



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

2005-2006

**M-TECH (SOFTWARE ENGINEERING)
I YEAR I SEMESTER**

SCODE	SUBJECTS	Max. Marks					Min. Marks To Pass			
		L	P	C	Int	Ext	Total	Ext	Total	
SE1.1	Software Requirements and Estimation	4	-	8	40	60	100	24	50	
SE1.2	Unix Network Programming	4	-	8	40	60	100	24	50	
SE1.3	Software Process and Project Management	4	-	8	40	60	100	24	50	
SE1.4	Web Technologies	4	-	8	40	60	100	24	50	
SE1.5	Wireless Networks and Mobile Computing	4	-	8	40	60	100	24	50	
SE1.6	Object Oriented Modeling	4	-	8	40	60	100	24	50	
	PRACTICALS									
SE1.7	Java/Web Technologies Lab	-	4	4	40	60	100	24	50	

I YEAR II SEMESTER

SCODE	SUBJECTS	Max. Marks					Min. Marks To Pass			
		L	P	C	Int	Ext	Total	Ext	Total	
SE2.1	Information Security	4	-	8	40	60	100	24	50	
SE2.2	Data Warehousing and Mining	4	-	8	40	60	100	24	50	
SE2.3	Software Quality Assurance and Testing	4	-	8	40	60	100	24	50	
SE2.4	Software Architecture and Design Pattern	4	-	8	40	60	100	24	50	
SE2.5	Elective-I	4	-	8	40	60	100	24	50	
SE2.6	Elective-II	4	-	8	40	60	100	24	50	
	PRACTICALS									
SE2.7	Information Security/Data warehousing Lab	-	4	4	40	60	100	24	50	

Elective-I

- SE/CS2.5.1 Human Computer Interaction
- SE/CS 2.5.2 Middle Ware Technologies
- SE/CS 2.5.3 Image Processing and Pattern Recognition

Elective-II

- SE/CS 2.6.1 Neural Networks
- SE/CS 2.6.2 Multimedia and Application Development

M.Tech. (Software Engineering) II Year

III-Semester

	Internal	External	Total
Project Seminar Satisfactory/Not-Satisfactory			

M.Tech. (Software Engineering) II Year

IV-Semester

	Internal	External	Total
Project Seminar	-	-	-
Dissertation/Thesis Excellent/good/Satisfactory/Not-Satisfactory			

- Note: Eligibility for admission to this course is B.E./B.Tech. in CSE or CSIT.

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2005-2006

M.Tech (SOFTWARE ENGINEERING)
I YEAR I SEMESTER

SE1.1 SOFTWARE REQUIREMENTS AND ESTIMATION

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

UNIT IV

Software Requirements Modeling

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

UNIT V

Software Estimation

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

UNIT VI

Size Estimation

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

UNIT VII

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 VIII

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*, published by Tata Mc Graw Hill

Reference Book

1. Software Requirements by Karl E. Weigers

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SE1.2 UNIX NETWORK PROGRAMMING

UNIT I

Review of Unix Utilities and Shell Programming-File handling utilities, security by file permissions, process utilities, disk utilities, networking commands, backup utilities, text processing utilities,

Working with the Bourne shell-What is a shell, shell responsibilities, pipes and input redirection, output redirection, here documents, the shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

UNIT II

Unix Files: Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2.

The standard I/O (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir, rewinddir, seekdir, telldir)

UNIT III

Unix Process, Threads and Signals: What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, **system call interface for process management**-fork, vfork, exit, wait, waitpid, exec, system, **Threads**-Thread creation, waiting for a thread to terminate, thread synchronization, condition variables, canceling a thread, threads vs. processes, **Signals**- Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

UNIT IV

Interprocess Communication Overview: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, file and record locking, other Unix locking techniques, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC (system-V)-message queues, semaphores and shared memory.

UNIT V

Message Queues-Unix system-V messages, Unix kernel support for messages, Unix APIs for messages, client/server example.

UNIT VI

Semaphores-Unix system-V semaphores, Unix kernel support for semaphores, Unix APIs for semaphores, file locking with semaphores.

Shared Memory-Unix system-V shared memory, Unix kernel support for shared memory, Unix APIs for shared memory, semaphore and shared memory example.

UNIT VII

Sockets: Berkeley sockets, socket system calls for connection oriented protocol and connectionless protocol, example-client/server program, advanced socket system calls, socket options.

UNIT VIII

Remote Procedure Calls-RPC Model, transparency issues, sun RPC

Text Books

1. Unix Network Programming, W.R.Stevens Pearson/PHI.
2. Unix Concepts and Applications, 3rd Edition, Sumitabha Das, TMH.
3. Advanced Unix Programming, 2nd Edition, M.J.Rochkind, Pearson Education.

Reference Books

1. Unix system programming using C++, T.Chan, PHI
2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education
3. Unix for programmers and users, 3rd Edition, Graham Glass, King Ables, Pearson Education.
4. Unix System-V Network Programming, Stephen A.Rago, Pearson Education.

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SE1.3 SOFTWARE PROCESS AND PROJECT MANAGEMENT

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.

UNIT III

Software Project Management Renaissance

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

UNIT IV

Managing Software Projects

Project Management and the CMM, Project Management and CMMi, Project Management Process Framework.

UNIT V

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 VI

Project Tracking and Control

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 VII

Project Closure

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

UNIT VIII

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*, published by Pearson Education
2. Software Project Management, by *Walker Royce*, published by Pearson Education

Reference Books

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

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SE/CS1.4

WEB TECHNOLOGIES

UNIT I

HTML Common tags- List, Tables, images, forms, Frames; Cascading Style sheets;

UNIT II

Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script

UNIT III

XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

UNIT IV

Java Beans: Introduction to Java Beans, Advantages of Java Beans, JDK
Introspection, Using Bound properties, Bean Info Interface, Constrained properties
Persistence, Customizes, Java Beans API, Introduction to EJB's

UNIT V

Web Servers: Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API,
The javax.servelet Package, Reading Servlet parameters, Reading Initialization parameters.
The javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies-
Session Tracking, Security Issues,

UNIT VI

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP
Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing
the Java Software Development Kit, Tomcat Server & Testing Tomcat

UNIT VII

JSP Application Development: Generating Dynamic Content, Using Scripting Elements
Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set
an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data
Between JSP pages, Requests, and Users Passing Control and Data between Pages – Sharing
Session and Application Data – Memory Usage Considerations

UNIT VIII

Database Access : Database Programming using JDBC, Studying javax.sql.*
package, Accessing a Database from a JSP Page, Application – Specific Database
Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework..

Text Books

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (UNIT s 1,2 ,3)
2. The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt. TMH (Chapters: 19, 20, 21, 22, 25, 27) (UNIT 4)
3. Java Server Pages –Hans Bergsten, SPD O’Reilly (UNITs 5,6,7,8)

Reference Books

1. Internet and World Wide Web – How to program by Dietel and Nieto PHI/Pearson Education Asia.
2. Jakarta Struts Cookbook , Bill Siggelkow, S P D O’Reilly for chap 8.
3. Murach’s beginning JAVA JDK 5, Murach, SPD
4. An Introduction to web Design and Programming –Wang-Thomson
5. Web Applications Technologies Concepts-Knuckles,John Wiley
6. Programming world wide web-Sebesta,Pearson
7. Building Web Applications-NIIT,PHI
8. Web Warrior Guide to Web Programmimg-Bai/Ekedaw-Thomas
9. Beginning Web Programming-Jon Duckett WROX.
10. Java Server Pages, Pekowsky, Pearson.

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SE/CS1.5 WIRELESS NETWORKS AND MOBILE COMPUTING

UNIT I

Introduction to Network Technologies and Cellular Communications:

HIPERLAN: Protocol architecture, physical layer, Channel access control sub-layer, MAC sub-layer, Information bases and networking

WLAN: Infrared vs. radio transmission, Infrastructure and ad hoc networks, IEEE 802.11.

Bluetooth.: User scenarios, Physical layer, MAC layer, Networking, Security, Link management

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

Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture

UNIT II

(Wireless) Medium Access Control:

Motivation for a specialized

MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.

UNIT III

Mobile Network Layer:

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

UNIT IV

Mobile Transport Layer:

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

UNIT V

Database Issues:

Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

UNIT VI

Data Dissemination:

Communications asymmetry, classification of new data delivery mechanisms, push-based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.

UNIT VII

Mobile Ad hoc Networks (MANETs):

Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs.

UNIT VIII

Protocols and Tools:

Wireless Application Protocol-WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.

Text Books

1. Jochen Schiller, "Mobile Communications", *Pearson Education*. (Chapters 4, 7, 9, 10, 11), second edition, 2004.
2. Stojmenovic and Cacute, "Handbook of Wireless Networks and Mobile Computing", *Wiley*, 2002, ISBN 0471419028.(Chapters 11, 15, 17, 26 and 27)

Reference Book

1. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press, October 2004,

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SE/CS1.6 OBJECT ORIENTED MODELLING

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.

UNIT II

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

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

UNIT III

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.

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

UNIT IV

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 V

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 VI

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.

UNIT VII

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 VIII

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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SE/CS2.1 INFORMATION SECURITY

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, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC,

UNIT III

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

UNIT IV

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

UNIT V

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

UNIT VI

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

UNIT VII

Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats

UNIT VIII

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,

Reference Books

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. Principles of Information Security, Whitman, Thomson.
4. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

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SE/CS2.2 DATA WAREHOUSING AND MINING

UNIT I

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

UNIT II

Data Preprocessing:Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation,

UNIT III

Data Mining Primitives, Languages, and System Architectures:Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems,

UNIT IV

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

UNIT V

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

UNIT VI

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

UNIT VII

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

UNIT VIII

Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining Spatial Databases, Mining Multimedia Databases, Mining Time-Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

Text Books

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber Harcourt India.
2. Data Mining Introductory and advanced topics –Margaret H Dunham,
Pearson education

Reference Books

- 1 Data Mining Techniques – Arun K Pujari, University Press.
2. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson
Edn Asia.
3. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition
4. The Data Warehouse Life cycle Tool kit – Ralph Kimball Wiley student edition

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SE2.3/CS2.6.4 SOFTWARE QUALITY ASSURANCE AND TESTING

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, Malcom Balridge, 3 Sigma, 6 Sigma

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, validate the software quality metrics – **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

UNIT IV

Software Testing Methodology

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

UNIT V

Software Testing Techniques

Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database, Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing

UNIT VI

Software Testing Tools

Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT and Cactus.

UNIT VII

Testing Process

Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program

Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness.

UNIT VIII Testing Specialized Systems and Applications

Testing Client/Server – Web applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse

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

Reference Books

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. Software Testing and continuous Quality Improvement, by William E.Lewis, Gunasekaran Veerapillai, Second Edition, Auerbach Publications
6. Metrics and Models for Software Quality Engineering, by Stephen H. Kan, by Pearson Education Publication

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SE2.4 SOFTWARE ARCHITECTURE AND DESIGN PATTERN

UNIT I

Envisioning Architecture

The Architecture Business Cycle, What is Software Architecture? Designing the Architecture, Documenting the architecture, Reconstructing Software Architecture

UNIT II

Creating an Architecture

Quality Attributes, Moving from quality to Architecture, Architectural styles and patterns, 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

UNIT IV

Moving from Architecture to Systems

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

UNIT V

Patterns

What is pattern? Pattern categories, Pattern Description, Patterns and Software Architecture, Pattern Systems, Classification, Selection

UNIT VI

Design Patterns Catalog

Creational Pattern, Structural Pattern, Behavioral Patterns, Pattern Community, Designing a document editor

UNIT VII

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*

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SE/CS2.5.1 HUMAN COMPUTER INTERACTION (ELECTIVE I)

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

UNIT VI

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

UNIT VII

Software tools – Specification methods, interface – Building Tools.

UNIT VIII

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

Text Books

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

Reference Books

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education

2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech,
3. User Interface Design, Soren Lauesen , Pearson Education.

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SE/CS2.5.2 MIDDLE WARE TECHNOLOGIES (ELECTIVE I)

UNIT I

Introduction to client server computing: Evolution of corporate computing models from centralized to distributed computing, client server models. Benefits of client server computing, pitfalls of client server programming.

UNIT II

CORBA with Java: Review of Java concept like RMI, RMI API, JDBC. Client/Server CORBA-style, The object web: CORBA with Java.

UNIT III

Introducing C# and the .NET Platform; Understanding .NET Assemblies; Object – Oriented Programming with C#; Callback Interfaces, Delegates, and Events.

UNIT IV

Building c# applications: Type Reflection, Late Binding, and Attribute-Based Programming; Object Serialization and the .NET Remoting Layer; Data Access with ADO.NET; XML Web Services.

UNIT V

Core CORBA / Java: Two types of Client/ Server invocations-static, dynamic. The static CORBA, first CORBA program, ORBlets with Applets, Dynamic CORBA-The portable count, the dynamic count multi count.

UNIT VI

Existential CORBA: CORBA initialization protocol, CORBa activation services, CORBAIDL mapping CORBA java- to- IDL mapping, The introspective CORBA/Java object.

UNIT VII

Java Bean Component Model: Events, properties, persistency, Introspection of beans, CORBA Beans

UNIT VIII

EJBs and CORBA: Object transaction monitors CORBA OTM's, EJB and CORBA OTM's, EJB container frame work, Session and Entity Beans, The EJB client/server development Process The EJB container protocol, support for transaction EJB packaging EJB design Guidelines.

Text Books

- 1 Client/Server programming with Java and CORBA Robert Orfali and Dan Harkey, John Wiley & Sons ,SPD 2nd Edition

2. Java programming with CORBA 3rd Edition, G.Brose, A Vogel and K.Duddy, Wiley-dreamtech, India John wiley and sons
3. C# and the .NET Platform Andrew Troelsen, Apress Wiley-dreamtech, India Pvt Ltd

Reference Books

1. Distributed Computing, Principles and applications, M.L.Liu, Pearson Education
2. Client/Server Survival Guide 3rd edition Robert Orfali Dan Harkey and Jeri Edwards, John Wiley & Sons
3. Client/Server Computing D T Dewire, TMH.
4. IBM Webspere Starter Kit Ron Ben Natan Ori Sasson, TMh, New Delhi
5. Programming C#, Jesse Liberty, SPD-O'Reilly.
6. C# Preciesely Peter Sestoft and Henrik I. Hansen, Prentice Hall of India
7. Intoduction to C# Using .NET Pearson Education
8. C# How to program, Pearson Education

**M.Tech (SOFTWARE ENGINEERING)
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SE/CS2.5.3 IMAGE PROCESSING AND PATTERN RECOGNITION (ELECTIVE I)

UNIT I

The digitized image and its properties: Applications of image processing, image function, image representation, sampling, quantization, color images, metrics and topological properties of digital images, histograms, image quality, noise image.

UNIT II

Image preprocessing: Pixel brightness transformation, position dependent brightness correction, gray scale transformation; geometric transformation, local preprocessing- image smoothing, edge detectors, zero-crossing, scale in image processing, canny edge detection, parametric edge models, edges in multi spectral images, local preprocessing and adaptive neighborhood 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

UNIT VI

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

UNIT VII

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: Millan sonka, Vaclav Hiavac, roger Boyle, vikas publishing House, Brooks/Cole.
2. Digital Image Processing: Pearson Education- Rafel C. Gonzalez Richard E. Woods. second edition

3. Pattern Recognition principles: Julius T. Tou and Rafael C. Gonzalez, Addison – Wesley publishing company.
4. Pattern Recognition and Image Analysis: Earl Gose, Richard Johnsonbaugh, Prentice Hall of India private limited, 1999.

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SE/CS2.6.1

NEURAL NETWORKS (ELECTIVE II)

UNIT I

Introduction - what is a neural network? Human Brain, Models of a Neuron, Neural networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks (p. no's 1 –49)

UNIT II

Learning Process – Error Correction learning, Memory based learning, Hebbian learning, Competitive, Boltzmann learning, Credit Assignment Problem, Memory, Adaption, Statistical nature of the learning process, (p. no's 50 –116)

UNIT III

Single layer perceptrons – Adaptive filtering problem, Unconstrained Organization Techniques, Linear least square filters, least mean square algorithm, learning curves, Learning rate annealing techniques, perceptron –convergence theorem, Relation between perceptron and Bayes classifier for a Gaussian Environment (p. no's 117 –155)

UNIT IV

Multilayer Perceptron – Back propagation algorithm XOR problem, Heuristics, Output representation and decision rule, Computer experiment, feature detection, (p. no's 156 –201)

UNIT V

Back Propagation - back propagation and differentiation, Hessian matrix, Generalization, Cross validation, Network pruning Techniques, Virtues and limitations of back propagation learning, Accelerated convergence, supervised learning. (p. no's 202 –234)

UNIT VI

Self Organization Maps – Two basic feature mapping models, Self organization map, SOM algorithm, properties of feature map, computer simulations, learning vector quantization, Adaptive pattern classification (p. no's 443 –469, 9.1 –9.8)

UNIT VII

Neuro Dynamics – Dynamical systems, stability of equilibrium states, attractors, neurodynamical models, manipulation of attractors as a recurrent network paradigm (p. no's 664 –680, 14.1 –14.6)

UNIT VIII

Hopfield Models – Hopfield models, computer experiment I (p. no's 680-701, 14.7 –14.8)

Text Book

1. Neural networks A comprehensive foundations, Simon Hhaykin, Pearson Education 2nd edition 2004

Reference Books

1. Artificial neural networks - B.Vegnanarayana Prentice Hall of India P Ltd 2005
2. Neural networks in Computer intelligence, Li Min Fu TMH 2003
3. Neural networks James A Freeman David M S kapura pearson education 2004

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SE/CS2.6.2 MULTIMEDIA AND APPLICATION DEVELOPMENT (ELECTIVE II)

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

UNIT VI

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

UNIT VII

Basic Video Compression Techniques: Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

UNIT VIII

Multimedia Networks: Basics of Multimedia Networks, Multimedia Network Communications and Applications : Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG-4, Media-on-Demand(MOD).

Text Books

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

Reference Books

1. Digital Multimedia, Nigel chapman and jenny chapman, Wiley-Dreamtech
 2. Macromedia Flash MX Professional 2004 Unleashed, Pearson.
 3. Multimedia and communications Technology, Steve Heath, Elsevier(Focal Press)
 4. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
 5. Multimedia Basics by Weixel Thomson
 6. Multimedia Technology and Applications, David Hilman, Galgotia
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SE/CS2.6.3 INFORMATION RETRIEVAL SYSTEMS (ELECTIVE-II)

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

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

UNIT IV

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

UNIT V

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

UNIT VI

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

UNIT VII

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 VIII

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 Book

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

Reference Books

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms, Prentice Hall, 1992.
2. Modern Information Retrieval By Yates Pearson Education.
3. Information Storage & Retrieval By Robert Korfhage – John Wiley & Sons.

