

**COURSE STRUCTURE  
AND  
DETAILED SYLLABUS  
for  
M.Tech course  
in  
SOFTWARE ENGINEERING  
(CSE)**

(Applicable for the batches admitted from 2012-2013)



**SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY**  
(An Autonomous Institution approved by UGC and affiliated to JNTUH)  
Yamnapet, Ghatkesar, R.R.District-501 301.

**M.Tech (Software Engineering) Course Structure and Syllabus****Academic Regulations: 2012**

<b>I Year</b>	<b>COURSE STRUCTURE</b>	<b>I Semester</b>
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S.No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1	122SE01	Software Requirements and Estimation	3	1	-	3	40	60
2	122SE02	Object Oriented Analysis and Design	3	1	-	3	40	60
3	122SE03	Software Process and Project Management	3	1	-	3	40	60
4	122SE04	Advanced Web Technologies	3	1	-	3	40	60
5		<b>PROFESSIONAL ELECTIVE I</b>	3	1	-	3	40	60
6		<b>PROFESSIONAL ELECTIVE II</b>	3	1	-	3	40	60
7	122SE71	Web Technologies and OOAD (Object Oriented Analysis and Design) Lab	-	-	6	3	40	60
8	122SE72	Technical paper writing and Seminar	-	-	3	2	50	-
		<b>Total</b>	<b>18</b>	<b>6</b>	<b>9</b>	<b>23</b>	<b>330</b>	<b>420</b>

PROFESSIONAL ELECTIVE I		PROFESSIONAL ELECTIVE II	
Subject Code	Subject Name	Subject Code	Subject Name
122SE05	Image Processing and Pattern Recognition	122SE08	Storage Area Networks
122SE06	Information Retrieval Systems	122SE09	Adhoc and Sensor Networks
122SE07	Neural Networks and Fuzzy logic	122SE10	Advanced Computer Networks
122SE18	Fault Tolerant Systems	122SE20	Network Security and Cryptography

<b>I Year</b>	<b>COURSE STRUCTURE</b>	<b>II Semester</b>
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S.No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1		<b>OPEN ELECTIVE</b>	3	1	-	3	40	60
2	122SE11	Software Quality Assurance and Testing	3	1	-	3	40	60
3	122SE12	Software Architecture and Design Patterns	3	1	-	3	40	60
4	122SE13	Data Warehousing and Data Mining	3	1	-	3	40	60
5	122SE14	Service Oriented Architecture	3	1	-	3	40	60
6		<b>PROFESSIONAL ELECTIVE III</b>	3	1	-	3	40	60
7	122SE73	Software Testing & Data Warehousing & Data Mining Lab	-	-	6	3	40	60
9	122SE74	Technical Seminar (Independent Review Paper)	-	-	3	2	50	-
		<b>Total</b>	<b>18</b>	<b>6</b>	<b>09</b>	<b>23</b>	<b>330</b>	<b>420</b>

PROFESSIONAL ELECTIVE III		OPEN ELECTIVE	
Subject Code	Subject Name	Subject Code	Subject Name
122SE15	Principles of Quantum Computing	122MB56	Banking Operations, Insurance and Risk Management
122SE16	Scripting Languages	122BT37	Indian Values, Ethics, Culture and Intellectual Property Rights
122SE17	Machine Learning and Artificial Intelligence	122VE17	Embedded Systems
122SE19	Distributed Computing	122BT19	Bio-informatics for Software Engineering

II Year	COURSE STRUCTURE	I Semester
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S.No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1	122SE75	Comprehensive Viva voice	-	-	-	2	-	50
2	122SE76	Project Seminar - I	-	-	-	2	50	-
3	122SE77	Project Work ( PART- I ) (Project Status Report) ( Excellent/ Good/ Satisfactory/ Un-Satisfactory )	-	-	-	18	grading	-
<b>Total</b>			-	-	-	<b>22</b>	<b>50</b>	<b>50</b>

II Year	COURSE STRUCTURE	II Semester
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S.No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1	122SE78	Project Seminar - II	-	-	-	2	50	-
2	122SE79	Project Work and Dissertation ( Excellent/ Good/ Satisfactory/ Un-Satisfactory )	-	-	-	20	-	grading
<b>Total</b>			-	-	-	<b>22</b>	<b>50</b>	-

**Note:** Eligibility for admission to this course is B.E./B.Tech. In CSE or IT

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

**M. Tech. (Software Engineering)****Program Objectives:**

To offer a program for systematic study of Computer Science and related Technology at the post graduate level by providing world class education in Engineering and Technology. To provide career advancement to students through a program offering contemporary know-how and proficiency in the software engineering and related areas and to have a viable option to take up academic pursuit as a means of career advancement. To contribute towards generation of quality manpower to meet the needs of the industry and related sectors that has relevance to Computer Science & Engineering. Keeping pace with the ever changing technological scenario, to help our students to gain proper direction to emerge as competent professionals fully aware of their commitment to the society and nation. To inculcate a flair for research, development and entrepreneurship in the student.

**THE PROGRAM IS DESIGNED TO ACHIEVE THE FOLLOWING OUT COMES :**

- a. Graduate of this program will demonstrate knowledge of Mathematics, basic and advanced Computer usage.
- b. Graduates will demonstrate an ability to identify, formulate and solve industry and research related problems.
- c. Graduates will demonstrate an ability to design analyze and interpret data.
- d. Graduates will demonstrate flair to help industry to take strategic decisions.
- e. Graduates will demonstrate an ability to visualize and work in laboratory and on multi-disciplinary tasks.
- f. Graduates will demonstrate skills to use modern software engineering approach and tools.
- g. Graduates will demonstrate knowledge of professional and ethical responsibilities.
- h. Graduates will demonstrate ability to communicate effectively in both verbal and written form.
- i. Graduates will show the understanding of impact of computer application on the society and also will be aware of contemporary issues.
- j. Graduates will develop confidence for self education and ability for life-long learning which will help them in pursuing their doctoral degree
- k. Graduate s can participate and succeed in competitive examinations like SLET NET, CAT, GMAT, GRE and TOFEL.

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

Software Engineering

#### SOFTWARE REQUIREMENTS AND ESTIMATION

Code: 122SE01

<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

- Student understand the basic concepts of software requirements engineering
- Select the appropriate requirements elicitation techniques to identify their requirements
- Effectively analyze their requirements
- Create a requirements specification to communicate their requirements
- Utilize various requirements validation techniques to critically evaluate their requirements and to identify defects
- Understand the importance of estimation and what are the problems associated with the estimations.

#### UNIT I

##### Software Requirements: What and Why

Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management

#### UNIT II

##### Software Requirements Engineering

Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality.

#### UNIT III

##### Software Requirements Management

Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirements Traceability Matrix, Links in requirements chain

##### Software Requirements Modelling

Use Case Modelling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames

#### UNIT IV

##### Advance Requirements Engineering

Defining the System-Managing Scope-Refining-Software Requirements –Refining Use Cases- On Ambiguity and Specificity-Building the Right System-From Requirements to Implementation- Using Traceability to Support Verification-Validating System

### **Software Estimation**

Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation

### **UNIT V**

#### **Size Estimation**

Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures, Effort, Schedule and Cost Estimation.

What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation

### **UNIT VI**

#### **Tools for Requirements Management and Estimation**

Requirements Management Tools: Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation, Software Estimation Tools: Desirable features in software estimation tools, IFPUG, USC's COCOMO II, SLIM (Software Life Cycle Management) Tools

### **TEXT BOOKS**

1. Software Requirements and Estimation by Rajesh Naik and Swapna Kishore, published by Tata Mc Graw Hill

### **REFERENCES**

1. Software Requirements by Karl E. Weigers

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**Syllabus for M.Tech I Year I Semester**  
Software Engineering  
**OBJECT ORIENTED ANALYSIS AND DESIGN**

Code: 122SE02

<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**

- To understand requirements, analysis and design workflow
- To learn to identify classes
- To learn to use diagram notation for use cases, class and object representation, links and associations, inheritance and object messages
- To gain a working knowledge of OOAD concepts.

**UNIT I**

**Introduction to UML:** The meaning of Object Orientation, object identity, Encapsulation, information hiding, polymorphism, generosity, importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture.

**Basic Structural Modeling:** Classes, Relationships, common Mechanisms, and diagrams.

**Class & Object Diagrams:** Terms, concepts, modeling techniques for Class & Object Diagrams.

**UNIT II**

**Basic Behavioral Modeling:** Use cases, Use case Diagrams, Activity Diagrams.

**Collaboration Diagrams:** Terms, Concepts, depicting a message, polymorphism in collaboration diagrams, iterated messages, use of self in messages.

**Sequence Diagrams:** Terms, concepts, depicting asynchronous messages with/without priority, callback mechanism, broadcast messages.

**UNIT III**

**Advanced Behavioral Modeling:** Events and signals, state machines, processes and Threads, time and space, state chart diagrams.

**Architectural Modeling:** Component, Deployment, Component diagrams and Deployment diagrams.

**UNIT IV**

**The Unified process:** use case driven, architecture centric, iterative, and incremental

**The Four Ps:** people, project, product, and process

**Use case driven process:** why use case, capturing use cases, analysis, design, and implementation to realize the use cases, testing the use cases

**Architecture-centric process:** architecture in brief, why we need architecture, use cases and architecture, the steps to architecture, an architecture description.

**UNIT V**

**Iterative incremental process:** iterative incremental in brief, why iterative incremental development? The iterative approach is risk driven, the generic iteration.

**The Generic Iteration workflow:** phases are the first division workflow, planning proceeds doing, risks affect project planning, use case prioritization, resource needed, assess the iteration and phases

**Inception phase:** early in the inception phase, the archetypal inception iteration workflow, execute the core workflows, requirements to test.

**Elaboration Phase:** elaboration phase in brief, early in the elaboration phase, the architectural elaboration iteration workflow, execute the core workflows-Requirements to test.

**Construction phase:** early in the construction phase, the archetypal construction iteration workflow, execute the core workflow.

**Transition phase:** early in the transition phase, activities in transition phase

## **UNIT VI**

**Case Studies:** Automation of a Library, Software Simulator application (2-floor elevator simulator)

### **Text Books**

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson education.
2. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY-dreamtech India Pvt. Ltd.
3. Ivar Jacobson, Grady Booch, James Rumbaugh: The Unified Software Development Process, Pearson Education.

### **Reference Books**

1. Meilir Page-Jones : Fundamentals of Object Oriented Design in UML, Pearson Education
2. Atul Kahate: Object Oriented Analysis & Design, The McGraw-Hill Companies.
3. Mark Priestley: Practical Object-Oriented Design with UML, TATA McGrawHill



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**Syllabus for M.Tech I Year I Semester - Software Engineering**  
**SOFTWARE PROCESS AND PROJECT MANAGEMENT**

**Code: 122SE03**

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**Course Objectives**

- This course covers a broad variety of process, project, quality, management, and engineering topics.
- Students will be expected to apply critical thinking in evaluating the options and tradeoffs implicit in selecting from among a variety of management and engineering practices
- Understand the implications of various improvement strategies for organizational maturity versus the continuous representation of process capability.
- They are expected to predict the challenges in change management associated with organizational transformation and discuss how these challenges can be addressed.

**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.

**UNIT II: Process Reference Models**

Capability Maturity Model (CMM), CMMi, PCMM, PSP, TSP, IDEAL, Process Definition Techniques.

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

**UNIT III: Managing Software Projects**

Project management knowledge areas: Introduction to Integration management, scope management, time management, cost management, quality management, human resource management, communication management, project risk management, procurement management, Project Management Process Framework.

**Project Planning**

Software Life Cycle Models, Project Organizations and Responsibilities, Artifacts of the Project Management Process, Cost and Scheduling estimation, Establishing Project Environment, Risk Management, Quality Assurance and Configuration Management

**UNIT IV: Project Tracking and Control**

Data Gathering and Analysis – Principles of Data Gathering – Data Gathering Process-Defect Tracking, Issue Tracking, Status Reports, Milestone Analysis, Defect Analysis and Prevention Methods, Process monitoring and audit, Reviews, Inspections and Walkthroughs, Seven Core Metrics, Management indicators, Quality Indicators

**UNIT V: Project Closure**

Project Closure Analysis, Role of Closure Analysis in a project, Performing Closure Analysis, Closure Analysis Report

**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 by Watts S. Humphrey, Pearson Education
2. Software Project Management, by Walker Royce, Pearson Education

**REFERENCES**

1. An Introduction to the Team Software Process, by Watts S. Humphrey, Pearson Education
2. A Discipline to Software Engineering by Watts S. Humphrey Pearson Education
3. Software Project Management in Practice by Pankaj Jalote, Pearson Education
4. Software Project Management Readings and Cases by Chris Kemerer, TATA McGrawHill
5. Head First PMP, Gennifer Greene PMP, Andrew Stellman PMP, Orelly publication

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**Syllabus for M.Tech I Year I Semester  
Software Engineering  
ADVANCED WEB TECHNOLOGIES**

**Code: 122SE04**

<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**

- To enable the student to design, build and manage websites.
- To understand the various roles required in the creation and development of a website.
- Understand the use of various web servers and databases.
- Understand the architecture of AJAX and understanding with the use of ASP and PHP.
- To understand the concept PHP and ASP along with the exercises
- Finally they must be able to manage and understand any sort of next generation web technologies

**UNIT I**

**Introduction to Internet** : The Internet in Industry and Research, Evolution of the Internet and World Wide Web, Web Basics, Multitier Application Architecture, Client-Side Scripting versus Server-Side Scripting, Object Technology.

**UNIT II**

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

**UNIT III**

**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.

**Web Servers (Apache and IIS)**: Introduction, HTTP Transactions, Accessing Web Servers, Apache, MySQL and PHP Installation, Microsoft IIS Express and WebMatrix.

**UNIT IV**

**Database: SQL, MySQL and Java DB**: Introduction, Relational Databases, SQL, MySQL, Java DB/Apache Derby.

**UNIT V**

**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 VI**

**Web App Development with ASP.NET in C#:** Introduction, Your First ASP.NET Application, Standard Web Controls: Designing a Form, Validation Controls, Session Tracking, Case Study: Database-Driven ASP.NET Guestbook, Case Study Introduction: ASP.NET AJAX (Traditional Web Applications, Ajax Web Applications, Testing an ASP.NET Ajax Application, The ASP.NET Ajax Control Toolkit, Using Controls from the Ajax Control Toolkit), Case Study Introduction: Password-Protected Books Database Application.

## **TEXT BOOKS**

1. Internet and World Wide Web-How to Program, 5<sup>th</sup> Edition by Dietel and Nieto PHI/Pearson Education Asia.

## **REFERENCES**

1. XML: The Complete Reference, Heather Williamson, Mc Graw Hill Education.
2. PHP for the Web: Visual QuickStart Guide, 4/e, Larry Ullman, Pearson Education.
3. PHP: The Complete Reference, Steven Holzner, Mc Graw Hill Education.
4. Learning PHP5 by David Sklar, O'Reilly Media.
5. Developing Web Applications in PHP and AJAX, Harwani, Mc Graw Hill Education.
6. Learning ASP.NET AJAX, CADCIM Technologies, Sham Tickoo, Abhijeet K. S. , Pearson Education.
7. ASP.NET 4.0 Programming, Joydip Kanjilal, Mc Graw Hill Education.

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**Syllabus for M.Tech I Year I Semester - Software Engineering**  
**IMAGE PROCESSING AND PATTERN RECOGNITION**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 122SE05**

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**3      1      -      3**

**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 I semester**  
**Software Engineering**  
**INFORMATION RETRIEVAL SYSTEMS**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 122SE06**

<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**

- To improve the students searching capabilities
- To understand the query precision and recall
- Students learn - how effectively and efficiently getting the appropriate data from the server through search engine
- This course help them in building new Search Engine

**UNIT I**

Introduction: Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses.

**UNIT II**

Information Retrieval System Capabilities: Search, Browse, Miscellaneous

**UNIT III**

Cataloguing and Indexing: Objectives, Indexing Process, Automatic Indexing, Information Extraction.

Data Structures: Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

**UNIT IV**

Automatic Indexing: Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

Document and Term Clustering: Introduction, Thesaurus generation, Item clustering, Hierarchy of clusters.

**UNIT V**

User Search Techniques: Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective

Dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext.

Information Visualization: Introduction, Cognition and perception, Information visualization technologies.

**UNIT VI**

Text Search Algorithms: Introduction, Software text search algorithms, Hardware text search systems.

Information System Evaluation: Introduction, Measures used in system evaluation, Measurement example – TREC results.

**TEXT BOOKS**

1. Information Retrieval Systems: Theory and Implementation by Kowalski, Gerald, Mark T Maybury-Kluwer Academic Press, 1997.

**REFERENCES**

1. Information Retrieval Data Structures and Algorithms by Frakes, W.B., Ricardo Baeza-Yates, Prentice Hall, 1992.

2. Modern Information Retrieval by Yates Pearson Education.

3. Information Storage & Retrieval by Robert Korfhage – John Wiley & Sons.



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**Syllabus for M.Tech I Year I Semester**  
**Software Engineering**  
**NEURAL NETWORKS AND FUZZY LOGIC**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 122SE07**

<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 course provides an overview of an important field of Artificial Intelligence, which uses neural networks for performing intelligent tasks using a computer. In addition, techniques of Fuzzy logic are also taught.
- This course provides the ground work for the student to work on Artificial Intelligent systems.

**UNIT I**

**Characteristics of Neural Networks**, Historical Development of Neural Networks Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws, Pattern Recognition Problem, Basic Functional UNITS, Pattern Recognition Tasks by the Functional UNITS.

**UNIT II**

**Feed-forward Neural Networks**: Introduction, Analysis of pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of pattern storage Networks. Analysis of Pattern Mapping Networks.

**UNIT III**

**Feedback Neural Networks**: Introduction, Analysis of Linear Auto-associative FF Networks, Analysis of Pattern Storage Networks.

**UNIT IV**

**From Classical Sets to Fuzzy Sets: A Grand Paradigm Shift**: Introduction, Crisp Sets: An Overview, Fuzzy Sets: Basic Types, Fuzzy Sets: Basic Concepts, Characteristics and Significance of the paradigm Shift.

**Fuzzy Sets Vs Crisp Sets**: Additional properties of  $\alpha$ - Cuts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets

**UNIT V**

**Operations on Fuzzy Sets**: Types of operations, Fuzzy Complements, Fuzzy intersections: t- Norms, Fuzzy Unions: t- Conorms, Combinations of Operations, Aggregation Operations.

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

## **UNIT VI**

**Fuzzy Logic:** Classical Logic: An Over View, Multivalued Logic, Fuzzy Prepositions, Fuzzy Quantifiers, Linguistic Hedges, Inference from Conditional Fuzzy Prepositions, Inference from Conditional and Quantified Prepositions, Inference from Quantified Prepositions,

### **TEXT BOOKS**

1. Fuzzy Sets and Fuzzy Logic by George J. Klir/ Bo Yuan, Printice Hall of India P Ltd.
2. Artificial Neural Networks by B. Vegnanarayana, Printice Hall of India P Ltd.

### **REFERENCES**

1. Artificial Intelligence 2nd Edition by E.Rich and K.Knight (TMH).
2. Artificial Intelligence and Expert Systems by Patterson, PHI.
3. Expert Systems: Principles and Programming- Fourth Edn by Giarrantana/ Riley, Thomson.
4. PROLOG Programming for Artificial Intelligence - Third Edition by Ivan Bratka, Pearson Education.
5. Neural Networks by Simon Haykin PHI
6. Artificial Intelligence - 3rd Edition by Patrick Henry Winston, Pearson Edition.

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**Syllabus for M.Tech I Year I Semester**  
Software Engineering  
**FAULT TOLERANT SYSTEMS**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 122SE18**

<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 the phases of fault tolerance, failure detection and fault diagnosis. Approaches for fault detection and corrective measures.

**UNIT I**

**Introduction.** Basic Concepts and Definitions. Phases in Fault Tolerance. Overview of Hardware Fault Tolerance. Reliability and Availability. Summary.

**Distributed Systems.** System Model. Interprocess Communication. Ordering of Events and Logical Clocks. Execution Model and System State. Summary.

**UNIT II**

**Basic Building Blocks.**

Byzantine Agreement. Synchronized Clocks. Stable Storage. Fail Stop Processors. Failure Detection and Fault Diagnosis. Reliable Message Delivery. Summary.

**Reliable, Atomic, and Causal Broadcast.** Reliable Broadcast. Atomic Broadcast. Causal Broadcast.

**UNIT III**

**Recovering A Consistent State.**

Asynchronous Checkpointing and Rollback. Distributed Checkpointing. Summary.

**Atomic Actions.** Atomic Actions and Serializability. Atomic Actions in a Centralized System. Commit Protocols. Atomic Actions on Decentralized Data. Summary.

**UNIT IV**

**Data Replication And Resiliency.** Optimistic Approaches. Primary Site Approach. Resiliency with Active Replicas. Voting. Degree of Replication. Summary.

**UNIT V**

**Process Resiliency.** Resilient Remote Procedure Call. Resiliency with Asynchronous Communication. Resiliency with Synchronous Message Passing. Total Failure and Last Process to Fail. Summary.

**UNIT VI**

**Software Design Faults.**

Approaches for Uniprocess Software. Backward Recovery in Concurrent Systems. Forward Recovery in Concurrent Systems. Summary.

**TEXT BOOKS**

Fault Tolerance in Distributed Systems by Pankaj Jalote

**REFERENCES**

1. Fault-Tolerant Systems by Israel Koren, C. Krishna, Morgan Kaufmann Publishers.
2. Fault-tolerant computer system design book contents. Dhiraj K. Pradhan, Prentice-Hall.
3. The Design and Analysis of Fault Tolerant Digital Systems by Barry W. Johnson Addison Wesley.

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

Software Engineering

**STORAGE AREA NETWORKS  
(PROFESSIONAL ELECTIVE –II)**

**Code: 122SE08**

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<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**Course objectives:**

Storage area networks are playing a vital role in handling data in a segregated manner. The basis for storage area networks can be associated with the library information handled in educational institutions. This course helps in understanding the importance of data and the way data should be stored over a network. Such that, data is easily indexed which may finally help in searching data in an efficient manner. This course also explains how proper storage of data can be associated with replication and how fault tolerance gets enhanced so that data base crashes can be managed.

**UNIT I**

**Introduction to Storage Technology**

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data centre infrastructure, role of each element in supporting business activities

**UNIT II**

**Storage Systems Architecture**

Hardware and software components of the host environment, Key protocols and concepts used by each component ,Physical and logical components of a connectivity environment ,Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, Concept of RAID and its components , Different RAID levels and their suitability for different application environments: RAID 0, RAID 1, RAID 3, RAID 4, RAID 5, RAID 0+1, RAID 1+0, RAID 6, Compare and contrast integrated and modular storage systems ,High-level architecture and working of an intelligent storage system

**UNIT III**

**Introduction to Networked Storage**

Evolution of networked storage, Architecture, components, and topologies of FC-SAN, NAS, and IP-SAN , Benefits of the different networked storage options, Understand the need for long-term archiving solutions and describe how CAS fululfil the need , Understand the appropriateness of the different networked storage options for different application environments

**UNIT IV**

**Information Availability & Monitoring & Managing Data centre**

List reasons for planned/unplanned outages and the impact of downtime, Differentiate between business continuity (BC) and disaster recovery (DR) ,RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures , Architecture of backup/recovery and the different backup/recovery topologies , replication technologies and their role in ensuring information availability and business

continuity, Remote replication technologies and their role in providing disaster recovery and business continuity capabilities.

#### **UNIT V**

Identify key areas to monitor in a data centre, Industry standards for data centre monitoring and management, Key metrics to monitor for different components in a storage infrastructure, Key management tasks in a data centre

#### **UNIT VI**

Securing Storage and Storage Virtualization

Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes

#### **Case Studies**

The technologies described in the course are reinforced with EMC examples of actual solutions.

Realistic case studies enable the participant to design the most appropriate solution for given sets of criteria.

#### **TEXT BOOKS**

1. EMC Corporation, Information Storage and Management, G.Somasundaram, A.Shrivastava, Wiley Publishing.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw Hill, Osborne, 2001.
4. Meeta Gupta, Storage Area Network Fundamentals, Pearson Education Limited, 2002.

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**Syllabus for M.Tech I Year I Semester**  
Software Engineering  
**ADHOC AND SENSOR NETWORKS**  
**(PROFESSIONAL ELECTIVE –II)**

**Code: 122SE09**

<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:**

Ad Hoc and Sensor Networks is playing a vital role in handling sensor nodes in Wireless Sensor Networks. The main goal of the subject is understanding the what is the MANETs how the concepts are comparable with sensor nodes. The information retrieval is a key mechanism in the cloud computing, how the data can be retrieved from sensor network and security issues in sensor networks can be learn in this subject.

**UNIT I**

**Introduction to Ad Hoc Networks:** Characteristics of MANETs, Applications of MANETs and challenges of MANETs - **Routing in MANETs:** Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, other routing algorithms.

**UNIT II**

**Data Transmission:** Broadcast storm problem, Broadcasting, Multicasting and Geocasting - **TCP over Ad Hoc:** TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

**UNIT III**

**Basics of Wireless, Sensors and Applications:** Design issues, Clustering of sensors, Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

**UNIT IV**

**Data Retrieval in Sensor Networks:** Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

**UNIT V**

**Security:** Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

**UNIT VI**

**Sensor Network Platforms and Tools:** Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms - **Operating System:** TinyOS - **Imperative Language:** nesC, Dataflow style language: TinyGALS, Node-Level Simulators, ns-2 and its sensor network extension, TOSSIM

**TEXT BOOKS**

1. Ad Hoc and Sensor Networks – Theory and Applications, *Carlos Corderio Dharma P. Aggarwal*, World Scientific Publications, March 2006, ISBN – 981-256-681-3
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 ( Morgan Kauffman)



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

**Code: 122SE10**

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**3      1      -      3**

**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**

**Review**

**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 - **Foundation of Networking Protocols:** 5-layer TCP/IP Model, 7-Layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM - **Networking Devices:** Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.

**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, Interconnections: Hubs and Switches, PPP: The Point-to-Point Protocol, Link Virtualization - **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

**UNIT III**

**Logical Addressing:** IPv4 Addresses, IPv6 Addresses - **Internet Protocol:** Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 – **Multicasting Techniques and Protocols:** Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms –

**UNIT IV**

**Transport and End-to-End Protocols:** Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control – **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, Socket Programming with TCP and UDP, Building a Simple Web Server

#### UNIT V

**Wireless Networks and Mobile IP:** Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standards, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - **Optical Networks and WDM Systems:** Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch

#### UNIT VI

**VPNs, Tunnelling and Overlay Networks:** Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks – **VoIP and Multimedia Networking:** Overview of IP Telephony, VoIP Signalling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol - **Mobile Ad-Hoc Networks:** Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks – **Wireless Sensor Networks:** Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

#### 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. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition, Tata McGraw Hill, 2007
2. Guide to Networking Essentials, Greg Tomsho, Ed Tittel, David Johnson, Fifth Edition, Thomson.
3. An Engineering Approach to Computer Networking, S.Keshav, Pearson Education.
4. Campus Network Design Fundamentals, Diane Teare, Catherine Paquet, Pearson Education (CISCO Press)
5. Computer Networks, Andrew S. Tanenbaum, Fourth Edition, Prentice Hall.
6. The Internet and its Protocols, A.Farrel, Elsevier.

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**Syllabus for M.Tech I Year I Semester**  
**Software Engineering**  
**NETWORK SECURITY AND CRYPTOGRAPHY**  
**(PROFESSIONAL ELECTIVE –II)**

**Code: 122SE20**

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**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.

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

Software Engineering

### WEB TECHNOLOGIES AND OOAD (Object Oriented Analysis and Design) LAB

Code: 122SE71

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#### Laboratory Objective

Students will be able to

- Build web pages with styles and validations, and publish it.
- Understand the importance of XML.
- Develop the web pages using AJAX, and also understand the concept.
- Develop the web pages using form elements of ASP.NET and understand most of the ActiveX controls.
- Accessing the database from webpage using Active server pages.
- How to handle file and directory using PHP.
- How to use scripting elements in PHP.
- Making form and accessing the database from PHP webpage.
- Develop software for an application using typical Case Tool (IBM Rational Rose or IBM RSA)

#### Web Technologies Lab

At the end of the lab course students are given a Case-Study and ask them to develop web application using any of the above technologies.

#### Prerequisites

The student must have the knowledge of

- HTML, CSS, Java Script, XML, JDBC
- AJAX, ASP.NET(During Course)
- PHP(During Course)

Tools to be used

- Web Browser (IE 6.0/Firefox 3.0 or above)
- XAMPP
- Apache Tomcat Web server 5.0 or above
- IIS Web Server
- Oracle 8.0/MySQL/ any database

### Exercises

#### **SUGGESTED LIST OF APPLICATIONS:**

- Student Marks Analyzing System
- Quiz System
- Online Ticket Reservation System
- Payroll System
- Course Registration System
- Expert Systems
- ATM Systems
- Stock Maintenance

#### **OOAD Lab**

Perform the following Software Engineering methodology as given below.

1. **Problem Statement:**

Thorough study of the problem, Identify project scope, Objectives and infrastructure.

2. Business modelling and requirements specification, the specification language (Unified Modelling Language (UML) will be used.

3. UML

Use work products, Data dictionary, Use case diagrams and activity diagrams, Build and test Class diagrams, Sequence diagrams, Collaboration diagrams and add interface to class diagrams.

4. Software Implementation, Coding, Use tools for automatic code generation from system specifications.

5. Change Management, program, Data and Documentation management

6. Software Testing

Prepare test plan, Perform validation testing, coverage analysis, Memory leaks, develop test case hierarchy, Site check and site monitor.

7. Software Documentation and Reverse Engineering

Apply Reverse Engineering approach and compare with the forward engineering approach and prepare documents and reports

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

Software Engineering

**TECHNICAL PAPER WRITING AND SEMINAR**

**Code: 122SE72**

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**Max. Marks: 50**

There shall be two 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 50 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 : 10 marks
- Final Report : 10 marks
- Presentation : 30 marks

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
- Writing style
- Rejection
- 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:**

1. <http://www.cs.dartmouth.edu/~scot/givingTalks/sld001.htm>
2. <http://www.cse.psu.edu/~yuanxie/advice.htm>
3. <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.



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

Software Engineering

**BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT**

(same as 124MB56,121MB56,101MB56)

**(OPEN ELECTIVE- I)**

**Code: 122MB56**

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**UNIT I**

**INTRODUCTION TO BANKING BUSINESS:**

Banking Sectors- Retail, Corporate, Rural, and International; Non-banking financial intermediaries; Types of advances and deposits in a bank, New Dimensions and Products. - Credit, Debit and Smart Cards, and e-Banking Structure of the Indian Banking System's. Commercial Banks – Public and Private Sector and Foreign Banks. Cooperative Banks.

**UNIT II**

**BANKING REFORMS AND REGULATION:** Banking Regulation Act, 1949, Reserve Bank of India Act 1934, and Reserve Bank's Instruments of Credit Control. Deficiencies in Indian Banking including Problems Accounts and Non-Performing Assets, Banking Sector Reforms.

**UNIT III**

**INSURANCE:** Need for and importance of insurance, branches of insurance (life and general insurance) policy and procedure.

**UNIT IV**

**INSURANCE BUSINESS ENVIRONMENT:**

Mathematical basis of life insurance, reinsurance coverage, regulatory and legal frame work governing the insurance, business and economics of insurance, need for changing mindset; Latest trends.

**UNIT V**

**INTRODUCTION TO RISK**

Types of Risks facing Business and Individuals, Risk Management Process, Risk Management Methods, Risk Identification and Measurement, Risk Management Techniques: Non Insurance Methods.

**UNIT VI:**

**INSURANCE AS A RISK MANAGEMENT**

Techniques Principles: Principle of Indemnity, Principle of Insurable Interest, Principle of Subrogation, Principle of utmost good Faith, Requisites of Insurable Risks, Requirements of an Insurance Contract, Distinguishes Characteristics of Insurance Contracts, Role of Agents and Brokers.

**TEXT BOOKS**

1. Varshney, P.N., Banking Law and Practice, Sultan Chand & Sons, New Delhi.
2. General principles of Insurance - Harding and Evanly
3. Mark S.Dorfman: Risk Management and Insurance, Pearson, 2009.

**REFERENCES:**

- Scott E. Harringam Gregory R. Nichaus: Risk Management & Insurance, , TMH, 2009.
- George E. Rejda: Principles of risk Management & Insurance, , 9/e, Pearson Education, 2009.
- G.Koteshwar: 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.

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

Software Engineering

### Indian Values, Ethics, Culture and Intellectual Property Rights

(OPEN ELECTIVE- I)

Code: 122BT37

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<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

#### UNIT-1 Indian Culture

A Introduction to Culture Values and Ethics, Bharata, The Indian Concept of Human Life, Indian Civilization, Sanskrit and Indian Languages, Festivals, Sculpture, Music, Dance, Drama, Ayurveda, Family and its Importance, Indian Marriage System, Status of Women in Indian Society, Education, Purpose, Ancient System, Value Education, Interfaith Understanding, Happiness, Modernism and its Effect on Lifestyle, Mind and its Operation, Control of Mind, Yoga, Exemplary Life Sketches-Albert Einstein, Abraham Lincoln

#### UNIT-II Value System

Human Value System, Truthfulness, Righteousness, Peace, Non-Violence, Love, Kindness and Compassion, Humility, Faith, Courage, Optimism, Forgiveness, Ceiling on Desires (Control of Sense organs), Exemplary Life Sketches-M K Gandhi, Abdul Kalam

#### UNIT-III Ethics

Ethics in Ancient India, Ethics, Morals, Ethics and Human Life, Core Areas for Ethics, Values, Morality, Integrity, Honesty, Character, Loyalty, Trustworthiness, Courage and Confidence, Confidentiality, Secrecy and Transparency, Justification, Contracts and Spirit Promises and Schedules, Quarrels, Selfishness, Obstacles, Supporting Measures, Reputation and its sale, Decision Making in Ethics, Exemplary Life Sketches-Vishveshwaraiah, Jagadeesh Chandra Bose, Meghanad Saha

#### UNIT- IV Professional Ethics

Occupation, Profession, Professional, Professional Organization, Obligations Of a Professional, Temptations, Aptitude, Importance of Professional Ethics for Engineers, Code of Ethics, Need for a Code, Impact of Ethical Behaviour, The Code of Ethics for Engineers, Fundamental Principles and Cannons, Commerce and Ethics, Marketing Ethics, Finance and Ethics, Science, Religion and Ethics, Medical Ethics, Genetics and Ethics, Politics and Ethics, Genders and Ethics, Media and Ethics, Computer Ethics  
Exemplary Life Sketches- Narayan Murthy, Homi Jahangir Bhabha

#### UNIT –V Intellectual Property Rights (IPR)

Invention and Creativity, Basic Types of Property, Need for Protection of IPR, IP Types Industrial Property (Patents, Trade Marks, Trade Secrets, Industrial Designs and Integrated Circuits), Copyrights and Related Rights, Geographical Indications.

**UNIT-VI** WIPO Mission and Activities, GATT & Trips, Indian Position on WTO and strategies, Indian IPR legislations-commitments to WTO-Patent Ordinance and the Bill, Draft of a National Intellectual Property Policy, Case Studies on IP

**REFERENCE BOOKS:**

- 1.The ABCs of Ethics by Michael. L. Buckner, Universe. Inc, New York Lincoln, Shangahai
- 2.Science, Faith and Ethics by Denis Alexander and Robert.S.White, Hendrickson Publishers, Massachusetts, USA, March 2006
- 3.Vedic Science Primer by PSR Murthy, BS Publications, Hyderabad
- 4.Medical Ethics-Global View Points, Edited by Diane Andrews, Hennig Feld, Green Haven Press
- 5.Divine Stories, Human Value Stories, Volume I and II, Sri Satya Sai Books and Publications.

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**Syllabus for M.Tech I Year II Semester**  
Software Engineering  
**EMBEDDED SYSTEMS**  
**(OPEN ELECTIVE- I)**

**Code: 122VE17**

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<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

**UNIT I**

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

**UNIT II**

The 8051 Architecture : Introduction, 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).

Basic Assembly Language Programming Concepts: The Assembly Language Programming Process, Programming Tools and Techniques, Programming the 8051. Data Transfer and Logical Instructions.

(Chapters 4, 5 and 6 from Text Book 2, Ayala).

**UNIT III**

Arithmetic Operations, Decimal Arithmetic. Jump and Call Instructions, Further Details on Interrupts. (Chapter 7 and 8 from Text Book 2, Ayala)

**UNIT IV**

Applications: Interfacing with Keyboards, Displays, D/A and A/D Conversions, 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,

Interrupt Routines in an RTOS Environment. (Chapter 6 and 7 from Text Book 3, Simon).  
Basic Design Using a Real-Time Operating System : Principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory and Power, An example RTOS like uC-OS (Open Source); 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, Using Laboratory Tools, An Example System. (Chapter 8,9,10 & 11 from Text Book 3, Simon).

## **UNIT VI**

Introduction to advanced architectures: ARM and SHARC, Processor and memory organization and Instruction level parallelism; Networked embedded systems: Bus protocols, I2C bus and CAN bus; Internet-Enabled Systems, Design Example-Elevator Controller. (Chapter 8 from Text Book 1, Wolf).

### **TEXT BOOKS**

1. Computers as Components-principles of embedded computer system design, Wayne Wolf, Elsevier.
2. The 8051 Microcontroller, Third Edition, Kenneth J.Ayala, Thomson.

### **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.
6. An Embedded Software Primer, David E. Simon, Pearson Education.

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**Syllabus for M.Tech I Year II Semester**  
**BIO INFORMATICS FOR SOFTWARE ENGINEERING**  
**(OPEN ELECTIVE- I)**

**Code: 122BT19**

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**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 , Neddleman-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

Software Engineering

### SOFTWARE QUALITY ASSURANCE AND TESTING

Code: 122SE11

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<b>3</b>	<b>1</b>	<b>-</b>	<b>3</b>

#### Course Objective:

- To understand various standards to measure quality
- To clearly understand the concept of metrics and their types
- To set a strategy for testing environment and to learn the testing methodologies in detail
- To understand and implement various testing techniques and to make a thorough study on various testing tools.

#### UNIT I

Software Quality Assurance Framework and Standards

SQA Framework: What is Quality? Software Quality Assurance, Components of Software Quality Assurance – Software Quality Assurance Plan: Steps to develop and implement a Software Quality Assurance Plan – Quality Standards: ISO 9000 and Companion ISO Standards, CMM, CMMI, PCMM, Malcolm Bal ridge, 3 Sigma, 6 Sigma, TMMI maturity model

#### UNIT II

Software Quality Assurance Metrics and Measurement

Software Quality Metrics: Product Quality metrics, In-Process Quality Metrics, Metrics for Software Maintenance, Examples of Metric Programs – Software Quality metrics methodology: Establish quality requirements, Identify Software quality metrics, implement the software quality metrics, analyze software metrics results, and validate the software quality metrics ,Linguistic Metrics , Structural Metrics, Hybrid Metrics, Metrics Implementation, Software quality indicators, Fundamentals in Measurement theory.

#### UNIT III

Software Testing Strategy and Environment

Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing, comparison of STLC with SDLC

#### UNIT IV

Software Testing Methodology and management

Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist

Basic concepts – Testing and debugging goals and policies – Test planning – Test plan components – Test plan attachments – Locating test items – Reporting test results.



## UNIT V

### Software Testing Techniques

Black-Box, White-Box Testing, Gray-Box, Boundary value, Equivalence Class Partitioning (ECP), Test adequacy criteria ,Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing,

## UNIT VI

### Software Testing Tools

Taxonomy of Testing tools, Methodology to evaluate automated testing tools(QTP), Static code analyzers, Test case generators, GUI Capture/Playback, Stress Testing, Testing Client -server applications, Testing compilers and language processors, Testing web-enabled applications. Study on tools like QTP, RFT (IBM), OpenSTA, JMetra, JUNIT, selenium and Cactus.

## TEXT BOOKS

1. Effective Methods for Software Testing, 2nd Edition by William E. Perry, Second Edition, published by Wiley
2. Software Quality, by Mordechai Ben-Menachem/Garry S. Marliss, by Thomson Learning publication

## REFERENCES

1. Testing and Quality Assurance for Component-based Software, by Gao, Tsao and Wu, Artech House Publishers
2. Software Testing Techniques, by Borjes Beizer, Second Edition, Dreamtech Press
3. Managing the Testing Process, by Rex Black, Wiley
4. Handbook of Software Quality Assurance, by G. Gordon Schulmeyer, James I.McManus, Second Edition, International Thomson Computer Press
5. **Ilene Burnstein, “Practical Software Testing”, Springer International Edition, 2003.**
6. Software Testing and continuous Quality Improvement, by William E.Lewis, Gunasekaran Veerapillai, Second Edition, Auerbach Publications
7. Metrics and Models for Software Quality Engineering, by Stephen H. Kan, by Pearson Education Publications.
8. <http://www.tmmifoundation.org/>
9. Edward Kit, “Software Testing in the Real World - Improving the Process”, Pearson Education, 2004.

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

Software Engineering

#### SOFTWARE ARCHITECTURE AND DESIGN PATTERN

Code: 122SE12

<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 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

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**Syllabus for M.Tech I Year II Semester**  
Software Engineering  
**DATAWAREHOUSING AND DATA MINING**

**Code: 122SE13**

<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 main purpose of the course is to develop and gain an understanding of the principles, concepts, functions and uses of data warehouses, data modeling and data mining in business. Enable students to understand and implement classical algorithms in data mining and data warehousing. Students will learn how to analyze the data, identify the problems, and choose the relevant algorithms to apply. Then, they will be able to assess the strengths and weaknesses of the algorithms and analyze their behaviour on real datasets.

**UNIT I**

**Introduction:** Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

**Data Preprocessing:** Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

**UNIT II**

**Data Warehouse and OLAP Technology for Data Mining:** Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining

**Data Cube Computation and Data Generalization:** Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

**UNIT III**

**Mining Frequent Patterns, Associations and Correlations:** Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining

**UNIT IV**

**Classification and Prediction:** Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

## **UNIT V**

**Cluster Analysis Introduction :**Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid- Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis - Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multirelational Data Mining:

## **UNIT VI**

**Mining Object, Spatial, Multimedia, Text and Web Data:** Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

**Applications and Trends in Data Mining:** Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining and Social Impacts of Data Mining.

## **TEXT BOOKS**

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, 2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

## **REFERENCES**

1. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia.
2. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition
3. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley student edition
4. Building the Data Warehouse By William H Inmon, John Wiley & Sons Inc, 2005.
5. Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson education
6. Data Mining Techniques – Arun K Pujari, University

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**Syllabus for M.Tech I Year II Semester**  
Software Engineering  
**SERVICE ORIENTED ARCHITECTURE**

**Code: 122SE14**

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**3      1      -      3**

**Subject Objective**

Goals of the Course, the students will:

- Understand what an SOA is, and how it differs from other architectures
- Know what Web Services are and their difference from and relationship to SOA
- Be able to build simple Web Services
- Be able to analyze and design example SOA systems, and implement them using basic Web Services

**UNIT I**

**SOA and Web Services Fundamentals**

Introducing SOA: Fundamental SOA, Common characteristics of contemporary SOA, Common tangible benefits of SOA, Common pitfalls of adopting SOA, The Evolution of SOA: An SOA time-line, The continuing evolution of SOA, The roots of SOA, Web Services and Primitive SOA: The Web services framework, Services, Service descriptions, messaging

**UNIT II**

**SOA and WS-\* Extensions**

Web Services and Contemporary SOA (Part I: Activity Management and Composition) - Message exchange patterns, Service activity, Coordination, Atomic transactions, Business activities, Orchestration, Choreography, Web Services and Contemporary SOA (Part II: Advanced Messaging, Metadata, and Security) : Addressing, Reliable messaging, Correlation, Policies, Metadata exchange, Security, Notification and eventing

**UNIT III**

**SOA and Service-Oriented**

Principles of Service-Oriented: Service-orientation and the enterprise, Anatomy of SOA, Common principles of service-orientation, Inter-relation between principles service-orientation, Service-orientation and object-orientation, Native Web service support for principles of service-orientation, Service Layers, Service-orientation and contemporary SOA, Service layer abstraction, Application service layer, Business service layer, Orchestration service layer, Agnostic services, Service layer configuration scenarios

**UNIT IV**

**Building SOA (Planning and Analysis)**

SOA Delivery Strategies, SOA delivery lifecycle phases, The top-down strategy, The bottom-up strategy, The agile strategy, Service-Oriented Analysis (Part I: Introduction), Introduction to service-oriented analysis, Benefits of a business-centric SOA, Deriving business services, Service-Oriented Analysis (Part II: Service Modelling), Service modelling, Service modelling guidelines, Classifying service model logic, Contrasting

service modelling approaches.

#### **UNIT V**

##### **Building SOA (Technology and Design)**

Service-Oriented Design (Part I: Introduction) - Introduction to service-oriented design, WSDL-related XML Schema language basics, WSDL language basics, Service interface design tools. Service-Oriented Design (Part II: SOA Composition Guidelines)- SOA composing steps, Considerations for choosing service layers, Considerations for positioning core SOA standards, Considerations for choosing SOA extensions. Service-Oriented Design (Part III: Service Design) - Service design overview, Entity-centric business service design, Application service design, Task-centric business service design, Service design guidelines.

#### **UNIT VI**

Service-Oriented Design (Part IV: Business Process Design)- WS-BPEL language basics, WS-Coordination overview, Service-oriented business process design, Fundamental WS-\* Extensions, WS-Addressing language basics, WS-Reliable Messaging language basics, WS-Policy language basics, WS-Metadata Exchange language basics, WS-Security language basics, SOA Platforms - SOA platform basics, SOA support in J2EE and .NET, Integration considerations.

#### **TEXT BOOKS:**

1. Service-Oriented Architecture- Concepts, Technology, and Design, Thomas Erl, Pearson Education.
2. Understanding SOA with Web Services, Eric Newcomer, Greg Lomow, and Pearson Education.

#### **REFERENCES:**

1. The Definitive guide to SOA, Jeff Davies and Others, Apress, Dreamtech.
2. Java SOA Cook Book, E. Hewitt, SPD.
3. SOA in practice, N.M.Josuttis, SPD.
4. Applied SOA, M Rosen and others, Wiley India pvt. Ltd.
5. Java Web Services Architecture, J. Mc Govern, and others, Morgan Kaufmann Publishers, Elsevier.
6. SOA for Enterprise Applications, Shankar. K, Wiley India Edition.
7. SOA- Based Enterprise Integration, W.Roshen, and TMH.
8. SOA Security, K.Rama Rao, C. Prasad, Dreamtech Press.

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**Syllabus for M.Tech I Year II Semester**  
Software Engineering  
**PRINCIPLES OF QUANTUM COMPUTING**  
**(PROFESSIONAL ELECTIVE –III)**

**Code: 122SE15**

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

**Subject Objective**

- This is a very new field of research.
- Quantum computing is likely to be the next advancement in computers in the coming decades.
- The course introduces the field of quantum computing by first teaching the necessary mathematical and physical background and introduces the current advancements in a logical manner.

**UNIT I**

**Introduction to Quantum Computing(over view):**

History of quantum computation and quantum information; quantum bits; single and multiple quantum qubits; quantum circuits, no-cloning theorem of quantum circuits. Brief overview of quantum algorithms, Deutsch' algorithm and Deutsch- Jozsa algorithm

**UNIT II**

**Introduction to quantum mechanics and the theory of computation:**

**Linear Algebra:** Hilbert space, bases and their independence, linear operators and matrices, adjoint operators, their eigen values and eigenvectors, Pauli matrices. The postulates of quantum mechanics; concept of state space, state of a quantum system and its evolution. Quantum measurement. - POVM, phase and composite systems.

Theory of computation: Turing machine, circuits, computational complexity, decision problems and complexity classes P and NP.

**UNIT III**

**Quantum circuits:**

Single qubit and their operations, Bloch sphere, controlled operations, measurement, universal quantum gates, two-level universal gates, single and CNOT gates and their universality. Universal operations, approximation of UNITary gates. Quantum computational complexity. Simulation of quantum systems.

**UNIT IV**

**Quantum Fourier Transform and other applications:**

The quantum Fourier transforms (QFT). Phase estimation. Applications in order finding and factoring; Shor's algorithm. Other general applications of QFT: period finding, discrete logarithms, hidden subgroup problem.

Quantum Search algorithms.



## **UNIT V**

### **Communication with quantum computers and quantum cryptography:**

The Entanglement problem in quantum communication. Communication, entropy and quantum information, quantum cryptography, encoding, dense coding, quantum key distribution. EPR pairs and Bell states.

## **UNIT VI**

### **Physical realization of quantum computers:**

Guiding principles, conditions for quantum computation, harmonic oscillator quantum computer; optical quantum computer; ion traps; NMR.

## **TEXT BOOKS**

1. Michael A. Nielsen and Isaac L Chuang: “Quantum Computation and Quantum Information”, Cambridge Univ. Press Ed 2002 (available in Indian edition)
2. Dan C. Marinescu and Gabriella Marinescu: “Approaching Quantum Computing” Pearson Education, 2008. (Available in India)

## **REFERENCES**

1. McMahon: “Quantum Computing Explained”, John Wiley and Sons, 2008
2. R.K. Brylinsk and Goong Chen: “Mathematics of Quantum Computation”, 2002, Chapman and Hall.
3. Goong Chen: Quantum Computing Devices: Principles, designs and analysis, Chapman and Hall 2007

### **For Background:**

1. Albert Messiah: “Quantum Mechanics Vol I, North Holland 1966
2. John von Neumann: Mathematical Foundations of Quantum Mechanics, Princeton Univ. Press. (Abridged) 1996

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

Software Engineering

**SCRIPTING LANGUAGES**

**(PROFESSIONAL ELECTIVE –III)**

**Code: 122SE16**

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

**UNIT I**

Introduction to PERL and Scripting

Scripts and Programs, Origin of Scripting , Scripting Today, Characteristics of Scripting Languages, Web Scripting, in the universe of Scripting Languages. PERL- Names and Values, Variables, Scalar Expressions, Control Structures, arrays, list, hashes, strings, pattern and regular expressions, subroutines, advance pen - finer points of looping, pack and unpack, file-system, eval, data structures, packages, modules, objects, interfacing to the operating ,System, Creating Internet ware applications, Dirty Hands Internet Programming, security Issue.

**UNIT II**

PHP Basics

PHP Basics- Features, Embedding P1W Code in your Web pages, outputting the data to the browser, Data types, Variables, Constants, expressions, string interpolation, control structures. Function, Creating a Function, Function Libraries, Arrays, strings and Regular Expressions.

**UNIT III**

Advanced PHP Programming (Part I)

PHP and Web Forms, Files, PHP Authentication and Methodologies -Hard Coded File Based, Database Based, [P Based, Login Administration, Uploading Files with PUP, Sending Email using PHP Encryption Functions, the Mcrypt package.

**UNIT IV**

Advanced PHP Programming (Part II)

Building Web sites for the World — Translating Websites- Updating Web sites Scripts, Creating the Localization Repository, Translating Files, text, Generate Binary Files, Set the desired language within your scripts, Localizing Dates, Numbers and Times.

**UNIT V**

TCL-Tk

TCL Structure, syntax, Variables and Data in TCL, Control Flow, Data Structures, input/output, procedures, strings , patterns, files, Advance TCL- eval, source, exec and up level commands, Name spaces, trapping errors, event driven programs, making applications internet aware, Nuts and Bolts Internet Programming, Security Issues, C Interface. Tk-Visual ‘Tool Kits, Fundamental Concepts of Tk, Tk by example, Events and Binding, Perl-Tk.

## UNIT VI

### Python

Introduction to Python language, python-syntax, statements, functions, Built-in-functions and Methods, Modules in python, Exception Handling, Integrated Web Applications in Python — Building Small, Efficient Python Web Systems , Web Application Framework.

### TEXT BOOKS

1. The World of Scripting Languages , David Barron,Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning P1W and MySQL, 3 Editions, Jason Gilmore, Apress Publications (Dream tech.).

### REFERENCES

1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Perl and PHP, J.Lee and B.Ware (Addison Wesley) Pearson Education. M. Thd., (S(\*'TWARE kNG
2. Programming Python,M.Lutz,SPI).
3. P111' 6 Fast and Easy Web Development ,Julie Meloni and Malt Tdfles Cengage Iearning Pub
4. P1W 5.1, I.Bayross and S.Shah, the X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.
6. Guide to Programming with Python, M.Dawson, Cengage Learning.
7. Pen by Example, E.Quigley, Pearson Education.
8. Programming Pen, Larry Wall, T.Chiitiansen and J .Orwant, O'Reil ly, SP1).
9. Tel and the Tk Tool kit, Ousterhout, I son Education.
10. NIP and MySQL by Exarnple, E.Quigley, Prince Hall (Pearson).
11. Pen Power .P.Flynt, Cengage Learning.
12. PUP Programming solutions, V.Vaswani, TMI I.

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

Software Engineering

**MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE**

**(PROFESSIONAL ELECTIVE –III)**

**Code: 122SE17**

<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:**

- This course will cover several advanced topics in Artificial Intelligence.
- 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.
- 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. Stork, second edition

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**Syllabus for M.Tech I Year II Semester**  
 Software Engineering  
**DISTRIBUTED COMPUTING**  
**(PROFESSIONAL ELECTIVE –III)**

**Code: 122SE19**

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**UNIT I**

Introduction

The different forms of computing - Monoh. H, Distributed, Parallel and cooperative computing, the meaning distributed computing, Examples of Distributed systems, the strengths and weaknesses of Distributed computing, operating system concepts relevant to distributed computing, the architecture of distributed applications.

**UNIT II**

Distributed Computing Paradigms

Paradigms for Distributed Applications — Message Passing Paradigm, The Client-Server Paradigm (Java Socket API). The peer-to-peer Paradigm, Message system (or MOM) Paradigm — the point-to-point message model and the publish/subscribe message model, RPC model, The Distributed Objects Paradigms — RML, ORB, the object space Paradigm, The Mobile Agent Paradigm, the Network Services Paradigm. The collaborative application (Groupware Paradigm) ,choosing a Paradigm *for* an application.

**UNIT III**

Distributed Objects Paradigm (RMI)

Message passing versus Distributed Objects, An Archetypal Distributed Object Architecture, Distributed Object Systems, RPC, RMI, The Java RMI Architecture, Java RMI API, A sample RMI Application, steps for building an RMJ application, testing and debugging, comparison of RMI and socket API

Distributed Object Paradigm(CORBA)

The basic Architecture, The CORBA object interface, Inter-ORB protocols, object servers and object clients, CORBA object references, CORBA Naming Service and the Interoperable Naming Service, CORBA object services, object Adapters, Java IDL, An example CORBA application.

**UNIT IV**

Distributed Document- based Systems

WWW, Lotus Notes, comparison of WWW and Lotus Notes, Distributed Coordination-based systems - Introduction to coordination models, TIB, JIM. comparison of TIB and JIN1

Software Agents, Agent Technology, Mobile Agents.

Distributed Multimedia Systems — characteristics of multimedia data, QOS of service management, Resource Management, Stream Adaptation

#### **UNIT V**

Grid Computing

Definition of grid, grid types — computational grid, data grid, grid benefits and applications, drawbacks of grid computing, grid components, grid architecture and its relation to various Distributed Technologies.

#### **UNIT VI**

Cluster Computing –

Parallel computing overview, cluster computing Introduction, Cluster Architecture, parallel programming models and Paradigms, Applications of Clusters. Bewoulf, COMPaS, NanOS

#### **TEXT BOOKS**

1. Distributed Computing, Principles and Applications, M.L.Liu, Pearson Education.
2. Distributed Systems, Principles and Paradigms, A.S.Tanenbaurn and M.V.Steen , Pearson Educatiota.
3. Client Server Programming with Java and CORBA, second edition, R.Orfali & Dan ilarkey, John Wiley & Sons.
4. Grid Computing, J.Joseph & C.Fellenstein, Pearson education.
5. High Performance Cluster Computing, Rajkumar Buyya, Pearson education.

#### **REFERENCES**

1. A Networking Approach to Grid Computing, D.Minoli, Wiley & sons.
2. Grid computing: A Practical Guide to Technology and Applications, A.Abbas, Firewall Media.
3. Java Network Programming, ER.Harold, 2' eaaioh,' O'Reilly, SPD.
4. Distributed Systems, Concepts and Design, 3 edition, GCouloqris, 3.Dollimore and Tim Kindbirg, Pearson Education.
5. Java Programming with CORBA. 3 edition, Brose, Vogel, Duddy, Wiley Dreamtech.

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

Software Engineering

#### SOFTWARE TESTING AND DATAWARE HOUSING & DATA MINING LAB

Code: 122SE73

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<b>-</b>	<b>-</b>	<b>6</b>	<b>3</b>

#### Course Objective:

- In software testing lab the various manual and automation testing processes are carried out to efficiently learn the testing activities.
  - Both commercial and open source testing tools are being taught to better the software testing in detail.
  - According the software industry requirements the testing tools are taught so that the students can directly make use of testing tools in industry.
  - Enable the students to analyze various data transformation techniques thus simulating the real world scenarios. Students use the data mining tool to perform data mining algorithms (clustering, logistic regression, decision tree, neural network ...) and model implementation.
  - Students will have chance to have hands-on experience on popular data mining tools in the marketplace.
1. Take any system and study its system specifications and report the various bugs.
  2. Create a test plan document for any application using any testing standards.
  3. Write the test cases for any known application and check their granularity.
  4. Perform the following in manual testing process:
    - a) Understand the functionality of program
    - b) Prepare a test environment
    - c) Execute test case(s) manually
    - d) Verify the actual result
  4. Do the following measurements on a chosen software implementation
    1. Halstead's Metrics
    2. McCabe's Metrics
  5. Do the following testing for a chosen software implementation using any commercial or freeware tools:
    1. Path-testing
    2. Transaction-flow testing
    3. Data-flow testing
  6. Study and related exercises on automated testing tool (( QTP (Quick Test Professional))
  7. Study of any open source web testing tool like Selenium.
  8. Study on defect tracking and prevention tools like Bugzilla..



9. Study of any open source- testing tool (e.g. test link, OpenSTA).
10. Simulate a test driver: Develop a simple software testing tool implementing any testing technique of your choice.

**DATAWAREHOUSING AND DATA MINING:**

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 form Sailors table and Boat\_Name from Boats table in a new table.
5. Compare the GRI and Apriori usage (Prepare a sample data set in Spread Sheet)
6. Determine the Drugs importance w.r.t. Age, Cholestrol and BP using C 5.0
7. Predict the accuracy of the test data set using Neural Net model using a Case Study of Botanical data set.
8. Using Kohonen model of classification determine the Classifier and the Test data and predict the test data set using classified data set.
9. Compare the C 5.0 and Neural Net using the sample data.

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

Software Engineering

**TECHNICAL SEMINAR  
(Independent Review Paper)**

**Code: 122SE74**

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

**Max. Marks: 50**

There shall be two 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 50 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 : 10 marks
- Final Report : 10 marks
- Presentation : 30 marks

a	b	c	d	e	f	g	h	i	j	k
									√	√

**Syllabus for M.Tech II Year I Semester**  
Software Engineering  
**COMPREHENSIVE VIVA-VOCE**

**Code: 122SE75**

**L      T      P      C**  
**-      -      -      2**

**Max. Marks: 50**

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.

a	b	c	d	e	f	g	h	i	j	k
							√		√	

**Syllabus for M.Tech II Year I Semester**  
Software Engineering  
**PROJECT SEMINAR - I**

**Code: 122SE76**

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

**Max. Marks: 50**

In II year I semester and II semester, a project seminar shall be conducted for 50 marks and for 2 credits (there is no external evaluation) in each of the semester. 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 25 marks and the end semester seminar evaluation shall carry 25 marks. The report for the project seminar will carry 10 marks and the remaining marks (15) shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

a	b	c	d	e	f	g	h	i	j	k
	√	√	√	√	√		√			

**Syllabus for M.Tech II Year I Semester**  
 Software Engineering  
**PROJECT WORK (PART I)**  
**PROJECT STATUS REPORT**

**Code: 122SE77**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
-	-	-	<b>18</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 attendance requirement, 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.

a	b	c	d	e	f	g	h	i	j	k
							√		√	

**Syllabus for M.Tech II Year II Semester**  
Software Engineering  
**PROJECT SEMINAR - II**

**Code: 122SE78**

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

**Max. Marks: 50**

In II year I semester and II semester, a project seminar shall be conducted for 50 marks and for 2 credits (there is no external evaluation) in each of the semester. 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 25 marks and the end semester seminar evaluation shall carry 25 marks. The report for the project seminar will carry 10 marks and the remaining marks (15) shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

a	b	c	d	e	f	g	h	i	j	k
	√						√		√	

**Syllabus for M.Tech II Year II Semester**  
Software Engineering  
**PROJECT WORK AND DISSERTATION**

**Code: 122SE79**

**L      T      P      C**  
**-      -      -      20**

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 favourable, the candidate shall revise and resubmit the Dissertation, in the time frame as prescribed by PRC. If the report of the examiner is unfavourable 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 favourable, 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.