

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

(Applicable for the batches admitted from 2014-2015)



**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
SREENIDHI INSTITUTE OF SCIENCE & TECHNOLOGY**

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

(Accredited by NAAC with 'A' Grade, Accredited by NBA of AICTE, Recipient of WBA under TEQIP I & II)  
Yamnampet, Ghatkesar, R.R.District-501 301.

**Department of Computer Science and Engineering**  
**M.Tech (Software Engineering) Course Structure and Syllabus**

**Academic Regulations: 2014-2015**

<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	4S101	Software Requirements and Estimation	3	1	-	3	40	60
2	4S102	Software Process and Project Management	3	1	-	3	40	60
3	4S103	Software Quality Assurance and Testing	3	1	-	3	40	60
4	4SC04	Cloud Computing	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	4S171	Software Testing Lab	-	-	4	2	40	60
8	4S172	Technical paper writing and Seminar	-	-	3	2	50	-
<b>Total</b>			<b>18</b>	<b>6</b>	<b>7</b>	<b>22</b>	<b>330</b>	<b>420</b>

PROFESSIONAL ELECTIVE I		PROFESSIONAL ELECTIVE II	
Subject Code	Subject Name	Subject Code	Subject Name
4S105	Secure Software Engineering	4SC08	Storage Area Networks
4SC06	Information Retrieval Systems	4S109	Adhoc and Sensor Networks
4S107	Cyber Security and Cyber Laws	4R103	Advanced Computer Networks
		4S120	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	4S211	Software Architecture and Design Patterns	3	1	-	3	40	60
3	4S212	Software Development Methodologies	3	1	-	3	40	60
4	4S213	Web Technologies & Services	3	1	-	3	40	60
5	4S214	Advanced Data Mining	3	1	-	3	40	60
6		<b>PROFESSIONAL ELECTIVE III</b>	3	1	-	3	40	60
7	4S273	Web Technologies and Services Lab	-	-	4	2	40	60
9	4S274	Technical Seminar (Independent Review Paper)	-	-	3	2	50	-
<b>Total</b>			<b>18</b>	<b>6</b>	<b>7</b>	<b>22</b>	<b>330</b>	<b>420</b>

PROFESSIONAL ELECTIVE III		OPEN ELECTIVE	
Subject Code	Subject Name	Subject Code	Subject Name
4SC16	Image Processing and Pattern Recognition	4ZC03	Banking Operations, Insurance and Risk Management
4S217	Machine Learning and Artificial Intelligence	4GC33	Intellectual Property Rights , Values and Ethics
4S218	Neural Networks and Fuzzy logic	4T217	Embedded Systems
		4GC42	Fundamentals of Bio-informatics

II Year	COURSE STRUCTURE	I Semester
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S.No.	Subject Code	Subject Name	L	T	P	C	Marks	
							Internal	External
1	4S375	Comprehensive Viva voce	-	-	-	2	-	50
2	4S376	Project Seminar - I	-	-	-	2	50	-
3	4S377	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	4S478	Project Seminar - II	-	-	-	2	50	-
2	4S479	Project Work and Dissertation ( Excellent/ Good/ Satisfactory/ Un-Satisfactory )	-	-	-	20	-	grading
		<b>Total</b>	-	-	-	<b>22</b>	<b>50</b>	<b>-</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: 4S101**

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

#### Objectives:

- Students will demonstrate knowledge of the distinction between critical and non-critical systems.
- Students will demonstrate the ability to manage a project including planning, scheduling and risk assessment/management.
- Students will author a software requirements document.
- Students will demonstrate an understanding of the proper contents of a software requirements document.
- Students will author a formal specification for a software system.
- Students will demonstrate an understanding of distributed system architectures and application architectures.
- Students will demonstrate an understanding of the differences between real-time and non-real time systems.
- Students will demonstrate proficiency in rapid software development techniques.
- Students will demonstrate proficiency in software development cost estimation
- Students will author a software testing plan.

#### 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 Modeling** Use Case Modeling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames

#### UNIT IV

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

**Size Estimation** Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures,

#### UNIT V

**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 BOOK:**

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

**REFERENCE BOOKS:**

1. Software Requirements by Karl E. Weigers, Microsoft Press.
2. Managing Software Requirements, Dean Leffingwell & Don Widrig, Pearson Education, 2003.
3. Mastering the requirements process, second edition, Suzanne Robertson & James Robertson, Pearson Education, 2006.
4. Estimating Software Costs, Second edition, Capers Jones, TMH, 2007.
5. Practical Software Estimation, M.A. Parthasarathy, Pearson Education, 2007.
6. Measuring the software process, William A. Florac & Anita D. Carleton, Pearson Education, 1999.

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## Syllabus for M.Tech I Year I Semester

Software Engineering

### SOFTWARE PROCESS AND PROJECT MANAGEMENT

**Code: 4S102**

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

#### Objectives:

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

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

#### UNIT I

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

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

#### UNIT II

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

#### UNIT III

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

#### UNIT IV

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

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

#### UNIT V

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

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

#### UNIT VI

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

#### TEXT BOOKS:

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

#### REFERENCE BOOKS:

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

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

**SOFTWARE QUALITY ASSURANCE AND TESTING**

**Code: 4S103**

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

**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 Bories 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 I Semester**  
Software Engineering  
**CLOUD COMPUTING**

**Code: 4SC04**

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

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

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

**UNIT - I**

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

**UNIT - II**

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

**UNIT - III**

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

**UNIT - IV**

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

**UNIT - V**

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

**UNIT - VI**

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

**TEXT BOOKS:**

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

**REFERENCES:**

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

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**Syllabus for M.Tech I Year I Semester**  
**Software Engineering**  
**SECURE SOFTWARE ENGINEERING**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 4S105**

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

**Objectives:**

- Students will demonstrate knowledge of the distinction between critical and non-critical systems.
- Students will demonstrate the ability to manage a project including planning, scheduling and risk assessment/management.
- Students will author a software requirements document, and formal specification for a software system.
- Students will demonstrate an understanding of the proper contents of a software requirements document.
- Students will demonstrate an understanding of distributed system architectures and application architectures. And the differences between real-time and non-real time systems.
- Students will demonstrate proficiency in rapid software development techniques.
- Students will be able to identify specific components of a software design that can be targeted for reuse.
- Students will demonstrate proficiency in software development cost estimation.
- Students will author a software testing plan.

**UNIT – I**

**Security a software Issue:** introduction, the problem, Software Assurance and Software Security, Threats to software security, Sources of software insecurity, Benefits of Detecting Software Security

**What Makes Software Secure:** Properties of Secure Software, Influencing the security properties of software, Asserting and specifying the desired security properties?

**UNIT – II**

**Requirements Engineering for secure software:** Introduction, the SQUARE process Model, Requirements elicitation and prioritization

**UNIT – III**

**Secure Software Architecture and Design:** Introduction, software security practices for architecture and design: architectural risk analysis, software security knowledge for architecture and design: security principles, security guidelines and attack patterns

**UNIT – IV**

**Secure coding and Testing:** Code analysis, Software Security testing, Security testing considerations throughout the SDLC

**UNIT – V**

**Security and Complexity:** System Assembly Challenges: introduction, security failures, functional and attacker perspectives for security analysis, system complexity drivers and security

**UNIT – VI**

**Governance and Managing for More Secure Software:** Governance and security, Adopting an enterprise software security framework, How much security is enough?, Security and project management, Maturity of Practice

**TEXT BOOK:**

1. Software Security Engineering: Julia H. Allen, Pearson Education

**REFERNCE BOOKS:**

1. Developing Secure Software: Jason Grembi, Cengage Learning
2. Software Security : Richard Sinn, Cengage Learning

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

**Code: 4SC06**

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

**Objectives:**

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

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

**UNIT I**

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

**UNIT II**

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

**UNIT III**

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

**UNIT IV**

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

**UNIT V**

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

**UNIT VI**

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

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

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**Syllabus for M.Tech I Year I semester**  
**Software Engineering**  
**CYBER SECURITY AND CYBER LAWS**  
**(PROFESSIONAL ELECTIVE –I)**

**Code: 4S107**

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

**Objectives:**

- To learn Internet, E-commerce and E-governance with reference to Free Market Economy
- To learn International Efforts relating to Cyberspace laws and Cyber crimes
- To learn Law relating to electronic records and intellectual property rights in India
- To learn Penalties, Compensation and Offences under the Cyberspace and Internet in India
- To learn Miscellaneous provisions of IT Act and Conclusions

**UNIT-I**

**Internet, E-commerce and E-governance with reference to Free Market Economy**

Understanding Computers, Internet and Cyber laws, Conceptual Framework of E-commerce: governance, the role of Electronic Signatures in E-commerce with Reference to Free Market Economy in India.

**UNIT-II**

**Law relating to electronic records and intellectual property rights in India**

Legal aspects of Electronic records / Digital signatures, The roles and regulations of Certifying Authorities in India, Protection of Intellectual Property Rights in Cyberspace in India.

**UNIT-III**

**International Efforts relating to Cyberspace laws and Cyber crimes**

International efforts related to Cyber laws, Council of Europe (COE) convention on Cyber Crimes.

**UNIT-IV**

**Penalties, Compensation**

Penalties, Compensation and Adjunction of violations of provisions of IT Act and Judicial review

**UNIT-V**

**Offences under the Cyberspace and Internet in India**

Some important offences under the Cyberspace law and the Internet in India, Other offences under the Information Technology Act in India.

**UNIT-VI: Miscellaneous provisions of IT Act and Conclusions**

The role of Electronic Evidence and miscellaneous provisions of the IT Act.

**TEXT BOOK:**

1. Cyber Laws and IT Protection, Harish Chander, PHI, 2012

**REFERENCE BOOKS:**

1. Cyberspace and Cybersecurity, George Kostopoulos, Auerbach Publications, 2012.
2. Cyber Forensics: A Field Manual for Collecting, Examining, and Preserving Evidence of Computer Crimes, Second Edition, Albert Marcella, Jr., Doug Menendez, Auerbach Publications, 2007.

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

**Code: 4SC08**

<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:**

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 fulfils 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: 4S109**

<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, 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 Kaufman)



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

**Code: 4R103**

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

**Course Objective:**

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

**UNIT I**

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

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

**UNIT II**

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

**Unit - III**

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

**UNIT IV**

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

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

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

**UNIT V**

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

**UNIT VI**

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

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

1. An Engineering Approach to Computer Networking , *S.Keshav*, Pearson Education, 1997
2. Computer Networks: Principles,Technologies And Protocols For Network Design, *Natalia Olifer, Victor Olifer*, Wiley India, 2006.
3. Computer Networks, *Andrew S. Tanenbaum*, Fourth Edition, Prentice Hall.
4. Fundamentals of Business Data Communications, Jerry FitzGerald and Alan Dennis, Tenth Edition, Wiley, 2009.
5. Campus Network Design Fundamentals, *Diane Teare, Catherine Paquet*, Pearson Education (CISCO Press)
6. Data Communications and Networking, *Behrouz A. Forouzan*, Fourth Edition, Tata McGraw Hill, 2007

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

**Code: 4S120**

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

**Course Objective:**

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

**UNIT - I**

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

**UNIT - II**

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

Public key cryptography principles, public key cryptography algorithms: RSA, DIFFIE HELL MAN, digital signatures, digital Certificates, Certificate Authority and key management  
 Kerberos, X.509 Directory Authentication Service.

**UNIT - III**

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

**UNIT - IV**

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

**UNIT – V**

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

Intruders, Viruses and related threats.

**UNIT - VI**

Firewall Design principles, Trusted Systems. Intrusion Detection Systems.

**TEXT BOOKS :**

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

**Code: 4S171**

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

**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.

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**Syllabus for M.Tech I Year I Semester**  
Software Engineering  
**TECHNICAL PAPER WRITING AND SEMINAR**

Code: 4S172

<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 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 (OPEN ELECTIVE)

**Code: 4ZC03**

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

#### UNIT I

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

#### UNIT II

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

#### UNIT III

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

#### UNIT IV:

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

#### UNIT V

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

#### UNIT VI

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

#### TEXT BOOKS:

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

#### REFERENCES:

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

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

Software Engineering

### INTELLECTUAL PROPERTY RIGHTS, VALUES AND ETHICS (OPEN ELECTIVE)

Code: 4GC33

<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: INTELLECTUAL PROPERTY RIGHTS - I

Invention and Creativity, Basic Types of Property, Need for Protection of IPR, Patents, Criteria for Patentability, Overview of Patent search, drafting and filing,

#### UNIT II: INTELLECTUAL PROPERTY RIGHTS - II

Trade Marks, Trade Secrets, Industrial Designs, Integrated Circuits, Geographical Indications, Copyrights.

#### UNIT-III: CONVENTIONS AND TREATIES:

WTO, GATT & TRIPS, WIPO Mission and Activities, Patent Cooperation Treaty, Case Studies on IP

#### UNIT-IV: CULTURE & VALUES:

A Introduction to Indian Culture Values and Ethics, 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, Human Value System, Interfaith Understanding, Happiness, Modernism and its Effect on Lifestyle, Mind and its Operation, Control of Mind, Yoga, Control of Sense organs, Exemplary Life Sketches-Albert Einstein, M K Gandhi, Abdul Kalam

#### UNIT-V: 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- VI: 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

#### REFERENCES:

1. Anitha Rao R & Bhanoji Rao “Intellectual Property Rights – A Primer”, Eastern Book Co, 2008.
2. The ABCs of Ethics by Michael. L. Buckner, Universe. Inc, New York Lincoln, Shangahai
3. Science, Faith and Ethics by Denis Alexander and Robert.S.White, Hendrickson Publishers, Massachusetts, USA, March 2006
4. Vedic Science Primer by PSR Murthy, BS Publications, Hyderabad
5. Medical Ethics-Global View Points, Edited by Diane Andrews, Hennig Feld, Green Haven Press
6. 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)**

**Code: 4T217**

<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**

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**  
 Software Engineering  
**FUNDAMENTALS OF BIO-INFORMATICS**  
 (OPEN ELECTIVE)

**Code: 4GC42**

<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 : 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 ARCHITECTURE AND DESIGN PATTERN

**Code: 4S211**

<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

### SOFTWARE DEVELOPMENT METHODOLOGIES

Code: 4S212

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

Your studies will enable you to develop:

- a broad and critical understanding of all the processes for engineering high quality software and the principles, concepts and techniques associated with software development
- an ability to analyze and evaluate problems and draw on the theoretical and technical knowledge to develop solutions and systems
- a range of skills focused on the analysis of requirements, design and implementation of reliable and maintainable software, with strong emphasis on engineering principles applied over the whole development lifecycle
- an awareness of current research in software development, the analytical skills and research techniques for their critical and independent evaluation and their application to new problems.

#### UNIT I

**Introduction to Software Engineering:** The evolving role of software, Changing Nature of Software, legacy software, Software myths.

**A Generic view of process:** Software engineering - A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

**Process models:** The waterfall model, Incremental process models, Evolutionary process models, specialized process models, The Unified process.

#### UNIT II

**Software Requirements:** Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

#### UNIT III

**Design Engineering:** Design process and Design quality, Design concepts, the design model, pattern based software design.

**Creating an architectural design:** software architecture, Data design, Architectural styles and patterns, Architectural Design, assessing alternative architectural designs, mapping data flow into software Architecture.

#### UNIT IV

**Modeling component-level design:** Designing class-based components, conducting component level design, Object constraint language, designing conventional components.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

#### UNIT V

**Testing Strategies:** A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

**Product metrics:** Software Quality, Frame work for Product metrics, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

**Metrics for Process and Products:** Software Measurement, Metrics for software quality.

## UNIT VI

**Risk management:** Reactive vs Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

**Quality Management:** Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

**Configuration Management:** Configuration Management planning, Change management, Version and release management, System building, CASE tools for configuration management.

### TEXT BOOKS:

1. Software Engineering: A practitioner's Approach, Roger S Pressman, sixth edition. McGraw Hill International Edition, 2005
2. Software Engineering, Ian Sommerville, seventh edition, Pearson education, 2004.

### REFERENCE BOOKS:

1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
2. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008
3. Fundamentals of Software Engineering, Rajib Mall, PHI, 2005
4. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
5. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
6. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition, 2006.
7. Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008.
8. Software Engineering 3: Domains, Requirements and Software Design, D.Bjorner, Springer, International Edition.
9. Software Engineering Principles and Practice, Hans Van Vliet, 3rd edition, Wiley India edition.
10. Introduction to Software Engineering, R.J.Leach, CRC Press.
11. Software Engineering Fundamentals, Ali Behforooz and Frederick J.Hudson, Oxford University Press, 2009
12. Software Engineering Handbook, Jessica Keyes, Auerbach,

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**Syllabus for M.Tech I Year II Semester  
Software Engineering  
WEB TECHNOLOGIES & SERVICES**

**Code: 4S213**

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

**Objectives:**

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

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

Server Side: PHP

Web services fundamentals, Axis framework for WS

**UNIT I**

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

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

**UNIT II**

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

**UNIT III**

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

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

**UNIT IV**

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

**UNIT V: Web Services I**

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

**UNIT VI: Web Services II**

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

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

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

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

**Code: 4S214**

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

**Objectives:**

- To develop the abilities of critical analysis to data mining systems and applications.
- To implement practical and theoretical understanding of the technologies for data mining
- To understand the strengths and limitations of various data mining models;

**UNIT-I**

**Data mining Overview**

Data mining tasks – mining frequent patterns, associations and correlations, classification and regression for predictive analysis, cluster analysis, outlier analysis.

**UNIT-II :Advanced Pattern Mining**

Advanced pattern mining in Multilevel, multidimensional space – mining multilevel associations, mining multidimensional Associations, mining quantitative association rules, mining rare patterns and negative patterns.

**UNIT-III : Advance Classification**

Classification by back propagation, support vector machines, classification using frequent patterns, other classification methods – genetic algorithms, roughest approach, fuzz>set approach;

**UNIT-IV:Advance Clustering**

Density - based methods –DBSCAN, OPTICS, DENCLUE; Grid-Based methods – STING, CLIQUE; Exception – maximization algorithm; clustering High- Dimensional Data; Clustering Graph and Network Data.

**UNIT-V:Web and Text Mining**

Introduction, web mining, web content mining, web structure mining, web usage mining, Text mining – unstructured text, episode rule discovery for texts, hierarchy of categories, text clustering.

**UNIT-VI:Temporal and Spatial Data Mining**

Introduction; Temporal Data Mining – Temporal Association Rules, Sequence Mining, GSP algorithm, SPADE, SPIRIT Episode Discovery, Time Series Analysis, Spatial Mining – Spatial Mining Tasks, Spatial Clustering. Data Mining Applications.

**TEXT BOOKS:**

1. Data Mining Concepts and Techniques, Jiawei Han, Micheline Kamber, Jian pei, Morgan Kaufmann.
2. Introduction to Data Mining – Pang-Ning Tan, Vipin kumar, Michael Steinbach, Pearson.

**REFERENCE BOOKS:**

1. Data Mining Techniques – Arun K pujari, Universities Press.
2. Data Mining Principles & Applications – T.V Sveresh Kumar, B.Esware Reddy, Jagadish S Kalimani, Elsevier.

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## Syllabus for M.Tech I Year II Semester

Software Engineering

### IMAGE PROCESSING AND PATTERN RECOGNITION (PROFESSIONAL ELECTIVE –III)

Code: 4SC16

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

#### Course Objectives

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

#### UNIT I

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

#### UNIT II

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

#### UNIT III

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

#### UNIT IV

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

#### UNIT V

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

#### UNIT VI

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

#### TEXT BOOKS

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



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## Syllabus for M.Tech I Year II Semester

Software Engineering

### MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

(PROFESSIONAL ELECTIVE –III)

Code: 4S217

<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 Strok, second edition

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

**Code: 4S218**

<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 II Semester**  
Software Engineering  
**WEB TECHNOLOGIES AND SERVICES LAB**

**Code: 4S273**

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

**Objectives:**

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

**LIST OF EXERCISES:**

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

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

Software Engineering

**TECHNICAL SEMINAR**

**(Independent Review Paper)**

**Code: 4S274**

<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

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

**Code: 4S375**

**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.

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

**Code: 4S376**

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

**Max. Marks: 50**

In II year I semester, a project seminar shall be conducted for 50 marks and for 2 credits (there is no external evaluation). The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 20 marks and the end semester seminar evaluation shall carry 30 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 10 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.

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

**Code: 4S377**

**L      T      P      C**  
**-      -      -      18**

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.

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

**Code: 4S478**

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

**Max. Marks: 50**

A project seminar shall be conducted for 50 marks and for 2 credits (there is no external evaluation). The evaluation for the project seminar shall be done in two stages, i.e. in the middle of the semester and at the end of the semester. The mid-semester seminar evaluation shall carry 20 marks and the end semester seminar evaluation shall carry 30 marks. The report for the mid-semester project seminar will carry 5 marks and remaining marks shall be for presentation and discussion. The report for end semester project seminar shall be for 10 marks and the remaining marks shall be for presentation and discussion. A candidate shall secure a minimum of 50% to be declared successful.



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

**Code: 4S479**

**L      T      P      C**  
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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.