of T2**

**TEXT BOOKS:**

1. Computer Networking: A Top-Down Approach Featuring the Internet, *James F. Kurose, Keith W. Ross*, Third Edition, Pearson Education, 2007
2. Computer and Communication Networks, *Nader F. Mir*, Pearson Education, 2007

**REFERENCE BOOKS:**

1. An Engineering Approach to Computer Networking , *S.Keshav*, Pearson Education, 1997
2. Computer Networks: Principles, Technologies And Protocols For Network Design, *Natalia Olifer, Victor Olifer*, Wiley India, 2006.
3. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.

4. Fundamentals of Business Data Communications, Jerry FitzGerald and Alan Dennis, Tenth Edition, Wiley, 2009.
5. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet*, Pearson Education (CISCO Press)
6. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill, 2007

**Syllabus for M. Tech. I Year I semester  
Computer Science and Engineering  
ARTIFICIAL INTELLIGENCE  
(PROFESSIONAL ELECTIVE – II)**

L	T	P	C
3	1	-	3

**Code: 5P113**

**Course Objectives:**

- To understand the different types of AI agents (c, i).
- Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms) (a, b).
- To understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving (a, b, c).
- Know how to build simple knowledge-based systems (i).
- Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information (a, c).
- Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems (c, i).
- Ability to carry out independent (or in a small group) research and communicate it effectively in a seminar setting.

**UNIT I**

**Introduction:** AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

**UNIT II**

**Searching:** Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Greedy best first search, A\* search Game Playing: Adverbial search, Games, minimax, algorithm, optimal decisions in multiplayer games, Alpha-Beta pruning, Evaluation functions, cutting of search. **Case studies:** Tic-tac-toe game

**UNIT III**

Knowledge Representation & Reasons logical Agents, Knowledge – Based Agents, the Wumpus world, logic, propositional logic, Resolution patterns in propos ional logic, Resolution, Forward & Backward, Chaining.

**UNIT IV**

First order logic. Inference in first order logic, propositional Vs. first order inference, unification & lifts forward chaining, Backward chaining, Resolution.

**UNIT V**

**Planning:** Classical planning problem, Language of planning problems, Expressiveness and extension, planning with state – space search, Forward states space search, Backward states – space search, Heuristics for states space search. Planning with state space search, partial order planning, Graphs. **Case studies:** STRIPS

## **UNIT VI**

**Learning:** Forms of learning, Induction learning, Learning Decision Tree, Statistical learning methods, Learning with complex data, learning with hidden variables – EM algorithm, Instance based learning, Neural Networks.

Case studies: Constructing Neural Network with MATLAB or SCILAB for AND, OR and EX-OR gates

## **TEXT BOOKS**

1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education.
2. Artificial Intelligence, 3<sup>rd</sup> Edition, Patrick Henry Winston, Pearson Education.

## **REFERENCES**

1. Artificial Intelligence , 2nd Edition, E.Rich and K.Knight (TMH).
2. Artificial Intelligence and Expert Systems – Patterson PHI.
3. Expert Systems: Principles and Programming- Fourth Edn, Giarrantana/ Riley, Thomson.
  4. PROLOG Programming for Artificial Intelligence. Ivan Bratka- Third Edition – Pearson Education

**Syllabus for M. Tech. I Year I semester  
Computer Science and Engineering  
SEMANTIC WEB AND SOCIAL NETWORKS  
(PROFESSIONAL ELECTIVE-II)**

**Code: 5PC14**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Outcomes**

Describe role of Web , its need and Intelligence.
Explain Machine Intelligence Ontology, Inference engines, Software Agents, Berners-Lee www and Semantic Road Map.
Describe Knowledge Representation for the Semantic Web with Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML and XML Schema.
Apply Ontology Engineering using Ontology Development Tools/ Methods, Ontology Libraries, Ontology Mapping, Logic and Inference Engines.
Explain Semantic Web Applications, Services and Technology.
Apply Social Network Analysis, Semantic web networks analysis and describe Building of Semantic Web Applications with social network features.

**Unit I**

**Web Intelligence:** Thinking and Intelligent Web Applications, The Information Age, The World Wide Web, Limitations of Today's Web, The Next Generation Web

**Unit II**

**Machine Intelligence:** Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

**Unit III**

**Knowledge Representation for the Semantic Web:** Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web –Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML, XML/XML Schema.

**Unit IV**

**Ontology Engineering:** Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

**Unit V**

**Semantic Web Applications, Services and Technology:** Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods,

**Unit VI**

**Social Network Analysis and Semantic web:** What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks, Building Semantic Web Applications with social network features.

**TEXT BOOKS:**

1. Thinking on the Web - Berners Lee, Godel and Turing, Wiley interscience, 2008.
2. Social Networks and the Semantic Web, Peter Mika, Springer, 2007.

**REFERENCE BOOKS:**

1. Semantic Web Technologies, Trends and Research in Ontology Based Systems, J.Davies,Rudi Studer,Paul Warren,JohnWiley&Sons.
2. Semantic Web and Semantic Web Services -Liyang Lu Chapman and Hall/CRC Publishers (Taylor & Francis Group)
3. Information Sharing on the semantic Web - Heiner Stuckenschmidt; Frank Van Harmelen, Springer Publications.
4. Programming the Semantic Web, T. Segaran, C. Evans, J. Taylor, O'Reilly, SPD.
5. A Semantic Web Primer, G. Antoniou and V. Harmelen, PHI.

**Syllabus for M. Tech. I Year I semester  
Computer Science and Engineering  
SCRIPTING LANGUAGES  
(PROFESSIONAL ELECTIVE –II)**

**Code: 5P115**

L	T	P	C
3	1	-	3

**Course Outcomes**

1. Explain Architecture, features, file systems, commands, utilities and securities issues of UNIX.
2. Use and apply important commands like grep, Sed and awk.
3. Write shell scripts using bash Shell.
4. Discuss python language syntax, statements, functions, Built-in-functions, Modules in python and Exception Handling.
5. Develop Integrated Web Applications in python.
6. Develop applications using Object-Orientation and use python Database Interface.

**Unit I**

Introduction to Unix:- Architecture of Unix, Features of Unix , Unix utilities – process utilities, disk utilities, networking commands, text processing utilities and backup utilities. Introduction to UNIX file system, vi editor, file handling utilities, security by file permissions.

**Unit II**

**Grep:** Operation, grep Family, Searching for File Content.

**Sed:** Scripts, Operation, Addresses, commands, Applications, grep and sed.

**awk:** Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.

**Unit III****Working with the Bash Shell:**

Introduction, Shell responsibilities, pipes and input redirection, output redirection, here documents, running a shell script, shell as a programming language, shell metacharacters, filename substitution, shell variables, command substitution, shell commands, the environment, quoting, test command, control structures, arithmetic in shell, Shell script examples, functions, debugging shell scripts.

**Unit IV****PYTHON**

Introduction to python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling



**Unit V**

Integrated Web Applications in python --- Building Small, Efficient python web Systems, Web Application Framework.

**Unit VI**

**Object-Orientation:** Data in Python, Data Structures in Python, Defining Classes

**The Python Database Interface**

Database Interfaces, the Underlying Interface Model, Some Database Modules, a Simple Database-Driven Web, SQL/Python Communication.

**TEXT BOOKS:**

1. UNIX and shell Programming Behrouz A. Forouzan, Richard F. Gilberg.Thomson.
2. Python Web Programming by Steve Holden

**REFERENCES:**

1. Your UNIX the ultimate guide, Sumitabha Das, TMH, 2<sup>nd</sup> Edition.
2. Programming in Python, Mark Lutz, Oreilly publications
3. Dive into python by Mark Pilgrim

**Syllabus for M. Tech. I Year I semester  
Computer Science and Engineering  
MOBILE COMPUTING  
(PROFESSIONAL ELECTIVE –II)**

**Code: 5P117**

L	T	P	C
3	1	-	3

**Course Outcomes**

1. Identify vast application areas for mobile / wireless communication / computing. They also understand the working principle of GSM technology.
2. Discuss various media access control methods that are meant for wireless communication along with SDMA, FDMA, TDMA and CDMA.
3. Identify IP mobile primitives in Network layer in the wireless communication and recognize suitable solutions for the same.
4. Explain the issues in the Transport layer in wireless communication and identifying suitable solutions for the same
5. Discuss MANETs with examples and explain hoarding, client sever computing along with the data delivery mechanisms.
6. Discuss protocols and tools such as WAP, Blue Tooth and explain emerging mobile operating systems.

**UNIT - I**

**Introduction to Mobile Communications and Computing:** Mobile Computing (MC): Introduction to MC, novel applications, limitations, introduction to mobile architecture - UMTS, GSM.

**Architecture GSM:** Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.

**UNIT - II**

**(Wireless) Medium Access Control:** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

**UNIT - III**

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

**UNIT - IV**

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

**UNIT - V**

**Mobile Ad hoc Networks (MANETs):** Overview, Properties of a MANET, spectrum of MANET applications, routing algorithms.

**Database:** Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, data delivery mechanisms

**UNIT - VI**

**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), introduction to mobile operating systems- Android, Java OS (J2ME).

**TEXT BOOKS**

1. Jochen Schiller, "Mobile Communications", *Addison-Wesley*. (Chapters 1, 2, 3, 4, 7, 8 and 9). Second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", *Wiley*, 2002, ISBN 0471419028. (Chapters 6, 11, 15, 17, 18, 19, 26 and 27)

**REFERENCES**

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,
2. Adelstein, Frank, [Gupta, Sandeep KS](#), [Richard III, Golden](#), [Schwiebert, Loren](#), "Fundamentals of Mobile and Pervasive Computing", ISBN: 0071412379, McGraw-Hill Professional, 2005.
3. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", *Springer*, second edition, 2003.
4. Martyn Mallick, "Mobile and Wireless Design Essentials", Wiley *DreamTech*, 2003
5. A. Tanenbaum "Computer Networks", 4<sup>th</sup> edition.

**Syllabus for M. Tech. I Year I semester  
Computer Science and Engineering  
BIG DATA ANALYTICS  
(PROFESSIONAL ELECTIVE –II)**

**Code: 5RC16**

L	T	P/D	C
3	1	-	3

**BIG DATA ANALYTICS****Course Outcomes:**

The students must be able to understand

- 1) The big Data platform, Challenges of Conventional Systems, Predictive Analytics, Data Mining, and Real Time Analysis by providing an advanced, practical background that allows the students to lead and participate in Big Data and Data Analytics projects.
- 2): Regression Modeling - Multivariate Analysis - Bayesian Modeling and Time series analysis.
- 3) The course incorporates a deep-dive into Big Data, the Data Analytics lifecycle, Machine Learning (ML), Hadoop (MapReduce, HDFS) and Tez, as well as the Apache projects Zookeeper, Storm, Kafka, Cassandra, HBase, and Mahout. Various Machine Learning algorithms are scrutinized and actual cases studies are conducted to solve comprehensive Big Data problems.

**UNIT I**

**INTRODUCTION TO BIG DATA:** Introduction to BigData Platform – Traits of Big data -Challenges of Conventional Systems - Web Data – Evolution Of Analytic Scalability - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - ReSampling - Statistical Inference - Prediction Error.

**UNIT II**

**DATA ANALYSIS :** Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Neural Networks: Learning And Generalization - Competitive Learning - Principal Component Analysis and Neural Networks - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees - Stochastic Search Methods.

**UNIT III**

**MINING DATA STREAMS :** Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

**UNIT IV**

**FREQUENT ITEMSETS AND CLUSTERING :** Mining Frequent Itemsets - Market Based Model – Apriori Algorithm – Handling Large Data Sets in Main Memory – Limited Pass Algorithm – Counting Frequent Itemsets in a Stream – Clustering Techniques – Hierarchical – K-Means – Clustering High Dimensional Data – CLIQUE And PROCLUS – Frequent Pattern based Clustering Methods – Clustering in NonEuclidean Space – Clustering for Streams and Parallelism.

**UNIT V**

**FRAMEWORKS AND VISUALIZATION :** MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques;

**UNIT VI:**

Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association Intelligence from unstructured information- Text analytics-Understanding of emerging trends and technologies-Industry challenges and application of Analytics

**TEXT BOOKS:**

1. Michael Berthold, David J. Hand, “Intelligent Data Analysis”, Springer, 2007.
2. AnandRajaraman and Jeffrey David Ullman, “Mining of Massive Datasets”, Cambridge University Press, 2012.
3. Bill Franks, “Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics”, John Wiley & sons, 2012.
4. Glenn J. Myatt, “Making Sense of Data”, John Wiley & Sons, 2007
5. Pete Warden, “Big Data Glossary”, O’Reilly, 2011.
6. Jiawei Han, MichelineKamber “Data Mining Concepts and Techniques”, Second Edition, Elsevier, Reprinted 2008.

**Syllabus for M. Tech. I Year I semester  
Computer Science and Engineering  
SOFTWARE REUSE  
(PROFESSIONAL ELECTIVE –II)**

**Code: 5P119**

<b>L</b>	<b>T</b>	<b>P/D</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Outcome:****The student must learn**

- 1) The basics of software reuse.
- 2) About Establishing and managing reuse Business.
- 3) About Various models used for software reuse.
- 4) About object oriented business engineering

**UNIT I INTRODUCTION**

Organizing Reuse - Introduction - Motivation for Reuse - Reuse driven organizations - Managing a reuse project - the characteristics of reuse of project - Roles in reuse projects - Adopting a project to reuse - Reuse tools.

**UNIT II REUSE METRICS**

Managing a repository - The REBOOT component model - Classification - Configuration management of the repository - Managing the repository - Computer supported cooperative working - Process metrics for reuse - Product metrics - Cost estimation - Forming a reuse Strategy - Assessing reuse maturity.

**UNIT III REUSABLE COMPONENTS**

Practicing reuse - Generic reuse development processes - Develop for reuse - Develop with reuse – Testing reusable components - Object oriented components - Techniques and life cycles

**UNIT IV OBJECT ORIENTED DEVELOPMENT FOR REUSE**

Object oriented development for reuse - Detailed design for reuse - Implementation for reuse - Verification, test and validation.

**UNIT V REUSE PHASES**

Development with reuse - with reuse specific activities - Common reuse processes - Phases of development with reuse - Impact of reuse on development cycle.

**UNIT VI CLEAN ROOM SOFTWARE ENGINEERING**

Re-engineering for reuse - Methodology - Retrieving objects in non-object oriented code-Measurements – Tools support for re-engineering - Overview of clean room software engineering - Phases in clean room method - Box structures algorithms - Adapting the box structures.

**Text Books:**

1. Even-Andre Karisson, " Software Reuse - A Holistic Approach ", John Wiley and Sons, 1996.
2. Karma McClure, " Software Reuse Techniques - Additional reuse to the systems development process ", Prentice Hall, 1997.

**Syllabus for M. Tech I Year I Semester  
Computer Science and Engineering  
Research Methodology**

L	T	P/D	C
1	1	-	1

**Code: 5P118**

**Course Outcomes:**

**1) After completing the course students are able to understand**

- 1) Study the concepts of Research, Characteristics and Prerequisites of research, Research needs in Engineering, Education, Science and Management.
- 2) Study the concepts of conducting a literature search, Evaluating, Organizing, and synthesizing the literature.
- 3) Identifying and describing the research, finding the research Problem, Sources of research problem
- 4) Perform Quantitative / Qualitative Research Design, basic principles of research design.
- 5) Familiar with concept of formatting a research proposal.
- 6) Familiar with writing Research report

**UNIT-I**

**1. Research Methodology: An Introduction**

Meaning of Research, Objectives of Research Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method. Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India,

**UNIT-II**

**2. Defining the Research Problem**

What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration, Conclusion .

**UNIT-III**

**3. Research Design**

Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Developing a Research Plan, Conclusion.

## **UNIT-IV**

### **4. Sampling Design**

Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample, Random Sample from an Infinite Universe, Complex Random Sampling Designs, Conclusion.

## **UNIT-V**

### **5. Methods of Data Collection**

Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data.

## **UNIT-VI**

### **6. Concept of Hypothesis and Testing**

What is a Hypothesis? Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Tests of Hypotheses. Important Parametric Tests, Hypothesis Testing of Correlation Coefficients, Limitations of the Tests of Hypotheses, Chi-square as a Test for Comparing Variance, Chi-square as a Non-parametric Test, Conditions for the Application of  $\chi^2$  Test, Steps Involved in Applying Chi-square Test.

#### **Text Books**

1. C.R. Kothari, Research Methodology Methods and Techniques, 2/e, Vishwa Prakashan, 2006
2. Donald H.McBurney, Research Methods, 5th Edition, Thomson Learning, ISBN:81-315-0047-0,2006

#### **Reference Books**

1. Donald R. Cooper, Pamela S. Schindler, Business Research Methods, 8/e, Tata McGraw-Hill Co. Ltd., 2006.
2. Fuzzy Logic with Engg Applications, Timothy J.Ross, Wiley Publications, 2nd Ed[d]
3. Simulated Annealing: Theory and Applications (Mathematics and Its Applications, by P.J. van Laarhoven & E.H. Aarts[e]
4. Genetic Algorithms in Search, Optimization, and Machine Learning by David E. Goldberg



**Syllabus for M. Tech I Year I Semester**  
Computer Science and Engineering

**ADVANCED DATA STRUCTURES and ALGORITHMS using JAVA LAB**

**Code: 5P171**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	<b>4</b>	<b>2</b>

**Objective:**

1. The fundamental design, analysis, and implementation of basic data structures.
2. Basic concepts in the specification and analysis of programs.
3. Principles for good program design, especially the uses of data abstraction.

**Sample Problems on Data structures:**

1. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods: a) Linear search b) Binary search
2. Write Java programs to implement the following using arrays and linked lists a) List ADT
3. Write Java programs to implement the following using an array. a) Stack ADT b) Queue ADT
4. Write a Java program that reads an infix expression and converts the expression to postfix form.  
  
(Use stack ADT).
5. Write a Java program to implement circular queue ADT using an array.
6. Write a Java program that uses both a stack and a queue to test whether the given string is a palindrome or not.
7. Write Java programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT
8. Write Java programs to implement the deque (double ended queue) ADT using  
a) Array b) Singly linked list c) Doubly linked list.
9. Write a Java program to implement priority queue ADT.
10. Write a Java program to perform the following operations:  
a) Construct a binary search tree of elements.  
b) Search for a key element in the above binary search tree.  
c) Delete an element from the above binary search tree.
11. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing.
12. Write a Java program to implement Dijkstra's algorithm for Single source shortest path problem.
13. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in  
a) Preorder b) Inorder c) Postorder.

14. Write Java programs for the implementation of bfs and dfs for a given graph.
15. Write Java programs for implementing the following sorting methods:
  - a) Bubble sort d) Merge sort g) Binary tree sort
  - b) Insertion sort e) Heap sort
  - c) Quick sort f) Radix sort
16. Write a Java program to perform the following operations:
  - a) Insertion into a B-tree b) Searching in a B-tree
17. Write a Java program that implements Kruskal's algorithm to generate minimum cost spanning tree.
18. Write a Java program that implements KMP algorithm for pattern matching.

**REFERENCE BOOKS:**

1. Data Structures and Algorithms in java, 3rd edition, A.Drozdek, Cengage Learning.
  2. Data Structures with Java, J.R.Hubbard, 2nd edition, Schaum's Outlines, TMH.
  3. Data Structures and algorithms in Java, 2nd Edition, R.Lafore, Pearson Education.
  4. Data Structures using Java, D.S.Malik and P.S. Nair, Cengage Learning.
  5. Data structures, Algorithms and Applications in java, 2nd Edition, S.Sahani, Universities Press.
  6. Design and Analysis of Algorithms, P.H.Dave and H.B.Dave, Pearson education.
  7. Data Structures and java collections frame work, W.J.Collins, Mc Graw Hill.
  8. Java: the complete reference, 7th editon, Herbert Schildt, TMH.
  9. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education / Java: How to Program P.J.Deitel and H.M.Deitel , 8th edition, PHI.
  10. Java Programming, D.S.Malik,Cengage Learning.
  11. A Practical Guide to Data Structures and Algorithms using Java, S.Goldman & K.Goldman, Chapman & Hall/CRC, Taylor & Francis Group.
- ( Note: Use packages like `java.io`, `java.util`, etc)

**Syllabus for M. Tech I Year I Semester**  
**Computer Science and Engineering**  
**Literature Review and Seminar-1**

**Code: 5P172**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	<b>3</b>	<b>1</b>

**Max. Marks: 100**

**After studying this course, the students will be able to**

1. Identify a research topic
2. Collect literature
3. Present seminar
4. Discuss the queries

There shall be three seminar presentations during I year I semester and I year II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 25 marks. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester the report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Technical Seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

**The evaluation format for seminar is as follows:**

- Day to day evaluation by the Supervisor : 20 marks
- Final Report : 20 marks
- Presentation : 60 marks (20 Abstract seminar +40 Final Presentation)

The presentation includes content (5) + Participation (5) + Presentation (10) for a total of 20 marks and double for 40 marks for final presentation.

A Student has to concentrate on the following sections while writing technical paper or presenting seminar.

**Contents:**

- Identification of specific topic
- Analysis
- Organization of modules
- Naming Conventions
- Writing style
- Figures
- Feedback
- Miscellaneous

REFERENCES:

**Teach Technical Writing in Two Hours per Week by Norman Ramsey**

For Technical Seminar the student must learn few tips from sample seminars and correcting himself, which is continues learning process

REFERENCE LINKS:

- I. <http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm>
- II. <http://www.cse.psu.edu/~yuanxie/advice.htm>
- III. <http://www.eng.unt.edu/ian/guides/postscript/speaker.pdf>

**NOTE:** A student can use any references for this process, but must be shared in classroom.

**Syllabus for M. Tech I Year I Semester**  
Computer Science and Engineering  
**Comprehensive Viva-Voce-1**

**Code: 5P173**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	3	2

**Max. Marks: 100**

There shall be a Comprehensive Viva-Voce in II year I Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he/she studied during the M.Tech course of study. The Comprehensive Viva-Voce is valued for 50 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce. A candidate has to secure a minimum of 50% to be declared successful.

# **Syllabus for M. Tech I Year II Semester**

Computer Science and Engineering

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**Syllabus for M. Tech I Year II Semester**  
Computer Science and Engineering  
**NETWORK SECURITY AND CRYPTOGRAPHY**

**Code: 5PC20**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objective:**

The students should learn all cryptographic algorithms, attacks on information passing through the network. After completion of this course, they are in a position to implement several authentication and encryption algorithm. They understand the security protocols in different layers.

**UNIT - I**

Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs.

**UNIT - II**

Conventional Encryption Principles, Conventional encryption algorithms: DES, TDES, AES, cipher block modes of operation, location of encryption devices, key distribution, Approaches of Message Authentication, Secure Hash Functions: SHA1 and HMAC.

Public key cryptography principles, public key cryptography algorithms: RSA, DIFFIE HELL MAN, digital signatures, digital Certificates, Certificate Authority and key management

Kerberos, X.509 Directory Authentication Service.

**UNIT - III**

Email privacy: Pretty Good Privacy (PGP) and S/MIME.

**UNIT - IV**

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

**UNIT – V**

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).

Intruders, Viruses and related threats.

**UNIT - VI**

Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

**TEXT BOOKS :**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Hack Proofing your network by Ryan Russell, Dan Kaminsky, Rain Forest Puppy, Joe Grand, David Ahmad, Hal Flynn Ido Dubrawsky, Steve W.Manzuik and Ryan Permech, wiley Dreamtech

**REFERENCES :**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.



**Syllabus for M. Tech I Year II Semester**  
Computer Science and Engineering

**Mobile Application Développement**

**Code: 5P221**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Outcome:**

The student must learn

- 1) Skills leaned in the Multimedia Technology.
- 2) Students will be exposed to a variety of software applications (includes the Internet, Adobe Photoshop, Illustrator, InDesign, Premiere, Flash and Dreamweaver). Students will be assigned projects in which they will work closely with staff. These projects will included but are not limited to: creating a multimedia graphics presentation, researching information from the Internet and other library sources, taking and editing photographs, creating a layered image for publishing, creating an advertisement, creating a business brochure, creating a cartoon, creating a tourism movie on a specified town, creating website(s), and creating an animated movie.

**UNIT-I**

Fundamental concepts in Text and Image: Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

**UNIT-II**

Fundamental concepts in video and digital audio: Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

**UNIT-III**

**Multimedia data compression:** Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

**UNIT-IV**

**Action Script I:** ActionScript Features, Object-Oriented ActionScript, Datatypes and Type Checking, Classes, Authoring an ActionScript Class

**UNIT-V**

**Action Script II:** Inheritance, Authoring an ActionScript 2.0 Subclass, Interfaces, Packages, Exceptions

**UNIT VI**

**Application Development:** An OOP Application Frame work, Using Components with ActionScript MovieClip Subclasses.

**TEXT BOOKS:**

1. Fundamentals of Multimedia by Ze-Nian Li and Mark S. Drew PHI/Pearson Education.
2. Essentials ActionScript 2.0, Colin Moock, SPD O,REILLY.

**REFERENCE BOOKS:**

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
3. Multimedia and communications Technology, Steve Heath, Elsevier (Focal Press).
4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
5. Multimedia Basics by Weixel Thomson.
6. Multimedia Technology and Applications, David Hilman , Galgotia.

**Syllabus for M.Tech I Year II Semester**  
**Computer Science and Engineering**  
**WEB TECHNOLOGIES & SERVICES**

**Code: 5P222**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Objective:**

The student who has knowledge of programming with java should be able to develop web based solutions using multi-tier architecture. She / He should have good understanding of different technologies on client and server side components as Follows:

Client Side: HTML5, CSS, Javascript, Ajax, and JSON

Server Side: PHP

Web services fundamentals, Axis framework for WS

**UNIT I**

**HTML5:** Introduction, Editing HTML5, First HTML5 Example, W3C HTML5 Validation Service, Headings, Linking, Images, Special Characters and Horizontal Rules, Lists, Tables, Forms, Internal Linking, meta Elements, New HTML5 Form input Types, input and datalist Elements and autocomplete Attribute, Page-Structure Elements

**Cascading Style Sheets:** Introduction, Inline Styles, Embedded Style Sheets, Conflicting Styles, Linking External Style Sheets, Positioning Elements, Backgrounds, Element, Box Model and Text Flow, Media Types and Media Queries, Drop-Down Menus, Text Shadows , Rounded Corners, Color, Box Shadows, Linear Gradients; Introducing Vendor Prefixes, Radial Gradients, Multiple Background Images, Image Borders, Animation; Selectors, Transitions and Transformations, Layouts.

**UNIT II:**

**JavaScript:** Introduction to Scripting, Control Statements, Functions, Arrays, Objects

**UNIT III**

**XML :** Introduction, XML Basics, Structuring Data, XML Namespaces, Document Type Definitions (DTDs) W3C XML Schema Documents, XML Vocabularies, Extensible Stylesheet Language and XSL Transformations, Document Object Model (DOM)

**Ajax-Enabled Rich Internet Applications with XML and JSON:** Introduction, Rich Internet Applications (RIAs) with Ajax, History of Ajax,“Raw” Ajax Example Using the XMLHttpRequest Object, Using XML and the DOM, Creating a Full-Scale Ajax-Enabled Application.

#### **UNIT IV**

**PHP** Introduction, Simple PHP Program, Converting Between Data Types, Arithmetic Operators, Initializing and Manipulating Arrays, String Comparisons, String Processing with Regular Expressions, Form Processing and Business Logic, Reading from a Database, Using Cookies, Dynamic Content.

#### **UNIT V: Web Services I**

Web Services and Service-Oriented Architecture, History of Web Services, What Is REST?, Review of HTTP Requests and Responses, HTTP as an API, A First RESTful Example, Why Use Servlets for RESTful Web Services? **RESTful Web Services:** The Service Side, The Client Side

#### **UNIT VI: Web Services II**

SOAP-Based Web Services, SOAP Handlers and Faults, Web Services Security, Web Services and Java Application Servers

#### **TEXT BOOKS:**

- Internet & World Wide Web How to Program, 5/e Paul J. Deitel, Harvey M. Deitel, Abbey Deitel
- Java Web Services: Up and Running, 2nd Edition, Martin Kalin, O'Reilly Media

#### **REFERENCE BOOKS:**

1. Programming the world wide web,4th edition,R.W.Sebesta,Pearson
2. Web Programming, building internet applications, Chris Bates 3 edition, WILEY Dreamtech .
3. The complete Reference Java 7 Edition , Herbert Schildt., TMH.
4. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India, rp –2008.
5. Understanding SOA with Web Services, Eric Newcomer and Greg Lomow, Pearson Edition –2009
6. Java Web Service Architecture, James McGovern, Sameer Tyagi et al., Elsevier - 2009
7. Beginning Web Programming-Jon Duckett ,WROX.
8. Java Script,D.Flanagan,O'Reilly,SPD.
9. Building Web Services with Java, 2 Edition, S. Graham and others, Pearson Edn., 2008.
10. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly,SPD.
11. McGovern, et al., Java Web Services Architecture, Morgan Kaufmann Publishers,2005.

**Syllabus for M. Tech. I Year II semester  
Computer Science and Engineering  
DATA WAREHOUSING AND DATA MINING**

L	T	P	C
3	1	-	3

**Code : 5PC23**

**Course outcomes:**

After undergoing the course, Students should be able to understand

- Design a data mart or data warehouse for any organization
- Develop skills to write queries using DMQL
- Extract knowledge using data mining techniques
- Adapt to new data mining tools
- Explore recent trends in data mining such as web mining, spatial-temporal mining
- Differentiate Online Transaction Processing and Online Analytical processing
- Learn Multidimensional schemas suitable for data warehousing
- Understand various data mining functionalities
- Inculcate knowledge on data mining query languages
- Know in detail about data mining algorithms

**UNIT I**

**Introduction:** Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining

**Data Preprocessing:** Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation. Data Mining Primitives, Data Mining Query Languages, Architectures of Data Mining Systems

**UNIT II**

Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation

**Data Cube Computation:** Efficient Methods for simple Data Cube Computation (Full Cube, Iceberg Cube, Closed Cube and Shell Cube), Discovery Driven exploration of data cubes

**UNIT III**

**Concepts Description: Characterization and Comparison:** Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

**UNIT IV**

**Mining Association Rules in Large Databases :** Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

**UNIT V**

**Classification and Prediction:** Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

## **UNIT VI**

**Cluster Analysis Introduction:** Introduction to machine learning, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

### **TEXT BOOK:**

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
2. Introduction to Data Mining - First Edition, by Pang-Ning Tan, Michael Steinbach and Vipin Kumar, ISBN-13: 978-0321321367

### **REFERENCES:**

1. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION
2. Data Mining Techniques – ARUN K PUJARI, University Press.
3. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
4. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.
5. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION

**Syllabus for M.Tech I Year II Semester**  
**Computer Science and Engineering**  
**SOFTWARE ARCHITECTURE AND DESIGN PATTERN**  
**(PROFESSIONAL ELECTIVE –III)**

**Code: 5S207**

L	T	P	C
3	1	-	3

**Course Objective:**

The main purpose of the course is to understanding of the concept of software architecture and how this phase in the development between requirement specification and detailed design plays a central role for the success of a software system. The students will get knowledge of some well-known architecture patterns, and be able to design, construct and evaluate architectures for software systems. The Student understands what a design pattern is, how to describe the design patterns, how design pattern solve design problems, and student be able to identify appropriate patterns for design problems.

**UNIT I**

**Envisioning Architecture**

The Architecture Business Cycle, What is Software Architecture, Architectural styles and patterns.

**UNIT II**

**Creating an Architecture**

Quality Attributes, Moving from quality to Architecture, UNIT Operations, Achieving qualities, designing the Architecture, Documenting the architecture, Reconstructing Software Architecture, shared information systems

**UNIT III**

**Analyzing Software Architecture**

Analyzing development qualities at the architectural level, SAAM, ATAM, CBAM, Architecture Reviews

**Moving from Architecture to Systems**

Software Product Lines, Building systems from off the shelf components, Reuse of Architectural assets within an organization.

**UNIT IV**

**Patterns**

what is pattern? Pattern categories, Pattern Description, Patterns and Software Architecture, Pattern Systems, Classification, Selection, Creational Patterns.

**UNIT V**

Design Patterns Catalogue, Structural Pattern, Behavioural Patterns, Pattern Community, Designing a document editor

Tools for Architectural design, Unicon, A4 - Exploiting style in architectural design, Architectural Interconnection.

**UNIT VI**

**Case Studies:**

Key word in Context, The World Wide Web - a case study in interoperability, Instrumentation software, cruise control, three vignettes in mixed styles, CORBA - a case study on Industry Standard computing infrastructure, Flight Simulation – a case study in architecture for integration, Celsius Tech – a case study in product line development.

**TEXT BOOKS**

- 1 Software Architecture in Practice, 2nd Edition by Len Bass, Paul Clements, Rick Kazman, published by Pearson Edition
2. Design Patterns, by Erich Gamma, Pearson Education
3. Mary Shaw David Garlan, "Software Architectural Perspectives on an emerging discipline ",  
EEE, PHI 1996

**Syllabus for M.Tech I Year II Semester**  
 Computer Science and Engineering  
**IMAGE PROCESSING AND PATTERN RECOGNITION**  
 (PROFESSIONAL ELECTIVE –III)

**Code: 5PC24**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives**

- Covers the basic theory and algorithms that are widely used in digital image processing
- Expose students to current technologies and issues that are specific to image processing systems
- Develop applications using image processing techniques
- Develop critical thinking about shortcomings of the state of the art in image processing
- Understand fundamental methods of pattern recognition related to Image Processing applications

**UNIT I**

The digitized image and its properties: Applications of image processing, image function, image representation, sampling, quantization, colour images, metrics and topological properties of digital images, histograms, image quality, noise image. Introduction to Fourier Transform and DFT – Properties of 2D Fourier Transform– Separable Image Transforms -Walsh – Hadamard – Discrete Cosine Transform, Haar, Slant – Karhunen – Loeve transforms, DWT.

**UNIT II**

Image pre-processing: Pixel brightness transformation, position dependent brightness correction, grey scale transformation; geometric transformation, Histogram equalization ,local pre-processing- image smoothening, Sharpening filters – Homomorphic filtering, edge detectors, zero-crossing, scale in image processing, canny edge detection, parametric edge models, edges in multi spectral images, local pre-processing and adaptive neighbourhood pre processing; image restoration

**UNIT III**

Image Segmentation-Threshold detection methods, optimal thresholding, multispectral thresholding, thresholding in hierarchical data structures; edge based image segmentation- edge image thresholding, edge relaxation, border tracing, border detection.



#### **UNIT IV**

Mathematical Morphology—Basic morphological concepts, four morphological principles, binary dilation, erosion, Hit or miss transformation, opening and closing; thinning and skeleton algorithms; Morphological segmentation -particles segmentation and watersheds, particles segmentation.

#### **UNIT V**

Image textures—statistical texture description, methods based on spatial frequencies, co-occurrence matrices, edge frequency, and texture recognition method applications

Image representation and description—representation, boundary descriptors, regional descriptors

#### **UNIT VI**

Pattern recognition fundamentals: Basic concepts of pattern recognition, fundamental problems in pattern recognition system, design concepts and methodologies, example of automatic pattern recognition systems, a simple automatic pattern recognition model

#### **TEXT BOOKS**

1. Image Processing Analysis and Machine Vision by Millan sonka, Vaclav Hiavac, Roger Boyle, Vikas publishing House, Brooks/Cole.
2. Digital Image Processing Second Edition by Rafel C. Gonzalez Richard E. Woods. Pearson Education
3. Pattern Recognition principles by Julius T. Tou and Rafel C. Gonzalez, Addison –Wesley publishing company.
4. Pattern Recognition and Image Analysis by Earl Gose, Richard Johnsonbaugh, Prentice Hall of India private limited, 1999.
5. A.K. Jain, PHI, New Delhi (1995)-Fundamentals of Digital Image Processing.

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**Syllabus for M.Tech I Year II Semester**  
Computer Science and Engineering  
**MACHINE LEARNING**  
**(PROFESSIONAL ELECTIVE –III)**

**Code: 5P225**

L	T	P	C
3	1	-	3

**Course Objectives:**

1. This course will cover several advanced topics in Artificial Intelligence.
2. This is a course of studying common state-of-the-art algorithms for both data compression and error-correcting codes which use the same tools and techniques as machine learning.
3. By the end of this course, students should possess a firm grounding in the existing techniques and component areas of Artificial Intelligence and be able to apply this knowledge to the development of Intelligent Systems or to the exploration of research problems.

**Unit I**

Introduction: Designing a learning system, perspectives and issues in machine learning, a concept learning task, concept learning as search, finding a maximally specific hypotheses, version spaces and the Candidate-Elimination algorithm

**Unit II**

Decision tree learning: Introduction, representation, appropriate problems for decision tree learning, the basic decision tree learning algorithms, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning

**Unit III**

Introduction to information theory, probability, entropy and inference, Data compression: The source coding theorem (without proof), limits of compressibility- Huffman coding, hash codes

**Unit IV**

Probabilities and inference: An example inference task: Clustering, exact inference by complete enumeration, maximum likelihood and clustering, Model comparison and Occam's razor, Monte Carlo methods, efficient Monte Carlo methods

**Unit V**

Neural networks: Introduction to neural networks, the single neuron as a classifier, capacity of a single neuron, learning as inference

**Unit VI**

Hopfield networks, boltzmann machines, supervised learning in multilayer networks

**Text Books:**

1. Machine Learning, Tom M. Mitchell, McGraw Hill, first edition, 1997.
2. Information Theory, Inference, and Learning Algorithms, David J.C. MacKay, first edition, 2005.

**Reference Book:**

1. Pattern Classification, [Richard O. Duda](#), [Peter E. Hart](#), David E Strok, second edition

**Syllabus for M.Tech I Year II Semester**  
**Computer Science and Engineering**  
**WIRELESS NETWORKS**  
**(PROFESSIONAL ELECTIVE –III)**

**Code: 5P226**

L	T	P	C
3	1	-	3

**Course outcome:**

At the end of the course, the students will be able to

1. Build an understanding of the fundamental concepts of computer networking, TDMA.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area in IEEE 802.11 MAC sublayer.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

**UNIT I MULTIPLE RADIO ACCESS**

Medium Access Alternatives: Fixed-Assignment for Voice Oriented Networks Random Access for Data Oriented Networks , Handoff and Roaming Support, Security and Privacy.

**UNIT II WIRELESS WANS**

First Generation Analog, Second Generation TDMA – GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000)

**UNIT III WIRELESS LANS**

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, Physical Layer- MAC sublayer- MAC Management Sublayer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

**UNIT IV ADHOC AND SENSOR NETWORKS**

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

**UNIT V WIRELESS MANS AND PANS**

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

**UNIT VI PROTOCOLS:**

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).

**TEXT BOOKS:**

1. William Stallings, "Wireless Communications and networks" Pearson / Prentice Hall of India, 2nd Ed., 2007.
2. Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2nd Ed., 2007.

**REFERENCES:**

1. Vijay. K. Garg, "Wireless Communication and Networking", Morgan Kaufmann Publishers, 2007.
2. Kaveth Pahlavan, Prashant Krishnamurthy, "Principles of Wireless Networks", Pearson Education Asia, 2002.
3. Gary. S. Rogers & John Edwards, "An Introduction to Wireless Technology", Pearson Education, 2007.
4. Clint Smith, P.E. & Daniel Collins, "3G Wireless Networks", Tata McGraw Hill, 2nd Ed,

**Syllabus for M.Tech I Year II Semester**  
**Computer Science and Engineering**  
**ADHOC SENSOR NETWORKS**  
**(PROFESSIONAL ELECTIVE –III)**

**Code: 5P227**

L	T	P	C
3	1	-	3

**Course Outcome:**

The student must have gained an understanding of the current topics in Ad hoc sensor networks · Understand the issue of broadcast storms and flooding, and how some techniques attempt to reduce them. · Are familiar with the layers of the Bluetooth standard and its functions · Have gained an understanding of the sensor network design, data retrieving from sensor networks and its security.

**UNIT I****ROUTING**

Cellular and Ad hoc wireless networks – Issues of MAC layer and Routing – Proactive, Reactive and Hybrid Routing protocols – Multicast Routing – Tree based and Mesh based protocols – Multicast with Quality of Service Provision.

**UNIT II QUALITY OF SERVICE**

Real-time traffic support – Issues and challenges in providing QoS – Classification of QoS Solutions – MAC layer classifications – QoS Aware Routing Protocols – Ticket based and Predictive location based Qos Routing Protocols

**UNIT III ENERGY MANAGEMENT AD HOC NETWORKS**

Need for Energy Management – Classification of Energy Management Schemes – Battery Management and Transmission Power Management Schemes – Network Layer and Data Link Layer Solutions – System power Management schemes

**UNIT IV MESH NETWORKS**

Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic Routing – Self Configuration and Auto Configuration - Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks

**UNIT V SENSOR NETWORKS**

Introduction – Sensor Network architecture – Data Dissemination – Data Gathering – MAC Protocols for sensor Networks – Location discovery – Quality of Sensor Networks – Evolving Standards – Other Issues – Recent trends in Infrastructure less Networks

**UNIT VI**

**SECURITY:** Security in Adhoc Networks, Key management, Secure routing.

**SENSOR NETWORK PLATFORM AND TOOLS:** Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level software Platforms, ns-2 and its sensor network extension, TOSSIM.

**TEXT BOOK:**

1. C. Siva Ram Murthy and B.S.Manoj, “Ad hoc Wireless Networks – Architectures and Protocols”, Pearson Education, 2004

**REFERENCES**

1. Feng Zhao and Leonidas Guibas, “Wireless Sensor Networks”, Morgan Kaufman Publishers, 2004.

2. C.K.Toh, “Adhoc Mobile Wireless Networks”, Pearson Education, 2002.

3. Thomas Krag and Sebastin Buettrich, ‘Wireless Mesh Networking’, O’Reilly Publishers, 2007.

**Syllabus for M. Tech. I Year II semester  
Computer Science and Engineering  
SOFTWARE RISK MANAGEMENT AND MAINTAINANCE  
(PROFESSIONAL ELECTIVE –III)**

Code: 5P228

L	T	P/D	C
3	1	-	3

**Course Objectives**

Upon completion of the course, students would have obtained:

- An ability to apply knowledge of mathematics, science, and engineering.
- An ability to design and conduct experiments, as well as to analyze and interpret data.
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, safety, and sustainability.
- Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
- An ability to identify, formulate, and solve engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively.
- Demonstrate a knowledge and understanding of management and business practices, such as risk and change management, and understand their limitations.
- A recognition of the need for, and an ability to engage in life-long learning.

**UNIT I: RISK CULTURE PROCESS**

Risk- Basic Terms- Risk Vocabulary – Risk- Driven Project Management- Controlling the Process, Environment and Risk- Maturity in Risk Culture – Risk Scale – Preparing for Risk

**UNIT II MANAGEMENT PROCESS**

Risk Management- Paradigms- Five Models of Risk Management – Thinking about Less Risky alternatives – Risk Management at Different Levels – Risk Escalation – Risk Models- Risk Intelligence - Software Risk Management steps.

**UNIT III: DISCOVERING RISK AND ASSESSMENT**

Identifying software risk- Classification of Risks – Risk Taxonomy – Risk Mapping – Statements – Risk Reviews – Risk Ownership and stakeholder management – Risk Assessment Approach – Risk Assessment tools and techniques – Risk Probability, impact, exposure, matrix and Application Problem- Self- assessment checklist.

**UNIT IV : RESPONDING TO RISKS AND TRACKING**

Special Treatment for Catastrophic risks- Constraint Risks – Risk Mitigation Plan Case Study – Contingency Plans- Implementing Risk Response- Tracking Risk Response and Hazards – Trigger Levels- Tracking Project Risks and Operational Risks- Learning by Tracking and Risk Tracker Tool.

**UNIT V: MAINTENANCE PROCESS**

Software Maintenance- Customer's Viewpoint- Economics of Maintenance- Issues in Maintenance- Software Maintenance Standard, Process, Activities and Categories – Maintenance Measurement – Service Measurement and Benchmarking – Problem Resolution- Reporting – Fix Distribution.

**UNIT VI: ACTIVITIES FOR MAINTENANCE**

Role of SQA for Support and Maintenance – SQA tools for Maintenance- Configuration Management and Maintenance – Maintenance of Mission Critical Systems – Global Maintenance Teams – Foundation of S3m Process Model- Exemplary Practices.



**REFERENCES:**

1. C. RavindranathPandian, "Applied Software Risk Management: A guide for Software Project Managers", Auerbach Publications, 2007.
2. John Mcmanus, "Risk Management in Software Development Projects", Elsevier Butterworth- Heinemann, First Edition, 2004.
3. Alian April and Alain Abran, "Software Maintenance Management: Evaluation and Continuous Improvement", John Wiley & Sons Inc, 2008.
4. Gopalaswamy Ramesh and Ramesh Bhattiprolu, "Software Maintenance: Effective Practices for Geographically Distributed Environments", Second Reprint, Tata McGraw- Hill, 2009.

**Syllabus for M. Tech I Year I Semester**  
**Computer Science and Engineering**  
**SOFTWARE PROCESS AND PROJECT MANAGEMENT**  
**(PROFESSIONAL ELECTIVE –III)**

**Code: 5S202**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course Objectives:**

At the end of the course, the student shall be able to:

1. To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. To compare and differentiate organization structures and project structures.
3. To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

**UNIT I**

**Software Process Maturity** : Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

**Process Reference Models** Capability Maturity Model (CMM), CMMi, PCMM, PSP, TSP.

**UNIT II**

**Software Project Management Renaissance** Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

**UNIT III**

**Life-Cycle Phases and Process artifacts** Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.

**UNIT IV**

**Workflows and Checkpoints of process** Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments.

**Process Planning** Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

**UNIT V**

**Project Organizations** Line-of- business organizations, project organizations, evolution of organizations, process automation.

**Project Control and process instrumentation** The seven core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

**UNIT VI**

**CCPDS-R Case Study and Future Software Project Management Practices** Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.

**TEXT BOOKS:**

1. Managing the Software Process, Watts S. Humphrey, Pearson Education.
2. Software Project Management, Walker Royce, Pearson Education.

**REFERENCE BOOKS:**

1. Effective Project Management: Traditional, Agile, Extreme, Robert Wysocki, Sixth edition, Wiley India, rp2011.
2. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education, 2000
3. Process Improvement essentials, James R. Persse, O'Reilly, 2006
4. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH, 2006
5. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly, 2006.
6. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly, 2007
7. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon 2ed, Wiley India, 2004.

**M. Tech I year II semester**  
Computer Science and Engineering  
**BANKING OPERATIONS, INSURANCE & RISK MANAGEMENT**  
**Open Elective – I**

L	T	P/D	C
3	1	-	3

**Code: 5ZC03**

**Course Objective:** The objective of the course is to provide to students an understanding of Banking Operations, Insurance Market, and Risk Management Principles and techniques to control the risk, & the major Institutions involved and the Services offered within this framework.

**UNIT I**

**INTRODUCTION TO BANKING BUSINESS:** Introduction to Banking sectors-History of banking business in India, Structure of Indian banking system: Types of accounts, advances and deposits in a bank New Dimensions and products- E-Banking, Mobile-Banking, Net Banking, CRM, cheque system and KYC system.

**UNIT II**

**BANKING REFORMS AND REGULATIONS:** Banking regulation Act-1949, Reserve Bank of India Act-1934, Establishment of RBI, Functions and credit control system; Role of commercial banks and its functions. Banking sector reforms in India and deficiencies in Indian banking including problems accounts and Non-Performing Assets.

**UNIT III**

**INTRODUCTION TO INSURANCE:** Introduction to insurance, Need and importance of Insurance, principles of Insurance, characteristics of insurance contract, branches of insurance and types of insurance; life insurance and its products: Role of Agents and brokers.

**UNIT IV**

**INSURANCE BUSINESS ENVIRONMENT:** Regulatory and legal frame work governing the insurance sector, history of IRDA and its functions: Business and economics of insurance, need for changing mindset and latest trends.

**UNIT V**

**INTRODUCTION TO RISK MANAGEMENT:** Introduction to Risk, meaning and types of risk in business and individual, Risk management process, methods: Risk identification and measurement, Risk management techniques; Non insurance methods.

**UNIT VI**

**FINANCIAL RISK MANAGEMENT:** Introduction to Financial markets. Financial risk management techniques –Derivatives, Hedging and Portfolio management techniques: Derivatives and types of Derivatives-Futures, options and swaps: Shares, Commodity and Currency trading in India.

**Books Recommended:**

- Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
- General Principles of Insurance Harding and Evantly
- Mark S. Dorfman: Risk Management and Insurance, Pearson, 2009.
- Reddy K S and Rao R N: Banking and Insurance, Paramount publishers, 2013

**References:**

- Scott E. Harringam Gregory R. Nichanus: Risk Management & Insurance, TMH, 2009.
- Geroge E. Rejda: Principles of risk Management & Insurance, 9/e, pearson Education. 2009.
- G. Koteswar: Risk Management Insurance and Derivatives, Himalaya, 2008.
- Gulati: Principles of Insurance Management, Excel, 2009.
- James S Trieschmann, Robert E. Hoyt & David N. Sommer: Risk Mgt. & Insurance, Cengage, 2009.
- Dorfman: Introduction to Risk Management and Insurance, 8/e, Pearson, 2009.
- P.K. Gupta: Insurance and Risk Management, Himalaya, 2009.
- Vivek & P.N. Asthana: Financial Risk Management, Himalaya, 2009.
- Jyotsna Sethi & Nishwan Bhatia : Elements of Banking and Insurance, 2/e,PHI, 2012.

**M. Tech I year II semester**  
 Computer Science and Engineering  
**INTELLECTUAL PROPERTY RIGHTS**  
**Open Elective – I**

L	T	P/D	C
3	1	-	3

**Code: 5QC33**

**Unit I: Introduction:** Discovery, Creativity, Innovation, Invention, Need for IPR, Types of IPR, Genesis & development of IPR in India

**Unit II: Patents:** Definition, Scope, Protection, Patentability Criteria, Types of Patents (Process, Product & Utility Models), Case studies on Patents (Basmati Rice, Turmeric, Neem), Software Patenting.

**Unit III: Patent Searching & Filing:** Types of Searching, Public & Private Searching Databases, Drafting & Filing of Patent applications, Patent Cooperation Treaty (PCT), Patent infringement.

**Unit IV: Types of IPR-I:** Copyrights – Definition, granting, infringement, searching & filing, distinction between copy rights and related rights; Trade Marks - role in commerce, importance, protection, registration, Domain names; Case Studies.

**Unit V: Types of IPR-II:** Trade Secrets, Unfair competition; Industrial Designs – Scope, protection, filing, infringement; Semiconductors, Integrated Circuits & Layout design; Geographical Indications & Appellations of Origin; Case Studies.

**Unit VI: International and National Conventions & Treaties:** Overview, WTO, GATT, TRIPS, WIPO, Berne Convention, Universal Copyright Convention, the Paris Convention, Madrid Protocol, Rome convention, Budapest Treaty, Hague agreement, Locarno agreement, Indian Patents Law, Copyright Law, Trademark Law, Trade secret Law, GI Law, Designs Act.

**Text Book:**

1. Deborah E. Bouchoux, Intellectual Property for Paralegals – The law of Trademarks, Copyrights, Patents & Trade secrets, 3<sup>rd</sup> Edition, Cengage learning, 2012
2. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property, Eastern Book Company, Lucknow, 2009.

**References**

1. M. M. S. Karki , Intellectual Property Rights: Basic Concepts, Atlantic Publishers, 2009
2. Neeraj Pandey & Khushdeep Dharni, Intellectual Property Rights, Phi Learning Pvt. Ltd
3. Ajit Parulekar and Sarita D' Souza, Indian Patents Law – Legal & Business Implications; Macmillan India Ltd, 2006.
4. B. L. Wadehra. Law Relating to Patents, Trade Marks, Copyright, Designs & Geographical Indications; Universal law Publishing Pvt. Ltd., India 2000.
5. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010

**M. Tech I year II semester**  
**Computer Science and Engineering**  
**EMBEDDED SYSTEMS**  
**Open Elective – I**

a	b	C	d	E	f	g	h	i	j	k	l	m
	x				x							

Code: 5T217

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**UNIT-1**

**Introduction to Embedded Systems** : Introduction, Complex Systems and Microprocessor, The Embedded System Design Process, Formalisms for System Design. (Chapter I from Text Book 1, Wolf).

**Unit – II**

**8051 Micro controller** : Hardware, Input/Output Ports and Circuits, External Memory, Counter and Timers, Serial data Input/Output, Interrupts. (Chapter 3 from Text Book 2, Ayala).

**UNIT-III**

**Basic Assembly Language Programming Concepts** : The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions. Arithmetic Operations, Decimal Arithmetic. Jump and Call Instruction. (Chapters 4,5,6,7 and 8 from Text Book 2, Ayala).

**UNIT –IV**

**8051 Interfacing** : Interfacing with Keyboards, Displays, D/A and A/D Converters, Programming multiple Interrupts, Serial Data Communication. (Chapter 10 and 11 from Text Book 2, Ayala).

**UNIT – V**

**Introduction to Real – Time Operating Systems** : Tasks and Task States, Tasks and Data, Semaphores, and Shared Data; Message Queues, Mailboxes and Pipes, Timer Functions, Events, Memory Management. (Chapter 6 and 7 from Text Book 3, Simon).

**UNIT – VI**

**Basic Design Using a Real-Time Operating System** : Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS uC-OS / Vx-Works / RT Linux; Embedded Software Development Tools: Host and Target machines, Linker/Locators for Embedded Software, Getting Embedded Software into the Target System; Debugging Techniques: Testing on Host Machine. (Chapter 8,9,10 & 11 from Text Book 3, Simon).

**TEXT BOOKS :**

1. Computers and Components, Wayne Wolf, Elsevier.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.
3. An Embedded Software Primer, David E. Simon, Pearson Education.

**REFERENCES :**

1. Embedding system building blocks, Labrosse, via CMP publishers.
2. Embedded Systems, Raj Kamal, TMH.
3. Micro Controllers, Ajay V Deshmukhi, TMH.
4. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
5. Microcontrollers, Raj kamal, Pearson Education.

**Syllabus for M. Tech I Year I Semester**  
Computer Science and Engineering

**ENTREPRENEURSHIP AND INNOVATION**  
(OPEN ELECTIVE)

Code: 5ZC13

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
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**After studying this course, the students will be able to**

- 1: Acquire qualities of an Entrepreneur
- 2: Understand how to set up an organization
- 3: Carry out SWOT analysis for setting up small business unit
- 4: Acquire decision making managerial behavior
- 5: Develop knowledge on getting financial support from various funding agencies
- 6: Buildup strategies for a successful business

The objective of the course is to make students understand the nature of entrepreneurship, and to motivate the student to start his/her own enterprise with innovative skills.

**Unit 1:** Nature of Entrepreneurship; Characteristics, Qualities and skills of an Entrepreneur, functions of entrepreneur, Entrepreneur scenario in India and Abroad. Forms of Entrepreneurship: Small Business, Importance in Indian Economy, Types of ownership, sole trading, partnership, Joint Stock Company and other forms. First-Mover disadvantages, Risk Reduction strategies, Market scope strategy, Imitation strategies, and Managing Newness.

**Unit 2:** Aspects of Promotion: Generation of new entry opportunity, SWOT Analysis, Technological Competitiveness, legal regulatory systems, patents and trademarks, Intellectual Property Rights- Project Planning and Feasibility Studies- Major steps in product development.

**Unit 3:** MANAGEMENT OF SMALL BUSINESS:

Pre feasibility study - Ownership - budgeting - project profile preparation - Feasibility Report preparation - Evaluation Criteria- Market and channel selection- Product launching - Monitoring and Evaluation of Business- Effective Management of Small business.

**Unit 4:** SUPPORT SYSTEMS FOR ENTREPRENEURS:

Institutional Support, Training institution, Financial Institutions and Aspects: Sources of raising Capital, Debt-Equity, Financing by Commercial Banks, Government Grants and Subsidies, Entrepreneurship Promotion Schemes of Department of Industries (DIC), KVIC, SIDBI, NABARD, NSIC, APSFC, IFCI and IDBI. New Financial Instruments. Research and Development – Marketing and legal aspects, Taxation benefits, Global aspects of Entrepreneurship.

**Unit 5:** INTRODUCTION TO INNOVATION:

Meaning of innovation, sources of innovative opportunity, 7 sources of innovative opportunity, Principles of innovation, the enablers of innovation, business insights, insights for innovation, technical architecture for innovation, focus on the essence of innovation.

**Unit 6:** PROCESS AND STRATEGIES FOR INNOVATION:

Process of innovation, the need for a conceptual approach, Factors contributing to successful technological innovation, Strategies that aim at innovation, impediments to value creation and innovation.



**Text Books:**

1. Robert D Hisrich, Michael P Peters, Dean A Shepherd: Entrepreneurship, TMH, 2009
2. H. Nandan: Fundamentals of Entrepreneurship, PHI, 2009.

**References:**

1. Bholanath Dutta: Entrepreneurship – Text and cases, Excel, 2009.
2. Vasanth Desai: Entrepreneurship, HPH, 2009
3. Barringer: Entrepreneurship, Pearson,2009.
4. Peter Drucker (1993), “Innovation and Entrepreneurship”, Hyper Business Book.
5. C.K. Prahalad, M.S. Krishnan, The new age of Innovation – Tata McGraw-Hill, Edition 2008

**M. Tech I year II semester**  
**Computer Science and Engineering**  
**ETHICS, MORALS, GENDER SENSITIZATION AND YOGA**  
**Open Elective – I**

Code: 5H233

L	T	P/D	C
1	1	-	1

**COURSE OUTCOMES****Students will be able to**

- Discriminate between right and wrong from their own behavior and judge the same in others.
- Understand how moral development involves thoughts, feelings, and behaviors regarding right and wrong and get intrapersonal and interpersonal dimensions.
- Understand Engineer's Responsibility for safety and risk.
- Understand rules and principles set by the society in a customary way.
- Perceive gender literacy and understand the importance of gender perspective and in turn delve into gender issues.
- Understand and appreciate the importance of yoga for an enriched life style.

**UNIT I: HUMAN VALUES AND MORALS**

Why Value Education, Understanding Social Factors, System, Structure and Source of Generic Values; Morals, Values and Ethics; Integrity; Work Ethics; Service Learning-Civic Virtue-Respect for Others-Living Peacefully-Caring-Sharing; Honesty; Courage; Value Time; Cooperation; Commitment; Empathy; Self Confidence; Spirituality; Character; Loyalty; Confidentiality

**UNIT II: ENGINEERING ETHICS AND PERSONALITY DEVELOPMENT**

Ethical Principles, Ethical Theories, , Use of Ethical Theories, Types of Inquiry, Engineering and Ethics, Engineering Ethics, Moral Autonomy of Engineers, Professional Ethics, Consensus and Controversy, Ethics in Business, Global business, Understanding Factors of Success, Human Aspirations, Personality and Our Identity, Understanding SELF, Happiness and Self-Interest, Positive Thinking, Custom and Religion, Understanding responsibility toward society, Understanding National and cultural Ethos; Professionalism

**UNIT III:ENGINEERING AS SOCIAL EXPERIMENTATION**

Comparison with Standard Experiments; Knowledge Gained; Learning from the Past; Engineer as Manager, Consultants and leaders and responsible social Experimenter; Engineers personality Trait, Big Five Personality model, Conscientiousness ,Accountability- Roles of Codes-Codes and Experimental Nature of Engineering; Engineer's Responsibility for safety and Risk, Concept of Safety-Types of Risks

**UNIT IV: GLOBAL PERSPECTIVE**

Distinguish between Bribes and Gifts; Occupational Crimes; Globalization- Cross-Cultural Issues; Environmental Ethics; Internet and Computer Codes of Ethics

**Case Study:**

Ethics in Military and Weapons Development-Ethics in Research work

**UNIT V: GENDER SENSITIZATION**

Introduction to Gender Study; Introduction to Gender Spectrum; Point of view; Gender and Structure of Knowledge; Contribution of Women in growth and development as Technologist, Scientist, R&D, GDP, Social Life, National Development, International Perspective"- Life Exemplary Madame Curie, Durga bai Deshmukh, Kalpana Chawla, Chanda Kochar, Mary Kom, Indra Gandhi, Mother Teresa, Indra Nooyi, Golda Meir, Margaret Thatcher and other achievers

**UNIT VI: YOGA**

Introduction to Yoga in India; Origin and Development; Theoretical understanding of yoga; Stress Management : Modern and Yogic perspectives ; Tackling ill-effects of Frustration, Anxiety and Conflict through modern and Yogic methods; Meditation Techniques; Suryanamaskar; Pranayama.

**TEXT BOOKS:**

1. *Indian Culture Values And Professional Ethics(For Professional Students)* by Prof.P.S.R.Murthy ; B.S.Publications.
2. *Professional Ethics and Human Values* by M. Jayakumar, Published by University Science Press,
3. Telugu Academy, Hyderabad, 2015, *Towards A World of Equals*, A Bilingual Text Book on Gender.

**REFERENCE BOOKS:**

1. *The Yoga Sutras of Patanjali* by Swami Satchitananda
2. *The Secret Power of Yoga* by Nischala Joy Devi
3. *Light on Pranayama* by B.K.S. Iyengar
4. *Books on the Art of Living* by Poojya Sri Sri Ravi Shanker
5. *Making It Relevant: Mapping the meaning of women's studies in Tamilnadu* by Anandi S and Swamynathan P
6. *Feminism is for Everybody; Passionate Politics* by Bell Hooks
7. *Gender* by Geetha V
8. *“Growing up Male” in what is worth teaching* by K Kumar
9. *The Lenses of Gender: Transforming the Debate on Sexual Inequality* - Sandra Lipsitz Bem
10. *The Lenses Of Gender* - by ANNE MURPHY

**M. Tech I year II semester  
Computer Science and Engineering  
BIOINFORMATICS  
Open Elective**

<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>	<b>l</b>	<b>m</b>
<b>x</b>	<b>x</b>	<b>x</b>							<b>x</b>			<b>x</b>
						<b>L</b>	<b>T</b>		<b>P/D</b>	<b>C</b>		
						<b>3</b>	<b>1</b>		<b>-</b>	<b>3</b>		

Code: 5Q4C47

**UNIT I : SCOPE OF BIOINFORMATICS and BIOLOGICAL DATABASES**

History, definition,, importance and applications of bioinformatics, Introduction to biological data, Organization and management of databases, Nucleotide databases (Genbank, ), Protein Databases(SWISS PROT)

**UNIT II: SEQUENCE ALIGNMENT**

Basic concepts of sequence homology Dynamic Programming, Dot Matrix analysis, Smith-Waterman Algorithm , Needleman-Wunsch Algorithm ,Scoring matrices: PAM and BLOSUM matrices

**UNIT III: SEQUENCE-BASED DATABASE SEARCHES**

BLAST and FASTA algorithms, various versions of basic BLAST and FASTA, Use of these methods for sequence analysis including the on-line use of the tools and interpretation of results.

**UNIT IV: MULTIPLE SEQUENCE ALIGNMENT**

Basic concepts of various approaches for MSA (e.g. progressive, hierarchical etc.). Algorithm of CLUSTALW and its application

**UNIT V: PHYLOGENETIC ANALYSIS**

Definition and description of phylogenetic trees. Distance based and character based methods of phylogenetic analysis.

**UNIT VI: PROTEIN STRUCTURE PREDICTION**

Secondary structure prediction methods, Algorithms of Chou Fasman, GOR methods. Protein homology modeling.

**TEXT BOOKS:**

1. Bioinformatics. David Mount, 2000. CSH Publications

**REFERENCES:**

1. Bioinformatics: A Machine Learning Approach P. Baldi. S. Brunak, MIT Press 1988.
2. Genomics and Proteomics-Functional and Computational aspects. Springer Publications. Editor-Sandor Suhai.
3. Bioinformatics- Methods and Protocols-Human Press. Stephen Misener, Stephen A. Krawetz.
4. Bioinformatics – A Practical guide to the Analysis of Genes and Proteins – Andreas D.Baxevanis, B.F. Francis Ouellette.

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**Syllabus for M.Tech I Year II Semester**  
Computer Science and Engineering  
**WEB TECHNOLOGIES AND INFORMATICA LAB**

**Code: 5P274**

L	T	P	C
-	-	4	2

**Objectives:**

1. Write syntactically correct HTTP messages and describe the semantics of common HTTP methods and header fields
2. Discuss differences between URIs, URNs, and URLs, and demonstrate a detailed understanding of http-scheme URLs, both relative and absolute
3. Describe the actions, including those related to the cache, performed by a browser in the process of visiting a Web address
4. Install a web server and perform basic administrative procedures, such as tuning communication parameters, denying access to certain domains, and interpreting an access log
5. Write a valid standards-conformant HTML document involving a variety of element types, including hyperlinks, images, lists, tables, and forms
6. Use CSS to implement a variety of presentation effects in HTML and XML documents, including explicit positioning of elements
7. Demonstrate techniques for improving the accessibility of an HTML document

**LIST OF EXERCISES:**

- 1) Create a simple webpage using HTML5.
- 2) Use frames to Include Images and Videos.
- 3) Add a Cascading Style sheet for designing the web page.
- 4) Design a dynamic web page with validation using JavaScript.
- 5) Design a catalogue in PHP with AJAX.
- 6) Simple application to demonstrate Web Service.
- 7) Design a simple online test web page in PHP.

**Informatica Lab**

1. Build a Data Warehouse to perform filter transformation for the employee database.
2. Add the commission of 1000 Rs in the Salary field of Employee table using Expression Transformation.
3. Using Aggregator transformation display the average salary of employees in each departments.
4. Using Joiner transformation display the Sailor\_Name from Sailors table and Boat\_Name from Boats table in a new table.

**M. Tech I year II semester  
Computer Science and Engineering**

**LITERATURE REVIEW & SEMINAR - 2**

**Code: 5P275**

**L      T      P      C**  
**-      -      3      1**

**Max. Marks: 100**

<b>A</b>	<b>b</b>	<b>C</b>	<b>d</b>	<b>E</b>	<b>f</b>	<b>g</b>	<b>h</b>	<b>i</b>	<b>j</b>	<b>k</b>
<b>X</b>	<b>X</b>		<b>X</b>				<b>X</b>	<b>X</b>		

**After studying this course, the students will be able to**

1. Identify a research topic
2. Collect literature
3. Write technical review paper
4. Present seminar
5. Discuss the queries and Publish research paper

There shall be three seminar presentations during I year I semester and I year II Semester. For seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the Department in a report form and shall make an oral presentation before the Departmental Committee, which shall consist of the Head of the Department, a senior Faculty Member and the Supervisor and will jointly evaluate the report and presentation. For each Seminar there will be only internal evaluation of 25 marks. A candidate has to secure a minimum of 50% to be declared successful.

In the First semester the report must be in the form of the review paper with a format used by IEEE / ASME etc. In the Second semester Technical Seminar in the form of Independent Review Paper must be of high quality fit for publication in a reputed conference / journal.

**The evaluation format for seminar is as follows:**

- Day to day evaluation by the Supervisor : 20 marks
- Final Report : 20 marks
- Presentation : 60 marks (20 Abstract seminar +40 Final Presentation)

The presentation includes content (5) + Participation (5) + Presentation (10) for a total of 20 marks and double for 40 marks for final presentation.

A Student has to concentrate on the following sections while writing technical paper or presenting seminar.

**Contents:**

- Identification of specific topic, Analysis
- Organization of modules, Naming Conventions
- Writing style, Figures
- Feedback
- Miscellaneous

**REFERENCES:**

Teach Technical Writing in Two Hours per Week by Norman Ramsey

For Technical Seminar the student must learn few tips from sample seminars and correcting himself, which is continues learning process

**REFERENCE LINKS:**

- IV. <http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm>
- V. <http://www.cse.psu.edu/~yuanxie/advice.htm>
- VI. <http://www.eng.unt.edu/ian/guides/postscript/speaker.pdf>

**NOTE:** A student can use any references for this process, but must be shared in classroom.

**Syllabus for M. Tech I Year I semester**  
**Computer Science and Engineering**

**PROJECT SEMINAR - 1**

**Code: 5P276**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>-</b>	<b>-</b>	<b>-</b>	<b>2</b>

**Max. Marks: 100**

In I year II semester, a project seminar shall be conducted for 100 marks and for 2 credits (there is no external evaluation). The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 10 marks and the end semester seminar evaluation shall carry 15 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 5 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.



**Syllabus for M. Tech I Year I semester**  
Computer Science and Engineering

**COMPREHENSIVE VIVA-VOCE – 2**

**Code: 5P277**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	-	<b>1</b>

**Max. Marks: 100**

There shall be a Comprehensive Viva-Voce in II year I Semester. The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the students' understanding in various subjects he/she studied during the M. Tech course of study. The Comprehensive Viva-Voce is valued for 50 marks by the Committee. There are no internal marks for the Comprehensive Viva-Voce. A candidate has to secure a minimum of 50% to be declared successful.

# **Syllabus for M. Tech II Year I Semester**

Computer Science and Engineering

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**Syllabus for M. Tech II Year I semester**  
**Computer Science and Engineering**  
**PROJECT SEMINAR - 2**

**Code: SP378**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	-	<b>4</b>

**Max. Marks:**

**100**

In II year I semester, a project seminar shall be conducted for 100 marks and for 4 credits (there is no external evaluation). The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 20 marks and the end semester seminar evaluation shall carry 30 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 10 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

**Syllabus for M. Tech II Year I semester**  
**Computer Science and Engineering**

**PROJECT WORK (PART I)**  
**PROJECT STATUS REPORT**

**Code: 5P379**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	-	<b>20</b>

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee.

A Project Review Committee (PRC) shall be constituted comprising of Heads of all the Departments which are offering the M.Tech programs and three other senior faculty members concerned with the M.Tech. programme.

Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the previous semesters and after obtaining the approval of the PRC.

After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the PRC for its approval. Only after obtaining the approval of PRC the student can initiate the Project work. This process is to be completed within four weeks of commencement of II year I semester.

The student shall submit a project report at the end of II year I semester, and the same shall be evaluated at the end of that semester by the PRC as Excellent/Good/Satisfactory/Unsatisfactory. In the case of Unsatisfactory declaration, the student shall re-submit the Project report after carrying out the necessary modifications / additions in the Project work, within the specified time as suggested by the PRC.

**Syllabus for M. Tech II Year II semester**  
Computer Science and Engineering  
**PROJECT SEMINAR-3**

**Code: 5P480**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	-	<b>2</b>

**Max. Marks: 100**

A project seminar shall be conducted for 100 marks and for 2 credits (there is no external evaluation). The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 20 marks and the end semester seminar evaluation shall carry 30 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 20 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

**Syllabus for M. Tech II Year I semester**  
**Computer Science and Engineering**

**PRE-PROJECT SUBMISSION SEMINAR**

**Code: 5P481**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	-	<b>2</b>

**Marks: 100**

Every candidate shall be required to submit thesis or dissertation after taking up a topic approved by the Project Review Committee.

A Project Review Committee (PRC) shall be constituted comprising of Heads of all the Departments which are offering the M.Tech programs and three other senior faculty members concerned with the M.Tech. programme.

Registration of Project Work: A candidate is permitted to register for the project work after satisfying the attendance requirement of all the previous semesters and after obtaining the approval of the PRC.

After satisfying 6.2, a candidate has to submit, in consultation with his project supervisor, the title, objective and plan of action of his project work to the PRC for its approval. Only after obtaining the approval of PRC the student can initiate the Project work. This process is to be completed within four weeks of commencement of II year I semester.

The student shall submit a project report at the end of II year I semester, and the same shall be evaluated at the end of that semester by the PRC as Excellent/Good/Satisfactory/Unsatisfactory. In the case of Unsatisfactory declaration, the student shall re-submit the Project report after carrying out the necessary modifications / additions in the Project work, within the specified time as suggested by the PRC.

**Syllabus for M. Tech II Year I semester**  
**Computer Science and Engineering**

**PROJECT WORK AND DISSERTATION**

**Code: 5P482**

L	T	P	C
-	-	-	20

**By the end of this course, students will be able to**

1. Critically and theoretically analyze the systems/products they are going to design or develop.
2. Apply the theoretical knowledge gained to bring out innovative products.
3. Effectively communicate in a variety of forms including written, visual, verbal, online and technical literacy.
4. Work and participate as effective members in a group within a professional environment.
5. Develop an ongoing critical awareness of learning needs in the application of appropriate technologies.
6. Gain as much knowledge and experience in areas of the area of Digital Systems and Computer Electronics

A candidate is permitted to submit Project Dissertation only after successful completion of PG subjects (theory and practical), seminars, Comprehensive viva-voce, PG Project Part-I, and after the approval of PRC, not earlier than 40 weeks from the date of registration of the project work. For the approval of PRC the candidate shall submit the draft copy of thesis to the Head of the Department and shall make an oral presentation before the PRC. Along with the draft thesis the candidate shall submit draft copy of a paper in standard format fit for publication in Journal / Conference, based on the project thesis, to the Head of the Department with due recommendation of the supervisor.

- Four copies of the Project Dissertation certified by the Supervisor and Head of the Department shall be submitted to the College.
- The dissertation shall be adjudicated by one examiner selected by the College. For this, Head of Department shall submit a panel of 3 examiners, who are eminent in that field, with the help of the PRC. The Chief Superintendent of the college in consultation with the college academic committee shall nominate the examiner.
- If the report of the examiner is not favorable, the candidate shall revise and resubmit the Dissertation, in the time frame as prescribed by PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected. The candidate can re-register only once for conduct of project and evaluation of Dissertation, and will go through the entire process as mentioned above. The total duration for the M. Tech program is limited to four years.

If the report of the examiner is favorable, viva-voce examination shall be conducted by a Board consisting of the Head of the Department, Supervisor and the Examiner who adjudicated the Dissertation. The Board shall jointly report the student's performance in the project work as – (a) Excellent, or (b) Good, or (c) Satisfactory, or (d) Unsatisfactory, as the case may be. In case, the student fails in the viva-voce examination, or gets the Unsatisfactory grade, he can re-appear only once for the viva-voce examination, as per the recommendations of the Board. If he fails at the second viva-voce examination, the candidate can re-register only once for conduct of project and evaluation of Dissertation, and will go through the entire process as mentioned above. The total duration for the M. Tech program is limited to four years.