UNIVERSITY DEPARTMENTS

ANNA UNIVERSITY :: CHENNAI 600 025

REGULATIONS – 2008

CURRICULUM FROM III TO VIII SEMESTERS FOR

B.E. COMPUTER SCIENCE AND ENGINEERING

SEMESTER III

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
MA9211	Mathematics III	3	1	0	4
EC9213	Electronic Devices and Circuits	3	0	0	3
CS9201	Design and Analysis of Algorithms	3	0	0	3
CS9202	Database Management Systems	3	0	0	3
CS9203	Programming and Data Structures II	3	0	0	3
CS9204	Computer Architecture	3	1	0	4
PRACTICAL					
CS9205	Database Management Systems Laboratory	0	0	3	2
CS9206	Programming and Data Structures Laboratory II	0	0	3	2
CS9207	Algorithms Laboratory	0	0	3	2
	TOTAL	**18**	**2**	**9**	**26**

SEMESTER IV

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
EE9262	Electrical Engineering and Control Systems	3	0	0	3
CS9251	Microprocessors and Micro controllers	3	0	0	3
CS9252	Operating Systems	3	0	0	3
CS9253	Web Technology	3	0	0	3
MA9265	Discrete Mathematics	3	1	0	4
CS 9254	Software Engineering	3	0	0	3
PRACTICAL					
CS9255	Microprocessors Laboratory	0	0	3	2
CS9256	Web Technology Laboratory	0	0	3	2
CS9257	Operating Systems Laboratory	0	0	3	2
	TOTAL	**18**	**1**	**9**	**25**

SEMESTER V

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
CS9301	Object Oriented Analysis and Design	3	0	0	3
CS9302	Theory of Computation	3	0	0	3
CS9303	System Software Internals	3	0	0	3
CS9304	Artificial Intelligence	3	0	0	3
CS9305	Data Communication and Computer Networks	3	1	0	4
	Elective I	3	0	0	3
PRACTICAL					
CS9306	Computer Networks Laboratory	0	0	3	2
CS9307	Case Tools Laboratory	0	0	3	2
GE9371	Communication Skills and Soft Skills lab	0	0	2	1
	TOTAL	**18**	**1**	**8**	**24**

SEMESTER VI

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
MA9266	Probability and Queuing Theory	3	1	0	4
CS9351	Digital Signal Processing	3	0	0	3
CS9352	Mobile and Pervasive Computing	3	0	0	3
CS9353	Principles of Compiler Design	3	0	0	3
GE9261	Environmental Science and Engineering	3	0	0	3
	Elective II	3	0	0	3
PRACTICAL					
CS9354	Compiler Laboratory	0	0	3	2
CS9355	Mobile and Pervasive Computing Laboratory	0	0	3	2
CS9356	Free and Open Source Software Laboratory	0	0	3	2
	TOTAL	**18**	**1**	**9**	**25**

SEMESTER VII

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
CS9401	Graphics and Multimedia	3	1	0	4
CS9402	Cryptography and Security	3	0	0	3
MG9401	Principles of Management	3	0	0	3
	Elective III	3	0	0	3
	Elective IV	3	0	0	3
	Elective V	3	0	0	3
PRACTICAL					
CS9404	Graphics and multimedia laboratory	0	0	3	2
CS9405	Software Development Laboratory	0	0	3	2
CS9406	Comprehension	0	0	2	1
	TOTAL	**18**	**1**	**8**	**24**

SEMESTER VIII

CODE NO	COURSE TITLE	L	T	P	C
THEORY					
	Elective VI	3	0	0	3
	Elective VII	3	0	0	3
PRACTICAL					
CS9451	Project Work	0	0	12	6
	TOTAL	**6**	**0**	**12**	**12**

TOTAL CREDITS : 24 + 27 +136 = 187

LIST OF ELECTIVES FOR B.E. COMPUTER SCIENCE AND ENGINEERING

SEMESTER V

CODE NO	COURSE TITLE	L	T	P	C
IT9304	Distributed Systems	3	0	0	3
CS9022	Internet Programming	3	0	0	3
CS9023	UNIX Internals	3	0	0	3
CS9024	Advanced Database Technology	3	0	0	3

SEMESTER VI

CODE NO	COURSE TITLE	L	T	P	C
CS9025	Software Requirements Management	3	0	0	3
CS9026	Software Design and Architecture	3	0	0	3
CS9027	Data Warehousing and Data Mining	3	0	0	3
CS9028	Middleware Technologies	3	0	0	3
CS9029	.Net and C# programming	3	0	0	3
CS9030	Digital Image Processing	3	0	0	3
CS9031	Cyber Forensics	3	0	0	3
CS9032	Graph Theory	3	0	0	3
CS9033	Advanced Computer Architecture	3	0	0	3
CS9034	TCP/IP Design and implementation	3	0	0	3
CS9035	Free/Open Source Software	3	0	0	3

SEMESTER VII

CODE NO	COURSE TITLE	L	T	P	C
CS9036	Soft Computing	3	0	0	3
CS9037	Knowledge Management	3	0	0	3
CS9038	Database Tuning	3	0	0	3
CS9039	Grid Computing	3	0	0	3
CS9040	Language Technologies	3	0	0	3
CS9041	Visualization Techniques	3	0	0	3
CS9042	Software Project Management	3	0	0	3
CS9043	Multi-core Programming	3	0	0	3
EC9073	Bio Informatics	3	0	0	3
IT 9401	Software Testing	3	0	0	3
IT9351	Service Oriented Architecture	3	0	0	3
CS9046	System Modelling and Simulation	3	0	0	3
CS9047	Adhoc and Sensor Networks	3	0	0	3
CS9048	Embedded Systems	3	0	0	3
CS9049	Programming In .Net	3	0	0	3
CS9050	Routers and Network Processors	3	0	0	3

SEMESTER VIII

CODE NO	COURSE TITLE	L	T	P	C
CS9071	High Speed Networks	3	0	0	3
CS9072	Semantic Web	3	0	0	3
CS9073	Scientific Computing Techniques	3	0	0	3
CS9074	Software Agents	3	0	0	3
CS9075	Network Analysis and Management	3	0	0	3
CS9077	Real Time Systems	3	0	0	3
GE9022	Total Quality Management	3	0	0	3
GE9021	Professional Ethics in Engineering	3	0	0	3
GE9023	Fundamentals of Nanoscience	3	0	0	3

MA 9211 **MATHEMATICS III** **L T P C**
(Common to all branches of BE / B.Tech Programmes) **3 1 0 4**

AIM:
To facilitate the understanding of the principles and to cultivate the art of formulating physical problems in the language of mathematics.

OBJECTIVES:
- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems
- To acquaint the student with Fourier transform techniques used in wide variety of situations in which the functions used are not periodic
- To introduce the effective mathematical tools for the solutions of partial differential equations that model physical processes
- To develop Z- transform techniques which will perform the same task for discrete time systems as Laplace Transform, a valuable aid in analysis of continuous time systems

UNIT I FOURIER SERIES 9+3
Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM 9+3
Fourier integral theorem – Fourier transform pair-Sine and Cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS 9+3
Formation – Solutions of first order equations – Standard types and Equations reducible to standard types – Singular solutions – Lagrange's Linear equation – Integral surface passing through a given curve – Solution of linear equations of higher order with constant coefficients.

UNIT IV APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS 9+3
Method of separation of Variables – Solutions of one dimensional wave equation and one-dimensional heat equation – Steady state solution of two-dimensional heat equation – Fourier series solutions in Cartesian coordinates.

UNIT V Z – TRANSFORM AND DIFFERENCE EQUATIONS 9+3
Z-transform – Elementary properties – Inverse Z-transform – Convolution theorem – Initial and Final value theorems – Formation of difference equation – Solution of difference equation using Z-transform.

L: 45, T: 15, TOTAL = 60 PERIODS

TEXT BOOK:
1. Grewal, B.S. "Higher Engineering Mathematics", Khanna Publications (2007)

REFERENCES:
1. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education (2007)
2. Ramana B.V., "Higher Engineering Mathematics" Tata McGraw Hill (2007).
3. Bali N.P. and Manish Goyal, "A Text Book of Engineering" 7th Edition (2007) Lakshmi Publications (P) Limited, New Delhi.

EC 9213 ELECTRONIC DEVICES AND CIRCUITS L T P C
3 0 0 3

AIM:
The aim of this is to introduce the concept of Circuit theory, Electronic Devices and their applications.

UNIT II CIRCUIT ANALYSIS TECHNIQUES 9
Linearity and Superposition, Sources Transformation, Thevinin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion, Single Phase and 3 Phase Circuits-Power Factor-Power-Concept of Phasor Diagrams.

UNIT III SEMICONDUCTOR DEVICES 9
PN-Junction Diode- Drift and Diffusion Current-Zener Diode-Zener Regulator-BJT- V-I Characteristics-CE Configuration-Current Equation h-Parameter Model.JFET- V-I Characteristics- Current Equation- Transconductance MOSFET-Types DMOS, EMOS – V-I Characteristics-Moll Current Equation Equalitine Treatment only.

UNIT IV RECTIFIER, AMPLIFIER AND OSCILLATOR 9
FWR-Filter-Capacitors Input Filter-Choke Input Filter – CE Amplification with and without feedback – Analysis and Frequency Response – CS MOSFET Amplifier - Analysis

UNIT V OPERATION AMPLIFIER 9
Introduction of an Inverting Amplifier, Non Inverting Amplifier, Basic Application of Operation Amplifier: Subractor, Summing Amplifier, Digital to Analogue Convertor, Low Pass Filter, First Order Low Pass Filter, First Order High Pass Filter, Integrator, Differentiator.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. David A.Bell “Electronic Devices and Circuit”,Oxford press-2008.
2. Robert T.Paynter “Introductory Electronic Devices and Circuits”, Pearson Education-Sixth Edition

REFERENCES:
1. Denal A.Neamar, “Electronic Circuit Analysis and Design”, Second Edition, Tata MCGraw Hill, 2002.
2. Adel S.Sedia Keanath “C with Micro Electronic Circuit”-Fourth Edition-Oxford University Press-1998.

CS 9201 DESIGN AND ANALYSIS OF ALGORITHMS L T P C
3 0 0 3

AIM:
The aim is to introduce the basics of algorithm design paradigms and analysis to enable designing of efficient algorithms.

OBJECTIVES:
- To introduce the basic concepts of algorithm analysis
- To introduce the design paradigms for algorithm design
- To introduce the basic complexity theory.

UNIT I PRELIMINARIES 9

The Role of Algorithms in Computing-Getting Started-Growth of Functions – Recurrences-The Substitution Method- The Recurrence Tree Method-The Master Method -Probabilistic Analysis and Randomized Algorithms-The Hiring Problem-Random Variables-Randomized Algorithms

UNIT II DESIGN TECHNIQUE I 9

Quicksort-Description-Performance-Randomized version-Analysis.Sorting in linear time-Lower bounds for sorting-Counting sort-Medians and order statistics-Minimum and maximum-Selection in expected linear time- Selection in worst-case linear time-Dynamic Programming – Matrix chain multiplication –Elements of Dynamic programming- Longest common sequences.

UNIT III DESIGN TECHNIQUE II 9

Greedy Algorithms-Activity selection problem-Elements of Greedy Strategy-Huffman code.Matrix Operations-Properties of matrices-Strassen's algorithm-Solving systems of linear equations-Inverting matrices.

UNIT IV APPLICATIONS 9

Linear Programming-Standard and slack forms-Formulating problems-Simplex algorithm-Duality-Initial basic feasible solution - String Matching-Naive string matching algorithm-Knuth-Morris-Pratt algorithm.

UNIT V NP PROBLEMS 9

NP-completeness-Polynomial time-Polynomial-time verification-NP-completeness and reducibility-NP-completeness proofs - NP-completeness problems. Approximation Algorithms-The vertex-cover problem-The traveling-salesman problem.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest, Cliford Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India, 2007.

REFERENCES:

1. Jon Kleinberg, Eva Tardos, "Algorithm Design", Pearson Education, 2006.
2. Michael T. Goodrich, Toberto Tamassisa, " Algorithm Design: Foundations, Analysis and Internet Examples", Wiley Student Edition, 2007.
3. Anany Levitin, "Introduction to Design and Analysis of Algorithms", Pearson Education, 2003.

CS 9202 DATABASE MANAGEMENT SYSTEMS L T P C
3 0 0 3

AIM:

To provide a strong foundation in database technology and an introduction to the current trends in this field.

OBJECTIVES:

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- To have an introductory knowledge about the Storage and Query processing techniques

UNIT I INTRODUCTION 9

Purpose of Database System -– Views of data – Data Models – Database Languages —– Database System Architecture – Database users and Administrator – Entity– Relationship model – E-R Diagrams -- Introduction to relational databases

UNIT II RELATIONAL MODEL 9

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals - Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

UNIT III DATABASE DESIGN 9

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form- Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT IV TRANSACTIONS 9

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery – Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

UNIT V IMPLEMENTATION TECHNIQUES 9

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary storage – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Catalog Information for Cost Estimation – Selection Operation – Sorting – Join Operation – Database Tuning.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database SystemConcepts”, Fifth Edition, Tata McGraw Hill, 2006.
2. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.

REFERENCES:

1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, FourthEdition , Pearson / Addision wesley, 2007.
2. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 2003.
3. S.K.Singh, “Database Systems Concepts, Design and Applications”, First Edition, Pearson Education, 2006.

CS 9203 PROGRAMMING AND DATA STRUCTURES II L T P C
3 0 0 3

AIM:

The aim is to introduce the concept of Object Oriented Programming and analyse the implementation of Advanced Data Structures using Object Oriented Programming Language.

OBJECTIVES:

- To introduce the concepts of Object Oriented Programming language.
- To introduce the concepts of Templates and Error Handling.
- To introduce the concepts of Advanced Data Structures.

UNIT I OOP CONCEPTS 9

Introduction – Learning C++ - Design of C++ - History and Use – Programming Paradigms – Standard Library – Types and Declaration – Pointers, Arrays, Structures – Expressions and Statements – Functions – Namespaces and Exceptions – Source Files and Programs – Classes – User-Defined Types – Objects – Operator Overloading – Operator Functions – Complex Number

UNIT II INHERITANCE 9

Type Conversion Operators – Friends – Large Objects – Essential Operators – Subscripting – Function Call – Dereferencing – Increment and Decrement – String Class – Derived Classes – Abstract Classes – Design of Class Hierarchies

UNIT III TEMPLATES AND EXCEPTIONS 9

Templates – Function Templates – Error Handling – Grouping of Exceptions – Catching Exceptions – Resource Management – Multiple Inheritance – Access Control – Run Time Type Information

UNIT IV DATA STRUCTURES 9

OO Perspective of List, Stack, Queue, and Search Tree ADTs – AVL Trees – Red Black Trees – Splay Trees – B-trees – Priority Queues (Heaps)

UNIT V SET AND GRAPHS 9

Disjoint Set ADT – Graph Algorithms – Topological Sort – Shortest-Path Algorithm – Network Flow Problems – Minimum Spanning Tree – Applications of Depth-First Search

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Bjarne Stroustrup, "The C++ Programming Language", 3rd ed., Pearson Education, 2007.
2. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 2nd ed., Pearson Education, 2005.

REFERENCES:

1. Ira Pohl, "Object-Oriented Programming using C++", 2nd ed., Pearson Education, 1997.
2. Goodrich, Michael T., Roberto Tamassia, David Mount. "Data Structures and Algorithms in C++". 7th edition, Wiley, 2004.

CS 9204 COMPUTER ARCHITECTURE L T P C
3 1 0 4

AIM:

To understand the organization of a computer, and the hardware-software interface.

OBJECTIVES:

- To know about the various components of a computer and their internals.
- To comprehend the importance of the hardware-software interface, and instruction-set architecture.
- To understand the architectural features of superscalar processors.

UNIT I BASIC STRUCTURE OF COMPUTERS 9+3

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Hardware – Software Interface – Instruction set architecture – Addressing modes – RISC – CISC - ALU design – Fixed point and floating point operations.

UNIT II BASIC PROCESSING UNIT 6+3

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Nano programming.

UNIT III PIPELINING AND ILP 12+3

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling – Advanced concepts in pipelining –Exploitation of more ILP – Hardware and software approaches – Dynamic scheduling – Speculation – Compiler approaches – Multiple issue processors.

UNIT IV MEMORY SYSTEM 9+3

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Improving cache performance – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

UNIT V I/O ORGANIZATION 9+3

Accessing I/O devices – Programmed Input/Output -Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

L: 45, T: 15, TOTAL = 60 PERIODS

TEXT BOOKS:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.
2. David A. Patterson and John L. Hennessy, "Computer Organization and Design: The Hardware/Software interface", Third Edition, Elsevier, 2005.

REFERENCES:

1. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
2. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
3. V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.
4. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2007.

CS 9205 DATABASE MANAGEMENT SYSTEMS LABORATORY LT P C
0 0 3 2

AIM:

The aim of this laboratory is to inculcate the abilities of applying the principles of database management systems. The course aims to prepare the students for projects where a proper implementation of databases will be required.

OBJECTIVES:

- The students will be able to create a database file
- The students will be able to query a database file
- The students will be able to append and update a database file

EXPERIMENTS IN THE FOLLOWING TOPICS:

1. Data Definition, Manipulation of base tables and views
2. High level programming language extensions.
3. Front end tools
4. Forms
5. Triggers
6. Menu Design
7. Importing/ Exporting Data.
8. Reports.
9. Database Design and implementation (Mini Project).

TOTAL: 45 PERIODS

CS 9206 PROGRAMMING AND DATA STRUCTURES LABORATORY II L T P C
0 0 3 2

AIM:

To implement different data structures and their algorithms for storing, accessing and manipulating data using an object oriented programming language.

OBJECTIVES:

- To implement the concepts of object oriented programming.
- To implement different data structures using object oriented programming language.
- To use standard template library in the implementation of standard data structures.

EXPERIMENTS IN THE FOLLOWING:

1. Implementation of any one of the following List, Stack, Queue ADTs, binary search trees.

2. Implement data abstraction by separate compilation of implementation (**.**h & **.**cpp) and application (main**.**cpp).

3. Use of standard Template Library: Strings, containers.

4. Use of STL: Iterators.

5. Operator Overloading.

6. Templates.

7. Exception handling, Class Hierarchies.

8. AVL Tree.

9. Splay Tree.

10. B Tree.

11. Graph algorithms.

TOTAL: 45 PERIODS

CS 9207 ALGORITHMS LABORATORY L T P C
0 0 3 2

AIM:
To understand the running time of algorithms.

OBJECTIVES:
- To understand the need for analyzing algorithms.
- To understand that algorithms execution speed cannot be expressed as a fixed time quantity.
- To know the ways of estimating time speed for different algorithms
- To study about applications of the different algorithms.
- To know about the various tools available for analyzing algorithms.

IMPLEMENT THE FOLLOWING

1. Simple recursive programs like Towers of Hanoi ,Generating Permutations.
2. Sort algorithms.
3. Randomized quick sort algorithm.
4. Merge sort using Divide and Conquer approach.
5. Generation of Huffman code using Greedy Approach.
6. Floyd's Algorithm -Dynamic Programming.
7. Simplex Method.
8. String matching algorithms.
9. Study of Benchmarking algorithms.
10. Study of Algorithms Tools.

TOTAL: 45 PERIODS

EE 9262 ELECTRICAL ENGINEERING & CONTROL SYSTEMS L T P C
3 0 0 3

AIM:
To provide knowledge in the basic concepts of circuits, electrical machines, linear control theory and its analysis.

OBJECTIVES:
- To impart knowledge on Network theorems.
- Principle of electrical machines.
- Different system representation, block diagram reduction and Mason’s rule.
- Time response analysis of LTI systems and steady state error.
- State variable analysis.

UNIT I ELECTRIC CIRCUITS 9

Dependent and independent sources – Kirchoff's laws – mesh current and node voltage methods – theorems – Thevenin's – Norton's - superposition - maximum power transfer- Phasors – sinusoidal steady state response of simple RLC circuits.

UNIT II ELECTRICAL MACHINES AND TRANSFORMERS 9

Principles of operation of single phase transformers – equivalent circuits – efficiency – DC motor – principle of operation – torque equation – load characteristics of DC shunt motor – single-phase induction motor – double field revolving theory – equivalent circuits – starting methods.

UNIT III MATHEMATICAL MODELS OF PHYSICAL SYSTEMS 9

Definition & classification of system – terminology & structure of feedback control theory – Differential equation of physical systems – Block diagram algebra – Signal flow graphs.

UNIT IV TRANSFER FUNCTION ANALYSIS 9

Frequency response – Bode plots –Time Response analysis of II order system – Time and frequency domain specifications.

UNIT V STATE VARIABLE ANALYSIS 9

Concept of state variable – State models for linear & continuous time systems – State variable realizations - Solution of state equation.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Smarajit Ghosh, "Fundamentals of Electrical and Electronics Engineering", 2nd Edition, Prentice-Hall, New Delhi, 2007.
2. Richard C Dorf and Robert H.Bishop, " Modern Control Systems", 8th Edition, Prentice-Hall, (Pearson Education, Inc.), New Delhi, 2005.

REFERENCES:

1. Vincent Del Toro, "Electrical Engineering Fundamentals", 2nd Edition, Prentice-Hall, (Pearson Education Inc.), 2007
2. John Bird, "Electrical and Electronics Principles and Technology", 3rd Edition, Elsevier, New Delhi.
3. Joseph J. Distefano, Allen R. Stubberud, Iran J.Williams, "Feedback and Control Systems", 2nd Edition, Tata McGraw Hill, New Delhi, 2007.

CS 9251 MICROPROCESSORS AND MICROCONTROLLERS L T P C
3 0 0 3

AIM:

- To have an in depth knowledge of the architecture and programming of 8-bit and 16-bit Microprocessors, Microcontrollers and to study how to interface various peripheral devices with them.

OBJECTIVES:

- To study the basic architectures and operational features of the processors and controllers
- To learn the assembly language programming
- To design and understand the multiprocessor configurations
- To understand the interfacing concepts of the peripheral devices with that of the processors

UNIT I THE 8085 AND 8086 MICROPROCESSORS 9

8085 Microprocessor architecture – Instruction set – Programming the 8085 - 8086 Microprocessor architecture – signals.

UNIT II 8086 SOFTWARE ASPECTS 9

Intel 8086 microprocessor – Instruction set – Addressing modes – Assembler directives – Assembly language programming – Procedures – Macros – Interrupts and interrupt service routines – BIOS function calls.

UNIT III SYSTEM DESIGN 9

Basic configurations **–** Minimum and maximum modes – System design using 8086 **–** Multiprocessor configurations – Introduction to 80286, 80386 and Pentium.

UNIT IV I/O INTERFACING 9

Memory Interfacing and I/O interfacing with 8085 and 8086 – Parallel communication interface – Serial communication interface – Timer – Keyboard / Display controller – Interrupt controller – DMA controller – Programming and applications.

UNIT V MICROCONTROLLERS 9

Architecture of 8051 microcontroller – Signals – Operational features – Memory and I/O addressing – Interrupts – Instruction set – System design using microcontrollers.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Ramesh S. Gaonkar, “Microprocessor **–** Architecture, Programming and Applications with the 8085”, Fifth Edition**,** Prentice Hall.,2002.
2. Yu-cheng Liu, Glenn A. Gibson, “Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design”, Second edition, Prentice Hall of India, 2006.
3. Mohamed Ali Mazidi, Janice Gillispie Mazidi, “The 8051 microcontroller and embedded systems using Assembly and C”, Second Edition, Pearson Education / Prentice Hall of India, 2007.

REFERENCES:

1. Barry B. Brey, "The Intel Microprocessors, 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium, PentiumPro Processor, PentiumII, PentiumIII, PentiumIV, Architecture, Programming & Interfacing", Seventh Edition, Pearson Education / Prentice Hall of India, 2007.
2. Douglas V. Hall, "Microprocessors and Interfacing: Programming and Hardware", Second edition, Tata Mc Graw Hill, 2006.
3. A.K. Ray & K. M. Bhurchandi, "Advanced Microprocessors and peripherals – Architectures, Programming and Interfacing", Tata Mc Graw Hill, 2006.
4. Peter Abel, "IBM PC Assembly language and programming", Fifth edition, Pearson Education / Prentice Hall of India Pvt. Ltd,2007 .

CS 9252 OPERATING SYSTEMS L T P C
3 0 0 3

AIM:

The course introduces the students to the basic principles of operating systems.

OBJECTIVES:

- To be aware of the evolution of operating systems
- To learn what processes are, how processes communicate, how process synchronization is done and how to manage processes
- To have an understanding of the main memory and secondary memory management techniques.
- To understand the I/O Subsystem
- To have an exposure to Linux and Windows 2000 operating systems

UNIT I OPERATING SYSTEMS OVERVIEW 9

Operating system – Types of Computer Systems – Computer-system operation – I/O structure – Hardware Protection – System components – System calls – System programs – System structure – Process concept – Process scheduling – Operations on processes – Cooperating processes – Interprocess communication – Communication in client-server systems – Multithreading models – Threading issues – Pthreads.

UNIT II PROCESS MANAGEMENT 10

Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation – Process Scheduling Models - The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – Critical regions – Monitors – System model – Deadlock characterization – Methods for handling deadlocks – Recovery from deadlock

UNIT III STORAGE MANAGEMENT 9

Memory Management – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing.

UNIT IV I/O SYSTEMS 9

File concept – Access methods – Directory structure – File-system mounting – Protection – Directory implementation – Allocation methods – Free-space management – Disk scheduling – Disk management – Swap-space management.

UNIT V CASE STUDY 8

The Linux System – History – Design Principles – Kernel Modules – Process Management – Scheduling – Memory management – File systems – Input and Output – Inter-process Communication – Network Structure – Security – Windows 2000 – History – Design Principles – System Components – Environmental subsystems – File system – Networking.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Silberschatz, Galvin and Gagne, “Operating System Concepts”, Sixth Edition, John Wiley & Sons Inc 2003.

REFERENCES:

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Second Edition, Addison Wesley, 2001.
2. Gary Nutt, “Operating Systems”, Second Edition, Addison Wesley, 2003.
3. H M Deital, P J Deital and D R Choffnes, “Operating Systems”, Pearson Education, 2004.

CS 9253 WEB TECHNOLOGY L T P C
3 0 0 3

AIM:

To provide an introduction to Java and basic Web concepts and enable the student to create simple Web based applications.

OBJECTIVES:

To introduce the features of object oriented programming languages using Java

- To design and create user interfaces using Java frames and applets
- To have a basic idea about network programming using Java
- To create simple Web pages and provide client side validation
- To create dynamic web pages using server side scripting

UNIT I BASICS OF JAVA 9

Java fundamentals – Class, Object – Inheritance – Polymorphism – Packages – Interfaces – Exception handling

UNIT II JAVA IO AND NETWORKING 9

I/O – AWT – Event handling – Introduction to Threads - Basics of Networking –TCP and UDP sockets – Connecting to the Web

UNIT III DATABASE AND DISTRIBUTED APPLICATIONS 9

Applets – JDBC – Swings – Remote Method Invocation

UNIT IV HTML AND CLIENT-SIDE SCRIPTS 9

World Wide Web – HTML – List –Tables – Frames – Forms – HTTP commands – XML – DTD, Schema – XSLT – XML Parser – Client side scripting

UNIT V SERVER SIDE SCRIPTS 9

Server side scripting – JSP – Servlets – Session management – Cookies

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Deitel and Deitel, "Java – How to program", 3rd ed., Pearson Education, 2001.
2. Robert W. Sebesta, "Programming the World Wide Web", 3rd ed., Pearson Education, 2006.

REFERENCES:

1. Herbert Schildt, "Java – The Complete Reference", 7th ed., Tata McGraw Hill, 2007.
2. Chris Bates, "Web Programming", 3rd ed., Wiley, 2006.
3. Black Book, "Java 6 Programming", Dreamtech Press, 2007.
4. Deitel, "Java How to Program", Pearson Education, 2003.
5. W Clay Richardson, et al, "Professional Java JDK 6 Edition", Wrox, 2007.

MA 9265 DISCRETE MATHEMATICS L T P C
3 1 0 4

AIM:

To extend student's Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

OBJECTIVES:

At the end of the course, students would

- Have knowledge of the concepts needed to test the logic of a program.
- Have an understanding in identifying structures on many levels.
- Be aware of a class of functions which transform a finite set into another finite set which relates to input output functions in computer science.
- Be aware of the counting principles.
- Be exposed to concepts and properties of algebraic structures such as semi groups, monoids and groups.

UNIT I LOGIC AND PROOFS 9

Propositional Logic – Propositional equivalences-Predicates and quantifiers – Nested Quantifiers – Rules of inference-introduction to proofs – proof methods and strategy.

UNIT II COMBINATORICS 9

Mathematical induction – Strong induction and well ordering – The basics of counting - The pigeonhole principle – Permutations and combinations – Recurrence relations-Solving linear recurrence relations-generating functions – Inclusion and exclusion and applications.

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UNIT III GRAPHS 9

Graphs and graph models – Graph terminology and special types of graphs - presenting graphs and graph isomorphism – connectivity – Euler and Hamilton paths.

UNIT IV ALGEBRAIC STRUCTURES 9

Algebraic systems – Semi groups and monoids – Groups-Subgroups and homomorphisms – Cosets and Lagrange's theorem – Ring & Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA 9

Partial ordering – Posets – Lattices as Posets – Properties of lattices-Lattices as algebraic systems – Sub lattices – direct product and Homomorphism – Some special lattices – Boolean algebra

L: 45, T: 15, TOTAL = 60 PERIODS

TEXT BOOKS:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", 6th Edition, Special Indian edition , Tata McGraw – Hill Pub. Co. Ltd., New Delhi, (2007).
2. Trembly J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Re-print (2007).

REFERENCES

1. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, (2002).
2. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier Publications, (2006).
3. Seymour Lipschutz and Mark Lipson, "Discrete Mathematics", Schaum's Outlines, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2007,Second edition, Fifth reprint, (2007).

CS 9254 SOFTWARE ENGINEERING L T P C

3 0 0 3

AIM:

The course is intended to give Software Engineering principles in classical sense.

OBJECTIVES:

- To be aware of generic models to structure the software development process.
- To understand fundamental concepts of requirements engineering and requirements specification.
- To understand different notion of complexity at both the module and system level.
- To be aware of some widely known design methods.
- To understand the role and contents of testing activities in different life cycle phases.

UNIT I SOFTWARE PROCESS MODELS 9

The Evolving role of Software – Software – The changing Nature of Software – Legacy software —A generic view of process– A layered Technology – A Process Framework – The Capability Maturity Model Integration (CMMI) – Process Assessment – Personal and Team Process Models - Product and Process - Process Models – The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model – Evolutionary Process Models – Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models – the Unified Process.

UNIT II REQUIREMENTS ENGINEERING 9

Software Engineering Practice – communication Practice – Planning practice Modeling practice– Construction Practice –Deployment - Requirements Engineering - Requirements Engineering tasks – Initiating the requirements Engineering Process- Eliciting Requirements – Developing Use cases – Building the Analysis Models – Elements of the Analysis Model – Analysis pattern – Negotiating Requirements – Validating Requirements.

UNIT III MODELLING 9

Requirements Analysis – Analysis Modeling approaches – data modeling concepts – Object oriented Analysis – Scenario based modeling – Flow oriented Modeling – Class based modeling – creating a behaviour model.

UNIT IV SOFTWARE DESIGN 9

Design Engineering – Design process -Design Quality-Design model-User interface Design – Testing strategies- strategies Issues for conventional and object oriented software-validation testing –system testing –Art of debugging – Project management

UNIT V SOFTWARE MEASUREMENT 9

Software evolution - Verification and Validation -Critical Systems Validation – Metrics for Process, Project and Product-Quality Management -Process Improvement –Risk Management- Configuration Management

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Roger S.Pressman, “Software Engineering: A Practitioner’s Approach”, McGraw Hill International edition, Sixth edition, 2005.
2. Ian Sommerville, “Software Engineering”, 8th Edition, Pearson Education, 2008.

REFERENCES:

1. Stephan Schach, “Software Engineering”, Tata McGraw Hill, 2007
2. Pfleeger and Lawrence “Software Engineering: Theory and Practice”, Pearson Education, second edition, 2001

CS 9255 MICROPROCESSORS LABORATORY L T P C
0 0 3 2

AIM:

To learn the assembly language programming of 8085, 8086 and 8051 and also to give a practical training of interfacing the peripheral devices with the processor.

OBJECTIVES:

- To implement the assembly language programming in 8085,8086 and 8051
- To study the system function calls like BIOS/DOS.
- To experiment the interface concepts of various peripheral device with the processor

EXPERIMENTS IN THE FOLLOWING:

1. Programming with 8085 – 2 Experiments.
2. Programming with 8086 – 3 Experiments including BIOS/DOS Calls: Keyboard Control, Display, File Manipulation.
3. Interfacing with 8085/8086-8255, 8253.
4. Interfacing with 8085/8086-8279, 8251.
5. 8051 Micro controller based experiments – assembly language programs.
6. 8051 Micro controller based experiments – control applications.
7. Mini – Project.

TOTAL: 45 PERIODS

CS 9256 WEB TECHNOLOGY LABORATORY L T P C
0 0 3 2

AIM:

To enable the students to program in Java and to create simple Web based applications.

OBJECTIVES:

- To write simple programs using Java.
- To design and create user interfaces using Java frames and applets.
- To write I/O and network related programs using Java.
- To create simple Web pages and provide client side validation.
- To create dynamic web pages using server side scripting.

EXPERIMENTS IN THE FOLLOWING:

1. Java Fundamentals, Classes, Objects.
2. Inheritance, Polymorphism.
3. Interfaces, Exception handling.
4. I/O, AWT.
5. Socket Programming.
6. Applets, Swings.
7. Database connectivity.
8. RMI.
9. XML, Style sheet, Parser.
10. Client side scripting.
11. JSP, Servlets.
12. Session Management.

TOTAL: 45 PERIODS

CS 9257 OPERATING SYSTEMS LABORATORY L T P C
0 0 3 2

AIM:
To have hands-on experience in operating system concepts and programming in the UNIX environment.

OBJECTIVES:
- To learn shell programming and the use of filters in the UNIX environment.
- To learn to program in C using system calls.
- To learn to use the file system related system calls.
- To have a knowledge in how processes are created and processes communicate.
- To learn how process synchronization is done using semaphores.

EXPERIMENTS IN THE FOLLOWING:
1. Basic UNIX commands.
2. Shell Programming.
3. Grep, sed, awk.
4. File system related system calls.
5. Process management – Fork, Exec.
6. Message queues.
7. Pipes, FIFOs.
8. Signals.
9. Shared memory.
10. Semaphores.

TOTAL: 45 PERIODS

CS 9301 OBJECT ORIENTED ANALYSIS AND DESIGN L T P C
3 0 0 3

AIM:
To study object oriented analysis and design and the techniques needed to apply them.

OBJECTIVES:
- To study the concepts of modelling in object oriented context.
- To learn about the Object Constraint Language.
- To study and learn how to apply analysis techniques and methodologies including Use cases, System Sequence Diagrams.
- To study and learn how to apply design techniques and methodologies including Interaction Diagrams, Class Diagrams.
- To study implementation related issues.
- To study and learn how to apply advanced techniques including Architectural Analysis and Design Patterns.

UNIT I INTRODUCTION 8
Introduction – Modelling as a design technique – UML diagrams - Class modeling – Object Constraint Language – State modeling – Interaction Modeling

UNIT II OVERVIEW OF USECASES 9

Inception – Evolutionary Requirements – Use Cases – Other Requirements – Domain Models – System Sequence Diagrams – Operation Contracts

UNIT III MODELING AS DESIGN TECHNIQUE 10

Requirements to Design – Logical Architecture and UML Package Diagrams – Object Design – Interaction Diagrams – Class Diagrams – Designing Objects with Responsibilities – Object Design Examples – Designing for Visibility

UNIT IV MAPPING 8

Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint

UNIT V PATTERNS 10

More Patterns – Analysis update – Objects with responsibilities – Applying design patterns – Architectural Analysis – Logical Architecture Refinement – Package Design – Persistence framework with patterns

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Michael Blaha and James Rumbaugh, "Object-oriented modeling and design with UML", Prentice-Hall of India, 2005. (Unit 1)
2. Craig Larman. "Applying UML and Patterns – An introduction to Object-Oriented Analysis and Design and Iterative Development", 3rd ed, Pearson Education, 2005.

REFERENCES:

1. Booch, Grady,"Object Oriented Analysis and Design", 2nd ed. Pearson Education. 2000.
2. Ali Bahrami, "Object Oriented Systems Development", McGraw-Hill, 1999.
3. Fowler, Martin. UML Distilled. 3rd ed. Pearson Education. 2004.
4. Lunn, Ken, "Software development with UML",Palgrave Macmillan. 2003.
5. O'Docherty, Mike,"Object-Oriented Analysis & Design",Wiley. 2005.

CS 9302 THEORY OF COMPUTATION L T P C
3 0 0 3

AIM:

To have foundation on automata languages and grammar.

OBJECTIVES:

- Develop the concepts and skills necessary to be able to evaluate the compatibility and undecidability.

UNIT I AUTOMATA 9

Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 9

Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

UNIT III CONTEXT-FREE GRAMMARS AND LANGUAGES 9

Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG– Deterministic Pushdown Automata.

UNIT IV PROPERTIES OF CONTEXT-FREE LANGUAGES 9

Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT V UNDECIDABILITY 9

A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem – The classes P and NP.

TOTAL: 45 PERIODS

TEXT BOOK

1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2003.

REFERENCES:

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.
2. J. Martin, "Introduction to Languages and the Theory of Computation", Third Edition, Tata Mc Graw Hill, 2003.
3. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

CS 9303 SYSTEM SOFTWARE INTERNALS LT P C
3 0 0 3

AIM

To study the internal structures and methodologies used in System Software

OBJECTIVES

- To study the design and implementation issues in implementing assemblers.
- To study the role of linkers and loaders and the interaction with hardware.
- To study how macroprocessors work, and a brief introduction to compilers.
- To study various issues in the design of Virtual Machines
- To study the techniques used in other system software contexts such as emulators, process virtual machines, profiling, migration and grids.

UNIT I ASSEMBLERS 9

Review of Computer Architecture – Machine Instructions and Programs – Assemblers – Basic Assembler Functions – Assembler Features – Assembler Design Options

UNIT II LOADERS AND LINKERS 10

Loaders and Linkers – Basic Loader Functions – Machine-Dependent Loader Features – Machine-Independent Loader Features – Loader Design Options – Architectural Issues – Object Files – Storage Allocation – Symbol Management – Libraries – Relocation – Loading and Overlays – Shared Libraries – Dynamic Linking and Loading – Advanced Techniques

UNIT III MACROPROCESSORS AND COMPILERS 8

Macroprocessors – Basic Macro Processor Functions – Machine-Independent Macro Processor Features – Macro Processor Design Options – Basic Compiler Functions – Grammars – Lexical Analysis – Syntactic Analysis – Code Generation

UNIT IV VIRTUAL MACHINES 9

Introduction to Virtual Machines (VM) – Pascal P-Code VM – Object-Oriented VMs – Java VM Architecture – Common Language Infrastructure – Dynamic Class Loading – Security – Garbage Collection – Optimization

UNIT V PROCESS VIRTUAL MACHINES 9

Emulation – Interpretation and Binary Translation – Instruction Set Issues – Process Virtual Machines – Profiling – Migration – Grids – Examples of real world implementations of system software

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Leland L. Beck, "System Software", 3rd ed., Pearson Education, 1997.
2. John R. Levine, "Linkers & Loaders", Morgan Kauffman, 2003.
3. James E Smith and Ravi Nair, "Virtual Machines", Elsevier, 2005.

REFERENCES:

1. Alfred V Aho, Ravi Sethi, Jeffrey D Ullman, "Compilers", Pearson Education, 1986.
2. Robert W. Sebesta, "Concepts of Programming Languages", 7th ed., Pearson Education, 2006.
3. Terrance W Pratt, Marvin V Zelkowitz, T V Gopal, "Programming Languages", 4th ed., Pearson Education, 2006.
4. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5th ed., McGraw Hill, 2002.
5. Silberschatz, Galvin, Gagne, "Operating System Concepts", 6th ed., Wiley, 2003.

CS 9304 ARTIFICIAL INTELLIGENCE L T P C

3 0 0 3

AIM:

The aim of this course is to provide an introduction to some basic issues and algorithms in artificial intelligence (AI). The course also provides an overview of Intelligent agent design, where agents perceive their environment and act rationally to fulfill their goals. The course approaches AI from an algorithmic, computer science-centric perspective.

OBJECTIVES:

- To be familiar with the history of AI, philosophical debates, and be able to discuss the potential and limitations of the subject in its current form.
- To identify the kind of problems that can be solved using AI technique: to know the relation between AI and other areas of computer science.
- To have knowledge of generic problem-solving methods in AI.
- To understand the basic techniques of knowledge representation and their use.
- To know what the basic components of an intelligent agent are, and how this relates to other advanced subjects such as information retrieval, database systems, computer vision, robotics, human-computer interaction, reactive systems etc.
- To be able to implement basic decision making algorithms, including search-based problem solving techniques, and first-order logic.

- To know the basic issues in machine learning, and be able to apply straightforward techniques to learn from observed data.
- To be able to explain the difficulty of computer perception with examples from different modalities, and be able to show how perception affects intelligent systems design.

UNIT I INTRODUCTION 9

Intelligent Agents –Environments – Behavior – Structure – Artificial Intelligence – Present and Future - Problem Solving –agents – examples– uninformed search strategies – Avoiding repeated states – searching with partial information.

UNIT II SEARCHING TECHNIQUES 9

Informed search strategies –greedy – best first – A* - local search algorithms and optimization – local search in continuous spaces **–** Constraint satisfaction problems (CSP) – Backtracking search and Local search – Structure **–** Adversarial Search – Games – Optimal decisions in games – Alpha – Beta Pruning – imperfect real-time decision games – elements of chance.

UNIT III KNOWLEDGE REPRESENTATION AND REASONING 9

Logical Agents – Wumpus world - Propositional logic - First order logic - syntax and semantics – Using first order logic – Inference – forward chaining – backward chaining**–** Knowledge representation **–** Ontological Engineering **–** Categories and objects – Actions **–** Simulation and events **–** Mental events and mental objects.

Reasoning with Default Information – Truth Maintenance Systems – Reasoning with Uncertain Information – Axioms of Probability – Independence – Bayes' Rule and it's use.

UNIT IV LEARNING 9

Learning from observations **–** forms of learning **–** Inductive learning - Learning decision trees **–** Ensemble learning **–** Knowledge in learning – Logical formulation of learning – Explanation based learning – Learning using relevant information - Reinforcement learning – Passive reinforcement learning **–** Active reinforcement learning **–** Generalization in reinforcement learning.

UNIT V APPLICATIONS 9

Communication – Communication as action – Formal grammar for a fragment of English – Syntactic analysis – Augmented grammars – Semantic interpretation - Perception – image Formation – Image Processing – Object Recognition – Robotics – Robotic Perception – Planning –Moving –Robotic Software Architecture.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2004.

REFERENCES:

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd., 2000.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Second Edition, Tata McGraw Hill, 2003.
3. George F. Luger, "Artificial Intelligence-Structures And Strategies For Complex Problem Solving", Pearson Education, 2002.

CS 9305 DATA COMMUNICATION AND COMPUTER NETWORKS L T P C
3 1 0 4

AIM :
To understand the concepts of data communication and computer networks

OBJECTIVES:

- To grasp the principles of data communication.
- To understand the layering concepts in computer networks.
- To understand the functions of each layer.
- To have knowledge in different applications that use computer networks.

UNIT I PHYSICAL LAYER 11 + 3
Data transmission – Transmission media – Signal encoding techniques – Multiplexing – Spread spectrum

UNIT II DATA LINK LAYER 11 + 3
Network architecture – Layers – Channel access on links – SDMA – TDMA - FDMA – CDMA – Hybrid multiple access techniques - Issues in the data link layer - Framing – Error correction and detection – Link-level Flow Control – Medium access – Ethernet – Token ring – FDDI – Wireless LAN – Bridges and Switches

UNIT III NETWORKING LAYER 9 + 3
Circuit switching – Packet switching – Virtual circuit switching – IP – ARP – RARP – DHCP – ICMP – Routing algorithms – RIP – OSPF – Subnetting – CIDR – Interdomain routing – BGP – IPv6 – Multicasting – Congestion avoidance in network layer

UNIT IV TRANSPORT LAYER 7 + 3
UDP – TCP – Flow Control – Congestion control – Queuing discipline – Congestion avoidance – QoS – RPC

UNIT V APPLICATIONS 7 + 3
Email (SMTP, MIME, POP3, IMAP) – HTTP – DNS- SNMP – Telnet – FTP

L: 45, T: 15, TOTAL = 60 PERIODS

TEXT BOOKS:

1. William Stallings, “Data and Computer Communications”, Eighth Edition, Pearson Education, 2007.
2. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fourth Edition, Morgan Kaufmann Publishers Inc., 2007.
3. James F. Kurose, Keith W. Ross, “Computer Networking, A Top-Down Approach Featuring the Internet”, Third Edition, Addison Wesley, 2005.

REFERENCES:

1. Nader F. Mir, “Computer and Communication Networks”, Pearson Education, 2007.
2. Douglas E. Comer, “Computer Networks and Internets with Internet Applications”, Fourth Edition, Pearson Education, 2003.
3. Andrew S. Tanenbaum, “Computer Networks”, Fourth Edition, Pearson Education, 2003.
4. Wayne Tomasi, “Introduction to Data Communications and Networking”, Pearson Education, First Edition, 2002.

CS 9306 COMPUTER NETWORKS LABORATORY L T P C
0 0 3 2

AIM:
To have hands-on experience in network programming and to use simulation tools to analyse network protocols.

OBJECTIVES:
- To learn socket programming.
- To use simulation tools.
- To analyse the performance of protocols in different layers in computer networks using simulation tools.

EXPERIMENTS IN THE FOLLOWING

1. Applications using TCP Sockets like
    a. Echo client and echo server.
    b. File transfer.
    c. Remote command execution.
    d. Chat.
    e. Concurrent server.
2. Applications using UDP Sockets like
    a. DNS.
    b. SNMP.
3. Applications using Raw Sockets like
    a. Ping.
    b. Traceroute.
4. RPC
5. Experiments using simulators like OPNET:
    a. Performance comparison of MAC protocols.
    b. Performance comparison of Routing protocols.

Study of TCP/UDP performance.

TOTAL: 45 PERIODS

CS 9307 CASE TOOLS LABORATORY L T P C
0 0 3 2

AIM:
Scope of this lab is to understand the application of case tools, which focuses on the software engineering activities.

OBJECTIVES:
- Software requirements analysis and specification
- Software design
- Software implementation
- Software testing and maintenance
- Communication skills and teamwork
- Modeling techniques and CASE tools
- Software project planning and management

EXPERIMENTS IN THE FOLLOWING TOPICS

1. Study of case tools such as rational rose or equivalent tools.

2. Requirements
   Implementation of requirements engineering activities such as elicitation, validation, management using case tools

4. Analysis and design
   Implementation of analysis and design using case tools.

5. Study and usage of software project management tools for cost estimation and scheduling

6. Documentation generators - Study and practice of Documentation generators.

7. Data modeling using automated tools.

8. Practice reverse engineering and re engineering using tools.

9. Exposure towards test plan generators, test case generators, test coverage and software metrics.

10. Meta modeling and software life cycle management.

TOTAL: 45 PERIODS

GE 9371	**COMMUNICATION SKILLS AND SOFT SKILLS LABORATORY FIFTH / SIXTH SEMESTER**	**L T P C** **0 0 2 1**

AIM

To enhance the overall capability of students and to equip them with the necessary Communication Skills and Soft Skills that would help them excel in their profession.

OBJECTIVES

- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their jobs.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

A. Viewing and discussing audio-visual materials (6 periods)

1. Resume / Report Preparation / Letter Writing 2
Letter writing – Job application with Resume - Project report - Email etiquette.

2. Presentation skills 1
Elements of effective presentation – Structure of presentation - Presentation tools – Body language.

3. Soft Skills
Time management – Stress management – Assertiveness – Negotiation strategies.

4. Group Discussion **1**

Group discussion as part of selection process, Structure of group discussion – Strategies in group discussion – Mock group discussions.

5. Interview Skills **1**

Kinds of interviews – Interview techniques – Corporate culture – Mock interviews. (Career Lab Software may be used for this section).

Note: Career Lab software may be used to learn the skills, to be applied in the practice session.

B. PRACTICE SESSION **(24 periods)**

1. **Resume / Report Preparation / Letter writing**: Students prepare their own resume and report. (4)
2. **Presentation Skills:** Students make presentations on given topics. (8)
3. **Group Discussion**: Students participate in group discussions. (6)
4. **Interview Skills**: Students participate in Mock Interviews (6)

TOTAL : 30 PERIODS

REFERENCES

1. Anderson, P.V, "Technical Communication", Thomson Wadsworth, Sixth Edition, New Delhi, 2007.
2. Prakash P, "Verbal and Non-Verbal Reasoning", Macmillan India Ltd., Second Edition, New Delhi, 2004.
3. John Seely, "The Oxford Guide to Writing and Speaking", Oxford University Press, New Delhi 2004.
4. David Evans, "Decisionmaker", Cambridge University Press, 1997.
5. Thorpe, E and Thorpe, "S Objective English", Pearson Education, Second Edition, New Delhi 2007.
6. Turton, N.D and Heaton, J.B, "Dictionary of Common Errors", Addision Wesley Longman Ltd., Indian reprint 1998.

MA 9266 **PROBABILITY AND QUEUEING THEORY** **L T P C**
3 1 0 4

AIM

To provide the required mathematical support in real life problems and develop probabilistic models which can be used in several areas of science and engineering.

OBJECTIVES

- The students will have a fundamental knowledge of the probability concepts.
- Acquire skills in analyzing queueing models.
- It also helps to understand and characterize phenomenon which evolve with respect to time in a probabilistic manner.

UNIT I RANDOM VARIABLES 9 + 3

Discrete and Continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma, Weibull and Normal distributions - Functions of a random variable.

UNIT II TWO-DIMENSIONAL RANDOM VARIABLES 9 + 3

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT III RANDOM PROCESSES 9 + 3

Classification – Stationary process –Markov process - Poisson process – Discrete parameter Markov chain – Chapman Kolmogorov equations –Limiting distributions.

UNIT IV QUEUEING THEORY 9 + 3

Markovian queues – Birth and Death processes – Single and multiple server queueing models – Little's formula - Queues with finite waiting rooms – Finite source models.

UNIT V NON-MARKOVIAN QUEUES AND QUEUEING NETWORKS 9 + 3

M/G/1 queue – Pollaczek Khinchin formula - M/D/1 and $M/E_K/1$ as special cases – Series queues – Open and closed Jackson networks.

L: 45, T: 15, TOTAL = 60 PERIODS

TEXT BOOKS:

1. Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, (2007).
2. Gross, D. and Harris, C.M., "Fundamentals of Queueing Theory", Wiley Student edition, (2004).

REFERENCES

1. Allen, A.O., "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2nd edition, (2005).
2. Taha, H.A., "Operations Research", Pearson Education", Asia, 8th edition, (2007).
3. Trivedi, K.S., "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd edition, (2002).
4. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill edition, New Delhi, (2004).

CS 9351 DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3

AIM:

To give an understanding on the study that deals with the representation of signals as ordered sequences of numbers and how to process those ordered sequences.

OBJECTIVES:

- To understand the basics of signals and system by analyzing the various transformations available and determine their use to DSP
- To study on the various digital filtering techniques and how to apply to DSP
- To study on the ways to estimate signal parameters, and transform a signal into a form that is more informative.
- To give students a flavour on the applications of DSP in the areas of speech and image

UNIT I SIGNALS AND SYSTEMS 9

Basic elements of DSP – concepts of frequency in Analog and Digital Signals – sampling theorem – Discrete – time signals, systems – Analysis of discrete time LTI systems – Z transform – Convolution (linear and circular) – Correlation.

UNIT II FREQUENCY TRANSFORMATIONS 9

Introduction to DFT – Properties of DFT – Filtering methods based on DFT – FFT Algorithms - Decimation – in – time Algorithms, Decimation – in – frequency Algorithms – Use of FFT in Linear Filtering – DCT.

UNIT III IIR FILTER DESIGN 9

Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (LPF, HPF, BPF, BRF) filter design using frequency translation

UNIT IV FIR FILTER DESIGN 9

Structures of FIR – Linear phase FIR filter – Filter design using windowing techniques, Frequency sampling techniques – Finite word length effects in digital Filters

UNIT V APPLICATIONS 9

Multirate signal processing – Speech compression – Adaptive filter – Musical sound processing – Image enhancement.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. John G. Proakis & Dimitris G.Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, Fourth edition, Pearson education / Prentice Hall, 2007.
2. Emmanuel C..Ifeachor, & Barrie.W.Jervis, “Digital Signal Processing”, Second edition, Pearson Education / Prentice Hall, 2002.

REFERENCES:

1. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach” ,Tata McGraw Hill, Third Edition, 2007 .
2. Alan V.Oppenheim, Ronald W. Jchafer & Hohn. R.Back, “Discrete Time Signal Processing”, Pearson Education, Second Edition, 2001.
3. Andreas Antoniou, “Digital Signal Processing”, Tata McGraw Hill,2006.

CS 9352 MOBILE AND PERVASIVE COMPUTING L T P C
3 0 0 3

AIM:

To introduce the students to the current challenges and insight regarding the way how mobile computing is evolving towards the world of pervasive computing.

OBJECTIVES:

- Understand and identify requirements issue limitation parameters and components in computing
- Using such a knowledge, understand the rationale for the solution adopted in existing or emerging systems
- Able to participate in the development and proposal of future systems.

UNIT I MOBILE NETWORKS 9

Media Access Control – SDMA, FDMA, TDMA, CDMA – GSM – Architecture, Protocols, Connection Establishment, Frequency Allocation , Localization, Handover, Security – GPRS.

UNIT II WIRELESS NETWORKS 9

Wireless LANs and PANs – IEEE 802.11 Standard – Architecture – Services –Network – HiperLAN – Blue Tooth- Wi-Fi – WiMAX

UNIT III ROUTING 9

Mobile IP – DHCP – AdHoc– Proactive and Reactive Routing Protocols – Multicast Routing.

UNIT IV TRANSPORT AND APPLICATION LAYERS 9

Mobile TCP– WAP – Architecture – WWW Programming Model– WDP – WTLS – WTP – WSP – WAE – WTA Architecture – WML – WMLScripts.

UNIT V PERVASIVE COMPUTING 9

Pervasive computing infrastructure-applications- Device Technology - Hardware, Human-machine Interfaces, Biometrics, and Operating systems– Device Connectivity – Protocols, Security, and Device Management- Pervasive Web Application architecture- Access from PCs and PDAs - Access via WAP

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, PHI, Second Edition, 2003.
2. Jochen Burkhardt, “Pervasive Computing: Technology and Architecture of Mobile Internet Applications”, Addison-Wesley Professional; 3rd edition, 2007

REFERENCES:

1. Frank Adelstein, Sandeep KS Gupta, Golden Richard, “Fundamentals of Mobile and Pervasive Computing”, McGraw-Hill 2005
2. Debashis Saha, “Networking Infrastructure for Pervasive Computing: Enabling Technologies”, Kluwer Academic Publisher, Springer; First edition, 2002
3. “Introduction to Wireless and Mobile Systems” by Agrawal and Zeng, Brooks/ Cole (Thomson Learning), First edition, 2002
4. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, New York, 2003.

CS 9353 PRINCIPLES OF COMPILER DESIGN L T P C
3 0 0 3

AIM:

To understand the design and implementation of a simple compiler.

OBJECTIVES:

- To understand the functions of the various phases of a complier
- To learn the overview of the design of lexical analyzer and parser
- To study the design of the other phases in detail.
- To learn the use of compiler construction tools.

UNIT I BASICS OF COMPILATION 9

Compilers – Analysis of source program – Phases of a compiler – Grouping of phases – Compiler Construction tools – Lexical Analyzer: Token specification -Token Recognition- A language for Specifying lexical analyzer– Top down parser : Table implementation of Predictive Parser - Bottom-up Parser : SLR(1) Parser - Parser generators.

UNIT II TYPE CHECKING AND RUNTIME ENVIRONMENTS 9

Syntax directed definitions – Construction of syntax trees – Type systems – Specification of a simple type checker - Equivalence of type expressions – Type conversions – Attribute grammar for a simple type checking system – Runtime Environments: Source language issues – Storage organization – Storage allocation strategies – Parameter passing.

UNIT III INTERMEDIATE CODE GENERATION 9

Intermediate languages – Declarations – Assignment statements – Boolean expressions – Case statements – Backpatching – Procedure calls.

UNIT IV CODE GENERATION 9

Issues in the design of a code generator – The target machine – Runtime storage management – Basic blocks and flow graphs – Next-use information – A simple code generator – Register allocation and assignment – The DAG representation of basic blocks – Generating code from DAG – Dynamic programming code generation algorithm – Code-generator generators.

UNIT V CODE OPTIMIZATION 9

Principal sources of optimization – Peephole optimization – Optimization of basic blocks – Loops in flow graphs – Introduction to global data flow analysis – Iterative solution of data flow equations – Code improving transformations – Dealing with aliases.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman. “Compilers Principles, Techniques and Tools”. Pearson Education, 2008.

REFERENCES

1. Steven S. Muchnick, “Advanced Compiler Design Implementation”, Morgan Koffman, 1997.
2. Charles N. Fischer, Richard J. Leblanc, “Crafting a Compiler with C”, Benjamin Cummings, 1991.
3. Allen Holub, “Compiler Design in C”, Prentice Hall of India, 1990.

GE 9261 ENVIRONMENTAL SCIENCE AND ENGINEER (Common to all branches) LT P C 3 0 0 3

AIM:

To create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participate.

OBJECTIVE:

At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds

Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd edition, Pearson Education (2004).
2. Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, (2006).

REFERENCES:

1. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.
4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press (2005)

CS 9354 COMPILER LABORATORY L T P C
0 0 3 2

AIM:

The student will be able to design and implement a compiler using the tools at the end of the semester.

OBJECTIVES:

- To implement a lexical analyzer, syntax analyzer using tools.
- To implement a code generator and the necessity for code optimization.
- To know about compiler simulation tools.

USE COMPILER GENERATOR TOOLS TO IMPLEMENT THE FOLLOWING.

1. Scanner
2. Parser
3. Type checker
4. Intermediate code generator
   a. Assignment statements
   b. Expressions with subscripted variables
   c. Boolean expressions
   d. Control structures

Use any high level language to do the following.

5. Flow graph construction from intermediate code
6. Code generation for the given machine specification

TOTAL: 45 PERIODS

CS 9355 MOBILE AND PERVASIVE COMPUTING LABORATORY L T P C
0 0 3 2

AIM:
The course aims at providing a sound conceptual knowledge in area of mobile and pervasive computing.

OBJECTIVES:
- To provide the students with the competencies required to simulate and understand the mobile wireless network.
- Teach the students to analyse and design web applications.

EXPERIMENTS IN THE FOLLOWING

1. Simulation of applications using J2ME simulator
2. Simulation of applications to access web sites using Microsoft Windows Mobile .net environment
3. Implementation of playing games and photo sharing applications using BREW (Binary Runtime Environment for Wireless Toolkit)
4. Simulation of Infotainment (news, weather forecasts etc) using WAP, WML Scripts
5. Pervasive devices connectivity – Using of server side programming in Java

i. Write web application from PCs using smart card authentication
ii. Write web application via WAP phones
iii. Write web application from PDAs

TOTAL: 45 PERIODS

CS 9356 FREE AND OPEN SOURCE SOFTWARE LABORATORY L T P C
0 0 3 2

AIM:
The student will get exposure to operating system and networking concepts at source code level.

OBJECTIVES:
- To learn the setting up of GNU/Linux-based servers and workstation
- To learn shell programming
- To learn to configure application and server software
- To learn to perform system administration tasks
- To learn to use free and open source components.

EXPERIMENTS IN THE FOLLOWING

1. GNU/Linux OS installation (provide details of how to detect hardware, configure disk partitions & filesystems and successfully install a GNU/Linux distribution).

2. Basic shell commands - logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management.

3. User and group management, file ownerships and permissions, PAM authentication, Introduction to common system configuration files & log files.

4. Configuring networking, basics of TCP/IP networking and routing, connecting to the Internet (through dialup, DSL, ethernet, leased line).

5. Configuring additional hardware - sound cards, displays & display cards, network cards, modems, usb drives, CD writers.

6. Performing every day tasks using GNU/Linux - accessing the Internet, playing music, editing documents and spreadsheets, sending and receiving email, copy files from disks and over the network, playing games, writing CDs.

7. Setting up email servers - using postfix (for SMTP services), courier (for IMAP & POP3 services), squirrelmail (for webmail services).

8. Setting up web servers - using Apache (for HTTP services), Setting up proxy services, printer services, firewall.

9. Using the GNU Compiler Collection - getting acquainted with the the GNU compiler tools - the C preprocessor (cpp), the C compiler (gcc) and the C++ compiler (g++), and the assembler (gas).

10. Understanding build systems - constructing makefiles and using make, using autoconf and autogen to automatically generate makefiles tailored for different development environments, Using flex (lex) and bison (yacc) to design parsers.

TOTAL: 45 PERIODS

CS 9401 GRAPHICS AND MULTIMEDIA L T P C
3 1 0 4

AIM:

- Introduce students to various two and three dimensional primitives and concepts
- Provide an opportunity for students to represent, design and implement two dimensional and three dimensional objects
- Introduce students to the different media used in multimedia systems.
- Introduce students to the design issues related to multimedia systems.

OBJECTIVES:

- Explain two and three dimensional concepts and their applications
- Identify all techniques related to modern graphics programming concepts
- Identify the media used in multimedia systems and to assess their relative advantages and disadvantages relative to both user and system points of view.
- Explain the interaction problems introduced by multimedia (e.g., compression and synchronization)

UNIT I 2D PRIMITIVES 12

Output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformation - Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms

UNIT II 3D CONCEPTS 12

Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces,- Visualization of data sets - 3D transformations – Viewing -Visible surface identification.

UNIT III GRAPHICS PROGRAMMING 12

Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects.

UNIT IV MULTIMEDIA BASICS 12

Introduction and definitions – applications - elements - Compression – Types of compressions - Lossless, Lossy – Video compression – Image Compression – Audio compression - Data and file format.

UNIT V MULTIMEDIA SYSTEMS 12

Multimedia Authoring Systems – Hypermedia Design considerations – User Interface Design – Object Display and Play back issues- Hypermedia Messaging- Distributed Multimedia Systems – Components – multimedia Object Servers – Managing Distributed Objects.

L: 45, T: 15, TOTAL = 60 PERIODS

TEXT BOOKS:

1. Donald Hearn, M.Pauline Baker, "Computer Graphics – C Version", second edition, Pearson Education,2004
2. Prabhat K Andleigh, Kiran Thakrar, "Multimedia systems design", PHI, 2007.

REFERENCES

1. F.S.Hill, "Computer Graphics using OPENGL" , Second edition, Pearson Education,2003.
2. Ralf Steinmetz and Klara, "Multimedia Computing, Communications and Applications", Pearson Education, 2004.

CS 9402 CRYPTOGRAPHY AND SECURITY L T P C
3 0 0 3

AIM:

To introduce the fundamentals of Cryptography and its application to Security.

OBJECTIVES:

- To understand the mathematics behind Cryptography
- To understand the standard algorithms used to provide confidentiality provide integrity and authenticity.
- To get a working knowledge of network security, data base security and DS security issues in order to build secure systems.

UNIT I MATHEMATICAL FUNDAMENTALS 9

Security trends – Attacks and services – Classical crypto systems – Different types of ciphers – LFSR sequences – Basic Number theory – Congruences – Chinese Remainder theorem – Modular exponentiation – Fermat and Euler's theorem – Legendre and Jacobi symbols – Finite fields – continued fractions.

UNIT II ENCRYPTION TECHNIQUES 9

Simple DES – Differential cryptoanalysis – DES – Modes of operation – Triple DES – AES – RC5, RC4 – RSA – Attacks – Primality test – factoring.

UNIT III KEY EXCHANGE AND AUTHENTICATION TECHNIQUES 9

Discrete Logarithms – Computing discrete logarithms – Diffie-Hellman key exchange – Elliptic curve cryptography Key exchange - ElGamal Public key cryptosystems – Message Authentication codes - Hash functions – Hash algorithms - Secure Hash – Birthday attacks - MD5 – Authentication protocols - Digital signatures – RSA, ElGamal, DSA.

UNIT IV NETWORK SECURITY PRACTICE 9

Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP, S/MIME – IP security – Web Security – SSL, TLS, SET – system security.

UNIT V OPERATING SYSTEMS AND DATABASE SECURITY 9

Trusted Operating systems – security models – designing trusted OS – assurance – Data base security – multi-level databases – multi-level security.

TOTAL: 45 PERIODS

TEXT BOOKS :

1 Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with coding theory", 2nd ed, Pearson, 2007.
2 William Stallings, "Cryptography and Network security Principles and Practices", Pearson/PHI, 4th ed, 2006.
3 Pfleeger and Pfleeger, "Security in computing", 3rd ed, PHI/Pearson, 2003.

REFERENCES :

1. Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson 2004.

MG 9401 PRINCIPLES OF MANAGEMENT L T P C
3 0 0 3

AIM:

To give the orientation for understanding the requirement of IT professionals in terms of managing the team members, making decisions, analysing the environment.

OBJECTIVES:

- To train basic and applied fields of Management
- To improve the Managerial skills
- To prepare the students on the functional areas of Management, and analytical skills
- To prepare the students to expose to the management world.

UNIT I OVERVIEW OF MANAGEMENT 9

Organization - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors - Managing globally - Strategies for International Business.

UNIT II PLANNING 9

Nature and purpose of planning - Planning process - Types of plans – Objectives - - Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions.

UNIT III ORGANIZING 9

Nature and purpose of organizing - Organization structure - Formal and informal groups / organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development - Career stages – Training - - Performance Appraisal.

UNIT IV DIRECTING 9

Creativity and Innovation - Motivation and Satisfaction - Motivation Theories Leadership - Leadership theories - Communication - Hurdles to effective communication - Organization Culture - Elements and types of culture - Managing cultural diversity.

UNIT V CONTROLLING 9

Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations.

TOTAL: 45 PERIODS

REFERENCES:

1. Hellriegel, Slocum & Jackson, " Management - A Competency Based Approach", Thomson South Western, 10th edition, 2007.
2. Harold Koontz, Heinz Weihrich and Mark V Cannice,"'Management - A global & Entrepreneurial Perspective", Tata Mcgraw Hill, 12th edition, 2007.
3. Stephen P. Robbins and Mary Coulter, "Management", Prentice Hall of India, 8th edition.
4. Charles W L Hill, Steven L McShane,"Principles of Management", Mcgraw Hill Education, Special Indian Edition, 2007.
5. Andrew J. Dubrin, "Essentials of Management", Thomson Southwestern, 7th edition, 2007.

CS 9404 GRAPHICS AND MULTIMEDIA LABORATORY L T P C
0 0 3 2

AIM:

This course will help students in understanding the implementation of two and three dimensional objects using OPENGL Graphics programming library suite. It also helps students in designing animations, hand lying images and implementing various compression algorithms.

OBJECTIVES:

- Student will be able to construct and manipulate multi dimensional objects.
- Students will be able to handle image files and can also create animations

IMPLEMENT EXPERIMENTS 1-6 USING OPENGL

1. Implementation of Bresenhams Algorithm – Line, Circle, Ellipse.
2. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
3. Composite 2D Transformations
4. Cohen Sutherland 2D clipping and Windowing
5. Three dimensional transformations - Translation, Rotation, Scaling
6. Composite 3D transformations
7. Compression Algorithms - To implement text and image compression algorithms.
8. 2D Animation – To create Interactive animation using any animation software
9. Image Editing and Manipulation - Basic Operations on image using any image editing software, Creating gif animated images, Image optimization

TOTAL: 45 PERIODS

CS 9405 SOFTWARE DEVELOPMENT LABORATORY L T P C
0 0 3 2

AIM:
The aim of this laboratory is to ensure that students understand and are able to apply the basic principles of software development. The course aims to inculcate the correct practices of software development among the students.

OBJECTIVES:
The following salient points to be included in each system development:

- Identification of Use cases for each application system and SRS preparation.
- Identification of reusable Components/Frameworks from open source and customizing them for each application.
- Coding/Customizing/Wrapping for components/subsystems.
- Testing – Scenario testing and test case preparation for each components/subsystems
- Integration of subsystems and Testing
- Simulation of datasets and load testing to analyze performance of the system.

CHOOSE CURRENT PROBLEMS FROM DOMAINS LIKE

1. Health care
2. Education
3. Banking & Finance
4. Military
5. E-Services
6. Business
7. Scientific Domain
8. Retail

TOTAL: 45 PERIODS

IT 9304 DISTRIBUTED SYSTEMS L T P C
3 0 0 3

AIM:
The aim of the course is to convey an insight into the fundamental concepts, principles, and state-of-the-art practice underlying the design of distributed systems.

OBJECTIVES:

- To understand the importance of communication in distributed environment and the actual implementation of various communication mechanisms
- To study how a distributed operating system works and how it differs from the single processor OS.
- To learn how to manage the resources in a distributed environment
- To learn how to make a distributed systems fault tolerant
- To study how the above-mentioned techniques have been used in actual, real-life distributed systems.

UNIT I COMMUNICATION IN DISTRIBUTED ENVIRONMENT 8

Introduction – Various Paradigms in Distributed Applications – Remote Procedure Call – Remote Object Invocation – Message-Oriented Communication – Unicasting, Multicasting and Broadcasting – Group Communication.

UNIT II DISTRIBUTED OPERATING SYSTEMS 12

Issues in Distributed Operating System – Threads in Distributed Systems – Clock Synchronization – Causal Ordering – Global States – Election Algorithms –Distributed Mutual Exclusion – Distributed Transactions – Distributed Deadlock – Agreement Protocols

UNIT III DISTRIBUTED RESOURCE MANAGEMENT 10

Distributed Shared Memory – Data-Centric Consistency Models – Client-Centric Consistency Models – Ivy – Munin – Distributed Scheduling – Distributed File Systems – Sun NFS.

UNIT IV FAULT TOLERANCE AND CONSENSUS 7

Introduction to Fault Tolerance – Distributed Commit Protocols – Byzantine Fault Tolerance – Impossibilities in Fault Tolerance.

UNIT V CASE STUDIES 8

Distributed Object-Based System – CORBA – COM+ – Distributed Coordination-Based System – JINI.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems Concepts and Design”, Third Edition, Pearson Education Asia, 2002.
2. Hagit Attiya and Jennifer Welch, “Distributed Computing: Fundamentals, Simulations and Advanced Topics”, Wiley, 2004.

REFERENCES:

1. Mukesh Singhal, “Advanced Concepts In Operating Systems”, McGrawHill Series in Computer Science, 1994.
2. A.S.Tanenbaum, M.Van Steen, “Distributed Systems”, Pearson Education, 2004.
3. M.L.Liu, “Distributed Computing Principles and Applications”, Pearson Addison Wesley, 2004.

CS 9022 INTERNET PROGRAMMING L T P C
3 0 0 3

AIM:

To provide an overview of 3-tier architecture and enable the student to create enterprise applications.

OBJECTIVES:

- To introduce the feature of the J2EE framework and the usage of MVC architecture.
- To design and create user interfaces using JSP.
- To write the business logic for the middle tier.
- To provide transaction and security support for enterprise applications.
- To study the features of other frameworks.

UNIT I BASIC FEATURES 9

Introduction – 3 tier architecture – working with model-view-controller – JCP – J2EE XML based APIs – Application servers

UNIT II WEB APPLICATIONS 9

Presentation tier and EIS tier – servlet programming – JSP – Java Mail – JMS – Java transactions – JNDI – Java authentication and authorization services – Java cryptography (9)

UNIT III ENTERPRISE JAVA BEANS 9

Service Tier and Data tier – EJB architecture – session beans – entity beans – message driven beans – JDBC – J2EE connector architecture

UNIT IV WEBSERVICES 9

Web Services – J2EE Web Services – patterns – presentation, service tier and Data tier patterns – J2ME

UNIT V ADVANCED CONCEPTS 9

AJAX - Struts – JSF – Hibernate – Spring

TOTAL: 45 PERIODS

TEXT BOOKS:

1. McGovern et al, "J2EE 1.4 Bible", Wiley India, 2007.
2. Black Book, "Java Server Programming", Dreamtech Press, 2007. (Unit V)

REFERENCES

1. Cay S Horstmann, Gary Cornell, "Core Java 2" Vol II, 7th ed, Pearson Education, 2005.
2. W Clay Richardson, et al, "Professional Java JDK 6 Edition", Wrox, 2007

CS 9023 UNIX INTERNALS L T P C
3 0 0 3

AIM:

To understand file system, process, memory management and I/O in Unix.

OBJECTIVES:

- To Understand the Interface Between Hardware And Software
- To Understand the Process Subsystem
- To Understand the Memory Subsystem
- To Understand Memory Management
- To Study the I/O Subsystem, Device Drivers And Ipc

UNIT I OVERVIEW 8

General Overview of the System : History – System structure – User perspective – Operating system services – Assumptions about hardware. Introduction to the Kernel : Architecture of the UNIX operating system – Introduction to system concepts. The Buffer Cache: Buffer headers – Structure of the buffer pool – Scenarios for retrieval of a buffer – Reading and writing disk blocks – Advantages and disadvantages of the buffer cache.

UNIT II FILE SUBSYSTEM 8

Internal representation of files: Inodes – Structure of a regular file – Directories – Conversion of a path name to an Inode – Super block – Inode assignment to a new file – Allocation of disk blocks.

UNIT III SYSTEM CALLS FOR THE FILE SYSTEM 10

Open – Read – Write – File and record locking – Adjusting the position of file I/O – Lseek – Close – File creation – Creation of special files – Changing directory, root, owner, mode – stat and fstat – Pipes – Dup – Mounting and unmounting file systems – link – unlink.

UNIT IV PROCESSES 10

Process states and transitions – Layout of system memory – The context of a process – Saving the context of a process – Manipulation of the process address space - Sleep. Process Control : Process creation – Signals – Process termination – Awaiting process termination – Invoking other programs – user id of a process – Changing the size of a process - Shell – System boot and the INIT process– Process Scheduling.

UNIT V MEMORY MANAGEMENT AND I/O 9

Memory Management Policies : Swapping – Demand paging. The I/O Subsystem : Driver Interface – Disk Drivers – Terminal Drivers– Streams – Inter process communication.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Maurice J. Bach, “The Design of the Unix Operating System”, First Edition, Pearson Education, 1999.

REFERENCES:

1. B. Goodheart, J. Cox, “The Magic Garden Explained”, Prentice Hall of India, 1986.
2. S. J. Leffler, M. K. Mckusick, M. J. .Karels and J. S. Quarterman., “The Design And Implementation of the 4.3 BSD Unix Operating System”, Addison Wesley, 1998.
3. Uresh Vahalia, “Unix Internals: The New Frontiers”, Pearson Education, 1996.

CS 9024 ADVANCED DATABASE TECHNOLOGY L T P C
3 0 0 3

AIM:

Advanced database aims at providing an understanding of the principles used in the design of different kinds of data models. It is also deals with the Transaction management of these different databases.

OBJECTIVES:

- To understand about different data models that can be used for specialized applications
- To make the students to get familiarized with transaction management of advanced database models
- To develop in-depth knowledge about web and intelligent database systems.
- To provide an introductory concept about the way in which data can be stored in multimedia databases.

UNIT I RELATIONAL MODEL ISSUES 9

ER Model - Normalization – Query Processing – Query Optimization – Transaction Processing - Concurrency Control – Recovery - Database Tuning.

UNIT II DISTRIBUTED DATABASES 9

Parallel Databases – Inter and Intra Query Parallelism – Distributed Database Features – Distributed Database Architecture – Fragmentation – Distributed Query Processing – Distributed Transactions Processing – Concurrency Control – Recovery – Commit Protocols.

UNIT III OBJECT ORIENTED DATABASES 9

Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks – Recovery – POSTGRES – JASMINE –GEMSTONE - ODMG Model.

UNIT IV EMERGING SYSTEMS 9

Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases- XML and Web Databases.

UNIT V CURRENT ISSUES 9

Rules - Knowledge Bases - Active and Deductive Databases - Multimedia Databases– Multimedia Data Structures – Multimedia Query languages - Spatial Databases.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Thomas Connolly and Carlolyn Begg, “Database Systems, A Practical Approach to Design, Implementation and Management”, Third Edition, Pearson Education 2003.

REFERENCES:

1. R. Elmasri, S.B. Navathe, “Fundamentals of Database Systems”, Fifth Edition, Pearson Education, 2006.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Fifth Edition, Tata McGraw Hill, 2006.
3. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, EighthEdition, Pearson Education, 2006.

CS 9025 SOFTWARE REQUIREMENTS MANAGEMENT L T P C
3 0 0 3

AIM:

This course brings out the importance of Software Requirement and management in Software development.

OBJECTIVES:

- To know several dimensions of problem analysis
- To explain important management concepts
- To be aware of different methods of refining systemic definition
- To know about change management and its impact on software development

UNIT I INTRODUCTION 9

Introduction - Requirements Problem – Requirements management – Requirements and software life cycle-software team.

UNIT II ANALYSING THE PROBLEM 9

The five steps in problem analysis– business modeling – Systems engineering of software intensive systems – Understanding user and stakeholders needs – Features of a product or system –Interviewing – Requirements workshops- Brain storming and Idea reduction- storyboarding

UNIT III DEFINING THE SYSTEM 9

Use case primer-Organizing requirement Information-Vision Document-Product Management-Managing scope-Establishing Project scope-Managing customer

UNIT IV REFINING THE SYSTEM DEFINITION 9

Software requirement-Refining the use cases-developing the supplementary specification- Ambiguity and specificity -Technical methods for specifying requirements

UNIT V BUILDING THE RIGHT SYSTEM 9

From use cases to Implementation-From use Cases to Test cases-Tracing requirements-Managing Change-Assessing Requirements Quality in Iterative Development-Agile Requirement methods.

TOTAL: 45 PERIODS

TEXTBOOK:

1. Leffingwell, D., Widrig, D., Managing Software Requirements A Use case approach, second edition, Pearson Education, 2003.

REFERENCES:

1. Suzanne & James Robertson,"Mastering the Requirements Process", Second Edition, Pearson.Education, 2007.
2. Swapna Kishore, Rajesh Naik, "Software Requirements and Estimation", Tata McGraw Hill, 2001
3. K.Weigers,"Software Requirements", Microsoft Press, 1999.
4. Ian Sommerville & P Sawyer, "Requirements engineering a good practice Guide", Wiley India, 1997

CS 9026 SOFTWARE DESIGN AND ARCHITECTURE L T P C
3 0 0 3

AIM:

The aim is to inculcate the abilities to convert the user requirements to design document. The course aims to teach the basics of Software Design and Paradigms and to apply for Real Time Projects.

OBJECTIVES

- To provide a background and conduct of Software Design process
- To provide a comprehensive list of Software Architecture Designs and Plan
- To introduce Software Design representations.
- To introduce functional design and Object Oriented Design.

UNIT I INTRODUCTION 9

Nature of design process – Characteristics of design activities, Essential elements of design- Factors affecting design quality - Design Quality models – Design principles – Notion of Software architecture – Simple case studies.

UNIT II SOFTWARE ARCHITECTURE 9

Description of software Architectures – Architectural design space – Scenario based analysis and evaluation – SAAM and ATAM methods - formalizing the architectural styles – Tools for architectural design.

UNIT III SOFTWARE DESIGN 9

Describing the detailed design – Design representations – rationale for software design methods- Design process – Simple design Practices – Stepwise refinement, Incremental design.

UNIT IV STRUCTURED DESIGN 9

Structured system analysis and Structured design – Jackson structured Programming and Development.

UNIT V OBJECT ORIENTED DESIGN 9

Object concept – Component based development – Formal approach to design – Design patterns- Design Review.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Hong Zhu, " Software Design Methodology – From principles to Architectural styles", Elsevier, 2006.
2. Mary Shaw and David Garlan, "Software Architecture – Perspectives on an emerging Discipline", PHI, 2003. (UNIT I and II)
3. David Budgen, "Software Design", Pearson Education, 2004.(UNIT –III to V)
4. Bass, L., Clements P. and Kazman, R., "Software Architecture in Practice", Addison Wesley, 1998.

CS 9027 DATA WAREHOUSING AND DATA MINING L T P C
3 0 0 3

AIM:

To serve as an introductory course to under graduate students with an emphasis on the design aspects of Data Mining and Data Warehousing

OBJECTIVES:

This course has been designed with the following objectives:

- To introduce the concept of data mining with detail coverage of basic tasks, metrics, issues, and implication. Core topics like classification, clustering and association rules are exhaustively dealt with.
- To introduce the concept of data warehousing with special emphasis on architecture and design.

UNIT I DATA WAREHOUSING 10

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.

UNIT II BUSINESS ANALYSIS 8

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT III DATA MINING 8

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT IV ASSOCIATION RULE MINING AND CLASSIFICATION 11

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Backpropagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction

UNIT V CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING 8

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods - K-means – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier, 2007.

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining", Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay ,"Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. Soumendra Mohanty, "Data Warehousing Design, Development and Best Practices", Tata McGraw – Hill Edition, 2006.

CS 9028 **MIDDLEWARE TECHNOLOGIES** **L T P C**
3 0 0 3

AIM:
The aim of the course is to teach the role of middleware in the distributed environment and its common services.

OBJECTIVES:
- To study the set of services that a middleware system constitutes of.
- To understand how middleware facilitates the development of distributed applications in heterogeneous environments.
- To study how it helps to incorporate application portability, distributed application component interoperability and integration
- To learn the object oriented middleware basics through the example of the following CORBA objects.
- To understand the basics of Web services that is the most often used middleware technique.

UNIT I INTRODUCTION **7**
Emergence of Middleware – Objects, Web Services – Middleware Elements – Vendor Architecture – Interoperability – Middleware in Distributed Applications – Types of Middleware – Transaction-Oriented Middleware – MOM – RPC.

UNIT II OBJECT ORIENTED MIDDLEWARE **12**
OOM – Developing with OOM – Heterogeneity – Dynamic Object Request – Java RMI – COM+.

UNIT III COMPONENT OBJECT RESOURCE BROKER ARCHITECTURE **12**
Naming – Trading – Life Cycle – Persistence – Security – CORBA.

UNIT IV WEB SERVICES **7**
Introduction – XML Web Services standards – Creating Web Services – Extending Web Services – Messaging Protocol – Describing – Discovering – Securing.

UNIT V OTHER TYPES OF MIDDLEWARE **7**
Real-time Middleware – RT CORBA – Multimedia Middleware **–** Reflective Middleware – Agent-Based Middleware – RFID Middleware.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Chris Britton and Peter Eye, “IT Architecture and Middleware”, Pearson Education, 2nd Edition, 2004.
2. Wolfgang Emmerich, “Engineering Distributed Objects”, John Wiley, 2000.
3. Keith Ballinger, “.NET Web Services – Architecture and Implementation”, Pearson Education, 2003.

REFERENCES:

1. Qusay H. Mahmoud, “Middleware for Communications”, John Wiley and Sons, 2004.
2. Gerald Brose, Andreas Vogel, Keith Duddy, “JavaTM Programming with CORBATM: Advanced Techniques for Building Distributed Applications”, Wiley, 3rd edition, January, 2004.
3. Michah Lerner, “Middleware Networks: Concept, Design and Deployment of Internet Infrastructure”, Kluwer Academic Publishers, 2000.

CS 9029 .NET AND C# PROGRAMMING L T P C
3 0 0 3

AIM:

To provide an introduction to the .NET framework and enable the student to program in C#.

OBJECTIVES:

- To study basic and advanced features of the C# language
- To create form based and web based applications
- To study the internals of the .NET framework

UNIT I C# BASICS 9

C# and the .NET framework – C# basics – Objects and types – Inheritance – Arrays – Operators and casts – Indexers

UNIT II ADVANCED C# FEATURES 9

Delegates and events – Strings and regular expressions – Generics – Collections – Memory management and pointers – Errors and exceptions

UNIT III I/O AND NETWORK PROGRAMMING 9

Tracing and events - threading and synchronization - .Net security – localization – Manipulating XML - Managing the file system – basic network programming

UNIT IV WINDOW AND WEB APPLICATIONS 9

Window based applications – Data access with .NET – basics of ASP .NET - Introduction to web services

UNIT V .NET FEATURES 9

Architecture – Assemblies – shared assemblies – CLR hosting – Appdomains – Reflection

TOTAL: 45 PERIODS

TEXT BOOK:

1. Christian Nagel et al. “Professional C# 2005 with .NET 3.0”, Wiley India , 2007

REFERENCES:

1. Jesse Liberty, “Programming C#”, O’Reilly, 2001.
2. Andrew Troelson, “Pro C# with .NET 3.0”, Apress, 2007.
3. Kevin Hoffman, “Visual C# 2005”, Pearson Education, 2006.
4. S. Thamarai Selvi, R. Murugesan, “A Text Book on C#”, Pearson Education, 2003.

CS 9030 DIGITAL IMAGE PROCESSING L T P C
3 0 0 3

AIM:

The aim is to inculcate a basic training in the processing of images for practical applications in the domain of medical, remoting sessions and in general.

OBJECTIVES:

- To introduce basic concepts in acquiring, storage and Processing of images
- To introduce for enhancing the quality of images.
- To introduce techniques for extraction and processing of region of interest
- To introduce case studies of Image Processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

UNIT II IMAGE ENHANCEMENT 9

Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening. Frequency Domain : Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.

UNIT III IMAGE SEGMENTATION AND FEATURE ANALYSIS 9

Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological WaterSheds – Motion Segmentation, Feature Analysis and Extraction.

UNIT IV MULTI RESOLUTION ANALYSIS AND COMPRESSIONS 9

Multi Resolution Analysis : Image Pyramids – Multi resolution expansion – Wavelet Transforms. Image Compression : Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

UNIT V APPLICATIONS OF IMAGE PROCESSING 9

Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Compositing – Mosaics – Colour Image Processing..

TOTAL: 45 PERIODS

TEXT BOOK:

1. Rafael C.Gonzalez and Richard E.Woods, “Digital Image Processing” Second Edition, Pearson Education, 2003.

REFERENCES:

1. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, AnalysisandMachine Vision”, Second Edition, Thomson Learning, 2001
2. Anil K.Jain, “Fundamentals of Digital Image Processing”, PHI, 2006.
3. Sanjit K. Mitra, & Giovanni L. Sicuranza, “Non Linear Image Processing” Elsevier, 2007.
4. Richard O. Duda, Peter E. HOF, David G. Stork, “Pattern Classification” Wiley Student Edition, 2006.

CS 9031 CYBER FORENSICS L T P C
3 0 0 3

AIM:

To study different types of Cyber forensic technologies and enable the student to have a foundation in this emerging area.

OBJECTIVES:

- To study the fundamentals of computer forensics
- To have an overview of techniques for Data Recovery and Evidence Collection
- To study various threats associated with security and information warfare
- To study the tools and tactics associated with cyber forensics.

UNIT I FUNDAMENTALS OF FORENSICS 9

Computer Forensics Fundamentals – Types of Computer Forensics Technology – Types of Vendor and Computer Forensics Services

UNIT II DATA RECOVERY AND DIGITAL EVIDENCE 9

Data Recovery – Evidence Collection and Data Seizure – Duplication and Preservation of Digital Evidence – Computer Image Verification and Authentication

UNIT III EVIDIENCE COLLECTION TECHNIQUE 9

Discover of Electronic Evidence – Identification of Data – Reconstructing Past Events – Networks

UNIT IV THREATS AND INFORMATION WALFARE 9

Fighting against Macro Threats – Information Warfare Arsenal – Tactics of the Military – Tactics of Terrorist and Rogues – Tactics of Private Companies

UNIT V TOOLS AND ADVANCED TECHNIQUES 9

The Future – Arsenal – Surveillance Tools – Victims and Refugees – Advanced Computer Forensics

TOTAL: 45 PERIODS

TEXTBOOK:

1. John R. Vacca, "Computer Forensics", Firewall Media, 2004.

REFERENCES:

1. Chad Steel, "Windows Forensics", Wiley India, 2006.
2. Majid Yar, "Cybercrime and Society", Sage Publications, 2006.
3. Robert M Slade, "Software Forensics", Tata McGrawHill, 2004.

CS 9032 GRAPH THEORY L T P C
3 0 0 3

AIM:

To develop Knowledge of basic Graph Theory and use them in problem solving.

OBJECTIVES:

- Acquiring knowledge of the basic concepts in Graph Theory. .

UNIT I INTRODUCTION 9

Graphs – Introduction – Isomorphism – Sub graphs – Walks, Paths, Circuits – Connectedness – Components – Euler Graphs – Hamiltonian Paths and Circuits – Trees – Properties of trees – Distance and Centers in Tree – Rooted and Binary Trees.

UNIT II TREES, CONNECTIVITY, PLANARITY 9

Spanning trees – Fundamental Circuits – Spanning Trees in a Weighted Graph – Cut Sets – Properties of Cut Set – All Cut Sets – Fundamental Circuits and Cut Sets – Connectivity and Separability – Network flows – 1-Isomorphism – 2-Isomorphism – Combinational and Geometric Graphs – Planer Graphs – Different Representation of a Planer Graph.

UNIT III MATRICES, COLORING AND DIRECTED GRAPH 9

Incidence matrix – Submatrices – Circuit Matrix – Path Matrix – Adjacency Matrix – Chromatic Number – Chromatic partitioning – Chromatic polynomial – Matching – Covering – Four Color Problem – Directed Graphs – Types of Directed Graphs – Digraphs and Binary Relations – Directed Paths and Connectedness – Euler Graphs – Adjacency Matrix of a Digraph.

UNIT IV ALGORITHMS- I 9

Algorithms: Connectedness and Components – Spanning tree – Finding all Spanning Trees of a Graph – Set of Fundamental Circuits – Cut Vertices and Separability – Directed Circuits.

UNIT V ALGORITHMS- II 9

Algorithms: Shortest Path Algorithm – DFS – Planarity Testing – Isomorphism.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India, 2003.

REFERENCE:

1. R.J. Wilson, "Introduction to Graph Theory", Fourth Edition, Pearson Education, 2003.

CS 9033 ADVANCED COMPUTER ARCHITECTURE L T P C
3 0 0 3

AIM:

To comprehend the advancements in computer architecture in all aspects – from implicit to explicit parallelism.

OBJECTIVES:

- To understand the principle and various dimensions of instruction-level parallelism, and thread-level parallelism.
- To appreciate the move towards multi-core architectures and realize the challenges in dealing with such architectures.
- To get a feel of programming for such architectures.

UNIT I INSTRUCTION LEVEL PARALLELISM AND ITS EXPLOITATION 9

ILP – Concepts and challenges – Review of hardware techniques – Compiler techniques for exposing ILP – Static branch prediction – VLIW & EPIC – Advanced compiler support – Hardware support for exposing parallelism – Hardware versus software speculation mechanisms – IA 64 and Itanium processors – Limits on ILP.

UNIT II MULTIPROCESSORS AND THREAD LEVEL PARALLELISM 9

Symmetric and distributed shared memory architectures – Performance issues – Synchronization – Models of memory consistency – Introduction to Multithreading.

UNIT III MEMORY AND I/O 9

Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.

UNIT IV MULTI-CORE ARCHITECTURES 9

Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture

UNIT V PARALLEL PROGRAMMING AND MULTITHREADED APPLICATION DEVELOPMENT 9

Parallel programming models – Shared memory programming – Message passing paradigm – Message Passing Interface – Parallel Virtual Machine – Algorithms, program development and performance tuning.

TOTAL: 45 PERIODS

TEXT BOOKS:

1 John L. Hennessey and David A. Patterson, " Computer architecture – A quantitative approach", Morgan Kaufmann / Elsevier Publishers, 4th. edition, 2007.
2. Shameem Akhter and Jason Roberts, "Multi-core Programming", Intel Press, 2006.

REFERENCES:

1. David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture : A hardware/ software approach" , Morgan Kaufmann /Elsevier Publishers, 1999.
2. Michael J Quinn, "Parallel programming in C with MPI and OpenMP", Tata McGraw Hill, 2003.
3. Kai Hwang and Zhi.Wei Xu, "Scalable Parallel Computing", Tata McGraw Hill, New Delhi, 2003.

www.intel.com/products.

CS 9034 TCP/IP DESIGN AND IMPLEMENTATION L T P C
3 0 0 3

AIM:

To study about the internetworking concepts and functionalities of TCP and IP software and to design data structures for implementing those functionalities.

OBJECTIVES:

- To understand the IP addressing schemes which provides the base for Layer 2 and Layer 3 header field detection, error reporting and dynamic address mapping.
- To develop data structures for basic protocol functions of TCP/IP and to understand and use the various members in the respective structures.
- To design and implement data structures for maintaining multiple local and global timers that will govern over various modules of TCP and IP software.

UNIT I INTRODUCTION 9

Internetworking concepts and architecture model – classful Internet address – CIDR – Subnetting and Supernetting – AARP – RARP- IP- IP Routing – ICMP – IPV6.

UNIT II TCP **9**

Services – header – connection establishment and termination – interactive data flow – bulk data flow – timeout and retransmission – persist timer – keep alive timer – futures and performance.

UNIT III IP IMPLEMENTATION **9**

IP global software organization – routing table – routing algorithms – fragmentation and reassembly – error processing (ICMP) – Multicast Processing (IGMP).

UNIT IV TCP IMPLEMENTATION I **9**

Data structure and input processing – transmission control blocks – segment format – comparision – finite state machine implementation – Output processing – mutual exclusion – computing the TCP Data length.

UNIT V TCP IMPLEMENTATION II **9**

Timers – events and messages – timer process – deleting and inserting timer event – flow control and adaptive retransmission – congestion avoidance and control – urgent data processing and push function.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Douglas E Comer,"Internetworking with TCP/IP Principles,Protocols and Architecture",Vol 1 V edition 2006 and Vol 2, III Edition, 1999.
2. W.Richard Stevens "TCP/IP Illustrated" Vol 1. Pearson Education, 2003.

REFERENCES:

1. Forouzan, " TCP/IP Protocol Suite" Second Edition, Tata MC Graw Hill, 2003.
2. W.Richard Stevens "TCP/IP Illustrated" Volume 2, Pearson Education 2003

CS 9035 FREE/OPEN SOURCE SOFTWARE **L T P C**
3 0 0 3

AIM:

To understand the FOSS Philosophy and use a Linux distribution to learn installation, administration and programming in this environment

OBJECTIVES:

- To impart a first hand knowledge on the FOSS philosophy and methodology
- To enable the students to install and use Linux distribution
- To train the students in Linux desktop usage and some commonly used programs
- To encourage students to apply OSS philosophy and migrate to FOSS in their own domains
- To develop application programs using FOSS

UNIT I HISTORY AND OVERVIEW OF GNU/LINUX AND FOSS **3**

Definition of FOSS & GNU, History of GNU/Linux and the Free Software Movement , Advantages of Free Software and GNU/Linux, FOSS usage , trends and potential—global and Indian.

UNIT II SYSTEM ADMINISTRATION 10

GNU/Linux OS installation--detect hardware, configure disk partitions & file systems and install a GNU/Linux distribution ; Basic shell commands -logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management ; User and group management, file ownerships and permissions, PAM authentication ; Introduction to common system configuration files & log files ; Configuring networking, basics of TCP/IP networking and routing, connecting to the Internet (through dialup, DSL, Ethernet, leased line) ; Configuring additional hardware - sound cards, displays & display cards, network cards, modems, USB drives, CD writers ; Understanding the OS boot up process ; Performing every day tasks using gnu/Linux -- accessing the Internet, playing music, editing documents and spreadsheets, sending and receiving email, copy files from disks and over the network, playing games, writing CDs ; X Window system configuration and utilities--configure X windows, detect display devices ; Installing software from source code as well as using binary packages

UNIT III SERVER SETUP AND CONFIGURATION 10

Setting up email servers--using postfix (SMTP services), courier (IMAP & POP3 services), squirrel mail (web mail services) ; Setting up web servers --using apache (HTTP services), php (server-side scripting), perl (CGI support) ; Setting up file services --using samba (file and authentication services for windows networks), using NFS (file services for gnu/Linux / Unix networks) ; Setting up proxy services --using squid (http / ftp / https proxy services) ; Setting up printer services -using CUPS (print spooler), foomatic (printer database) ; Setting up a firewall -Using netfilter and iptables

UNIT IV PROGRAMMING TOOLS 12

Using the GNU Compiler Collection --GNU compiler tools ; the C preprocessor (cpp), the C compiler (gcc) and the C++ compiler (g++), assembler (gas) ; Understanding build systems --constructing make files and using make, using autoconf and autogen to automatically generate make files tailored for different development environments ; Using source code versioning and management tools --using cvs to manage source code revisions, patch & diff ; Understanding the GNU Libc libraries and linker -linking against object archives (.a libraries) and dynamic shared object libraries (.so libraries), generating statically linked binaries and libraries, generating dynamically linked libraries ; Using the GNU debugging tools --gdb to debug programs, graphical debuggers like ddd, memory debugging / profiling libraries mpatrol and valgrind ; Review of common programming practicies and guidelines for GNU/Linux and FOSS ; Introduction to Bash, sed & awk scripting

UNIT V APPLICATION PROGRAMMING 10

Basics of the X Windows server architecture ; Qt Programming ; Gtk+ Programming ; Python Programming ; Programming GUI applications with localisation support.

TOTAL: 45 PERIODS

REFERENCES:

1. N. B. Venkateshwarlu (Ed); “Introduction to Linux: Installation and Programming”, B S Publishers; 2005.
2. Matt Welsh, Matthias Kalle Dalheimer, Terry Dawson, and Lar Kaufman, “Running Linux”, Fourth Edition, O'Reilly Publishers, 2002.
3. Carla Schroder, “Linux Cookbook”, First Edition, O'Reilly Cookbooks Series, 2004.

ON-LINE MATERIAL:

1. Open Sources: Voices from the Open Source Revolution, First Edition, January1999,ISBN:1-56592-582-3.
   URL**:** Http://www.oreilly.com/catalog/opensources/book/toc.html
2. The Linux Cookbook: Tips and Techniques for Everyday Use, First Edition, Michael Stutz, 2001. URL: http://dsl.org/cookbook/cookbook_toc.html
3. The Linux System Administrators' Guide, Lars Wirzenius, Joanna Oja, StephenStafford,andAlexWeeks,December2003.

URL: http://www.tldp.org/guides.html
4. Using GCC, Richard Stallman et al. URL: http://www.gnu.org/doc/using.html
5. An Introduction to GCC, Brian Gough. URL: http://www.network-theory.co.uk/docs/gccintro/
6. GNU Autoconf, Automake and Libtool, Gary V. Vaughan, Ben Elliston, Tom Tromey and Ian Lance Taylor. URL: http://sources.redhat.com/autobook/
7. Open Source Development with CVS, Third Edition, Karl Fogel and Moshe Bar. URL: http://cvsbook.red-bean.com/
8. Advanced Bash Scripting Guide, Mendel Cooper, June 2005. URL: http://www.tldp.org/guides.html
9. GTK+/GNOME Application Development, Havoc Pennington. URL: http://developer.gnome.org/doc/GGAD

Python Tutorial, Guido van Rossum, Fred L. Drake, Jr., Editor. URL: http://www.python.org/doc/current/tut/tut.html

CS 9036 SOFT COMPUTING L T P C
3 0 0 3

AIM:
To give an overall understanding on the theories that are available to solve hard real-world problems

OBJECTIVES:
- To give the students an overall knowledge of soft computing theories and fundamentals
- To give an understanding on the fundamentals of non-traditional technologies and approaches to solving hard real-world problems
- Fundamentals of artificial neural networks, fuzzy sets and fuzzy logic and genetic algorithms.
- Use of ANN, Fuzzy sets to solve hard real-world problems
- To given an overview of Genetic algorithms and machine learning techniques to solving hard real-world problems
- To study about the applications of these areas

UNIT I INTRODUCTION 9
Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence – Neural Networks - Scope and Evolution – Models of Neural Networks – Feed forward Networks – Supervised Learning Neural Networks – Associative memory networks – Unsupervised learning networks – Special Networks

UNIT II FUZZY SETS AND FUZZY LOGIC 9
Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations - Fuzzy Rules Non – interactive fuzzy sets – Fuzzification– Intuition , inference, Rank ordering – Defuzzification – Max-membership principle, centroid method, center of sums, center of largest area.

UNIT III FUZZY MEASURES AND REASONING 9

Fuzzy arithmetic and measures – Fuzzy reasoning – approximate reasoning – categorical, qualitative, syllogistic, dispositional – Fuzzy inference systems – fuzzy decision making – individual, multiperson, multi objective, Bayesian – fuzzy logic control system – architecture, model and application

UNIT IV MACHINE LEARNING AND GENETIC ALGORITHM 9

Machine Learning Techniques – Machine Learning Using Neural Nets – Genetic Algorithms (GA) – Simple and General GA – Classification of Genetic Algorithm – Messy, Adaptive, Hybrid, Parallel – Holland Classifier System

UNIT V APPLICATION AND IMPLEMENTATION SOFT COMPUTING 9

Genetic algorithms -. Traveling Salesperson Problem, Internet Search Techniques – Fuzzy Controllers – Bayesian Belief networks for Rocket Engine Control - Neural Network, Genetic algorithm and Fuzzy logic implementation in C++ and Matlab

TOTAL: 45 PERIODS

TEXT BOOK:

1. S.N. Sivanandam and S.N. Deepa, “Principles of Soft Computing”, Wiley India Ltd., First Indian Edition, 2007

REFERENCES:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing”, Prentice-Hall of India, 2003.
2. James A. Freeman and David M. Skapura, “Neural Networks Algorithms, Applications, and Programming Techniques”, Pearson Edn., 2003.
3. George J. Klir and Bo Yuan, “Fuzzy Sets and Fuzzy Logic-Theory and Applications”, Prentice Hall, 1995.
4. Amit Konar, “Artificial Intelligence and Soft Computing”, First Edition,CRC Press, 2000.
5. Simon Haykin, “Neural Networks: A Comprehensive Foundation”, Second Edition Prentice Hall, 1999.
6. Mitchell Melanie, “An Introduction to Genetic Algorithm”, Prentice Hall, 1998.
7. David E. Goldberg, “Genetic Algorithms in Search, Optimization and Machine Learning”, Addison Wesley, 1997.

CS 9037 KNOWLEDGE MANAGEMENT L T P C
3 0 0 3

AIM

This course is intended to provide undergraduate students a perspective on how Knowledge Management Systems can be built and its underlying technologies

OBJECTIVES

- The students will be exposed to deep knowledge in designing a knowledge management system.
- Current trends in information technology such as electronic markets, digital library, E auction, E governance etc can be developed and deployed effectively using knowledge management issues.
- KM strategies will improve future organizational structures.

UNIT I KNOWLEDGE MANAGEMENT 9

KM Life Cycle – Understanding Knowledge – Knowledge, intelligence – Experience – Common Sense – Cognition and KM – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.

UNIT II KNOWLEDGE MANAGEMENT SYSTEM LIFE CYCLE 9

Challenges in Building KM Systems – Conventional Vrs KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation. Knowledge Architecture.

UNIT III CAPTURING KNOWLEDGE 9

Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid- Concept Mapping – Blackboarding.

UNIT IV KNOWLEDGE CODIFICATION 9

Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer's Skill Sets – System Testing and Deployment – Knowledge Testing – Approaches to Logical Testing, User Acceptance Testing – KM System Deployment Issues – User Training – Post implementation.

UNIT V KNOWLEDGE TRANSFER AND SHARING 9

Transfer Methods – Role of the Internet – Knowledge Transfer in e-world – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Decision Making Architecture – Data Management – Knowledge Management Protocols – Managing Knowledge Workers.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Elias.M. Awad & Hassan M. Ghaziri – "Knowledge Management" Pearson Education 2003.

REFERENCES:

1. Amrit Tiwana, "Knowledge management toolkit, The practical techniques for building a knowledge management system", Pearson Education, Second ed, 1999.
2. KIMIZ DALKIR, "Knowledge management in theory and practices", Elsevier Publications, 2005.
3. C.W. Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol 1 and 2, 2003

CS 9038 DATABASE TUNING LT P C
3 0 0 3

AIM:

To provide a strong foundation in database tuning and Query processing

OBJECTIVES:

- On completion of the course each student trained in this course will develop effective query execution plans, tune the recovery sub system, tune nested queries, procedures and functions, identify where denormalization is required and tune the application interface.
- In addition to the above the student will gain knowledge on tuning in the most popularly used Database Servers Oracle, SQL Server and DB2 UDB. Tuning on distributed database implementation is also part of this course

UNIT I FUNDAMENTALS OF TUNING 8

Review of Relational Databases – Relational Algebra - Locking and Concurrency Control – Correctness Consideration – Lock Tuning – Logging and the Recovery Subsystem – Principles of Recovery – Tuning the Recovery Subsystem – Operating Systems Considerations – Hardware Tuning.

UNIT II INDEX TUNING 8

Types of Queries – Data Structures – B tree – B^+ Tree - Hash Structures – Bit Map Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Hot Tables – Comparison of Indexing and Hashing Techniques.

UNIT III QUERY OPTIMIZATION 10

Techniques - Tuning Relational Systems – Normalization – Tuning Denormalization – Clustering Two Tables – Aggregate Maintenance – Record Layout – Query Tuning – Triggers – Client Server Mechanisms – Objects, Application Tools and Performance – Tuning the Application Interface – Bulk Loading Data – Accessing Multiple Databases.

UNIT IV TROUBLESHOOTING 10

Query Plan Explainers – Performance Monitors – Event Monitors – Finding "Suspicious" Queries – Analyzing a Query's Access Plan – Profiling a Query Execution – DBMS Subsystems.

UNIT V CASE STUDIES 9

Transaction Chopping – Time Series Databases – Understanding Access Plans – Configuration Parameters: Oracle; SQL Server; DB2UDB – Distributed Database - Implementation.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Dennis Shasha and Philippe Bonnet "Database Tuning, Principles, Experiments, and Troubleshooting Techniques", Morgan Kaufmann, An Imprint of Elsevier 2003.

REFERENCES:

1. Thomas Connoly and Carlolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education 2003.
2. M.Tamer Ozsu, Patrick Valduriez and S.Sridhar "Principles of Distributed Database Systems", Pearson Education 2007.

CS 9039 GRID COMPUTING L T P C
3 0 0 3

AIM:

To understand the latest advances in the field of computation to optimize the utilization of resources.

OBJECTIVES:

- To enable resource sharing across networks
- To integrate heterogeneous computing systems and data resources with the aim of providing a global computing space
- To manage and schedule the resources in grid environments
- To know the standards and protocols used
- To Know the middleware in grid computing

UNIT I CONCEPTS AND ARCHITECTURE 9

Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing-Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF.

UNIT II GRID MONITORING 9

Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE – JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridMon

UNIT III GRID SECURITY AND RESOURCE MANAGEMENT 9

Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS**.**

UNIT IV DATA MANAGEMENT AND GRID PORTALS 9

Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-First-Generation Grid Portals-Second-Generation Grid Portals.

UNIT V GRID MIDDLEWARE 9

List of globally available grid Middlewares - Case Studies-Current version of Globus Toolkit and Lite - Architecture, Components and Features.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Maozhen Li, Mark Baker, “The Grid: Core Technologies”, John Wiley & Sons ,2005.

REFERENCES:

1. Ian Foster & Carl Kesselman, “The Grid 2 – Blueprint for a New Computing Infrastructure”, Morgan Kaufman – 2004
2. Joshy Joseph & Craig Fellenstein, “Grid Computing”, Pearson Education 2004.
3. Fran Berman, Geoffrey Fox, “Anthony J.G.Hey”, Grid Computing: Making the Global Infrastructure a Reality”, John Wiley and Sons, 2003
4. URLs : www.globus.org and glite.web.cern.ch

CS 9040 LANGUAGE TECHNOLOGIES L T P C
3 0 0 3

AIM:

The aim of this course is understand the issues and challenges of tackling natural language and outline some of the techniques and heuristics used in language technologies.

OBJECTIVES:

- To understand the issues and challenges in natural language and the various modules of a typical natural language processing system
- To learn the indexing and searching processes of a typical information retrieval system and to study NLP based retrieval systems
- To gain knowledge about typical text categorization and clustering techniques
- To know about evaluation techniques for information retrieval and text mining
- To comprehend Multimodality and multilingualism issues
- To gain knowledge about translation, dialog agents and Generation systems

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 (evaluation).

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 PERIODS

TEXT BOOKS:

1. Daniel Jurafsky and James H. Martin, " Speech and Language Processing" , 2000.
2. Gerald J. Kowalski and Mark.T. Maybury, "Information Storage and Retrieval systems", Kluwer academic Publishers, 2000.

REFERENCES:

1. Tomek Strzalkowski " Natural Language Information Retrieval ", Kluwer academic Publishers, 1999.
2. Christopher D.Manning and Hinrich Schutze, "Foundations of Statistical Natural Language Processing ", MIT Press, 1999.
3. Michael W. Berry " Survey of Text Mining: Clustering, Classification and Retrieval", Springer Verlag, 2003.
4. James Allen " Natural Language Understanding", Benjamin/ Cummings Publishing Co. 1995.

CS 9041 VISUALIZATION TECHNIQUES L T P C
3 0 0 3

AIM:

This course aims at understanding Information and Scientific visualization techniques and give a clear picture of various abstraction mechanisms

OBJECTIVES:

- At the end of the course the student will be able to understand basic visualization and interaction techniques in the information visualization fields, as well as basic approaches to visually exploring large databases
- Students will also understand the various abstraction mechanisms and to create interactive visual interfaces

UNIT I FOUNDATIONS FOR DATA VISUALIZATION 9

Visualization stages – Experimental Semiotics based on Perception Gibson‘s Affordance theory – A Model of Perceptual Processing – Types of Data.

UNIT II COMPUTER VISUALIZATION 9

Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Non Linear Magnificaiton – Comparing Visualization of Information Spaces – Abstraction in computer Graphics – Abstraction in user interfaces.

UNIT III MULTIDIMENSIONAL VISUALIZATION 9

1D, 2D, 3D – Multiple Dimensions – Trees – Web Works – Data Mapping: Document Visualization – Workspaces.

UNIT IV TEXTUAL METHODS OF ABSTRACTION 9

From Graphics to Pure Text – Figure Captions in Visual Interfaces – Interactive 3D illustrations with images and text – Related work – Consistency of rendered – images and their textual labels – Architecture – Zoom techniques for illustration purpose – Interactive handling of images and text.

UNIT V ABSTRACTION IN TIME AND INTERACTIVE SYSTEMS 9

Animating non Photo realistic Computer Graphics – Interaction Facilities and High Level Support for Animation Design – Zoom Navigation in User Interfaces – Interactive Medical Illustrations – Rendering Gesturall Expressions – Animating design for Simulation – Tactile Maps for Blind People – Synthetic holography – Abstraction Versus Realism– Integrating Spatial and Non Spatial Data.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Colin Ware “Information Visualization Perception for Design”, 2 nd edition, Morgan Kaufman 2004,.
2. Stuart.K.Card, Jock.D.Mackinlay and Ben Shneiderman, “Readings in Information Visualization Using Vision to think”, Morgan Kaufmann Publishers, 1999

REFERENCES:

1. Thomas Strothotte, “ Computer Visualization–Graphics Abstraction and Interactivity”, Springer Verlag Berlin Heiderberg 1998.

CS 9042 SOFTWARE PROJECT MANAGEMENT L T P C
3 0 0 3

AIM:

This course aims at the role of software developers in getting exposure on planning and controlling aspect of software development

OBJECTIVES:

- To understand the roles of the project manager
- To understand the threats and opportunities in project management
- To gain Expertise in size, effort and cost estimation techniques
- To understand the techniques available with which a project's aims and objectives, timetable, activities, resources and risks can be kept under control
- To understand the social and political problems a project will encounter--against which the technical problems pale into insignificance--and to begin to understand how to approach non-technical problems
- To appreciate management issues like team structure, group dynamics

UNIT I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT 9

Project Definition – Contract Management – Activities Covered by Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

UNIT II PROJECT EVALUATION 9

Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation. – software effort estimation

UNIT III ACTIVITY PLANNING 9

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning and Control.

UNIT IV MONITORING AND CONTROL 9

Resource allocation - identifying and scheduling resources – publishing resource and cost schedule – scheduling sequence - Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Priortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT V MANAGING PEOPLE AND ORGANIZING TEAMS 9

Introduction – Understanding Behavior – Organizational Behaviour - Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Bob Hughes, Mikecotterell, “Software Project Management”, Third Edition, Tata McGraw Hill, 2004.

REFERENCES:

1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, “Software Project Management”, Pearson Education, 1999.
3. Jalote, “Software Project Management in Practice”, Pearson Education, 2002.
4. Robert T. Futrell, Donald F. Shefer and Linda I. Shefer, “Quality Software Project Management”, Pearson Education, 2003.

CS 9043 MULTI-CORE PROGRAMMING L T P C
3 0 0 3

AIM:

To learn about the techniques useful for programming parallel architectures in general, and multi-core processors in particular.

OBJECTIVES

- To realize the difference between programming for serial processors and parallel processors.
- To understand the challenges in parallel and multi-threaded programming.
- To learn about the various parallel programming paradigms, and solutions.

UNIT I INTRODUCTION TO MULTIPROCESSORS AND SCALABILITY ISSUES 9

Scalable design principles – Principles of processor design – Instruction Level Parallelism, Thread level parallelism. Parallel computer models –- Symmetric and distributed shared memory architectures – Performance Issues – Multi-core Architectures - Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies – Intel Multi-core architecture – SUN CMP architecture.

UNIT II PARALLEL PROGRAMMING 9

Fundamental concepts – Designing for threads. Threading and parallel programming constructs – Synchronization – Critical sections – Deadlock. Threading APIs.

UNIT III OPENMP PROGRAMMING 9

OpenMP – Threading a loop – Thread overheads – Performance issues – Library functions. Solutions to parallel programming problems – Data races, deadlocks and livelocks – Non-blocking algorithms – Memory and cache related issues.

UNIT IV MPI PROGRAMMING 9

MPI Model – collective communication – data decomposition – communicators and topologies – point-to-point communication – MPI Library.

UNIT V MULTITHREADED APPLICATION DEVELOPMENT 9

Algorithms, program development and performance tuning.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Shameem Akhter and Jason Roberts, “Multi-core Programming”, Intel Press, 2006.
2. Michael J Quinn, “Parallel programming in C with MPI and OpenMP”, Tata MacgrawHill, 2003.

REFERENCES:

1. John L. Hennessey and David A. Patterson, “ Computer architecture – A quantitative approach”, Morgan Kaufmann/Elsevier Publishers, 4th. edition, 2007.
2. David E. Culler, Jaswinder Pal Singh, “Parallel computing architecture : A hardware/ software approach” , Morgan Kaufmann/Elsevier Publishers, 1999.

EC 9073 **BIOINFORMATICS** **L T P C**
3 0 0 3

AIM:

By using the well-tested and successful approach of problem-based learning, students will learn through applying the strategies and tools used in bioinformatics to topical problems drawn from ongoing research and applications in a variety of fields.

OBJECTIVES:

- To emphasize how to use the computer as a tool for biomedical research.
- To understand the use of Databases and Data mining concepts in the field of biology
- To study and understand the various modeling techniques that are used for modeling biological data
- To explore visualization techniques for DNA and RNA molecules
- To be aware of the microarray technology for genome expression study

UNIT I INTRODUCTION 9

Need for Bioinformatics technologies – Overview of Bioinformatics technologies – Structural bioinformatics – Data format and processing – secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.

UNIT II DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS 9

Bioinformatics data – Datawarehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics

UNIT III MODELING FOR BIOINFORMATICS 9

Hidden markov modeling for biological data analysis – Sequence identification – Sequence classification – multiple alignment generation – Comparative modeling – Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling

UNIT IV PATTERN MATCHING AND VISUALIZATION 9

Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization – Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences

UNIT V MICROARRAY ANALYSIS 9

Microarray technology for genome expression study – image analysis for data extraction – preprocessing – segmentation – gridding – spot extraction – normalization, filtering – cluster analysis – gene network analysis – Compared Evaluation of Scientific Data Management Systems – Cost Matrix – Evaluation model - Benchmark - Tradeoffs

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Yi-Ping Phoebe Chen (Ed), “BioInformatics Technologies”, First Indian Reprint, Springer Verlag, 2007.
2. Zoe lacroix and Terence Critchlow, “BioInformatics – Managing Scientific data”, First Indian Reprint, Elsevier, 2004

REFERENCES:

1. Zoe Lacroix and Terence Critchlow, “Bioinformatics – Managing Scientific Data”, First Edition, Elsevier, 2004
2. Bryan Bergeron, “Bio Informatics Computing”, Second Edition, Pearson Education, 2003.
3. Arthur M Lesk, “Introduction to Bioinformatics”, Second Edition, Oxford University Press, 2005

IT 9401 **SOFTWARE TESTING** **L T P C**
3 0 0 3

AIM:

The course looks at the role of developers in areas such as test planning, implementation, and defect tracking. It explains how to review and manage test requirements and how to incorporate testing into the software development life cycle.

OBJECTIVES:

- To determine software testing objectives and criteria
- To develop and validate a test plan
- To select and prepare test cases
- To identify the need for testing
- To prepare testing policies and standards
- To use testing aids and tools
- To test before buying a software package
- Test after maintenance and enhancement changes
- To measure the success of testing efforts

UNIT I INTRODUCTION **8**

Testing as an Engineering Activity – Testing as a Process – testing axioms - Basic Definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – cost of defects - Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository – Defect Prevention Strategies

UNIT II TEST CASE DESIGN **11**

Test Case Design Strategies – Using Black Box Approach to Test Case Design - Random Testing – Requirements based testing – Boundary Value Analysis – Decision tables - Equivalence Class Partitioning - State-based testing – Cause-effect graphing – Error guessing - Compatibility testing – User documentation testing – Domain testing
Using White Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White–box Based Test Design – code complexity testing – Evaluating Test Adequacy Criteria.

UNIT III LEVELS OF TESTING **9**

The Need for Levels of Testing – Unit Test – Unit Test Planning –Designing the Unit Tests - The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – Scenario testing – Defect bash elimination
System Testing – Acceptance testing – Performance testing - Regression Testing – Internationalization testing – Ad-hoc testing - Alpha , Beta Tests – testing OO systems – Usability and Accessibility testing – Configuration testing - Compatibility testing – Testing the documentation – Website testing

UNIT IV TEST MANAGEMENT **9**

People and organizational issues in testing – organization structures for testing teams – testing services - Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V TEST AUTOMATION **8**

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation - Test metrics and measurements –project, progress and productivity metrics.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Srinivasan Desikan and Gopalaswamy Ramesh, " Software Testing – Principles and Practices", Pearson education, 2006.
2. Ilene Burnstein, "Practical Software Testing", Springer International Edition, 2003.

REFERENCES:

1. Ron Patton, " Software Testing", Second Edition, Sams Publishing, Pearson education, 2007
2. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004.
3. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, 1995.
4. Boris Beizer, "Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold, New York, 1990.
5. Aditya P. Mathur, "Foundations of Software Testing – Fundamental algorithms and techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008

IT 9351 SERVICE ORIENTED ARCHITECTURE L T P C
3 0 0 3

AIM:

To provide an overview of Service Oriented Architecture and enable the student to create applications in a collaborative environment.

OBJECTIVES:

- To study the importance of Service Oriented Architecture.
- Implementation of SOA in the Java and .NET frameworks.
- To study the advanced features of SOA.

UNIT I SOA BASICS 9

Introduction – Service Oriented Enterprise – Service Oriented Architecture (SOA) – SOA and Web Services – Multi-Channel Access – Business Process management – Extended Web Services Specifications – Overview of SOA – Concepts – Key Service Characteristics – Technical Benefits – Business Benefits

UNIT II WEB SERVICES 9

SOA and Web Services – Web Services Platform – Service Contracts – Service-Level Data Model – Service Discovery – Service-Level Security – Service-Level Interaction patterns – Atomic Services and Composite Services – Proxies and Skeletons – Communication – Integration Overview – XML and Web Services - .NET and J2EE Interoperability – Service-Enabling Legacy Systems – Enterprise Service Bus Pattern

UNIT III COMPOSING WEB SERVICES 9

Multi-Channel Access – Business Benefits – SOA for Multi Channel Access – Tiers – Business Process Management – Concepts – BPM, SOA and Web Services – WS-BPEL – Web Services Composition

UNIT IV JAVA WEB SERVICES 9

Java Web Services – JAX APIs – JAXP – JAX-RPC – JAXM – JAXR – JAXB

UNIT V WEB SERVICE TRANSACTION 9

Metadata Management – Web Services Security – Advanced Messaging – Transaction Management.

TOTAL: 45 PERIODS

TEXTBOOKS:

1. Eric Newcomer, Greg Lomow, “Understanding SOA with Web Services”, Pearson Education, 2005.
2. James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, “Java Web Services Architecture”, Elsevier, 2003. (Unit 4)

REFERENCES:

1. Thomas Erl, “Service Oriented Architecture”, Pearson Education, 2005.
2. Frank Cohen, “FastSOA”, Elsevier, 2007.
3. Scott Campbell, Vamsi Mohun, “Mastering Enterprise SOA”, Wiley, 2007.
4. Eric Pulier, Hugh Taylor, “Understanding Enterprise SOA”, Dreamtech Press, 2007.
5. Jeff Davies, “The Definitive Guide to SOA”, Apress, 2007.
6. Sandeep Chatterjee, James Webber, “Developing Enterprise Web Services”, Pearson Education, 2004.

CS 9046 SYSTEM MODELING AND SIMULATION L T P C
3 0 0 3

AIM:

The aim of this course is to study the system modeling and simulation techniques, which finds application in diverse fields.

OBJECTIVE:

- The objective of this course is to introduce the fundamental principles and concepts in the general area of systems and simulation. The purpose is to learn about the overview of computer simulation concepts, overview of modeling theory, review of probability distributions and queuing theory, random number generation, probability distribution generation, data collection and input analysis, discrete modeling and simulation concepts, state based models, Markov models, model validation and verification and some simulation systems and languages.

UNIT I INTRODUCTION TO SIMULATION 9

Introduction – Simulation Terminologies- Application areas – Model Classification – Types of Simulation- Steps in a Simulation study- Concepts in Discrete Event Simulation - Simulation Examples

UNIT II MATHEMATICAL MODELS 9

Statistical Models - Concepts – Discrete Distribution- Continuous Distribution – Poisson Process- Empirical Distributions- Queueing Models – Characteristics- Notation – Queueing Systems – Markovian Models- Properties of random numbers- Generation of Pseudo Random numbers- Techniques for generating random numbers-Testing random number generators- Generating Random-Variates- Inverse Transform technique – Acceptance- Rejection technique – Composition & Convolution Method.

UNIT III ANALYSIS OF SIMULATION DATA 9

Input Modeling - Data collection - Assessing sample independence - Hypothesizing distribution family with data - Parameter Estimation - Goodness-of-fit tests - Selecting input models in absence of data- Output analysis for a Single system – Terminating Simulations – Steady state simulations.

UNIT IV VERIFICATION AND VALIDATION 9

Model Building – Verification of Simulation Models – Calibration and Validation of Models – Validation of Model Assumptions – Validating Input – Output Transformations.

UNIT V SIMULATION OF COMPUTER SYSTEMS AND CASE STUDIES 9

Simulation Tools – Model Input – High level computer system simulation – CPU – Memory Simulation – Comparison of systems via simulation – Simulation Programming techniques - Development of Simulation models.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jerry Banks and John Carson, " Discrete Event System Simulation", Fourth Edition, PHI, 2005.
2. Geoffrey Gordon, "System Simulation", Second Edition, PHI, 2006 (Unit – V).

REFERENCES

1. Frank L. Severance, " System Modeling and Simulation", Wiley, 2001.
2. Averill M. Law and W.David Kelton, "Simulation Modeling and Analysis", Third Edition, McGraw Hill, 2006.
3. Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice", Wiley, 1998.

CS 9047 ADHOC AND SENSOR NETWORKS L T P C
3 0 0 3

AIM:

To provide a strong foundation in wireless adhoc networks and sensor networks.

OBJECTIVES:

- To understand the issues of MAC layer and routing protocols
- To study about the different types of adhoc routing protocols
- To learn about the QoS aware adhoc routing protocols
- To study about power and energy management in adhoc networks
- To understand the routing and models of mesh networks.
- To study about the architecture and protocols of wireless sensor networks

UNIT I ROUTING 9

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

UNIT II QUALITY OF SERVICE 9

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

UNIT III ENERGY MANAGEMENT AD HOC NETWORKS 9

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

UNIT IV MESH NETWORKS 9

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

UNIT V SENSOR NETWORKS 9

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

TOTAL: 45 PERIODS

TEXT BOOK:

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

REFERENCES:

1. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.
2. C.K.Toh, "Adhoc Mobile Wireless Networks", Pearson Education, 2002.
3. Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007.

CS 9048 EMBEDDED SYSTEMS L T P C
3 0 0 3

AIM:

To provide sufficient Knowledge to understand the embedded systems design, embedded programming and their operating system.

OBJECTIVES:

- To provide in-depth knowledge about embedded processor, its hardware and software.
- To explain programming concepts and embedded programming in C and assembly language.
- To explain real time operating systems, inter-task communication and an embedded software development tool.

UNIT I EMBEDDED COMPUTING 9

Challenges of Embedded Systems – Embedded system design process. Embedded processors – ARM processor – Architecture, ARM and Thumb Instruction sets

UNIT II EMBEDDED C PROGRAMMING 9

C-looping structures – Register allocation – Function calls – Pointer aliasing – structure arrangement – bit fields – unaligned data and endianness – inline functions and inline assembly – portability issues.

UNIT III OPTIMIZING ASSEMBLY CODE 9

Profiling and cycle counting – instruction scheduling – Register allocation – conditional execution – looping constructs – bit manipulation – efficient switches – optimized primitives.

UNIT IV PROCESSES AND OPERATING SYSTEMS 9

Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Exception and interrupt handling - Performance issues.

UNIT V EMBEDDED SYSTEM DEVELOPMENT 9

Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers. Design methodologies – Case studies – Complete design of example embedded systems.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Andrew N Sloss, D. Symes, C. Wright, " Arm system developers guide", Morgan Kauffman/ Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education , 2007.

REFERENCES:

1. Wayne Wolf, "Computers as Components:Principles of Embedded Computer System Design", Elsevier, 2006.
2. Steve Heath, "Embedded System Design" , Elsevier, 2005.

CS 9049 PROGRAMMING IN .NET L T P C
3 0 0 3

AIM

To enable the student to use the advanced features of C# programming in the .NET framework.

OBJECTIVES

- To study and implement applications using the Presentation Foundation.
- To study the features associated with enterprise services.
- To create distributed applications using Web services and remoting.
- To study the features of the Workflow Foundation
- To introduce the concepts of the Compact Framework.

UNIT I PRESENTATION FOUNDATION 9

Windows Presentation Foundation – Overview – Event Handling – Data Binding – Windows Forms Integration – ASP.NET Introduction - ADO.NET and Data Binding – ASP.NET Development - Custom Controls – Master Pages – Site Navigation – Security – Themes – Web Parts - ASP.NET AJAX

UNIT II WEBSERVICES AND REMOTING 9

Communication – Web Services with ASP.NET – SOAP, WSDL, Web Services - .NET Remoting - .NET Remoting Architecture - .NET Remoting Features – Mobile Web Services

UNIT III ENTERPRISE SERVICES 9

Enterprise Services – Overview – COM+ Application – Message Queuing

UNIT IV WORKFLOW FOUNDATION 9

Windows Workflow Foundation – Activities – Custom Activities – Workflows – Workflow Services – Hosting Workflows – Directory Services – Architecture – Administration Tools

UNIT V COMPACT FRAMEWORK 9

.NET Compact Framework – Compact Edition Data Stores – Errors, Testing and Debugging – Optimizing performance – Packaging and Deployment – Networking and Mobile Devices – Security

TOTAL: 45 PERIODS

TEXT BOOKS

1. Christian Nagel et al. "Professional C# 2005 with .NET 3.0", Wiley India , 2007.
2. Andy Wigley, Daniel Moth, Peter Foot, "Mobile Development Handbook", Microsoft Press, 2007.

REFERENCES

1. Andrew Troelson, "Pro C# with .NET 3.0", Apress, 2007.
2. Kevin Hoffman, "Visual C# 2005", Pearson Education, 2006.
3. Justin Smith, "Inside Windows Communication Foundation", Microsoft Press, 2007.

CS 9050 ROUTERS AND NETWORK PROCESSORS L T P C
3 0 0 3

AIM:

To understand the internals of a router and get an experience of designing such systems.

OBJECTIVES:

- To learn the functions of a router, and its architecture.
- To learn about Network processors – their architecture, programming issues, and design issues.

UNIT I ROUTING IN IP NETWORKS 9

Static Routes – Dynamic Routes – RIP v1, RIP v2 – IGRP – EIGRP – OSPF – Integrated IS-IS – IP Traffic engineering – Traffic, Stochasticity, Delay and Utilization – Application view – Architecture Framework – EGP, BGP routing.

UNIT II ROUTER ARCHITECTURE 9

Function of Router – Types – Elements – Packet flow – Packet Processing - Algorithms And Data Structures (packet buffer allocation, etc) - Packet processing functions (Bridge Algorithm, Table Lookup And Hashing, etc)- Protocol Software (threads, Interrupts, etc) - Hardware Architectures For Protocol Processing - Classification And Forwarding – Switching Fabrics.

UNIT III NETWORK PROCESSORS 9

Scalability With Parallelism And Pipelining - Complexity Of Network Processor Design (packet processing, ingress & egress processing, Macroscopic Data Pipelining And Heterogeneity etc) - Network Processor Architectures : architectural variety, Primary architectural characteristics, Packet Flow, Clock Rates, software architecture, Assigning Functionality To The Processor Hierarchy.

UNIT IV NP ARCHITECTURES 9

Issues In Scaling A Network Processor (processing hierarchy and scaling)– examples of commercial Network Processors : Multi-Chip Pipeline, Augmented RISC Processor, Embedded Processor Plus Coprocessors, etc. - Design Tradeoffs and consequences (Programmability Vs. Processing Speed , speed vs functionality. etc).

UNIT V CASE STUDY – NP ARCHITECTURE AND PROGRAMMING 9

Intel NP - Multithreaded Architecture Overview – Basic Features, External Connections, Internal components – Embedded RISC processor (instruction set, internal peripheral unit, User And Kernel Mode Operation) -Packet Processor Hardware (microsequencing, instruction set, etc) – memory interfaces – system and control interface components – Bus interface -Software Development Kit – IXP instruction set – MicroEngine Programming - thread synchronization – developing sample applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Douglas E. Comer ”Network System Design using Network Processors” Prentice Hall, 2006.
2. Deepankar Medhi, Karthikeyan Ramasamy, “Network Routing : Algorithms, Protocols, and Architecture”, Elsevier, 2007.

REFERENCES:

1. Patrick Crowley, M A Franklin, H Hadimioglu, PZ Onufryk, “Network Processor Design, Issues and Practices Vol - I”, Morgan Kauffman, 2002.
2. http://www.npforum.org/
3. http://www.intel.com/design/network/products/npfamily/

CS 9071 HIGH SPEED NETWORKS L T P C
3 0 0 3

AIM:

To provide an understanding of the networking standards that can be adopted with the current day requirements of complex and voluminous content transfer over heterogeneous platforms.

OBJECTIVES:

- To know about the various standards adopted for handling high traffic.
- To have a primitive level performance analysis for few network constraints for various amount traffic with different networking standards.
- To get a feel of designing a High speed network setup with specialized hardware and optimization approaches like parallelism and pipelining.

UNIT I HIGH SPEED NETWORKS 9

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection – ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet – Gigabit Ethernet– Fibre Channel – Wireless LANs.

UNIT II CONGESTION AND TRAFFIC MANAGEMENT 9

Queuing Analysis – Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

UNIT III ATM CONGESTION CONTROL 9

Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats – ABR Capacity allocations – GFR traffic management.

UNIT IV OPTICAL NETWORKS 9

SONET/SDH-Optical wavelength routing networks-Optical Cross connects and Burst Switching-PONS- Intelligent optical networks-IP over WDM networks.

UNIT V DESIGN TECHNIQUES 9

Design principles and trade offs-End-to-End Vs Hop-by-Hop-Control Mechanisms - Design techniques-Scaling time and space-specialized hardware implementation-parallelism and pipelining-data structure optimization -latency reduction.
Future trends: Changing resource tradeoffs-technology and applications.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. William Stallings, "High speed networks and internet", Second Edition, Pearson Education, 2002. (Unit 1,2 and 3)
2. Warland, Pravin Varaiya, "High performance communication networks", Second Edition , Jean Harcourt Asia Pvt. Ltd., , 2001. (Unit 4)
3. James P.G Sterbenz and Joseph D.Touch "High Speed Networking: A Systematic approach to high-bandwidth low latency communication"Wiley,2001 (Unit 5).

REFERENCES:

1. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
2. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.

CS 9072 **SEMANTIC WEB** **L T P C**
3 0 0 3

AIM:

The aim of this course is to understand the fundamentals of ontologies and the role of ontologies in the web. The course also outlines the issues and languages of semantic web.

OBJECTIVES:

- To understand the fundamentals of ontologies.
- To know about the Semantic Web and the different languages used in the context of semantic web.
- To learn the methodologies used for ontology learning for semantic web.
- To know about ontology management and tools used for Ontology annotation.
- To comprehend the role of semantics in web services and to discuss some of the security issues.

UNIT I INTRODUCTION 9

Components – Types – Ontological Commitments – Ontological Categories – Philosophical Background - Knowledge Representation Ontologies – Top Level Ontologies – Linguistic Ontologies – Domain Ontologies – Semantic Web – Need – Foundation – Layers – Architecture.

UNIT II LANGUAGES FOR SEMANTIC WEB AND ONTOLOGIES 10

Web Documents in XML – RDF - Schema – Web Resource Description using RDF- RDF Properties – Topic Maps and RDF – Overview – Syntax Structure – Semantics – Pragmatics - Traditional Ontology Languages – LOOM- OKBC – OCML - Flogic Ontology Markup Languages – SHOE – OIL - DAML + OIL- OWL

UNIT III ONTOLOGY LEARNING FOR SEMANTIC WEB 10

Taxonomy for Ontology Learning – Layered Approach – Phases of Ontology Learning – Importing and Processing Ontologies and Documents – Ontology Learning Algorithms - Evaluation

UNIT IV ONTOLOGY MANAGEMENT AND TOOLS 9

Overview – need for management – development process – target ontology – ontology mapping – skills management system – ontological class – constraints – issues. Evolution – Development of Tools and Tool Suites – Ontology Merge Tools – Ontology based Annotation Tools.

UNIT V APPLICATIONS 7

Web Services – Semantic Web Services - Case Study for specific domain – Security issues – current trends.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernandez-Lopez, “Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web” Springer, 2004
2. Grigoris Antoniou, Frank van Harmelen, “A Semantic Web Primer (Cooperative Information Systems)”, The MIT Press, 2004

REFERENCES:

1. Alexander Maedche, “Ontology Learning for the Semantic Web”, Springer; 1 edition, 2002
2. John Davies, Dieter Fensel, Frank Van Harmelen, “Towards the Semantic Web: Ontology – Driven Knowledge Management”, John Wiley & Sons Ltd., 2003.
3. Dieter Fensel (Editor), Wolfgang Wahlster, Henry Lieberman, James Hendler, “Spinning the Semantic Web: Bringing the World Wide Web to Its Full Potential”, The MIT Press, 2002
4. Michael C. Daconta, Leo J. Obrst, Kevin T. Smith, “The Semantic Web: A Guide to the Future of XML, Web Services, and Knowledge Management”, Wiley, 2003
5. Steffen Staab (Editor), Rudi Studer, “Handbook on Ontologies (International Handbooks on Information Systems)”, Springer 1st edition, 2004

CS 9073 SCIENTIFIC COMPUTING TECHNIQUES L T P C
3 0 0 3

AIM:

The aim of the course is to provide the student with enough information that they may be able to understand the uses of computers for processing a simulating model of real time systems with a numerical analysis

OBJECTIVES:

- This course uses fitting, PDEs, Integrating etc. , and introduce the student to practical/real world systems which require understanding and defy complete (if any) analytical methods towards their analysis and hence the requirement to form deep knowledge and create skills for numerical treatment of mathematical models governed by curve for modeling and simulation. This will include the mathematical, statistical and language tools required for specifying a model, running the simulation and analyzing the results.

UNIT I INTRODUCTION TO SYSTEM MODELING 10

Modeling and General Systems Theory-Concepts of Simulation-Types of Simulation-Experimental Design Consideration- Comparison and Selection of Simulation Languages-Development of Simulation Models Using any one of the Languages for Some Problems **-**Stochastic Simulation - Randomness and Random Numbers - Random Number Generators - Software for Generating Random Numbers.

UNIT II APPROXIMATIONS IN SCIENTIFIC COMPUTING 8

General Strategy - Approximations in Scientific Computation - Mathematical Software - Mathematical Software Libraries - Scientific Computing Environments - Extended Arithmetic Packages

UNIT III OPTIMIZATION 8

Optimization Problems - Existence and Uniqueness - Convexity - Optimization in One Dimension- Multidimensional Unconstrained Optimization - Constrained Optimization - Linear Programming

UNIT IV ROOTS OF EQUATION , LINEAR ALGEBRAIC EQUATION AND INTERPOLATION 10

Graphical Method – Iterative Methods- Newton-Raphson Method- Break-Even Analysis-Gauss Elimination-Solution Of Linear Systems By Gaussian, Gauss-Jordan, Jacobi And

Gauss Seidel Methods-Matrix Inversion-Gauss-Jordan Method. Least-Square Regression -Newton's Divided-Difference Interpolating Polynomials-Lagrange's polynomials-Newton's Forward and Backward Difference Formula- Stirling's and Bessel's Central Difference Formula.

UNIT V NUMERICAL ORDINARY AND PARTIAL DIFFERENTIATION AND INTEGRATION 9

Numerical Differentiation: Runge-Kutta Methods, Boundary-Value and Eigen value Problems.Partial Differential Equation-Elliptic Equation, Parabolic Equations.Numerical Integration: Trapezoidal and Simpson's Rules – Two and Three Point Gaussian Quadrature Formula – Double Integral Using Trapezoidal and Simpson's Rule.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jerry Banks and John Carson, "Discrete Event System Simulation", Third Edition, PHI, 2002.
2. Steven C. Chapra, Raymond P. Canale, "Numerical Methods for Engineering", Second Edition, McGraw-Hill, 1989.

REFERENCES:

1. Sastry S.S "Introductory Methods of Numerical Analysis", Third Edition, Prentice Hall India, 1998
2. Geoffery Gordon, "System Simulation", Second Edition, PHI, 2002.

CS 9074 SOFTWARE AGENTS L T P C
3 0 0 3

AIM:

This course aims at providing sufficient in depth knowledge in Software agents.

OBJECTIVES:

- The student can well understand the philosophy and psychology of both human agents and software agents regarding co ordinations operation and communication.
- Intelligent / Cognitive aspects are dealt with software knowledge support.

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- FIPA – ACL – DIA GAL– 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

Reasoning about Multi agent Interaction between agents – Reactive English Agents Dutch – Combinational Spectrum – Cognitive Agents – Interaction protocols – Agent coordination – Agent negotiation – Agent Cooperation – Agent Organization – Self-Interested agents in Electronic Commerce Applications – Probabilistic Agents – Temporal Agents.

UNIT IV INTELLIGENT SOFTWARE AGENTS 9

Interface Agents – Agent Communication Languages – Agent Knowledge Representation – Agent Adaptability – Belief Desire Intension – Mobile Agent Applications- Argumentaic and Knowledge Sharing Agent.

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 Agents.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Bigus & Bigus, " Constructing Intelligent agents with Java ", Wiley, 1997.
2. Bradshaw, " Software Agents ", MIT Press, 2000.

REFERENCES:

1. Russel, Norvig, "Artificial Intelligence: A Modern Approach", Second Edition, Pearson Education, 2003.
2. Richard Murch, Tony Johnson, "Intelligent Software Agents", Prentice Hall, 2000.
3. Gerhard Weiss, “Multi Agent Systems – A Modern Approach to Distributed Artificial Intelligence”, MIT Press, 2000.

CS9075 NETWORK ANALYSIS AND MANAGEMENT L T P C
3 0 0 3

AIM:

To introduce the performance analysis of networks and to understand the features and structures required for network management.

OBJECTIVES:

- To make a quantitative analysis and performance of network
- To explore critical design issues and approaches to meet the communication requirements
- To manage today’s systems effectively and to plan intelligently for the future use of network management system

UNIT I NETWORK ANALYSIS 9

Performance Characteristics – Requirement Analysis: Concepts –User, Device, Network Requirements – Process –Developing RMA ,Delay, Capacity Requirements – Flow Analysis – Identifying and Developing Flows –Flow Models –Flow Prioritization – Specification.

UNIT II PROBABILITY AND STOCHASTIC PROCESS 9

Overview of probability – Random variables-Stochastic process –Link Delay components – Queuing Models – Little’s Theorem – Birth & Death process – Queuing Disciplines.

UNIT III QUEUING MODELS 9

Markovian FIFO Queuing Systems – M/M/1 – M/M/a – M/M/∞ - M/G/1 – M/M/m/m and other Markov – Non-Markovian and self-similar models – Network of Queues –Burke’s Theorem –Jackson’s Theorem.

UNIT IV NETWORK MONOTORING 9

Monitoring & Control – Standard bodies -SNMP ,V2,V3,RMON1,RMON2

UNIT V NETWORK MANAGEMENT 9

Network management Functions - concepts - management interface bases- ASN.1- network management security issues- CMIP- network management tools - network management case study and review .

TOTAL: 45 PERIODS

TEXT BOOKS:

1. James D.McCabe, “Network Analysis, Architecture and Design”, 2nd Edition,Elsevier
2. Nader F.Mir “Computer and Communication Networks”, Pearson Education.
3. Stallings, William, “SNMP, SNMPv2 and CMIP”, Addison-Wesley, Reading, Mass., 1993

REFERENCES:

1. Bertsekas & Gallager ,”Data Networks”, second edition ,Pearson Education, 1991
2. William Stallings,”High-Speed Networks”, Prentice-Hall, 1998
3. Mauro and Schmidt,”Essential SNMP”, O'Reilly, 2001

CS 9077 REAL TIME SYSTEMS L T P C
3 0 0 3

AIM:

To study the adaptation of architecture and development methods to support real-time systems

OBJECTIVES:

- To characterize the problem space real-time systems address and what are the specialized requirements of real-time systems
- To describe the solutions for standard problems of real-time systems
- To characterize the solution space real-time systems employ and how these solutions tend to differ from other systems
- To describe and justify adaptations to the development process to support real-time systems
- To understand the evaluation of real time systems

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 PERIODS

TEXT BOOK:

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.

GE 9022 TOTAL QUALITY MANAGEMENT L T P C
3 0 0 3

AIM:

To provide comprehensive knowledge about the principles, practices, tools and techniques of Total quality management.

OBJECTIVES:

- To understand the various principles, practices of TQM to achieve quality.
- To learn the various statistical approaches for Quality control.
- To understand the TQM tools for continuous process improvement.
- To learn the importance of ISO and Quality systems.

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II TQM PRINCIPLES 9

Leadership – Strategic quality planning, Quality statements - Customer focus Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I 9

The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV TQM TOOLS & TECHNIQUES II 9

Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

UNIT V QUALITY SYSTEMS 9

Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, Third Edition, Indian Reprint (2006).

REFERENCES:

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2003.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.
4. Janakiraman,B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

GE 9021 PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

AIM:

To sensitize the engineering students on blending both technical and ethical responsibilities.

OBJECTIVES:

- Identify the core values that shape the ethical behavior of an engineer.
- Utilize opportunities to explore one's own values in ethical issues.
- Become aware of ethical concerns and conflicts.
- Enhance familiarity with codes of conduct.
- Increase the ability to recognize and resolve ethical dilemmas.

UNIT I ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral Dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as Responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY 9

Safety and Risk – Assessment of Safety and Risk – Risk analysis-Reducing Risk – The Government Regulator's Approach to Risk - Case Studies -Chernobyl and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V GLOBAL ISSUES 9

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TOTAL: 45 PERIODS

TEXT BOOKS :

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York (2005).
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, (2000).

REFERENCES:

1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, (1999).
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, (2003)
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, (2001)
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, (2004)
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)

GE9023 FUNDAMENTALS OF NANOSCIENCE L T P C
3 0 0 3

AIM:

To make the students understand the importance ,relevance and potentialities of this emerging field of study.

OBJECTIVES:

- Study the basic nano technology and nano science.
- Understand interdisciplinary nature of this field.
- Understand the important role of physics, chemistry ,biology.
- Recognize that the rules of nano science are fundamentally different than those we experience.
- Study the basic fabrication strategies of nano science.

UNIT I INTRODUCTION 10

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II PREPARATION METHODS 10

Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES 5

Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma /reactive ion) etching, Etch resists-dip pen lithography

UNIT IV PREPARATION ENVIRONMENTS 10

Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working Practices, Sample cleaning, Chemical Purification, Chemical and Biological contamination, Safety Issues, Flammable and Toxic Hazards, Biohazards.

UNIT V CHARECTERISATION TECHNIQUES 10

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

TOTAL: 45 PERIODS

TEXT BOOKS:

1. A.S. Edelstein and R.C. Cammearata, eds., “Nanomaterials: Synthesis, Properties and Applications”, Institute of Physics Publishing, Bristol and Philadelphia, 1996.
2. N John Dinardo, “Nanoscale charecterisation of surfaces & Interfaces”, 2nd Edition, Weinheim Cambridge, Wiley-VCH, 2000

REFERENCES:

1. G Timp (Editor), “Nanotechnology”, AIP press/Springer, 1999
2. Akhlesh Lakhtakia (Editor), “The Hand Book of Nano Technology,Nanometer Structure”, Theory, Modeling and Simulations, Prentice-Hall of India (P) Ltd, New Delhi, 2007.