

**UNIVERSITY DEPARTMENTS**  
**ANNA UNIVERSITY CHENNAI :: CHENNAI 600 025**  
**REGULATIONS - 2009**  
**CURRICULUM I TO IV SEMESTERS (FULL TIME)**  
**M.E. SOFTWARE ENGINEERING**  
**SEMESTER I (5+1)**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	MA9110	<a href="#">Operations Research</a>	3	1	0	4
2	CP9115	<a href="#">Network Engineering and Management</a>	3	0	0	3
3	CP9114	<a href="#">Object Oriented Systems Engineering</a>	3	0	0	3
4	CP9112	<a href="#">Advanced Data Structures and Algorithms</a>	3	0	0	3
5	SW9111	<a href="#">Software Architecture and Design</a>	3	0	0	3
<b>PRACTICAL</b>						
6	SW9114	<a href="#">Case Tools Laboratory</a>	0	0	3	2
<b>TOTAL</b>			<b>15</b>	<b>1</b>	<b>3</b>	<b>18</b>

**SEMESTER II (6+1)**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	CP9165	<a href="#">Integrated Software Project Management</a>	3	0	0	3
2	SW9121	<a href="#">Software Quality Assurance</a>	3	0	0	3
3	SW9122	<a href="#">Software Reliability and Metrics</a>	3	0	0	3
4	SW9123	<a href="#">Software Requirements Management</a>	3	0	0	3
5	E1	Elective - I	3	0	0	3
6	E2	Elective - II	3	0	0	3

PRACTICAL						
SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
7	SW9127	<a href="#">Software Requirements and Testing</a>	0	0	3	2
<b>TOTAL</b>			<b>18</b>	<b>0</b>	<b>3</b>	<b>20</b>

### SEMESTER III (3+1)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	CP9131	<a href="#">Security Principles and Practice</a>	3	0	0	3
2	E3	Elective – III	3	0	0	3
3	E4	Elective – IV	3	0	0	3
<b>PRACTICAL</b>						
4	SW9134	Project Phase - I	0	0	12	6
<b>TOTAL</b>			<b>9</b>	<b>0</b>	<b>12</b>	<b>15</b>

### SEMESTER IV (0+1)

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>PRACTICAL</b>						
1	SW9141	Project Phase - II	0	0	24	12
<b>TOTAL</b>			<b>0</b>	<b>0</b>	<b>24</b>	<b>12</b>

**Total No of Credits** : **65**  
**No of Theory courses** : **14**  
**No of Lab Courses** : **04**

**UNIVERSITY DEPARTMENTS**  
**ANNA UNIVERSITY CHENNAI : : CHENNAI 600 025**  
**REGULATIONS - 2009**  
**CURRICULUM I TO VI SEMESTERS (PART TIME)**  
**M.E. SOFTWARE ENGINEERING**

**SEMESTER I**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	MA9110	Operations Research	3	1	0	4
2	CP9112	Advanced Data Structures and Algorithms	3	0	0	3
3	CP9114	Object Oriented Systems Engineering	3	0	0	3
<b>TOTAL</b>			<b>9</b>	<b>1</b>	<b>0</b>	<b>10</b>

**SEMESTER II**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	SW9122	Software Reliability and Metrics	3	0	0	3
2	SW9123	Software Requirements Management	3	0	0	3
3	E1	Elective I	3	0	0	3
<b>PRACTICAL</b>						
4	SW9127	Software Requirement and Testing Laboratory	0	0	3	2
<b>TOTAL</b>			<b>9</b>	<b>0</b>	<b>3</b>	<b>11</b>

**SEMESTER III**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	SW9111	Software Architecture and Design	3	0	0	3
2	CP9115	Network Engineering and Management	3	0	0	3
<b>PRACTICAL</b>						
3	SW9114	Case Tools Laboratory	0	0	3	2
<b>TOTAL</b>			<b>6</b>	<b>0</b>	<b>3</b>	<b>8</b>

**SEMESTER IV**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	CP9165	Integrated Software Project Management	3	0	0	3
2	SW9121	Software Quality Assurance	3	0	0	3
3	E2	Elective II	3	0	0	3
<b>TOTAL</b>			<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>

**SEMESTER V**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1	CP9131	Security Principles and Practice	3	0	0	3
2	E3	Elective III	3	0	0	3
3	E4	Elective IV	3	0	0	3
<b>PRACTICAL</b>						
4	SW9134	Project Work (phase I)	0	0	12	6
<b>TOTAL</b>			<b>9</b>	<b>0</b>	<b>12</b>	<b>15</b>

### SEMESTER VI

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
<b>PRACTICAL</b>						
1	SW9141	Project Work (Phase II)	0	0	24	12
<b>TOTAL</b>			<b>0</b>	<b>0</b>	<b>24</b>	<b>12</b>

### LIST OF ELECTIVES

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	SW9151	<a href="#">Web Design and Management</a>	3	0	0	3
2	SW9152	<a href="#">Formal Methods in Software Engineering</a>	3	0	0	3
3	SW9153	<a href="#">Real Time Systems</a>	3	0	0	3
4	<b>SW9161</b>	<a href="#">Software Agents</a>	3	0	0	3
5	SW9154	<a href="#">Geographical Information System</a>	3	0	0	3
6	CP9176	<a href="#">Human Resources Management</a>	3	0	0	3
7	SW9155	<a href="#">Supply Chain Management</a>	3	0	0	3
8	SW9156	<a href="#">Enterprise Application Integration</a>	3	0	0	3
9	SW9157	<a href="#">IT Systems Management</a>	3	0	0	3
10	SW9158	<a href="#">Software Engineering Process Models</a>	3	0	0	3
11	CP9151	<a href="#">Component Based Development</a>	3	0	0	3
12	SW9159	<a href="#">Informatics</a>	3	0	0	3
13	CP9156	<a href="#">User Interface Design</a>	3	0	0	3
14	CP9158	<a href="#">Bioinformatics</a>	3	0	0	3
15	CP9160	<a href="#">Language Technologies</a>	3	0	0	3
16	CP9164	<a href="#">Data Ware Housing And Data Mining</a>	3	0	0	3
17	CP9161	<a href="#">Knowledge Management</a>	3	0	0	3
18	<b>SW9160</b>	<a href="#">XML and Web Services</a>	3	0	0	3
19	<b>IT9123</b>	<a href="#">Advances in Databases</a>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>
20	CP9177	<a href="#">Multicore Architecture</a>	3	0	0	3

**MA9110**

**OPERATIONS RESEARCH**

**L T P C**

**3 1 0 4**

**UNIT I            QUEUEING MODELS**

**9**

Poisson Process – Markovian Queues – Single and Multi-server Models – Little's formula – Machine Interference Model – Steady State analysis – Self Service Queue.

**UNIT II            ADVANCED QUEUEING MODELS**

**9**

Non- Markovian Queues – Pollaczek Khintchine Formula – Queues in Series – Open Queueing Networks – Closed Queueing networks.

**UNIT III           SIMULATION**

**9**

Discrete Even Simulation – Monte – Carlo Simulation – Stochastic Simulation – Applications to Queueing systems.

**UNIT IV           LINEAR PROGRAMMING**

**9**

Formulation – Graphical solution – Simplex method – Two phase method Transportation and Assignment Problems.

**UNIT V            NON-LINEAR PROGRAMMING**

**9**

Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn – Tucker conditions – Quadratic Programming.

**L + T: 45+15 =60**

**TEXT BOOKS**

1. Winston.W.L. "Operations Research", Fourth Edition, Thomson – Brooks/Cole, 2003.
2. Taha, H.A. "Operations Research: An Introduction", Ninth Edition, Pearson Education Edition, Asia, New Delhi, 2002.

**REFERENCES**

1. Robertazzi. T.G. "Computer Networks and Systems – Queuing Theory and Performance Evaluation", Third Edition, Springer, 2002 Reprint.
2. Ross. S.M., "Probability Models for Computer Science", Academic Press, 2002.

**UNIT I FOUNDATIONS OF NETWORKING 9**

Communication Networks – Network Elements – Switched Networks and Shared media Networks – Probabilistic Model and Deterministic Model – Datagrams and Virtual Circuits – Multiplexing – Switching - Error and Flow Control – Congestion Control – Layered Architecture – Network Externalities – Service Integration – Modern Applications

**UNIT II QUALITY OF SERVICE 9**

Traffic Characteristics and Descriptors – Quality of Service and Metrics – Best Effort model and Guaranteed Service Model – Limitations of IP networks – Scheduling and Dropping policies for BE and GS models – Traffic Shaping algorithms – End to End solutions – Laissez Faire Approach – Possible improvements in TCP – Significance of UDP in inelastic traffic

**UNIT III HIGH PERFORMANCE NETWORKS 9**

Integrated Services Architecture – Components and Services – Differentiated Services Networks – Per Hop Behaviour – Admission Control – MPLS Networks – Principles and Mechanisms – Label Stacking – RSVP – RTP/RTCP

**UNIT IV HIGH SPEED NETWORKS 9**

Optical links – WDM systems – Optical Cross Connects – Optical paths and Networks – Principles of ATM Networks – B-ISDN/ATM Reference Model – ATM Header Structure – ATM Adaptation Layer – Management and Control – Service Categories and Traffic descriptors in ATM networks

**UNIT V NETWORK MANAGEMENT 9**

ICMP the Forerunner – Monitoring and Control – Network Management Systems – Abstract Syntax Notation – CMIP – SNMP Communication Model – SNMP MIB Group – Functional Model – Major changes in SNMPv2 and SNMPv3 – Remote monitoring – RMON SMI and MIB

**REFERENCES**

1. Mahbub Hassan and Raj Jain, 'High Performance TCP/IP Networking', Pearson Education, 2004.
2. Larry L Peterson and Bruce S Davie, 'Computer Networks: A Systems Approach', Fourth Edition, Morgan Kaufman Publishers, 2007.
3. Jean Warland and Pravin Vareya, 'High Performance Networks', Morgan Kauffman Publishers, 2002
4. William Stallings, 'High Speed Networks: Performance and Quality of Service', 2<sup>nd</sup> Edition, Pearson Education, 2002.
5. Mani Subramaniam, 'Network Management: Principles and Practices', Pearson Education, 2000
6. Kasera and Seth, 'ATM Networks: Concepts and Protocols', Tata McGraw Hill, 2002.

**UNIT I CLASSICAL PARADIGM**

System Concepts – Project Organization – Communication – Project Management

**UNIT II PROCESS MODELS**

Life cycle models – Unified Process – Iterative and Incremental – Workflow – Agile Processes

**UNIT III ANALYSIS**

Requirements Elicitation – Use Cases – Unified Modeling Language, Tools – Analysis Object Model (Domain Model) – Analysis Dynamic Models – Non-functional requirements – Analysis Patterns

**UNIT IV DESIGN**

System Design, Architecture – Design Principles - Design Patterns – Dynamic Object Modeling – Static Object Modeling – Interface Specification – Object Constraint Language

**UNIT V IMPLEMENTATION, DEPLOYMENT AND MAINTENANCE**

Mapping Design (Models) to Code – Testing - Usability – Deployment – Configuration Management – Maintenance

**REFERENCES**

1. Bernd Bruegge, Alan H Dutoit, Object-Oriented Software Engineering, 2<sup>nd</sup> ed, Pearson Education, 2004.
2. Craig Larman, Applying UML and Patterns 3<sup>rd</sup> ed, Pearson Education, 2005.
3. Stephen Schach, Software Engineering 7<sup>th</sup> ed, McGraw-Hill, 2007.
4. Ivar Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, 1999.
5. Alistair Cockburn, Agile Software Development 2<sup>nd</sup> ed, Pearson Education, 2007.

<b>UNIT I</b>	<b>FUNDAMENTALS</b>	<b>9</b>
Mathematical Induction - Asymptotic Notations – Properties of Big-oh Notation – Conditional Asymptotic Notation – Algorithm Analysis – Amortized Analysis – NP-Completeness – NP-Hard – Recurrence Equations – Solving Recurrence Equations – Memory Representation of Multi-dimensional Arrays – Time-Space Tradeoff.		
<b>UNIT II</b>	<b>HEAP STRUCTURES</b>	<b>9</b>
Min/Max heaps – Deaps – Leftist Heaps – Binomial Heaps – Fibonacci Heaps – Skew Heaps – Lazy-Binomial Heaps.		
<b>UNIT III</b>	<b>SEARCH STRUCTURES</b>	<b>9</b>
Binary Search Trees – AVL Trees – Red-Black trees – Multi-way Search Trees –B-Trees – Splay Trees – Tries.		
<b>UNIT IV</b>	<b>MULTIMEDIA STRUCTURES</b>	<b>9</b>
Segment Trees – k-d Trees – Point Quad Trees – MX-Quad Trees – R-Trees – TV-Trees.		
<b>UNIT V</b>	<b>ALGORITHMS</b>	<b>9</b>
Huffman Coding – Convex Hull – Topological Sort – Tree Vertex Splitting – Activity Networks – Flow Shop Scheduling – Counting Binary Trees – Introduction to Randomized Algorithms.		

**TOTAL = 45****REFERENCES**

1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Uiversity Press, 2007.
2. E. Horowitz, S. Sahni and S. Rajasekaran, Computer Algorithms/C++, Second Edition, University Press, 2007.
3. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice –Hall, 1988.
4. V.S. Subramanian, Principles of Multimedia Database systems, Morgan Kaufman, 1998.

**UNIT I INTRODUCTION TO ARCHITECTURE 9**

Notion of Architecture – Notion of Software Architecture - Architectural Styles – Description of Software Architecture –Visual Notation – Examples.

**UNIT II DESIGN FUNDAMENTALS 9**

The Basic Concepts of Design – Characteristics of Design Activities – Essential Elements of Design – The Factors that Affect the Design – Design Principles Basic Rules of Software Design – Design Processes

**UNIT III DESIGN METHODOLOGIES 9**

Structured Design – Design Practices – Stepwise Refinement – Incremental Design – Structured System Analysis and Design – Jackson Structured Programming – Jackson System Development – Designing with Objects – User Interface Design.

**UNIT IV ARCHITECTURAL DESIGN 9**

Typical Architectural Design – Data Flow – Independent Components – Call and Return – Using Styles in Design – Choices of Style – Combination of Styles – Architectural Design Space – Theory of Design Spaces – Design Space of Architectural Elements – Design Space of Architectural Styles.

**UNIT V CASE STUDIES 9**

Tools for Architectural design – Case Studies.

**TOTAL : 45****REFERENCES**

1. Hong Zhu, "Software Design Methodology From Principles to Architectural Styles", Elsevier, 2005.
2. David Budgen, "Software Design", Second Edition, Pearson Education, 2004.
3. Mary Shaw David Garlan, " Software Architectural Perspectives on an emerging discipline ", EEE, PHI 1996.
4. John Robinson, "Software Design for Engineers and Scientists", Newnes, 2004.
5. R. S. Pressman, "Software Engineering", Fifth Edition, McGraw Hill Inc., 2001.
6. A. G. Sutcliffe, "Human Computer Interface Design", Second Edition Macmillan, 1995.

1. Practicing the different types of case tools such as (Rational Rose & other Open Source) used for all the phases of Software development life cycle.
2. Data modeling
3. Semantic data modeling
4. Source code generators
5. Re-engineering
6. Experimenting CASE Environments
  - a. Toolkits
  - b. Language-centered
  - c. Integrated
  - d. Fourth generation
  - e. Process-centered
  
7. Implementation of the following using CASE Workbenches:
  - a. Business planning and modeling
  - b. Analysis and design
  - c. User-interface development
  - d. Programming
  - e. Verification and validation
  - f. Maintenance and reverse engineering
  - g. Configuration management
  - h. Project management



**SW9121 SOFTWARE QUALITY ASSURANCE**

**L T P C  
3 0 0 3**

**UNIT I 9**  
Introduction to software quality - challenges – objectives – quality factors – components of SQA – contract review – development and quality plans – SQA components in project life cycle – SQA defect removal policies – Reviews

**UNIT II 9**  
Basics of software testing – test generation from requirements – finite state models – combinatorial designs - test selection, minimization and prioritization for regression testing – test adequacy, assessment and enhancement

**UNIT III 9**  
Testing strategies – white box and black box approach – integration testing – system and acceptance testing – performance testing – regression testing - internationalization testing – ad-hoc testing – website testing – usability testing – accessibility testing  
Test plan – management – execution and reporting – software test automation – automated testing tools

**UNIT IV 9**  
Hierarchical models of software quality – software quality metrics –function points - Software product quality – software maintenance quality – effect of case tools – software quality infrastructure – procedures – certifications – configuration management – documentation control.

**UNIT V 9**  
Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit

**TOTAL = 45**

**REFERENCES**

1. Daniel Galin, Software quality assurance – from theory to implementation , Pearson education, 2009.
2. Aditya Mathur, Foundations of software testing, Pearson Education, 2008
3. Srinivasan Desikan and Gopaldaswamy Ramesh, Software testing – principles and practices , Pearson education, 2006
4. Ron Patton, Software testing , second edition, Pearson education, 2007
5. Alan C Gillies, “Software Quality Theory and Management”, Cengage Learning, Second edition, 2003

**UNIT I INTRODUCTION TO SOFTWARE RELIABILITY 7**  
Basic Concepts – Failure and Faults – Environment – Availability –Modeling –uses.

**UNIT II SOFTWARE RELIABILITY MODELING 12**  
Concepts – General Model Characteristic – Historical Development of models – Model Classification scheme – Markovian models – General concepts – General Poisson Type Models – Binomial Type Models – Poisson Type models – Fault reduction factor for Poisson Type models.

**UNIT III COMPARISON OF SOFTWARE RELIABILITY MODELS 10**  
Comparison Criteria – Failure Data – Comparison of Predictive Validity of Model Groups – Recommended Models – Comparison of Time Domains – Calendar Time Modeling – Limiting Resource Concept – Resource Usage model – Resource Utilization – Calendar Time Estimation and confidence Intervals.

**UNIT IV FUNDAMENTALS OF MEASUREMENT 8**  
Measurements in Software Engineering – Scope of Software metrics – Measurements theory – Goal based Framework – Software Measurement Validation.

**UNIT V PRODUCT METRICS 8**  
Measurement of Internet Product Attributes – Size and Structure – External Product Attributes – Measurement of Quality –Reliability Growth Model – Model Evaluation

**TOTAL = 45**

**REFERENCES**

1. John D. Musa, Anthony Iannino, Kazuhira Okumoto, "Software Reliability – Measurement, Prediction, Application, Series in Software Engineering and Technology", McGraw Hill, 1987.
2. John D. Musa, "Software Reliability Engineering", Tata McGraw Hill, 1999.
3. Norman E . Fenton, Shari Lawrence Pfleeger, "Software metrics", Second Edition, International Student Edition, 2003.

**UNIT I REQUIREMENTS ENGINEERING OVERVIEW 9**

Software Requirement Overview – Software Development Roles –Software Development Process Kernels – Commercial Life Cycle Model – Vision Development – Stakeholders Needs & Analysis.

**UNIT II REQUIREMENTS ELICITATION 9**

The Process of Requirements Elicitation – Requirements Elicitation Problems – Problems of Scope – Problems of Understanding – Problems of Volatility – Current Elicitation Techniques – Information Gathering – Requirements Expression and Analysis – Validation – An Elicitation Methodology Framework – A Requirements Elicitation Process Model – Methodology over Method – Integration of Techniques – Fact-Finding – Requirements Gathering – Evaluation and Rationalization – Prioritization – Integration and Validation.

**UNIT III REQUIREMENTS ANALYSIS 9**

Identification of Functional and Non Functional Requirements – Identification of Performance Requirements – Identification of safety Requirements – Analysis – Feasibility and Internal Compatibility of System Requirements – Definition of Human Requirements Baseline.

**UNIT IV REQUIREMENTS DEVELOPMENT 9**

Requirements analysis – Requirements Documentation – Requirements Development Workflow – Fundamentals of Requirements Development – Requirements Attributes Guidelines Document – Supplementary Specification Document – Use Case Specification Document – Methods for Software Prototyping – Evolutionary prototyping –Throwaway prototyping.

**UNIT V REQUIREMENTS VALIDATION 9**

Validation objectives – Analysis of requirements validation – Activities – Properties – Requirement reviews – Requirements testing – Case tools for requirements engineering.

**TOTAL = 45**

**REFERENCES**

1. Ian Sommerville, Pete Sawyer, “Requirements Engineering: A Good Practice Guide”, Sixth Edition, Pearson Education, 2004.
2. Dean Leffingwell , Don Widrig, “Managing Software Requirements A Use Case Approach”, Second Addition, Addison Wesley , 2003.
3. Karl Eugene Wiegers, “Software Requirements”, Word Power Publishers, 2000.
4. Ian Graham, “Requirements Engineering and Rapid Development”, Addison Wesley, 1998.

**Aim:**

The students should go through full SDLC traceability for features, requirements and testing.

**Objectives:**

The students are expected to refine and validate software requirements through the performance of the following:

- Identify customer's needs.
  - Evaluate system for feasibility.
  - Perform economic and technical analysis.
  - Allocate functions to system elements.
  - Establish schedule and constraints.
  - Create system definitions
- 
1. Study various tools such as OSRMT, Borland Caliber Analyst, IBM Telelogic DOORS, Rational Rose Suite etc.
  2. Do experiments that cover Requirements Lifecycle Management practices, and techniques of the whole requirements process:
    - a. Requirements elicitation (requirements capture)
    - b. Requirements definition
    - c. Requirements validation
    - d. Requirements analysis
    - e. Requirements modeling
    - f. Requirements management
    - g. Requirements traceability
    - h. Requirements-based testing
  3. Study various testing tools such as WinRunner, LoadRunner, TestDirector, Rational Suite and other Opensource Tools.
  4. Perform experiments to do the following:
    - a. Requirements Testing
    - b. Use-case Scenario Testing
    - c. Documentation Testing
  5. Mini projects on any relevant current topics. Suggested topics:

- a. IT Infrastructure Management Application
- b. Reservation Systems for Air lines, Railways etc.
- c. Knowledge Management System
- d. Remote Procedure Call Implementation

**CP9131 SECURITY PRINCIPLES AND PRACTICE**

**L T P C  
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**UNIT I INTRODUCTION & MATHEMATICAL FOUNDATION 9**  
Beginning with a simple communication game – wrestling between safeguard and attack – Probability and Information Theory - Algebraic foundations – Number theory.

**UNIT II ENCRYPTION – SYMMETRIC TECHNIQUES 9**  
Substitution Ciphers - Transposition Ciphers - Classical Ciphers – DES – AES – Confidentiality Modes of Operation – Key Channel Establishment for symmetric cryptosystems.

**UNIT III ENCRYPTION –ASYMMETRIC TECHNIQUES & DATA INTEGRITY TECHNIQUES 9**  
Diffie-Hellman Key Exchange protocol – Discrete logarithm problem – RSA cryptosystems & cryptanalysis – ElGamal cryptosystem – Need for stronger Security Notions for Public key Cryptosystems – Combination of Asymmetric and Symmetric Cryptography – Key Channel Establishment for Public key Cryptosystems - Data Integrity techniques – Symmetric techniques - Asymmetric techniques

**UNIT IV AUTHENTICATION 9**  
Authentication Protocols Principles – Authentication protocols for Internet Security – SSH Remote logic protocol – Kerberos Protocol – SSL & TLS – Authentication frame for public key Cryptography – Directory Based Authentication framework – Non - Directory Based Public-Key Authentication framework .

**UNIT V SECURITY PRACTICES 9**  
Protecting Programs and Data – Information and the Law – Rights of Employees and Employers – Software Failures – Computer Crime – Privacy – Ethical Issues in Computer Security.

**TOTAL: 45**

**REFERENCES**

1. Wenbo Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, First Edition, 2006.
2. Douglas R. Stinson, “Cryptography Theory and Practice ”, Third Edition, Chapman & Hall/CRC,2006.

3. Charles B. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing", Fourth Edition, Pearson Education, 2007.
4. Wade Trappe and Lawrence C. Washington, "Introduction to Cryptography with Coding Theory" Second Edition, Pearson Education, 2007.

**SW9151 WEB DESIGN AND MANAGEMENT**

**L T P C**  
**3 0 0 3**

**UNIT I SITE ORGANIZATION AND NAVIGATION**

**9**

User centered design – Web medium – Web design process – Evaluating process – Site types and architectures – Navigation theory – Basic navigation practices – Search – Site maps.

**UNIT II ELEMENTS OF PAGE DESIGN**

**9**

Browser compatible design issues - Pages and Layout – Templates – Text – Color – Images – Graphics and Multimedia - GUI Widgets and Forms – Web Design patterns

**UNIT III SCRIPTING LANGUAGES**

**10**

Client side scripting: XHTML – DHTML– JavaScript– XML Server side scripting: Perl – PHP – ASP/JSP Designing a Simple web application

**UNIT IV PRE-PRODUCTION MANAGEMENT**

**8**

Principles of Project Management – Web Project Method – Project Road Map – Project Clarification – Solution Definition – Project Specification – Content – Writing and Managing content.

**UNIT V PRODUCTION, MAINTENANCE AND EVALUATION**

**9**

Design and Construction – Testing, Launch and Handover – Maintenance – Review and Evaluation – Case Study.

**TOTAL = 45**

**TEXT BOOKS:**

1. Thomas A. Powell, "The Complete Reference – Web Design", Tata McGraw Hill, Third Edition, 2003.
2. Ashley Friedlein, "Web Project Management", Morgan Kaufmann Publishers, 2001.
3. H. M. Deitel, P. J. Deitel, A. B. Goldberg, "Internet and World Wide Web – How to Program", Third Edition, Pearson Education 2004.

**REFERENCES:**

1. Joel Sklar, "Principles of Web Design", Thomson Learning, 2001.
2. **Van Duyne, Landay, and Hong** "The Design of Sites: Patterns for creating winning web sites", 2<sup>nd</sup> Edition, Prentice Hall, 2006.
3. Lynch, Horton and Rosenfeld, "Web Style Guide: Basic Design Principles for Creating Web Sites", 2<sup>nd</sup> Edition, Yale University Press, 2002.

The suggestions are as follows

- The third Unit in the syllabus may be revised to provide the students with simple applications.
- The scripting languages title includes languages as well as ‘CGI’ which is not a language
- The scripting languages may be divided into client side and server side
- Using the design rules a simple web site deployed on the server may be experimented with and justify the design and its functionality.
- The Ashley Book is not available in the dept library and may be procured
- Unit 2 and 4 , new topics are added
- The teaching hours have been altered from the previous
- Two new books have been added which are really useful

**SW9152 FORMAL METHODS IN SOFTWARE ENGINEERING**

**L T P C**  
**3 0 0 3**

**UNIT I INTRODUCTION 8**

Need for Formal methods – Problems in Natural Language Specifications, Formal Versus Informal Programming – Advantages of Formal Methods – Requirements of Formal System – Types – Propositional Logic – Predicate Logic – Relationships and Functions.

**UNIT II FORMAL SPECIFICATION STYLE 8**

Model-Oriented – Specifications – Concurrency-Based Specifications –Example Specification Languages.

**UNIT III VDM 10**

Introduction to VDM – Basic Types – Quote Types – Compound Types – Optional Types – Functions – Operations – Additional Constructs – Modules.

**UNIT IV THE Z NOTATION 10**

The Interchange Language – User-Defined Identifiers – Data Types – Basic Types – Compound Types – Schemas – Additional Constructs.

**UNIT V FORMAL SEMANTICS AND TOOLS 9**

Operational Semantics – Denotational Semantics – Axiomatic Semantics Proof Editors – Proof Analyser – Symbolic Simulators –Translators – Test Generation Tools.

**TOTAL = 45**

**REFERENCES:**

1. Andrew Harry, “ Formal Methods: Fact File VDM and Z”, John Wiley and Sons, 1996.
2. Jim Woodcock, Jim Davies, “Using Z Specification, Refinement and Proof”, Prentice Hall International, 1996.

**UNIT I INTRODUCTION 9**

Introduction - Issues in Real Time Computing, Structure of a Real Time System. Task Classes, Performance Measures for Real Time Systems, Estimating Program Run times. Task Assignment and Scheduling - Classical Uniprocessor scheduling algorithms, UniProcessor scheduling of IRIS Tasks, Task Assignment, Mode Changes, and Fault Tolerant Scheduling.

**UNIT II PROGRAMMING LANGUAGES AND TOOLS 9**

Programming Language and Tools – Desired Language characteristics, Data Typing, Control structures, Facilitating Hierarchical Decomposition, Packages, Run-time (Exception) Error handling, Overloading and Generics, Multitasking, Low Level programming, Task scheduling, Timing Specifications, Programming Environments, Run-time Support.

**UNIT III REAL TIME DATABASES 9**

Real time Databases - Basic Definition, Real time Vs General Purpose Databases, Main Memory Databases, Transaction priorities, Transaction Aborts, Concurrency Control Issues, Disk Scheduling Algorithms, Two-phase Approach to improve Predictability, Maintaining Serialization Consistency, Databases for Hard Real Time systems.

**UNIT IV COMMUNICATION 9**

Real-Time Communication - Communications Media, Network Topologies Protocols, Fault Tolerant Routing. Fault Tolerance Techniques - Fault Types, Fault Detection. Fault Error containment Redundancy, Data Diversity, Reversal Checks, Integrated Failure handling.

**UNIT V EVALUATION TECHNIQUES 9**

Reliability Evaluation Techniques - Obtaining Parameter Values, Reliability Models for Hardware Redundancy, Software Error models. Clock Synchronization - Clock, A Nonfault-Tolerant Synchronization Algorithm, Impact of Faults, Fault Tolerant Synchronization in Hardware, Fault Tolerant Synchronization in Software.

**TOTAL = 45****TEXT BOOKS:**

1. C.M. Krishna, Kang G. Shin, "Real-Time Systems", McGraw-Hill International Editions, 1997.

**REFERENCES:**

1. Stuart Bennett, "Real Time Computer Control-An Introduction", Second edition, Prentice Hall PTR, 1994.
2. Peter D. Lawrence, "Real time Micro Computer System Design – An Introduction", McGraw Hill, 1988.
3. S.T. Allworth and R.N. Zobel, "Introduction to real time software design", Macmillan, II Edition, 1987.
4. R.J.A Buhur, D.L. Bailey, " An Introduction to Real-Time Systems", Prentice-Hall International, 1999.
5. Philip.A.Laplante "Real Time System Design and Analysis" PHI , III Edition, April 2004.

**UNIT I AGENTS – OVERVIEW 9**

Agent Definition – Agent Programming Paradigms – Agent Vs Object – Aglet – Mobile Agents – Agent Frameworks – Agent Reasoning.

**UNIT II JAVA AGENTS 9**

Processes – Threads – Daemons – Components – Java Beans – ActiveX – Sockets – RPCs – Distributed Computing – Aglets Programming – Jini Architecture – Actors and Agents – Typed and proactive messages.

**UNIT III MULTIAGENT SYSTEMS 9**

Interaction between agents – Reactive Agents – Cognitive Agents – Interaction protocols – Agent coordination – Agent negotiation – Agent Cooperation – Agent Organization – Self-Interested agents in Electronic Commerce Applications.

**UNIT IV INTELLIGENT SOFTWARE AGENTS 9**

Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications.

**UNIT V AGENTS AND SECURITY 9**

Agent Security Issues – Mobile Agents Security – Protecting Agents against Malicious Hosts – Untrusted Agent – Black Box Security – Authentication for agents – Security issues for Aglets.

**TOTAL = 45**

**REFERENCES:**

1. Bigus & Bigus, " Constructing Intelligent agents with Java ", Wiley, 1997.
2. Bradshaw, " Software Agents ", MIT Press, 2000.
3. Russel, Norvig, "Artificial Intelligence: A Modern Approach", Second Edition, Pearson Education, 2003.
4. Richard Murch, Tony Johnson, "Intelligent Software Agents", Prentice Hall, 2000.
5. Gerhard Weiss, "Multi Agent Systems – A Modern Approach to Distributed Artificial Intelligence", MIT Press, 2000.

**UNIT I**

GIS – Definition - History of GIS - Basic Components of GIS – Hardware, Software, Data, Methods, People – List of GIS Software: Popular software, Open Source software

**UNIT II****10**

Data: Spatial and Non-Spatial Data – Spatial Data: Points, Lines, Polygons/Area and Surface - Non-Spatial Data - Levels of Measurement: Nominal, Ordinal, interval, ratio – Data Base – Functions - Data Base Structures – Hierarchical, Network, Relational-Relational Data Base Management System – Normalization, E-R Diagram

**UNIT III****10**

Raster Data Model – Grid Cell/Pixel - Tessellations – Regular, Irregular – Geometry of Regular Tessellations: Shape, Adjacency, Connectivity, Orientation - Size of Grid Cell – Data Encoding: Rule of dominance, Rule of importance, Centre of Cell - Data Compression: Runlength, Chain, Block and Quadtree coding - Vector Data Model – Topology - Euler Equation, Rules for Topological Consistency – Arc-Node Data Structure – Raster vs. Vector Comparison

**UNIT IV****9**

Vector Data Input – Digitizer: Principles, Co-ordinate transformation – Errors in digitizing – Scanner: Principles, On Screen Digitization, Georeferencing – Raster File Formats, Vector File formats – Import/Export Functionality – Linking Non-spatial data with Spatial data – Linking digital databases: ODBC – GPS data integration

**UNIT V****9**

Discrete and Continuous Surfaces – Interpolation Techniques - Digital Elevation Models – Sources of DEM: Ground Survey, Photogrammetry, Stereo Satellite data, Airborne Laser Terrain Mapping- DEM representation – Gridded DEM, TIN structure – Extraction of Topographic Parameters: Slope, Aspect, Delimitation of Watershed and Drainage Network – DEM Applications

**Total = 45****TEXT BOOKS**

1. Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems Prentice Hall, 2/E,2006.

**REFERENCES**

1. Peter A. Burrough, Rachael A. McDonnell, Principles of GIS, Oxford University Press, 2000
2. Robert Laurini and Derek Thompson, Fundamentals of Spatial Information Systems, Academic Press, 1996
3. Paul Longley , Geographic Information Systems and Science, John Wiley & Sons Inc ,2001.

**UNIT I****PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT****9**

Evolution of human resource management – the importance of the human factor – objectives of human resource management – role of human resource manager – human resource policies – computer applications in human resource management.

**UNIT II THE CONCEPT OF BEST FIT EMPLOYEE 9**

Importance of human resource planning – forecasting human resource requirement – internal and external sources. Selection process-screening – tests - validation – interview - medical examination – recruitment introduction – importance – practices – socialization benefits.

**UNIT III TRAINING AND EXECUTIVE DEVELOPMENT 9**

Types of training, methods, purpose, benefits and resistance. Executive development programmes – common practices - benefits – self development – knowledge management.

**UNIT IV SUSTAINING EMPLOYEE INTEREST 9**

Compensation plan – reward – motivation – theories of motivation – career management – development, mentor – protégé relationships.

**UNIT V PERFORMANCE EVALUATION AND CONTROL PROCESS 9**

Method of performance evaluation – feedback – industry practices. Promotion, demotion, transfer and separation – implication of job change. The control process – importance – methods – requirement of effective control systems grievances – causes – implications – redressal methods.

**TOTAL = 45**

**TEXT BOOKS:**

1. Decenzo and Robbins, Human Resource Management, Wilsey, 6<sup>th</sup> edition, 2001.
2. Biswajeet Pattanayak, Human Resource Management, Prentice Hall of India, 2001.

**REFERENCES:**

1. Human Resource Management, Eugence Mckenna and Nic Beach, Pearson Education Limited, 2002.
2. Dessler Human Resource Management, Pearson Education Limited, 2002.
3. Mamoria C.B. and Mamoria S. Personnel Management, Himalaya Publishing Company, 1997.
4. Wayne Cascio, Managing Human Resource, McGraw Hill, 1998.
5. Ivancevich, Human Resource Management, McGraw Hill 2002.

**SW9155 SUPPLY CHAIN MANAGEMENT**

**L T P C  
3 0 0 3**

**UNIT I FUNDAMENTALS OF SUPPLY CHAIN MANAGEMENT**

Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

## **UNIT II        SCM STRATEGIES, PERFORMANCE**

Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

## **UNIT III        PLANNING AND MANAGING INVENTORIES**

Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

## **UNIT IV        DISTRIBUTION MANAGEMENT**

Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning,

## **UNIT V        STRATEGIC COST MANAGEMENT IN SUPPLY CHAIN**

The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

## **REFERENCES**

1. David Simchi-Levi, Philip Kaminsky, and Edith Simchi-Levi Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, Second Edition, , McGraw-Hill/Irwin, New York, 2003.
2. Sunil Chopra and Peter Meindel. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, 2002.
3. Sunil Chopra & Peter Meindl, Supply Chain Management , Prentice Hall Publisher, 2001
4. Robert Handfield & Ernest Nichols, Introduction to Supply Chain Management , Prentice hall Publishers, 1999.

## **SW9156        ENTERPRISE APPLICATION INTEGRATION**

**L T P C**

**3 0 0 3**

### **UNIT I        INTRODUCTION**

**9**

Business Imperative for Enterprise Integration – Business agility – ROI of Enterprise Integration – Challenges – Business drivers – Defining Requirements – Enterprise Integration strategy.

### **UNIT II        ENTERPRISE INTEGRATION ARCHITECHTURE**

**9**

Overview – Business case – Components of EIA – Organizational Structure – Architectural Governance - Understanding Integration Technology – Current Integration Architecture – Technical Integration Architecture specification.

**UNIT III SERVICE AND INFORMATION INTEGRATION ARCHITECTURE 9**  
Service Oriented Architecture – Benefits – Defining Services – Event driven service design – specification – Understanding Metadata – Metadata Architecture – standards – Information Integration Patterns – Architecture Specification.

**UNIT IV PROCESS AND APPLICATION INTEGRATION ARCHITECTURE 9**  
Process to Business – Process Integration Technology – Process Standards – Architecture Specification - Choosing Technology - Application Integration Technology – Implementation Specification – Composite Application – Composite integration specification.

**UNIT V CASE STUDY 9**

**TEXT BOOKS:**

1. David S.Linthicum, “Enterprise Application Integration”,Addison – Wesley Information Technology Services, 2006.
2. Martin Fowler Patterns of Enterprise Application Architecture (Addison-Wesley Signature Series) 2002

**SW9157 IT SYSTEMS MANAGEMENT**

**L T P C**  
**3 0 0 3**

**UNIT I INTRODUCTION 5**  
Introduction to IT Systems Management - Scope and definitions, Current and future Technology – hardware, software, storage, networks, Systems Management frameworks.

**UNIT II CHANGE MANAGEMENT 10**  
Change Management Processes - Identifying the need for change, Making a business case and measuring return on investment, Managing change – people, tools, processes.

**UNIT III CONFIGURATION MANAGEMENT 10**  
Configuration Management Processes - Current and Target Architecture Definitions, Vendor Selection, Solution Deployment.

**UNIT IV OPERATIONS MANAGEMENT I 10**  
Operations Management Processes - Application Management, Performance Management, Capacity Planning.

**UNIT V OPERATIONS MANAGEMENT II 9**  
Operations Management Processes - Business Continuity and Disaster Recovery, Problem Management, Exception Management.

**TOTAL = 45**

**REFERENCES:**

1. Schiesser, Rich, "IT Systems Management", Prentice Hall of India, New Delhi, 2002.

2. Frenzel, Carrol W, "Management of Information Technology", Boyd and Fraser, Boston, 1992.
3. Davenport, Thomas H, "Information Ecology - Mastering the information and knowledge environment", Oxford University Press, 1997.

**ADDITIONAL READING:**

1. Phillips, Joseph, "IT Project Management - On track from start to finish", Tata McGraw Hill, 2002.
2. Williams, Brian K., Stacey C. Sawyer, Sarah E. Hutchinson; "Using Information Technology - A practical introduction to computers and communications", Third Edition, Tata McGraw Hill, 1999.
3. Turban, Efraim, Rainer, R. Kelly, Potter, Richard E., "Introduction to Information Technology", John Wiley, 2003.

**SW9158 SOFTWARE ENGINEERING PROCESS MODELS**

**L T P C**  
**3 0 0 3**

**UNIT I PROCESS AND BASIC PROCESS MODELS**

**9**

Process Definition – Process for Software Development and Maintenance – Process Models – Waterfall – Prototypes – Throwaway – Evolutionary – Incremental.

**UNIT II ADVANCED PROCESS MODELS**

**8**

Spiral – Rapid Application Development – Unified Process Models.

**UNIT III ADVANCED PROCESS MODELS – II**

**12**

Agile – Extreme Programming (XP) – Adaptive Software Development (ASD) – DSDM – Scrum – Crystal – Feature Driven Development (FDD) – Comparison of Different Models.

**UNIT IV PROCESS IMPROVEMENT MODELS – I**

**8**

Need for Process Improvement – ISO 9000: 2000 – SPICE.

**UNIT V PROCESS IMPROVEMENT MODELS – II**

**8**

Six Sigma – CMMI.

**TOTAL = 45**

**REFERENCES:**

1. Pankaj Jalote , “An Integrated Approach to Software Engineering”, Second Edition, Springer Verlag, 1997.
2. Roger S. Pressman, “Software Engineering: A Practitioner’s Approach”, Fifth Edition, McGraw Hill, 2001.
3. Ian Sommerville, “Software Engineering”, Sixth Edition, Addison Wesley, 2000.

4. Jim Highsmith , "Agile Software Development Ecosystems", First Edition, Addison Wesley, 2002.
5. Alistair Cockburn , "Agile Software Development", First Edition, Pearson Education Asia, 2001.
6. Kent Beck, "eXtreme Programming eXplained : EMBRACE CHANGE", First Edition, Pearson Education Asia, 1999.
7. Philippe Kruchten, "The Rational Unified Process, an introduction", Second Edition, Addison Wesley, 2000.
8. Humphrey Watts S, "Managing the Software Process", Addison Wesley, 1989.
9. Alan C. Gillies, "Software Quality - Theory and Management", Second Edition, International Thomson Computer Press, 1999.
10. David Hoyle, "ISO 9000 Quality Systems Handbook", Fourth Edition, Butterworth – Heinemann, 2001.
11. Peter S. Pande, Larry Holpp, Pete Pande, Lawrence Holpp," What Is Six Sigma?", McGraw-Hill Trade, 2001.

**CP9151          COMPONENT BASED DEVELOPMENT**

**L T P C  
3 0 0 3**

**UNIT I          INTRODUCTION**

**9**

Software Components – objects – fundamental properties of Component technology – modules – interfaces – callbacks – directory services – component architecture – components and middle ware.

**UNIT II          JAVA COMPONENT TECHNOLOGIES**

**9**

Threads – Java Beans – Events and connections – properties – introspection – JAR files – reflection – object serialization – Enterprise Java Beans – Distributed Object models – RMI and RMI-IIOP.

**UNIT III          CORBA TECHNOLOGIES**

**9**

Java and CORBA – Interface Definition language – Object Request Broker – system object model – portable object adapter – CORBA services – CORBA component model – containers – application server – model driven architecture.

**UNIT IV          COM AND .NET TECHNOLOGIES**

**9**

COM – Distributed COM – object reuse – interfaces and versioning – dispatch interfaces – connectable objects – OLE containers and servers – Active X controls – .NET components - assemblies – appdomains – contexts – reflection – remoting.

**UNIT V          COMPONENT FRAMEWORKS AND DEVELOPMENT**

**9**

Connectors – contexts – EJB containers – CLR contexts and channels – Black Box component framework – directory objects – cross-development environment –

component-oriented programming – Component design and implementation tools – testing tools - assembly tools.

**Total = 45**

## REFERENCES

1. Clements Szyperski, "Component Software: Beyond Object-Oriented Programming", Pearson Education publishers, 2003.
2. Ed Roman, "Enterprise Java Beans", Third Edition, Wiley, 2004.
3. Kuth Short, "Component Based Development and Object Modeling", Sterling Software, 1997.

## SW9159 INFOMETRICS

**L T P C**  
**3 0 0 3**

### UNIT I IT ORGANIZATION 9

Metrics that matter - Interpreting the metrics – Collecting the data – Managing the data – Obstacles to acquiring IT metrics information – Old data versus new graphical analysis – Core of software planning – Measuring the core metrics (Product, Quality, Process, Productivity, Time, Effort) – Estimating and controlling with the core metrics – Work output measurements.

### UNIT II MEASUREMENT PROGRAM APPROACHES 9

EDS Brazil metrics program – Measurement program implementation approaches – Bench marking – Data definition framework for defining software measurements.

### UNIT III SOFTWARE METRICS 9

Functional points as part of measurement program – Estimation of software reliability – Establishing central support for software sizing activities – Using metrics to manage projects – Tracking software progress – Effectively utilizing software metrics.

### UNIT IV SOFTWARE ESTIMATION 9

Problems with measurements – Avoiding obstacles and common pitfalls – Unreported and unpaid overtime – Using software metrics for effective estimating – Estimating software development projects – Enhanced estimation on time within budget – Metrics in outsourcing – Lifigaton – The product of non practicing function point metrics – Applying statistical process central to software – Metrics in E-Commerce.

### UNIT V KNOWLEDGE MANAGEMENT 9

Quality information and knowledge – Why quality information and knowledge – Define information quality – Create organizational knowledge – Manage knowledge as assets – Create customized solution – Network knowledge infrastructure.

**TOTAL = 45**

## REFERENCES:

1. Stephen H. Kan, “ Metrics and Models In Software Quality Engineering”, First Edition, Pearson Education, 2003.
2. N. Fenton, S. L. Pfleeger, “Software Metrics: A Rigorous and Practical Approach”, Thomson Learning, 1997.
3. IT Measurement – A Practical Advice from the Experts”, International Function Point Users Group, Pearson Education, Asia.

**CP9156            USER INTERFACE DESIGN**

**L T P C  
3 0 0 3**

<b>UNIT I            INTRODUCTION</b>	<b>8</b>
Human–Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.	
<b>UNIT II            HUMAN COMPUTER INTERACTION</b>	<b>7</b>
User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – General Design Principles – Conceptual Model Design – Conceptual Model Mock-Ups	
<b>UNIT III            WINDOWS</b>	<b>12</b>
Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– System Timings - Device– Based Controls Characteristics– Screen – Based Controls — Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus. Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.	
<b>UNIT IV            MULTIMEDIA</b>	<b>9</b>
Text For Web Pages – Effective Feedback– Guidance & Assistance– Internationalization– Accessibility– Icons– Image– Multimedia – Coloring.	
<b>UNIT V            EVALUATION</b>	<b>9</b>
Conceptual Model Evaluation – Design Standards Evaluation – Detailed User Interface Design Evaluation	

**Total = 45**

**TEXT BOOKS:**

1. Wilbent. O. Galitz ,“The Essential Guide To User Interface Design”, John Wiley& Sons, 2001.
2. **Deborah Mayhew, The Usability Engineering Lifecycle**, Morgan Kaufmann, 1999Ben Shneiderman, “Design The User Interface”, Pearson Education, 1998.

**REFERENCES:**

1. Alan Cooper, “The Essential Of User Interface Design”, Wiley – Dream Tech Ltd., 2002. Sharp, Rogers, Preece, ‘Interaction Design’, Wiley India Edition, 2007

**CP9158 BIO INFORMATICS**

**L T P C**  
**3 0 0 3**  
**9**

**UNIT I INTRODUCTORY CONCEPTS**

The Central Dogma – The Killer Application – Parallel Universes – Watson’s Definition – Top Down Versus Bottom up – Information Flow – Convergence – Databases – Data Management – Data Life Cycle – Database Technology – Interfaces – Implementation – Networks – Geographical Scope – Communication Models – Transmissions Technology – Protocols – Bandwidth – Topology – Hardware – Contents – Security – Ownership – Implementation – Management.

**UNIT II SEARCH ENGINES AND DATA VISUALIZATION**

**9**

The search process – Search Engine Technology – Searching and Information Theory – Computational methods – Search Engines and Knowledge Management – Data Visualization – sequence visualization – structure visualization – user Interface – Animation Versus simulation – General Purpose Technologies.

**UNIT III STATISTICS AND DATA MINING**

**9**

Statistical concepts – Microarrays – Imperfect Data – Randomness – Variability – Approximation – Interface Noise – Assumptions – Sampling and Distributions – Hypothesis Testing – Quantifying Randomness – Data Analysis – Tool selection statistics of Alignment – Clustering and Classification – Data Mining – Methods – Selection and Sampling – Preprocessing and Cleaning – Transformation and Reduction – Data Mining Methods – Evaluation – Visualization – Designing new queries – Pattern Recognition and Discovery – Machine Learning – Text Mining – Tools.

**UNIT IV PATTERN MATCHING**

**9**

Pairwise sequence alignment – Local versus global alignment – Multiple sequence alignment – Computational methods – Dot Matrix analysis – Substitution matrices – Dynamic Programming – Word methods – Bayesian methods – Multiple sequence alignment – Dynamic Programming – Progressive strategies – Iterative strategies – Tools – Nucleotide Pattern Matching – Polypeptide pattern matching – Utilities – Sequence Databases.

**UNIT V MODELING AND SIMULATION**

**9**

Drug Discovery – components – process – Perspectives – Numeric considerations – Algorithms – Hardware – Issues – Protein structure – AbInitio Methods – Heuristic

methods – Systems Biology – Tools – Collaboration and Communications – standards - Issues – Security – Intellectual property.

**Total = 45**

## REFERENCES

1. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, 2003.
2. T.K.Attwood and D.J. Perry Smith, “Introduction to Bio Informatics, Longman Essen, 1999.

## CP9160 LANGUAGE TECHNOLOGIES

**L T P C**  
**3 0 0 3**

### UNIT I INTRODUCTION

**9**

Natural Language Processing – Linguistic Background- Spoken language input and output Technologies – Written language Input - Mathematical Methods - Statistical Modeling and Classification Finite State methods Grammar for Natural Language Processing – Parsing – Semantic and Logic Form – Ambiguity Resolution – Semantic Interpretation.

### UNIT II INFORMATION RETRIEVAL

**9**

Information Retrieval architecture - Indexing- Storage – Compression Techniques – Retrieval Approaches – Evaluation - Search engines- commercial search engine features- comparison- performance measures – Document Processing - NLP based Information Retrieval – Information Extraction.

### UNIT III TEXT MINING

**9**

Categorization – Extraction based Categorization- Clustering- Hierarchical Clustering- Document Classification and routing- finding and organizing answers from Text search – use of categories and clusters for organising retrieval results – Text Categorization and efficient Summarization using Lexical Chains – Pattern Extraction.

### UNIT IV GENERIC ISSUES

**9**

Multilinguality – Multilingual Information Retrieval and Speech processing - Multimodality – Text and Images – Modality Integration - Transmission and Storage – Speech coding- Evaluation of systems – Human Factors and user Acceptability.

### UNIT V APPLICATIONS

**9**

Machine Translation – Transfer Metaphor - Interlingua and Statistical Approaches - Discourse Processing – Dialog and Conversational Agents – Natural Language Generation – Surface Realization and Discourse Planning.

**TOTAL = 45**

## TEXT BOOKS:

1. Daniel Jurafsky and James H. martin, “ Speech and Language Processing” , 2000.
2. Ron Cole, J.Mariani, et.al “Survey of the State of the Art in Human Language Technology”, Cambridge University Press, 1997.

3. Michael W. Berry “ Survey of Text Mining: Clustering, Classification and Retrieval”, Springer Verlag, 2003.
4. Christopher D.Manning and Hinrich Schutze, “ Foundations of Statistical Natural Language Processing “, MIT Press, 1999.

**REFERENCES:**

1. James Allen “ Natural Language Understanding “, Benjamin/ Cummings Publishing Co. 1995.
2. Gerald J. Kowalski and Mark.T. Maybury, “Information Storage and Retrieval systems”, Kluwer academic Publishers, 2000.
3. Tomek Strzalkowski “ Natural Language Information Retrieval “, Kluwer academic Publishers, 1999.
4. Christopher D.Manning and Hinrich Schutze, “ Foundations of Statistical Natural Language Processing “, MIT Press, 1999.

**CP9164 DATA WAREHOUSING AND DATA MINING**

**L T P C**  
**3 0 0 3**

**UNIT I**

**9**

Data Warehousing and Business Analysis: - Data warehousing Components –Building a Data warehouse – Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata – reporting – Query tools and Applications – Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.

**UNIT II**

**9**

Data Mining: - Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

**UNIT III**

**9**

Classification and Prediction: - Issues Regarding Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

**UNIT IV**

**9**

Cluster Analysis: - Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model-Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

**UNIT V**

**9**

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

**REFERENCES**

1. Jiawei Han and Micheline Kamber “Data Mining Concepts and Techniques” Second Edition,
2. Elsevier, Reprinted 2008.
3. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw – Hill Edition, Tenth Reprint 2007.
4. K.P. Soman, Shyam Diwakar and V. Ajay “Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
5. G. K. Gupta “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
6. Pang-Ning Tan, Michael Steinbach and Vipin Kumar “Introduction to Data Mining”, Pearson Education, 2007.

**CP9161 KNOWLEDGE MANAGEMENT****L T P C  
3 0 0 3****UNIT I INTRODUCTION****9**

The value of Knowledge – Knowledge Engineering Basics – Knowledge Economy – The Task and Organizational Content – Knowledge Management – Knowledge Management Ontology.

**UNIT II KNOWLEDGE MODELS****9**

Knowledge Model Components – Template Knowledge Models – Reflective Knowledge Models – Knowledge Model Construction – Types of Knowledge Models.

**UNIT III TECHNIQUES OF KNOWLEDGE MANAGEMENT****8**

Knowledge Elicitation Techniques – Modeling Communication Aspects – Knowledge Management and Organizational Learning.

**UNIT IV KNOWLEDGE SYSTEM IMPLEMENTATION****11**

Case Studies – Designing Knowledge Systems – Knowledge Codification – Testing and Deployment – Knowledge Transfer and Knowledge Sharing – Knowledge System Implementation.

**UNIT V ADVANCED KM****8**

Advanced Knowledge Modeling – Value Networks – Business Models for Knowledge Economy – UML Notations – Project Management.

**TOTAL = 45****TEXT BOOKS:**

1. Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, “Knowledge Engineering and Management”, Universities Press, 2001.

2. Elias M.Awad & Hassan M. Ghaziri, "Knowledge Management", Pearson Education, 2003.

## REFERENCES:

1. C.W. Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol 1 and 2, 2003.
2. <http://www.epistemics.co.uk>
3. [http://depts.washington.edu/pettt/papers/WIN\\_poster\\_text.pdf](http://depts.washington.edu/pettt/papers/WIN_poster_text.pdf)

**SW9160**

**XML AND WEB SERVICES**

**L T P C  
3 0 0 3**

### **UNIT I XML TECHNOLOGY FAMILY 9**

XML – benefits – Advantages of XML over HTML – EDL –Databases – XML based standards – DTD –XML Schemas – X- Files – XML processing – DOM –SAX- presentation technologies – XSL – XFORMS – XHTML – voice XML – Transformation – XSLT – XLINK – XPATH –XQ

### **UNIT II ARCHITECTING WEB SERVICES 9**

Business motivations for web services – B2B – B2C- Technical motivations – limitations of CORBA and DCOM – Service – oriented Architecture (SOA) – Architecting web services – Implementation view – web services technology stack – logical view – composition of web services – deployment view – from application server to peer to peer – process view – life in the runtime

### **UNIT III WEB SERVICES BUILDING BLOCK 9**

Transport protocols for web services – messaging with web services – protocols – SOAP – describing web services – WSDL – Anatomy of WSDL – manipulating WSDL – web service policy – Discovering web services – UDDI – Anatomy of UDDI- Web service inspection – Ad-Hoc Discovery – Securing web services.

### **UNIT IV IMPLEMENTING XML IN E-BUSINESS 9**

B2B - B2C Applications – Different types of B2B interaction – Components of e-business XML systems – ebXML – Rosetta Net Applied XML in vertical industry – Web services for mobile devices.

### **UNIT V XML AND CONTENT MANAGEMENT 9**

Semantic Web – Role of Meta data in web content – Resource Description Framework – RDF schema – Architecture of semantic web – content management workflow – XLANG –WSFL.

**TOTAL: 45 PERIODS**

## TEXT BOOKS:

1. Ron schmelzer et al, "XML and Web Services", Pearson Education, 2002.
2. Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004.

**REFERENCES:**

1. Frank P. Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002.
2. Keith Ballinger, ".NET Web Services Architecture and Implementation", Pearson Education, 2003.
3. Henry Bequet and Meeraj Kunnumpurath, "Beginning Java Web Services", Apress, 2004.
4. Russ Basiura and Mike Batongbacal, "Professional ASP.NET Web Services", Apress, 2003.

**IT9123            ADVANCES IN DATABASES****L T P C****3 0 0 3****UNIT I            QUERY AND TRANSACTION PROCESSING            9**

Data Storage and Querying : Storage and File Structure - Indexing and Hashing - Physical Database Design and Tuning - Query Processing Algorithms - Query Optimization Techniques - Transaction Management: Transaction Processing Concepts - Concurrency Control - Recovery Techniques - Database Security.

**UNIT II            PARALLEL AND DISTRIBUTED DATABASES            9**

Database System Architectures: Centralized and Client-Server Architectures - Server System Architectures - Parallel Systems- Distributed Systems - Parallel Databases: I/O Parallelism - Inter and Intra Query Parallelism - Inter and Intra operation Parallelism - Distributed Database Concepts - Distributed Data Storage - Distributed Transactions - Commit Protocols - Concurrency Control - Distributed Query Processing - Three Tier Client Server Architecture- Case Studies.

**UNIT III            OBJECT AND OBJECT RELATIONAL DATABASES            9**

Concepts for Object Databases: Object Identity - Object structure - Type Constructors - Encapsulation of Operations - Methods - Persistence - Type and Class Hierarchies - Inheritance - Complex Objects - Object Database Standards, Languages and Design: ODMG Model - ODL - OQL - Object Relational and Extended - Relational Systems : Object Relational features in SQL / Oracle - Case Studies.

**UNIT IV            ENHANCED DATA MODELS            9**

Active Database Concepts and Triggers - Temporal Databases - Spatial Databases - Multimedia Databases - Deductive Databases - XML Databases: XML Data Model - DTD - XML Schema - XML Querying - Geographic Information Systems - Genome Data Management.

**UNIT V            EMERGING TECHNOLOGIES            9**

Mobile Databases: Location and Handoff Management - Effect of Mobility on Data Management - Location Dependent Data Distribution - Mobile Transaction Models - Concurrency Control - Transaction Commit Protocols - Web Databases - Information Retrieval - Data Warehousing - Data Mining.

**TOTAL : 45 PERIODS**

## REFERENCES

1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education/Addison Wesley, 2007.
2. Thomas Cannolly and Carolyn Begg, " Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.
3. Henry F Korth, Abraham Silberschatz, S. Sudharshan, "Database System Concepts", Fifth Edition, McGraw Hill, 2006.
4. C.J.Date, A.Kannan and S.Swamynathan,"An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
5. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition 2004.

## CP9177 MULTICORE ARCHITECTURE

**L T P C**  
**3 0 0 3**

<b>UNIT I</b>	<b>9</b>
Fundamentals of SuperScalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP – Multicore Vs Multithreading.	
<b>UNIT II</b>	<b>9</b>
Shared memory architectures– synchronization – Memory organization – Cache Memory – Cache Coherency Protocols - Design of Levels of Caches.	
<b>UNIT III</b>	<b>9</b>
Multicore programming Model – Shared memory model, message passing model, transaction model – OpenMP and MPI Programming.	
<b>UNIT IV</b>	<b>9</b>
PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management Power 5 Multicore architecture design, Power 6 Architecture.	
<b>UNIT V</b>	<b>9</b>
Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.	

**TEXT BOOK:**

1. Hennessey & Pateterson, "Computer Architecture A Quantitative Approach", Harcourt Asia, Morgan Kaufmann, 1999
2. Joseph JaJa, Introduction to Parallel Algorithms, Addison-Wesley, 1992.
3. IBM Journals for Power 5, Power 6 and Cell Broadband engine architecture.

**REFERENCES:**

1. Kai Hwang, "Advanced Computer Architecture: Parallelism, Scalability and Programmability" McGraw-Hill, 1993
2. Richard Y. Kain, "Advanced Computer Architecture: A System Design Approach", PHI, 1999
3. Rohit Chandra, Ramesh Menon, Leo Dagum, and David Kohr, Parallel Programming in OpenMP, Morgan Kaufmann, 2000.