

COURSE OBJECTIVES

The student should be made to:

- Be familiar with the use of Office software
- Be exposed to presentation and visualization tools
- Be exposed to problem solving techniques and flow charts
- Learn to use Arrays, strings, functions, structures and unions

LIST OF EXERCISES**a) Word Processing****10**

1. Document creation, Text manipulation with Scientific notations.

2. Table creation, Table formatting and Conversion.

3. Mail merge and Letter preparation.

4. Drawing - flow Chart

b) Spread Sheet**10**

5. Chart - Line, XY, Bar and Pie.

6. Formula - formula editor.

7. Spread sheet - inclusion of object, Picture and graphics, protecting the document and sheet.

8. Sorting and Import / Export features.

c) Techpub software

9. CorelDraw – SGML – Illustrator

d) C Programming**10**

10. Data types, Expression Evaluation, Condition Statements.

11. Arrays

12. Structures and Unions

13. Functions

14. File Handling

15. Pointers

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- Apply good programming design methods for program development.
- Design and implement C programs for simple applications.
- Develop recursive programs

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Standalone desktops with C compiler 30 Nos. (or)
2. Server with C compiler supporting 30 terminals or more

Mapping of Course Outcomes with Programming Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	3	3	3	-	1	1	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	-	-	-	-	-	-	-	2	3	3
CO4	1	3	3	3	-	-	-	-	-	-	-	2	1	3



COURSE OBJECTIVES

The students should be made to:

- learn the organization of a digital computer.
- be exposed to the number systems.
- learn to think logically and write pseudo code or draw flow charts for problems.
- be exposed to the syntax of C.
- learn to use arrays, strings, functions, pointers, structures and unions in C.

UNIT I INTRODUCTION TO COMPUTERS 9

Introduction – **Characteristics of Computers** – Evolution of Computers – Computer Generations – Classification of Computers – **Basic Computer organization** – Number Systems. Computer Software – Types of Software – Software Development Steps – **Internet Evolution** - Basic Internet Terminology – Getting connected to Internet Applications. Problem Solving Techniques- Planning the Computer Program

– Purpose – Algorithm – Flow Charts – Pseudo code. Application Software Packages- Introduction to Office Packages -CorelDraw – **SGML – Illustrator** (not detailed commands for examination).

UNIT II BASICS OF 'C' LANGUAGE 9

Overview of C – Constants, Variables and Data Types – **Operators and Expressions** – Managing Input and Output operators – **Decision Making** - **Branching and Looping**.

UNIT III ARRAYS AND STRINGS 9

Array Concepts- **Two Dimensional Array** - **Passing Arrays to Functions** - Multi Dimensional Array. String Operations - **Sorting and Searching**

UNIT IV FUNCTIONS AND POINTERS 9

Functions – **Function Prototypes** – Parameter Passing Methods – Recursion – Library Functions. Pointers – Pointers and Functions – Pointers and Strings – **Operations on Pointers** – **Dynamic Memory Allocation**

UNIT V STRUCTURE, UNIONS AND FILE HANDLING 9

Structures and Union – **Declaring** , Accessing, **Initialization**, Structure assignment, Nested Structure, Array of Structure. **File Handling Functions**.

TOTAL PERIODS: 45

COURSE OUTCOMES

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

- design C Programs for problems.
- write and execute C programs for simple applications
- logically and draw flow charts for problems
- write pseudo code or draw flow charts for problems
- use arrays, strings, functions, pointers, structures

TEXT BOOKS:

1. Anita Goel and Ajay Mittal, “Computer Fundamentals and Programming in C”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.
2. Pradip Dey, Manas Ghosh, “Fundamentals of Computing and Programming in C”, First Edition, Oxford University Press, 2009.
3. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.

REFERENCES:

1. Byron Gottfried, “Programming with C”, 3rd Edition, (Indian Adapted Edition), TMH publications, 2010.
2. Stephen G.Kochan, “Programming in C”, 5th Edition, Pearson Education India, (2011).
3. Brian W. Kernighan and Dennis M.Ritchie, “The C Programming Language”, Pearson Education Inc., (2009).
4. E.Balagurusamy, “Computing fundamentals and C Programming”, TataMcGraw-Hill Publishing Company Limited, (2011).
5. Dromey R.G., “How to Solve it by Computer”, Pearson Education, Fifth Reprint, 2009.

WEB LINKS:

1. <http://www.nptel.ac.in/>
2. http://www.tutorialspoint.com/cprogramming/cprogramming_tutorial.pdf
3. <https://www.youtube.com/watch?v=QsBVjhRlfh8>

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3	3	2



COURSE OBJECTIVES

The student should be made to:

- Achieve an understanding of fundamental data structures and the tradeoffs between different implementations of these abstractions.
- Be exposed to Theoretical analysis, implementation, and application.
- Learn linear data structures – list, stack, and queue.
- Be exposed to sorting, searching and hashing algorithms.
- Understand various algorithm design and analysis techniques.

UNIT I LINEAR STRUCTURES**9**

Abstract Data Types (ADT) - List ADT -array-based implementation -linked list implementation -cursor-based linked lists -doubly linked lists -applications of lists - Stack ADT - Queue ADT - circular queue implementation -Applications of stacks and queues

UNIT II TREE STRUCTURES**9**

Tree ADT -tree traversals -left child right sibling data structures for general trees -Binary Tree ADT - expression trees - applications of trees -binary search tree ADT- AVL trees – binary heaps.

UNIT III HASHING AND SETS**9**

Hashing -Separate Chaining – Open Addressing – Rehashing – Extendible Hashing – Disjoint Set ADT - dynamic equivalence problem -smart union algorithms - path compression – applications of Sets.

UNIT IV GRAPHS**9**

Definitions - Topological sort - breadth-first traversal - shortest-path algorithms - minimum spanning tree - Prim's and Kruskal's algorithms -Depth-first traversal – bi connectivity -Euler circuits - applications of graphs

UNIT V ALGORITHM DESIGN AND ANALYSIS**9**

Introduction to algorithm design techniques: Greedy algorithms, Divide and conquer, Dynamic programming, backtracking, branch and bound, Randomized algorithms – Introduction to algorithm analysis: asymptotic notations, recurrences – Introduction to NP-complete problems

TOTAL PERIODS 45

COURSE OUTCOMES:

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

- Understand the concepts of data structure, data type and array data structure.
- Implement linked list data structure to solve various problems
- Understand and apply various data structure such as stacks, queues, trees and graphs to solve various computing problems using C-programming language.
- Implement and know when to apply standard algorithms for searching and sorting.
- Analyze algorithms and determine their time complexity.

TEXT BOOKS

1. M. A. Weiss, "Data Structures and Algorithm Analysis in C", Pearson Education Asia, 2002.
2. ISRD Group, "Data Structures using C", Tata McGraw- Hill Publishing Company Ltd., 2006.

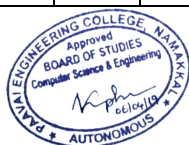
REFERENCES:

1. A. V. Aho, J. E. Hopcroft, and J. D. Ullman, "Data Structures and Algorithms", Pearson Education, 2009.
2. R. F. Gilberg, B. A. Forouzan, "Data Structures", Second Edition, Thomson India Edition, 2008.
3. M. Tenenbaum, Y. Langsam, and M. J. Augenstein, "Data Structures using C", Pearson Education, 2007.
4. K.S. Easwarakumar, Object Oriented Data Structures using C++, Vikas Publishing House pvt.Ltd., 2010.
5. Sara Baase and A. Van Gelder, "Computer Algorithms", Third Edition, Pearson Ed., 2011

WEB LINKS:

1. <http://www.nptel.ac.in/>
2. <http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms>
3. <https://www.youtube.com/watch?v=RpRRUQFbePU>

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CO3	1	3	1	1	-	1	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	1	1	3
CO5	3	1	3	1	-	2	-	-	-	-	-	3	3	2



TEXT BOOKS

1. Veerarajan T., “Transforms and Partial Differential Equations”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, Second reprint, 2012.
2. Narayanan S., Manickavasagam Pillai.T.K and Ramanaiah.G “Advanced Mathematics for Engineering Students” ,Vol. II & III, S.Viswanathan Publishers Pvt Ltd. 1998

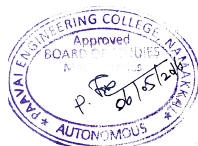
REFERENCES

1. Larry C. Andrews, Bhimsen K. Shivamoggi, “Integral Transforms for Engineers”, SPIE Optical Engineering press, Washington USA (1999).
2. Ramana.B.V., “Higher Engineering Mathematics”, Tata Mc-GrawHill Publishing Company limited, New Delhi (2010).
3. Glyn James, “Advanced Modern Engineering Mathematics”, 3rd Edition, Pearson Education (2007).
4. Erwin Kreyszig., “Advanced Engineering Mathematics” 10th Edition,Wiley Publications
5. Ray Wylie C and Barrett.L.C, “Advanced Engineering Mathematics”, Tata McGraw Hill Education Pvt Ltd, Sixth Edition, New Delhi, 2012.

WEB LINKS

1. <https://www.youtube.com/watch?v=coe-UA5ONi0>
2. <https://www.youtube.com/watch?v=gZnm7L96pfY>
3. <http://172.16.100.200/NPTEL/displayweb.html?type1=111103021%2F35.pdf>
4. <https://www.youtube.com/watch?v=4GHY8sRKPu>
5. <http://172.16.100.200/NPTEL/displayweb.html?type1=111104031%2Flectures.pdf%23page%3D101>.

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak															
COs	Programme Outcomes(POs)													PSO1	PSO2
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12			
CO1	3	3	2	3	-	-	-	-	-	-	-	1	3	2	
CO2	3	3	2	3	-	-	-	-	-	-	-	1	3	2	
CO3	3	3	2	3	-	-	-	-	-	-	-	1	3	2	
CO4	3	3	2	3	-	-	-	-	-	-	-	1	3	2	
CO5	3	3	3	2	-	-	-	-	-	-	-	1	3	2	



COURSE OBJECTIVES

- To expose the students to the fundamentals of Database Management Systems.
- To make the students understand the relational model.
- To familiarize the students with ER diagrams.
- To familiarize the students the SQL and different types of databases.
- To make the students understand the Security Issues in Databases.

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 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 I/O 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/ Code 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 PERIODS 45**COURSE OUTCOMES**

At the end of the course, the student should be able to

- design Databases for applications.

- use the Relational model, ER diagrams.
- apply concurrency control and recovery mechanisms for practical problems.
- design the Query Processor and Transaction Processor.
- apply security concepts to databases.

TEXT BOOKS

1. Silberschatz, H.Korth and Sudarshan S., “Database System Concepts”, 6th Edition, McGraw-Hill International, 2010.
2. Elmasri R. and Shamakant B. Navathe, “Fundamentals of Database Systems”, 6th Edition, Addison Wesley , 2011.

REFERENCES

1. Atul Kahate, “Introduction to Database Management Systems”, Pearson Education, New Delhi, 2006.
2. Raghu Ramakrishnan, “Database Management Systems”, Fourth Edition, Tata Mc Graw Hill, 2010.
3. Rob Cornell, “Database Systems Design and Implementation”, Cengage Learning, 2011.
4. C.J.Date, A.Kannan, S.Swamynathan, “An Introduction to Database Systems”, Eighth Edition, Pearson Education, 2006.
5. Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom, “Database Systems: The Complete Book”, Pearson Education, Second Edition, 2008.

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CO1	2	2	2	2	3	-	-	-	2	2	2	2	2	1
CO2	3	3	3	3	3	-	-	-	3	3	3	1	3	3
CO3	3	3	2	2	2	-	-	-	3	2	2	1	3	3
CO4	3	2	2	2	2	-	-	-	2	2	2	1	3	2
CO5	2	2	2	2	2	-	-	-	2	2	2	1	2	2



COURSE OBJECTIVES

- To understand the basic structure and operation of digital computer.
- To familiarize the students with arithmetic and logic unit and implementation of fixed point and floating-point arithmetic operations.
- To expose the students with the concept of pipelining.
- To provide the knowledge of memory system.
- To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

UNIT I	BASIC STRUCTURE OF COMPUTERS	9
	Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Hardware – Software Interface – Instruction set architecture – Addressing modes – RISC – CISC.	
UNIT II	BASIC PROCESSING UNIT & ALU OPERATIONS	9
	Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – ALU-Addition and subtraction – Multiplication – Division.	
UNIT III	PIPELINING & PARALLELISM	9
	Basic concepts – Data hazards – Instruction hazards – Structural Hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling – Instruction- level-parallelism – Parallel processing challenges – Flynn's classification – Hardware multithreading – Hardware support for exposing parallelism	
UNIT IV	MEMORY SYSTEM	9
	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
	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.	

TOTAL PERIODS 45**COURSE OUTCOMES**

At the end of the course, the student should be able to

- design arithmetic and logic unit.
- design and analyse pipelined control units.
- evaluate performance of memory systems.
- understand parallel processing architectures.
- understand Memory access Mode.

TEXT BOOKS

1. David A. Patterson and John L. Hennessey, "Computer organization and design", MorganKauffman / Elsevier, Fifth edition, 2014.
2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, "Computer Organization", VITH Edition, Tata McGraw Hill, 2012.

REFERENCES

1. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.
2. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
3. William Stallings, "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
4. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
5. V.P. Heuring, H.F. Jordan, "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.

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CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	1	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	1	-	-	2	-	-	-	-	-	3	3	2



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1. H.Taub, D L Schilling ,G Saha ,”Principles of Communication”3/e,2007.
2. B.P.Lathi,”Modern Analog And Digital Communication systems”, 3/e, Oxford University Press, 2007
3. Blake, “Electronic Communication Systems”, Thomson Delmar Publications, 2002.
4. Martin S.Roden, “Analog and Digital Communication System”, 3rd Edition, PHI, 2002.
5. B.Sklar,”Digital Communication Fundamentals and Applications”2/e Pearson Education 2007.

GE 2021

ENVIRONMENTAL SCIENCE AND ENGINEERING

L T P C
3 0 0 3

AIM

- The aim of this course is 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 participates.

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.

COURSE OBJECTIVES

- To know the constituents of the environment and the precious resources in the environment.
- To conserve all biological resources.
- To understand the role of human being in maintaining a clean environment and useful environment for the future generations.
- To maintain the ecological balance and preserve bio-diversity.
- The role of government and non-government organizations in environment management.

UNIT I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES**9**

Environment: Definition- scope - **importance** – need for public awareness. Forest resources: Use –over exploitation- deforestation - case studies- mining - effects on forests and tribal people. Water resources: Use – over utilization of surface and ground water- floods – drought - **conflicts over water**. Mineral resources: Use – 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. Land resources: Land as resource - land degradation - soil erosion. Role of an individual in conservation of natural resources.

UNIT II ECOSYSTEMS AND BIODIVERSITY**9**

Concept of an ecosystem: Structure and function of an ecosystem – producers - consumers -decomposers – energy flow in the ecosystem – ecological succession – food chains - food webs and ecological pyramids. Types of ecosystem: Introduction - characteristic features - **forest ecosystem** - grassland ecosystem - desert ecosystem - aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity: Introduction– definition (genetic - species –ecosystem) diversity. Value of biodiversity: **Consumptive use** - productive use – social values – **ethical values** - aesthetic values. Biodiversity level: Global - national - locallevels- India as a mega diversity nation- **hotspots 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.

UNIT III ENVIRONMENTAL POLLUTION**9**

Pollution: Definition –air pollution - water pollution - **soil pollution** - marine pollution - noise pollution - thermal pollution – nuclear hazards. **Solid waste management: Causes - effects** - control measures of urban and industrial wastes. Role of an individual in prevention of pollution - **pollution case studies** - Disaster management: Floods – earthquake - **cyclone - landslides**. Electronic wastes--Sources-Causes and its effects.

UNIT IV SOCIAL ISSUES AND ENVIRONMENT**9**

Sustainable development: Unsustainable to sustainable development – urban problems related to energy. Water conservation - rain water harvesting - **watershed management**. Resettlement and rehabilitation of

people. Environmental ethics: Issues - possible solutions – climate change - global warming and its effects on flora and fauna - acid rain - ozone layer depletion - nuclear accidents - nuclear holocaust - wasteland reclamation - consumerism and waste products. Environment protection act: Air (Prevention and Control of Pollution) act – water (Prevention and control of Pollution) act – wildlife protection act – forest conservation act – issues involved in enforcement of environmental legislation.

UNIT V HUMAN POPULATION AND ENVIRONMENT 9

Human population: Population growth - variation among nations – population explosion – family welfare programme and family planning – environment and human health – Human rights – value education – HIV / AIDS, Swine flu – women and child welfare. Role of information technology in environment and human health.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student will be able to

- know the relationship between the human population and environment.
- understand the basic concepts of environment studies and natural resources.
- gaining the knowledge about ecosystem and biodiversity.
- have knowledge about causes, effects and control measures of various types of pollution.
- understand the social issues and various environmental acts.

TEXT BOOKS

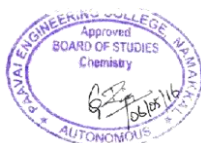
1. T.G.Jr. Miller, Environmental Science, 10thEdn, Wadsworth Publishing Co., 2004.
2. Raman Sivakumar, Introduction to Environmental Science and Engineering, 2ndEdn, Tata McGraw Hill Education Private Limited, New Delhi, 2010.
3. Benny Joseph, “Environmental Science and Engineering”, Tata McGraw Hill, 2010.

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1. BharuchaErach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India,2010 .
2. S. Divan, Environmental Law and Policy in India, Oxford University Press, New Delhi, 2001.
3. K.D. Wager, Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.
4. W.P. Cunningham, Environmental Encyclopedia, JaicoPublishing House, Mumbai, 2004.
5. Clair Nathan Sawyer, Perry L. McCarty, Gene F. Parkin, “Chemistry for Environmental Engineering and Science”, McGraw Hill Science, 2010.

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CO3	2	-	2	-	2	1	-	3	-	2	-	3	1	-
CO4	2	2	2	-	2	1	3	3	-	2	-	3	1	-
CO5	-	2	-	-	-	1	3	3	2	2	-	2	1	-



COURSE OBJECTIVES

The students should be made to:

- Demonstrate familiarity with major algorithms and data structures.
- Analyze performance of algorithms.
- Choose the appropriate data structure and algorithm design method for a specified application.
- Determine which algorithm or data structure to use in different scenarios.

LIST OF EXPERIMENTS

1. Implement singly and doubly linked lists.
2. Represent a polynomial as a linked list and write functions for polynomial addition.
3. Implement stack and use it to convert infix to postfix expression
4. Implement an expression tree. Produce its pre-order, in-order, and post-order traversals.
5. Implement binary search tree.
6. Implement priority queue using heaps
7. Implement hashing techniques.
8. Implement Dijkstra's algorithm using priority queues
9. Implement Greedy algorithm using C.
10. Implement Branch and bound, Divide and Conquer algorithm using C.

TOTAL PERIODS: 30

COURSE OUTCOMES

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

- Understand the importance of structure and abstract data type, and their basic usability in different applications through C programming.
- Understand the linked implementation, and its uses both in linear and non-linear data structure.
- Understand various data structure such as stacks, queues, trees, graphs, etc. to solve various computing problems.
- Implement various kinds of searching and sorting techniques, and know when to choose which technique.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

- Standalone desktops with C compiler 30 Nos.

(or)

- Server with C compiler supporting 30 terminals or more.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	1	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	1
CO3	2	3	2	-	1	-	1	-	-	-	-	2	2	3
CO4	3	3	3	3	-	-	-	-	-	-	-	1	1	3



COURSE OBJECTIVES

- To create and use a database
- To have hands on experience on DDL Commands
- To have a good understanding of DML Commands and DCL commands
- To be Familiarize with advanced SQL queries.

LIST OF EXPERIMENTS

1. Data Definition, Table Creation, Constraints,
2. Insert, Select Commands, Update & Delete Commands.
3. Nested Queries & Join Queries
4. Views
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Front end tools
7. Forms
8. Triggers
9. Menu Design
10. Reports.
11. Database Design and implementation (Mini Project).
 - a. Personal Information System.
 - b. Web Based User Identification System.
 - c. Timetable Management System.
 - d. Hotel Management System

TOTAL PERIODS 60**COURSE OUTCOMES**

At the end of the course, the student should be able to

- design and implement a database schema for a given problem-domain
- populate and query a database
- create and maintain tables using PL/SQL.
- prepare reports.

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
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CO1	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO2	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO3	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2



- review Queuing Theory and its empirical analysis based on the observed data of checking out sales service unit of ICA Supermarket
- be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

TEXT BOOKS

1. Gross, Donald Harris and M Carl, “Fundamentals of Queuing Theory”, 3rd ed., Wiley Publications, New Delhi, 2008.
2. Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 2nd Indian Reprint, 2010.
3. T Veerarajan, “Probability, Statistics and Random Processes”, 2nd ed., Tata McGraw- Hill, New Delhi, 2008.

REFERENCES

1. Trivedi, K.S., “Probability and Statistics with Reliability, Queueing and Computer Science Applications”, PHI, New Delhi, 2nd Edition, 2009.
2. Hwei Hsu, “Schaum’s Outline of Theory and Problems of Probability, Random Variables and Random Processes”, Tata McGraw Hill, New Delhi, 9th Reprint, 2010.
3. Yates. R.D. and Goodman. D. J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd.,Bangalore, 2nd Edition, 2012.
4. Venkatachalam. G, “Probability and Queueing Theory”,Hitech Publishing Company Pvt.Ltd.,Chennai,3rd Edition, 2012.

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CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2
CO5	2	2	2	2	2	-	-	-	2	2	2	1	2	2



COURSE OBJECTIVES

- To understand the concepts of data communications
- To be familiar with the Transmission media and Tools
- To study the functions of OSI layers
- To learn about IEEE standards in computer networking
- To get familiarized with different protocols and network components.

UNIT I FUNDAMENTALS & LINK LAYER 9

Building a network – Requirements – Layering and protocols – Internet Architecture – Network software – Performance ; Link layer Services – Framing – Error Detection – Flow control

UNIT II MEDIA ACCESS & INTERNET WORKING 9

Media access control – Ethernet (802.3) – Wireless LAN' s – 802.11 – Bluetooth – Switching and bridging – Basic Internetworking (IP, CIDR, ARP, DHCP, ICMP)

UNIT III ROUTING 9

Routing (RIP, OSPF, metrics) – Switch basics – Global Internet (Areas, BGP, IPv6), Multicast – addresses – multicast routing (DVMRP, PIM, MSDB, MPLS) – Routing among Mobile Devices.

UNIT IV TRANSPORT LAYER 9

Overview of Transport layer – UDP – Reliable byte stream (TCP) – Connection management – Flow control – Retransmission – TCP Congestion control – Congestion avoidance (DECbit, RED) – QoS – Application requirements

UNIT V APPLICATION LAYER 9

Traditional applications -Electronic Mail (SMTP, POP3, IMAP, MIME) – HTTP – Web Services – DNS – SNMP – Overlay networks.

TOTAL PERIODS 45**COURSE OUTCOMES**

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

- identify the components required to build different types of networks.
- choose the required functionality at each layer for given application.
- identify solution for each functionality at each layer.
- trace the flow of information from one node to another node in the network.
- understanding the Applications of Networks and data communications.

TEXT BOOKS

1. Larry L. Peterson, Bruce S. Davie, “Computer Networks: A Systems Approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.
2. Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw – Hill, 2011.

REFERENCES

1. Andrew S. Tanenbaum, Computer Networks, Pearson Education, 2008
2. James F. Kurose, Keith W. Ross, “Computer Networking – A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
4. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.
5. William Stallings, “Data and Computer Communication”, Sixth Edition, Pearson Education, 2000

Mapping of Course Outcomes with Programming Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
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CO3	3	3	2	2	2	-	-	-	3	2	2	2	3	3
CO4	2	2	2	2	2	-	-	-	2	2	2	1	2	2
CO5	2	2	2	2	2	-	-	-	2	2	2	1	2	2



COURSE OBJECTIVES

- To know the basic concepts and functions of operating systems.
- To understand the structure and functions of OS.
- To learn about Processes, Threads and Scheduling algorithms.
- To understand the principles of concurrency and Deadlocks.
- To learn various memory management schemes.

UNIT I INTRODUCTION 9

Introduction: Computer system organization - **Introduction to operating systems** – operating system structures – services - system calls – system programs. **Processes: Process concept** – Process scheduling – Operations on processes – Cooperating processes – Inter process communication – Communication in client-server systems. Threads: Multi-threading models – **Threading issues**. Case Study: Pthreads library.

UNIT II PROCESS MANAGEMENT AND DEADLOCK 10

CPU Scheduling: Scheduling criteria – Scheduling algorithms – **Multiple**-processor scheduling – Real time scheduling – Algorithm Evaluation. Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – Monitors. **Deadlock: System model** – Deadlock characterization – **Methods for handling deadlocks** – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock. Case Study: Process scheduling in Linux.

UNIT III MEMORY MANAGEMENT 9

Main Memory: Background – **Swapping** – Contiguous memory allocation – **Paging** – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Page replacement – Allocation of frames – **Thrashing**. Case Study: **Memory management in windows and Solaris**.

UNIT IV FILE SYSTEMS 9

File-System Interface: File concept – Access methods – **Directory structure** – File system mounting – File sharing - Protection. File-System Implementation: Directory implementation – Allocation methods – Free-space management – **efficiency and performance** – recovery – Network file systems. **Case studies: File system in Windows XP**.

UNIT V I/O SYSTEMS AND MASS STORAGE MANAGEMENT 8

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem – **streams** – performance. Mass-Storage Structure: Disk attachment - Disk scheduling – Disk management – **Swap-space management** – RAID – **stable storage**. Case study: **I/O in Linux**.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to

- design various Scheduling algorithms and apply the principles of concurrency.
- design deadlock, prevention and avoidance algorithms.
- compare and contrast various memory management schemes.
- design and Implement a prototype for file systems.
- schedule and manage the disk effectively.

TEXT BOOK

1. Silberschatz, Galvin, and Gagne, “Operating System Concepts”, Ninth Edition, Wiley India Pvt Ltd, 2013.

REFERENCES

1. Andrew S. Tanenbaum, “Modern Operating Systems”, Fourth Edition, Pearson Education, 2014.
2. William Stallings, “Operating Systems – internals and design principles”, Prentice Hall, 7thEdition, 2011.
3. Harvey M. Deital, “Operating Systems”, Third Edition, Pearson Education, 2007.
4. Andrew S. Tannenbaum & Albert S. Woodhull, “Operating System Design and Implementation”, Prentice Hall, 3rd Edition, 2006.
5. Gary J.Nutt, “Operating Systems”, Pearson/Addison Wesley, 3rd Edition, 2004.

Mapping of Course Outcomes with Programming Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3	3	2



COURSE OBJECTIVES

- To know about the various phases in a software project.
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the major considerations for enterprise integration and deployment.
- To learn various testing and maintenance measures.
- To be familiar with software estimation techniques.

UNIT I SOFTWARE PROCESS 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 SOFTWARE REQUIREMENTS 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 REQUIREMENTS ANALYSIS 9

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

UNIT IV SOFTWARE DESIGN AND SOFTWARE TESTING 9

Design Engineering – Design process – **-Design Quality** - Design model - Agile Methods – Extreme Programming - Rapid Application development – Software Prototyping - Software Reuse – The Reuse Landscape – Design Patterns – **Generator-Based Reuse** – Application Frameworks – Application System Reuse - Software Evolution Program Evolution Dynamics – **Software Maintenance** – Evolution Processes – Legacy system evolution Planning - Verification and Validation – Software Inspections – Automated Static analysis – Verification and Formal methods - Software Testing – **System Testing** – Component Testing – Test case Design – Test Automation.

UNIT V SOFTWARE PROJECT MANAGEMENT 9

Software Cost Estimation – productivity – **Estimation Techniques** – Algorithmic Cost Modelling – **Project Duration and Staffing** - Process and Product Quality – Quality Assurance and Standards – Planning –

Control- Software Measurement and Metrics - Process Improvement – Process Classification – Measurement –Analysis and Modelling –Change – **The CMMI process improvement Framework** - Configuration Management. –Planning Change Management – Version and Release Management – System Building – CASE tools for configuration management.

TOTAL PERIODS 45

COURSE OUTCOMES

At the end of the course, the student should be able to

- identify the key activities in managing a software project and compare different process models.
- understand the concepts of requirements engineering and Analysis Modeling.
- apply systematic procedure for software design and deployment.
- compare and contrast the various testing and maintenance.
- understand the concept of Software Project Management.

TEXT BOOKS

1. Roger S.Pressman, Software Engineering: A Practitioner’s Approach, McGraw Hill International edition, Eighth edition, 2015.
2. Ian Sommerville, Software Engineering, 9 th Edition, Pearson Education, 2011.
3. Watts S.Humphrey, ”A Discipline for Software Engineering”, Pearson Education, 2007.

REFERENCES

1. Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI Learning Private Limited, 2009.
2. Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010.
3. Kelkar S.A., “Software Engineering”, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R.Schach, “Software Engineering”, Tata McGraw-Hill Publishing Company Limited, 2007.
5. James F.Peters and Witold Pedrycz, ”Software Engineering, An Engineering Approach”, Wiley-India, 2007.



Mapping of Course Outcomes with Programming Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	2	2	3	-	-	-	3	3	3	2	1	1
CO2	2	2	1	2	3	-	-	-	3	2	2	2	2	2
CO3	3	2	3	3	3	-	-	-	3	2	3	2	3	2
CO4	3	3	2	3	3	-	-	-	3	2	3	2	3	3
CO5	3	3	2	3	3	-	-	-	3	2	3	2	3	3

COURSE OBJECTIVES

- To experiment about the socket programming
- To be familiar with the simulation tools.
- To have hands on experience on various networking protocols.
- To know about TCP and UDP performance.

LIST OF EXPERIMENTS

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. Trace route
4. RPC
5. Experiments using open source simulators:
 - a. Performance comparison of MAC protocols
 - b. Performance comparison of routing protocols
 - c. Study of TCP/UDP performance

TOTAL PERIODS 60**COURSE OUTCOMES**

At the end of the course, the student should be able to

- use simulation tools
- implement the various protocols.
- analyze the performance of the protocols in different layers.
- analyze various routing algorithms

**Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak**

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO2	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO3	3	3	2	2	3	1	1	-	1	1	1	2	3	1
CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2



COURSE OBJECTIVES

- To perform Basic arithmetic and Logical operations using 8086 and MASM.
- To execute Floating point operations, string manipulations, sorting and searching using 8086 and MASM.
- To experiment the interface concepts of Stepper motor control and traffic light control with the processor.
- To implement the assembly language programming for Basic arithmetic and Logical operations using 8051.

LIST OF EXPERIMENTS**Assembly Language programming using 8086 and MASM**

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Floating point operations, string manipulations, sorting and searching
4. Counters and Time Delay

Interfacing with 8086 microprocessor

5. Traffic light control
6. Stepper motor control
7. Digital clock
8. Key board and Display
9. Serial interface and Parallel interface

Programming using 8051 microcontroller

10. Basic arithmetic and Logical operations
11. Unpacked BCD to ASCII

TOTAL PERIODS 60**COURSE OUTCOMES**

At the end of the course, the student should be able to

- write Assembly language Programmes for various applications
- interface different peripherals with microprocessor
- execute Programs in 8051
- explain the difference between simulator and Emulator

Mapping of Course Outcomes with Programming Outcomes
(1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
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CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2



COURSE OBJECTIVES

- To acquire knowledge of the C++ language.
- To understand the concepts of Object Oriented Programming.
- To understand the concepts of Operating Systems.
- To learn about the concepts of stack and queue classes

LIST OF EXPERIMENTS

OOPS

1. Design C++ classes with static members, methods with default arguments, friend functions. (For example, design matrix and vector classes with static allocation, and a friend function to do matrix-vector multiplication)
2. Implement Matrix class with dynamic memory allocation and necessary methods. Give proper constructor, destructor, copy constructor, and overloading of assignment operator.
3. **Design stack and queue classes with necessary exception handling.**
4. Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism and RTTI.
5. Write a C++ program that randomly generates complex numbers (use previously designed Complex class) and writes them two per line in a file along with an operator (+, -, *, or /). The numbers are written to file in the format (a + ib). Write another program to read one line at a time from this file, perform the corresponding operation on the two complex numbers read, and write the result to another file (one per line).

OPERATING SYSTEM

1. Simulate the following CPU scheduling algorithms
 - a. Round Robin
 - b. SJF
 - c. FCFS
 - d. Priority
2. Implement the producer – consumer problem using semaphores.
3. Simulate Bankers Algorithm for Dead Lock Avoidance
4. Simulate all page replacement algorithms
 - a. FIFO
 - b. LRU
 - c. Optimal
5. **Implementation of paging technique in memory management**

TOTAL PERIODS 60

COURSE OUTCOMES

At the end of the course, the student should be able to

- apply the concepts of Object Oriented Programming.
- compare the performance of various CPU Scheduling Algorithm.

- implement deadlock avoidance, and Detection Algorithms.
- apply the concept of paging technique in memory management

REFERENCES

1. Spoken-tutorial.org,
2. Laboratory Manual.

Mapping of Course Outcomes with Programming Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
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CO4	3	3	2	2	3	1	1	-	1	1	1	2	3	2



COURSE OBJECTIVES

enable the students to

- Introduce students to ideas and techniques from discrete mathematics that are widely used in science and engineering.
- Make the students to think logically and mathematically and apply these techniques in solving problems.
- Provide the foundation for imbedding logical reasoning in computer science.
- Develop recursive algorithms based on mathematical induction.
- Know basic properties of relations.

UNIT I PROPOSITIONAL CALCULUS

9

Propositions - Logical connectives - **Compound propositions** - Conditional and conditional propositions - Truth tables - Tautologies and contradictions - **Contrapositive** - Logical equivalences and implications - **DeMorgan's Laws** - Normal forms - Principal conjunctive and disjunctive normal forms - Rules of inference - Arguments - Validity of arguments.

UNIT II PREDICATE CALCULUS

9

Predicates - Statement function - Variables - **Free and bound variables** - Quantifiers - Universe of discourse - Logical equivalences and implications for quantified statements - **Theory of inference** - The rules of universal specification and generalization - **Validity of arguments.**

UNIT-III SET THEORY

9

Basic concepts - Notations - Subset - **Algebra of sets** - The power set - Ordered pairs and Cartesian product - Relations on sets - Types of relations and their properties - **Relational matrix and the graph of relation** - Partitions Equivalence relations.

UNIT IV FUNCTIONS

9

Definitions of functions - **Classification of functions** - Type of functions - Examples - Composition of functions - Inverse functions - **Binary and n - ary operations** - Characteristic function of a set - Hashing functions - Recursive functions - **Permutation functions.**

UNIT-V LATTICE THEORY

9

Partial ordering - Posets - Lattices as Posets - **Properties of lattices** - **Lattices as Algebraic systems** - **Sub lattices** - Direct product and Homomorphism - Some Special lattices.

TOTAL PERIODS 45**COURSE OUTCOMES**

At the end of the course, students will be able to

- Construct mathematical arguments using logical connectives and quantifiers.
- Verify the correctness of an argument using propositional and predicate logic and truth tables.
- Demonstrate the ability to solve problems using counting techniques and combinatorics Construct proofs using direct proof, proof by contraposition, proof by contradiction, and proof by cases.
- Perform operations on discrete structures such as sets, functions, relations, and sequences.
- Understand the concepts of Boolean algebra.

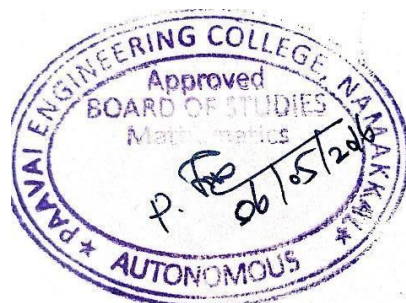
TEXT BOOKS

1. Kenneth H.Rosen, “Discrete Mathematics and its Applications (with Combinatorics and Graph Theory)”, 6th Edition, Tata McGraw - Hill, 5th Reprint 2008.
2. Trembly J.P and Manohar.R, “Discrete Mathematical Structures with Applications to Computer Science”, Tata McGraw - Hill, 35th Reprint 2008.

REFERENCES

1. Ralph.P.Grimaldi, “Discrete and Combinatorial Mathematics: An Applied Introduction”, 4th Edition, Pearson Education, 2002.
2. A.Tamilarasi, A.M.Natarajan, “Discrete Mathematics and its Applications”, 3rd Edition, Khanna Publishers, 2008.
3. T.Veerarajan, “Discrete Mathematics with Graph Theory and Combinatorics”, Tata McGraw - Hill, 2007.

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak														
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CO4	2	2	3	3	-	-	-	-	-	-	-	2	3	3
CO5	3	3	3	-	-	-	-	-	-	-	-	3	3	3



COURSE OBJECTIVES

- To understand the mathematical models of computation
- To design grammars and recognizers for different formal languages
- To construct correct mathematical models.
- To know the relation among regular language, context free language and the corresponding recognizer.
- To determine the decidability and intractability of computational problems.

UNIT I AUTOMATA**15**

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**15**

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**15**

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**15**

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

UNIT V UNDECIDABILITY**15**

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 – **Measuring and classifying complexity.**

TOTAL HOURS: 75**COURSE OUTCOMES**

At the end of this course, the students will be able to

- synthesize finite automata with specific properties, demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages
- understand the properties of regular expressions, convert regular expression to finite automata and minimize finite automata specify a well-defined set of rules for syntax verification.
- understand the Equivalence of Pushdown automata and CFG
- understand the normal forms and Programming Techniques for TM.
- analyze the undecidability of problems, understand that there are limitations on what computers can do, and learn examples of unsolvable problems.

TEXT BOOKS

1. John E.Hopcroft, Rajeev Motwani and Jeffrey.D Ullman, Introduction to Automata Theory, Languages and Computations, Pearson Education, Third Edition, 2009
2. John C.Martin, Introduction to Languages and the Theory of Computation, TMH, 2007

REFERENCES

1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.
2. S.N.Sivanandam, "Theory of computation", I.K.International Publishing Pvt Limited, 2009
3. Thomas A. Sudkamp, "An Introduction to the Theory of Computer Science, Languages and Machines", Third Edition, Pearson Education, 2007.
4. Raymond Greenlaw and H.James Hoover, "Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
5. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.

WEB LINKS

1. www.freetechbooks.com/theory-of-computation-f50.html
2. www.nptel.ac.in/courses/106106049
3. www.freecomputerbooks.com/compScComputationBooks.html
4. www.tutorialspoint.com/automata_theory
5. <http://freevideolectures.com/Course/3045/Theory-of-Computation-I>

Mapping of Course Outcomes with Programming Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	3	-	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3	3	2



UNIT III PRODUCTION AND COST ANALYSIS 10

Production function - Returns to scale - Production optimization - Least cost input - Isoquants - Managerial uses of production function.

Cost Concepts - Cost function - Determinants of cost - Short run and Long run cost curves - Cost Output Decision - Estimation of Cost.

UNIT IV PRICING 5

Determinants of Price - Pricing under different objectives and different market structures - Price discrimination - Pricing methods in practice.

UNIT V FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT) 10

Balance sheet and related concepts - Profit & Loss Statement and related concepts - Financial Ratio Analysis - Cash flow analysis - Funds flow analysis - Comparative financial statements - Analysis & Interpretation of financial statements.

UNIT VI CAPITAL BUDGETING (ELEMENTARY TREATMENT) 5

Investments - Risks and return evaluation of investment decision - Average rate of return - Payback Period - Net Present Value - Internal rate of return.

TOTAL : 45 PERIODS

REFERENCES:

1. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
2. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.
3. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007.
4. Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson South Western, 4th Edition, 2001.
5. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.

CS2401

COMPUTER GRAPHICS

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

UNIT I 2D PRIMITIVES 9

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 9

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 9
 Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects - Drawing three dimensional scenes

UNIT IV RENDERING 9
 Introduction to Shading models – Flat and Smooth shading – Adding texture to faces – Adding shadows of objects – Building a camera in a program – Creating shaded objects – Rendering texture – Drawing Shadows.

UNIT V FRACTALS 9
 Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals – Overview of Ray Tracing – Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition, Pearson Education, 2004.
2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

REFERENCE:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

CS2402 MOBILE AND PERVASIVE COMPUTING L T P C
3 0 0 3

UNIT I MOBILE NETWORKS 9
 Cellular Wireless Networks – GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – 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.

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML
 - i) To embed an image map in a web page
 - ii) To fix the hot spots
 - iii) Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML
4. Write programs in Java to create applets incorporating the following features:
5. Create a color palette with matrix of buttons
Set background and foreground of the control text area by selecting a color from color palette.
In order to select Foreground or background use check box control as radio buttons
To set background images
6. Write programs in Java using Servlets:
To invoke servlets from HTML forms
To invoke servlets from Applets
7. Write programs in Java to create three-tier applications using JSP and Databases
 - for conducting on-line examination.
 - for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
8. Programs using XML – Schema – XSLT/XSL
9. Programs using AJAX
10. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Data base.

TOTAL 15 + 45 = 60 PERIODS**TEXT BOOK:**

1. Robert W. Sebesta, "Programming the world wide web", Pearson Education, 2006.

REFERENCE:

1. Deitel, "Internet and world wide web, How to Program", PHI, 3rd Edition, 2005.

MG2452 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING L T P C
3 0 0 3

UNIT I INTRODUCTION 5
Managerial Economics - Relationship with other disciplines - Firms: Types, objectives and goals - Managerial decisions - Decision analysis.

UNIT II DEMAND & SUPPLY ANALYSIS 10
Demand - Types of demand - Determinants of demand - Demand function - Demand elasticity - Demand forecasting - Supply - Determinants of supply - Supply function - Supply elasticity.

UNIT V APPLICATIONS

9

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

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. Alan V. Oppenheim, Ronald W. Schaffer & John R. Buck, "Discrete Time Signal Processing", Pearson Education, 2nd edition, 2005.
2. Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2001

CS2405

COMPUTER GRAPHICS LABORATORY

L T P C
0 0 3 2

1. Implementation of Bresenham's Algorithm – Line, Circle, Ellipse.
2. Implementation of Line, Circle and ellipse Attributes
3. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
4. Composite 2D Transformations
5. Cohen Sutherland 2D line clipping and Windowing
6. Sutherland – Hodgeman Polygon clipping Algorithm
7. Three dimensional transformations - Translation, Rotation, Scaling
8. Composite 3D transformations
9. Drawing three dimensional objects and Scenes
10. Generating Fractal images

TOTAL : 60 PERIODS

CS2406

OPEN SOURCE LAB

L T P C
0 0 3 2

OBJECTIVE:

To expose students to FOSS environment and introduce them to use open source packages

1. **Kernel configuration, compilation and installation** : Download / access the latest kernel source code from kernel.org, compile the kernel and install it in the local system. Try to view the source code of the kernel

COURSE OBJECTIVES

- To understand the basic concepts of mobile computing.
- To be familiar with the network protocol stack.
- To learn the basics of mobile telecommunication system.
- To be exposed to Ad - Hoc networks.
- To gain knowledge about different mobile platforms and application development.

PRE - REQUISITE: Computer Networks.

UNIT I INTRODUCTION 9

Mobile Computing - Mobile computing Vs. wireless Networking - **Mobile Computing Applications** - Characteristics of Mobile Computing - **Structure of Mobile Computing Application**. MAC Protocols - Wireless MAC Issues - Fixed Assignment Schemes - Random Assignment Schemes - Reservation Based Schemes.

UNIT II MOBILE INTERNET PROTOCOL AND TRANSPORT LAYER 9

Overview of Mobile IP - **Features of Mobile IP** - Key Mechanism in Mobile IP - **Route Optimization** - Overview of TCP/IP - **Architecture of TCP/IP** - Adaptation of TCP Window - Improvement in TCP Performance.

UNIT III MOBILE TELECOMMUNICATION SYSTEM 9

Global System for Mobile Communication (GSM) - **General Packet Radio Service (GPRS)** - Universal Mobile Telecommunication System (UMTS) - Case Study: **2G - 3G - 4G - LTE**.

UNIT IV MOBILE AD-HOC NETWORKS 9

Ad-Hoc Basic Concepts - **Characteristics** - **Applications** - Design Issues - **Routing** - Essential of Traditional Routing Protocols - Popular Routing Protocols - **Vehicular Ad Hoc networks (VANET)** - MANET Vs. VANET - Security.

UNIT V MOBILE PLATFORMS AND APPLICATIONS 9

Mobile Device Operating Systems - **Special Constrains & Requirements** - Commercial Mobile Operating Systems - Software Development Kit: iOS - **Android** - BlackBerry - Windows Phone - M - Commerce - Structure - Pros &Cons - **Mobile Payment System** - Security Issues.

TOTAL PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- explain the basics of mobile telecommunication system.
- choose the required functionality at each layer for given application.
- identify solution for each functionality at each layer.
- apply simulator tools and design ad hoc networks.
- develop a mobile application.

TEXT BOOKS

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi - 2012.

REFERENCES

1. Jochen H. Schller, "Mobile Communications", Second Edition, Pearson Education, New Delhi, 2007.
2. Dharma Prakash Agarval, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
3. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
4. William.C.Y.Lee, "Mobile Cellular Telecommunications - Analog and Digital Systems", Second Edition, Tata McGraw Hill Edition, 2006.

WEB LINKS

1. https://onlinecourses.nptel.ac.in/noc16_cs13.
2. www.nptelvideos.in/2012/12/wireless-communication.html.
3. <http://nptel.ac.in/courses/106106147/>.

Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak														
COs	Programme Outcomes POs												Programme Specific Outcomes PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	-	-	-	-	-	-	-	1	2	3
CO2	3	3	2	1	-	-	-	-	-	-	-	2	2	2
CO3	3	2	2	3	-	-	-	-	-	-	-	1	2	3
CO4	3	2	2	1	-	-	-	-	-	-	-	1	3	3
CO5	3	2	2	2	-	-	-	-	-	-	-	1	2	3



COURSE OBJECTIVES

- To learn the methods of solving problems using artificial Intelligence.
- To know the concepts of knowledge representation.
- To understand about inferring the knowledge.
- To know the concepts of machine learning.
- To understand about expert system.

UNIT I INTRODUCTION TO AI AND PRODUCTION SYSTEMS 9

Introduction to AI-Problem formulation, **Problem Definition** - Production systems, Control strategies Search strategies. Problem characteristics, Production system characteristics –**Specialized productions system**- Problem solving methods – **Problem graphs, Matching, Indexing and Heuristic functions** – Hill Climbing-Depth first and Breath first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms.

UNIT II REPRESENTATION OF KNOWLEDGE 9

Game playing – Knowledge representation, **Knowledge representation using Predicate logic**, Introduction to predicate calculus, **Resolution**, Use of predicate calculus, Knowledge representation using other – Structured representation of knowledge.

UNIT III KNOWLEDGE INFERENCE 9

Knowledge representation **-Production based system**, Frame based system. Inference – Backward logic chaining, **Forward chaining**, Rule value approach, **Fuzzy reasoning**.

UNIT IV PLANNING AND MACHINE LEARNING 9

Basic plan generation systems – **Strips** –Advanced plan generation systems – K strips - Strategic explanations -**Why, Why not and how explanations**. Learning- Machine learning, **adaptive Learning**.

UNIT V PLANNING AND MACHINE LEARNING 9

Expert systems – **Architecture of expert systems**, Roles of expert systems – Knowledge Acquisition– Meta knowledge, **Heuristics**, Typical expert systems – MYCIN, DART, XOON- **Expert systems shells**.

TOTAL HOURS 45

COURSE OUTCOMES

At the end of this course, the students will be able to

- identify problems that are amenable to solution by AI methods.
- identify appropriate AI methods to solve a given problem.
- formalize a given problem in the language/framework of different AI methods.
- implement basic AI algorithms.
- design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

TEXT BOOKS

1. Kevin Night and Elaine Rich, Nair B, “Artificial Intelligence (SIE)”, McGraw Hill- 2008. (Units-I,II,IV & V)
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).

REFERENCES

1. Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007.
3. Deepak Khemani “Artificial Intelligence”, Tata McGraw Hill Education 2013.

Mapping of Course Outcomes with Programming Outcomes (1/2/3 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
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CO1	3	3	3	3	1	-	-	-	-	-	-	3	3	3
CO2	3	2	3	3	-	-	-	-	-	-	-	2	3	3
CO3	2	3	3	-	-	-	-	-	-	-	-	3	3	3
CO4	3	2	3	3	-	2	-	-	-	-	-	2	3	3
CO5	3	2	3	2	1	-	-	-	-	-	-	3	3	3



UNIT III KNOWLEDGE INFERENCE 9
Knowledge representation -Production based system, **Frame based system**. Inference - Backward chaining, Forward chaining, **Rule value approach**, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - **Shafer theory**.

UNIT IV PLANNING AND MACHINE LEARNING 9
Basic plan generation systems - **Strips** -Advanced plan generation systems – **K strips** -Strategic explanations -Why, Why not and how explanations. **Learning-** Machine learning, adaptive Learning.

UNIT V EXPERT SYSTEMS 9
Expert systems - **Architecture of expert systems**, Roles of expert systems - **Knowledge Acquisition** – Meta knowledge, Heuristics. **Typical expert systems** - MYCIN, DART, XOON, Expert systems shells.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Identify problems that are amenable to solution by AI methods.
- Identify appropriate AI methods to solve a given problem.
- Formalise a given problem in the language/framework of different AI methods.
- Implement basic AI algorithms.
- Design and carry out an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.

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2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).

REFERENCES:

1. Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
2. Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007.
3. Deepak Khemani “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.
4. <http://nptel.ac.in>

CS6611 MOBILE APPLICATION DEVELOPMENT LABORATORY L T P C
0 0 3 2

OBJECTIVES:

The student should be made to:

- Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- Understand how to work with various mobile application development frameworks.
- Learn the basic and important design concepts and issues of development of mobile applications.
- Understand the capabilities and limitations of mobile devices.

LIST OF EXPERIMENTS:

1. Develop an application that uses GUI components, Font and Colours
2. **Develop an application that uses Layout Managers and event listeners.**
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.

5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multi threading
8. Develop a native application that uses GPS location information.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Write a mobile application that creates alarm clock

TOTAL: 45 PERIODS

OUTCOMES:

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

- Design and Implement various mobile applications using emulators.
- Deploy applications to hand-held devices

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Standalone desktops with Windows or Android or iOS or Equivalent Mobile Application Development Tools with appropriate emulators and debuggers - 30 Nos.

CS6612

COMPILER LABORATORY

**L T P C
0 0 3 2**

OBJECTIVES:

The student should be made to:

- Be exposed to compiler writing tools.
- Learn to implement the different Phases of compiler
- Be familiar with control flow and data flow analysis
- Learn simple optimization techniques

LIST OF EXPERIMENTS:

1. Implementation of Symbol Table
2. Develop a lexical analyzer to recognize a few patterns in C. (Ex. identifiers, constants, comments, operators etc.)
3. Implementation of Lexical Analyzer using Lex Tool
4. Generate YACC specification for a few syntactic categories.
 - a) Program to recognize a valid arithmetic expression that uses operator +, -, *, /.
 - b) Program to recognize a valid variable which starts with a letter followed by any number of letters or digits.
 - d) Implementation of Calculator using LEX and YACC
5. Convert the BNF rules into Yacc form and write code to generate Abstract Syntax Tree.
6. Implement type checking
7. Implement control flow analysis and Data flow Analysis
8. Implement any one storage allocation strategies(Heap,Stack,Static)
9. Construction of DAG
10. Implement the back end of the compiler which takes the three address code and produces the 8086 assembly language instructions that can be assembled and run using a 8086 assembler. The target assembly instructions can be simple move, add, sub, jump. Also simple addressing modes are used.
11. Implementation of Simple Code Optimization Techniques (Constant Folding., etc.)

TOTAL: 45 PERIODS

OUTCOMES:

At the end of the course, the student should be able to

- Implement the different Phases of compiler using tools
- Analyze the control flow and data flow of a typical program
- Optimize a given program
- Generate an assembly language program equivalent to a source language program

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C / C++ compiler and Compiler writing tools 30 Nos.
(or)

Server with C / C++ compiler and Compiler writing tools supporting 30 terminals or more.

LEX and YACC

GE6674 COMMUNICATION AND SOFT SKILLS- LABORATORY BASED L T P C
0 0 4 2

OBJECTIVES:

To enable learners to,

- Develop their communicative competence in English with specific reference to speaking and listening
- Enhance their ability to communicate effectively in interviews.
- Strengthen their prospects of success in competitive examinations.

UNIT I LISTENING AND SPEAKING SKILLS 12

Conversational skills (formal and informal)- **group discussion**- making effective presentations using computers, listening/**watching interviews conversations**, documentaries. Listening to lectures, **discussions from TV/ Radio/ Podcast**.

UNIT II READING AND WRITING SKILLS 12

Reading different genres of texts ranging from newspapers to creative writing. Writing job applications- **cover letter**- resume- **emails**- letters- memos- reports. **Writing abstracts**- summaries- interpreting visual texts.

UNIT III ENGLISH FOR NATIONAL AND INTERNATIONAL EXAMINATIONS AND PLACEMENTS 12

International English Language Testing System (IELTS) - Test of English as a Foreign Language (TOEFL) - **Civil Service(Language related)**- Verbal Ability.

UNIT IV INTERVIEW SKILLS 12

Different types of Interview format- answering questions- **offering information**- mock interviews-body language(paralinguistic features)- **articulation of sounds**- intonation.

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML
 - i) To embed an image map in a web page
 - ii) To fix the hot spots
 - iii) Show all the related information when the hot spots are clicked.
2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML
4. Write programs in Java to create applets incorporating the following features:
5. Create a color palette with matrix of buttons
Set background and foreground of the control text area by selecting a color from color palette.
In order to select Foreground or background use check box control as radio buttons
To set background images
6. Write programs in Java using Servlets:
To invoke servlets from HTML forms
To invoke servlets from Applets
7. Write programs in Java to create three-tier applications using JSP and Databases
 - for conducting on-line examination.
 - for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
8. Programs using XML – Schema – XSLT/XSL
9. Programs using AJAX
10. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Data base.

TOTAL 15 + 45 = 60 PERIODS**TEXT BOOK:**

1. Robert W. Sebesta, "Programming the world wide web", Pearson Education, 2006.

REFERENCE:

1. Deitel, "Internet and world wide web, How to Program", PHI, 3rd Edition, 2005.

MG2452 ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING L T P C
3 0 0 3

UNIT I INTRODUCTION 5

Managerial Economics - Relationship with other disciplines - Firms: Types, objectives and goals - Managerial decisions - Decision analysis.

UNIT II DEMAND & SUPPLY ANALYSIS 10

Demand - Types of demand - Determinants of demand - Demand function - Demand elasticity - Demand forecasting - Supply - Determinants of supply - Supply function - Supply elasticity.

UNIT III PRODUCTION AND COST ANALYSIS 10

Production function - Returns to scale - Production optimization - Least cost input - Isoquants - Managerial uses of production function.

Cost Concepts - Cost function - Determinants of cost - Short run and Long run cost curves - Cost Output Decision - Estimation of Cost.

UNIT IV PRICING 5

Determinants of Price - Pricing under different objectives and different market structures - Price discrimination - Pricing methods in practice.

UNIT V FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT) 10

Balance sheet and related concepts - Profit & Loss Statement and related concepts - Financial Ratio Analysis - Cash flow analysis - Funds flow analysis - Comparative financial statements - Analysis & Interpretation of financial statements.

UNIT VI CAPITAL BUDGETING (ELEMENTARY TREATMENT) 5

Investments - Risks and return evaluation of investment decision - Average rate of return - Payback Period - Net Present Value - Internal rate of return.

TOTAL : 45 PERIODS

REFERENCES:

1. Samuelson. Paul A and Nordhaus W.D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi, 2004.
2. McGuigan, Moyer and Harris, 'Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.
3. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, New Delhi, 2007.
4. Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson South Western, 4th Edition, 2001.
5. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition, 2005.

CS2401

COMPUTER GRAPHICS

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

UNIT I 2D PRIMITIVES 9

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 9

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 9
Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects - Drawing three dimensional scenes

UNIT IV RENDERING 9
Introduction to Shading models – Flat and Smooth shading – Adding texture to faces – Adding shadows of objects – Building a camera in a program – Creating shaded objects – Rendering texture – Drawing Shadows.

UNIT V FRACTALS 9
Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals – Overview of Ray Tracing – Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition, Pearson Education, 2004.
2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education, 2003.

REFERENCE:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

**CS2402 MOBILE AND PERVASIVE COMPUTING L T P C
3 0 0 3**

UNIT I MOBILE NETWORKS 9
Cellular Wireless Networks – GSM – Architecture – Protocols – Connection Establishment – Frequency Allocation – Routing – Mobility Management – 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.

**CS2403 DIGITAL SIGNAL PROCESSING L T P C
3 0 0 3**

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 – **(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 PERSVASIVE 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.

**CS2403 DIGITAL SIGNAL PROCESSING L T P C
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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

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Structures of IIR – Analog filter design – Discrete time IIR filter from analog filter – IIR filter design by Impulse Invariance, Bilinear transformation, Approximation of derivatives – (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.

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. Alan V. Oppenheim, Ronald W. Schaffer & John R. Buck, "Discrete Time Signal Processing", Pearson Education, 2nd edition, 2005.
2. Andreas Antoniou, "Digital Signal Processing", Tata McGraw Hill, 2001

CS2405

COMPUTER GRAPHICS LABORATORY

L T P C
0 0 3 2

1. Implementation of Bresenham's Algorithm – Line, Circle, Ellipse.
2. Implementation of Line, Circle and ellipse Attributes
3. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
4. Composite 2D Transformations
5. Cohen Sutherland 2D line clipping and Windowing
6. Sutherland – Hodgeman Polygon clipping Algorithm
7. Three dimensional transformations - Translation, Rotation, Scaling
8. Composite 3D transformations
9. Drawing three dimensional objects and Scenes
10. Generating Fractal images

TOTAL : 60 PERIODS

CS2406

OPEN SOURCE LAB

L T P C
0 0 3 2

OBJECTIVE:

To expose students to FOSS environment and introduce them to use open source packages

1. **Kernel configuration, compilation and installation** : Download / access the latest kernel source code from kernel.org, compile the kernel and install it in the local system. Try to view the source code of the kernel

2. **Virtualisation environment** (e.g., xen, kqemu or lguest) to test an applications, new kernels and isolate applications. It could also be used to expose students to other **alternate OSs like *BSD**
3. **Compiling from source** : learn about the various build systems used like the auto* family, cmake, ant etc. instead of just running the commands. This could involve the full process like fetching from a cvs and also include autoconf, **automake etc.,**
4. **Introduction to packet management system** : Given a set of RPM or DEB, how to build and maintain, **serve packages over http or ftp.** and also how do you configure client systems to access the package repository.
5. **Installing various software packages**
 - Either the package is yet to be installed or an older version is existing. The student can practice installing the latest version. Of course, this might need internet access.
 - **Install samba and share files to windows**
 - Install Common Unix Printing System(CUPS)
6. **Write userspace drivers using fuse** -- **easier to debug** and less dangerous to the system (Writing full-fledged drivers is difficult at student level)
7. **GUI programming : a sample programme** – using Gambas since the students have VB knowledge. However, **one should try using GTK or QT**
8. **Version Control System setup and usage** using **RCS,** CVS, SVN
9. **Text processing with Perl:** simple programs, connecting with database e.g., **MYSQL**
10. **Running PHP :** **simple applications** like login forms after setting up a LAMP stack
11. **Running Python :** **some simple exercise** – e.g. Connecting with MySql database
12. **Set up the complete network interface** usinf ifconfig command liek setting gateway, **DNS,** IP tables, etc.,

RESOURCES :

An environment like **FOSS Lab Server** (developed by NRCFOSS containing the various packages)

OR

Equivalent system with Linux distro supplemented with relevant packages

Note:

Once the list of experiments are finalised, NRCFOSS can generate full lab manuals complete with exercises, necessary downloads, etc. These could be made available on NRCFOSS web portal.

CS2028

UNIX INTERNALS

L T P C
3 0 0 3

UNIT I

9

General Review of the System-History-**System structure**-User Perspective-Operating System Services- Assumptions About Hardware. **Introduction to the Kernel-Architecture** System Concepts-Data Structures-**System Administration.**

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- Prepare a literature survey in a specific domain as a team / individual to motivate lifelong learning.
- Identify the problem by applying acquired knowledge.
- Choose efficient tools for designing project modules.
- Design engineering solutions to complex problems utilizing a systems approach and combine all the modules for efficient testing.

GUIDELINES

1. The students are expected to get formed into a team of convenient groups of not more than 3 members on a project.
2. Every project team shall have a guide who is the member of the faculty of the institution. Identification of student group and their faculty guide has to be completed within the first two weeks from the day of beginning of 7th semester
3. The group has to identify and select the problem to be addressed as their project work. Make through literature survey and finalize a comprehensive aim and scope of their work to be done.
4. A project report has to be submitted by each student group for their project work.
5. Three reviews have to be conducted by a team of faculty (minimum of 3 and maximum of 5) along with their faculty guide as a member of faculty team (for monitoring the progress of project planning and implementation).

COURSE OUTCOMES

Upon the completion of the course, the students will be able to

- Prepare a literature survey in a specific domain as a team / individual to motivate lifelong learning.
- Identify the problem by applying acquired knowledge
- Choose efficient tools for designing project modules
- Design engineering solutions to complex problems utilizing a systems approach and combine all the modules for efficient testing. □ Demonstrate the knowledge, skills and attitudes of a professional engineer.

TOTAL PERIODS 180

Mapping of Course Outcomes with Programme Outcomes
(1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak

COs	Programme Outcomes POs												Programme Specific Outcomes PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	-	-	3	2	3
CO2	3	3	3	3	-	-	-	-	-	-	-	1	2	2
CO3	3	2	2	1	-	-	-	-	-	-	-	1	3	3
CO4	2	2	3	1	-	-	-	-	-	-	-	1	2	3



COURSE OBJECTIVES

- To understand the fundamentals of Data Warehousing with its architecture.
- To understand the Data Warehousing Business Analysis concepts.
- To understand the Data Mining concepts and pre - processing methods.
- To understand the Association rule mining and various Classification techniques in Data Mining.
- To understand the various Clustering methods in Data Mining.

PRE - REQUISITE: Data Base Management System

UNIT I	DATA WAREHOUSING	9
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	9
Reporting and query tools and applications - Tool categories - The need for applications - Cognos impromptu - Online Analytical Processing - Need - Multidimensional data model - OLAP guidelines - Multidimensional versus multi relational OLAP - Categorization of OLAP tools - OLAP tools and the Internet.		
UNIT III	DATA MINING	9
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 - Data Preprocessing - Cleaning - Integration - Transformation - Reduction - Discretization - Concept Hierarchy Generation.		
UNIT IV	ASSOCIATION RULE MINING AND CLASSIFICATION	9
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 back Propagation - Support vector machines - Associative classification - Lazy learners - Other classification methods - Prediction.		
UNIT V	CLUSTERING, TRENDS IN DATA MINING AND APPLICATIONS	9
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 PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- understand the fundamentals of Data Warehousing with its architecture.
- learn Data Warehousing Business Analysis concepts.
- learn Data Mining concepts and Pre - processing methods.
- know the Association rule mining and various classification techniques in Data Mining.
- Be familiar with various Clustering methods in Data Mining.

TEXT BOOKS

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw Hill, 2007.
2. Jiawei Han and Miche line Kamber, “Data Mining Concepts and Techniques”, 2nd Edition, Elsevier, 2011.

REFERENCES

1. Pang - Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction To Data Mining”, Person Education, 2007.
2. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
3. Daniel T.Larose, “Data Mining Methods and Models”, Wile - Inter science, 2006.
4. S. K. Mourya, Shalu Gupta, Data Mining and Data Warehousing, Alpha Science International Limited, 2013.
5. G. K. Gupta, Introduction to Data Mining With Case Studies, Eastern Economy, Third Edition 2013.

WEB LINKS

1. http://www.tutorialspoint.com/data_mining/dm_applications_trends.htm
2. http://home.deib.polimi.it/matteucc/Clustering/tutorial_html/
3. <http://www.youtube.com/watch?v=zqKFH7WNmf>



Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak														
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2	-	-	-	-	-	-	-	1	2	2
CO2	3	3	3	3	-	-	-	-	-	-	-	2	2	3
CO3	3	3	2	3	-	-	-	-	-	-	-	1	3	3
CO4	3	2	3	2	-	-	-	-	-	-	-	1	2	3
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	3

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. Aja, "Insight into Data Mining Theory and Practice", Eastern Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, "Introduction to Data Mining with Case Studies", Eastern Economy Edition, Prentice Hall of India, 2006.
4. Daniel T.Larose, "Data Mining Methods and Models", Wiley-Interscience, 2006.

CS6002

NETWORK ANALYSIS AND MANAGEMENT

L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn network devices functions and configurations hub, switch, tap and routers.
- Be familiar with network Security Devices.
- Be exposed to network services.
- Understand and analyze application performance
- Learn to analyze network traffic and protocols
- Be aware of network-troubleshooting concepts.
- Understand network security concepts.

UNIT I A SYSTEM APPROACH TO NETWORK DESIGN AND REQUIREMENT ANALYSIS

9

Introduction-Network Service and Service based networks- **Systems and services**- characterizing the services. Requirement Analysis: Concepts – Background – User Requirements- Application Requirements- **Host Requirements-Network Requirements** – Requirement Analysis: Guidelines – Requirements gathering and listing- Developing service metrics to measure performance – Characterizing behavior- developing performance threshold – **Distinguish between service performance levels.** Requirement Analysis: Practice –Template, table and maps –simplifying the requirement analysis process –case study.

UNIT II FLOW ANALYSIS: CONCEPTS, GUIDELINES AND PRACTICE

9

Background- Flows- Data sources and sinks- **Flow models**- Flow boundaries- **Flow distributions**- Flow specifications- Applying the flow model-Establishing flow boundaries-Applying flow distributions-Combining flow models, boundaries and distributions- **Developing flow specifications**-prioritizing flow-simplifying flow analysis process –examples of applying flow specs- case study.

UNIT III LOGICAL DESIGN: CHOICES, INTERCONNECTION MECHANISMS, NETWORK MANAGEMENT AND SECURITY

9

Background- Establishing design goals- **Developing criteria for technology evolution**- Making technology choices for design-case study- Shared Medium- Switching and Routing: Comparison and contrast- Switching- **Routing-Hybrid Routing/Switching Mechanisms** – Applying Interconnection Mechanism to Design – Integrating Network management and security into the Design- **Defining Network Management**- Designing with manageable resources- Network Management Architecture- Security- Security mechanism- Examples- Network Management and security plans- Case study.

UNIT IV NETWORK DESIGN: PHYSICAL, ADDRESSING AND ROUTING 9

Introduction- Evaluating cable plant design options – Network equipment placement- diagramming the physical design- **diagramming the worksheet** –case study. **Introduction to Addressing and routing- establishing routing flow in the design environments-** manipulating routing flows- developing addressing strategies- developing a routing strategy- case study.

UNIT V NETWORK MANAGEMENT AND SNMP PROTOCOL MODEL 9

Network and System management, **Network management system platform**; Current SNMP Broadband and TMN management, Network management standards. SNMPV1, SNMPV2 system architecture, **SNMPV2**, structure of management information. SNMPV2 – MIB – SNMPV2 protocol, SNMPV3-Architecture, Application, MIB, security user based security model, **access control RMON.**

TOTAL: 45 PERIODS

OUTCOMES:

At the end of this course the students should be able to:

- Explain the key concepts and algorithms in complex network analysis.
- Apply a range of techniques for characterizing network structure.
- Discuss methodologies for analyzing networks of different fields.
- Demonstrate knowledge of recent research in the area and exhibit technical writing and presentation skills.

TEXT BOOKS:

1. James.D.McCabe, “Practical Computer Network Analysis and Design”, 1st Edition, Morgan Kaufaman, 1997.
2. Mani Subramanian, “Network Management – Principles & Practice” – 2nd Edition Prentice Hall, 2012.

REFERENCES:

1. J.Radz,”Fundamentals of Computer Network Analysis and Engineering: Basic Approaches for Solving Problems in the Networked Computing Environment”, Universe, 2005.
2. Mark Newman, “Networks: An Introduction”,Kindle Edition,2010.
3. Laura Chappel and Gerald Combs ,“Wireshark 101: Essential Skills for Network Analysis”,Kindle Edition,2013.
4. William Stallings., “SNMP, SNMP2, SNMP3 and RMON1 and 2”, Pearson Education, 2004.
5. Daw Sudira, “Network Management”, Sonali Publications, 2004.

IT6004

SOFTWARE TESTING

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

OBJECTIVES:

The student should be made to:

- Expose the criteria for test cases.
- Learn the design of test cases.
- Be familiar with test management and test automation techniques.
- Be exposed to test metrics and measurements.

UNIT I INTRODUCTION**9**

Testing as an Engineering Activity – Role of Process in Software Quality – Testing as a Process – Basic Definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository.

UNIT II TEST CASE DESIGN**9**

Introduction to Testing Design Strategies – The Smarter Tester – Test Case Design Strategies – Using Black Box Approach to Test Case Design Random Testing – Requirements based testing – positive and negative 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 – types of system testing - Acceptance testing – performance testing - Regression Testing – internationalization testing – ad-hoc testing - Alpha – Beta Tests – testing OO systems – usability and accessibility 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 CONTROLLING AND MONITORING**9**

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 – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans– Reporting Review Results. – evaluating software quality – defect prevention – testing maturity model

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Srinivasan Desikan and Gopaldaswamy Ramesh, " Software Testing – Principles and Practices", Pearson education, 2006.
2. Aditya P.Mathur, "Foundations of Software Testing", Pearson Education,2008.

REFERENCES:

1. Boris Beizer, "Software Testing Techniques", Second Edition, Dreamtech, 2003
2. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.
3. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004.

IT2401

SERVICE ORIENTED ARCHITECTURE

L T P C
3 0 0 3

OBJECTIVES:

- To gain understanding of the basic principles of service orientation
- To learn service oriented analysis techniques
- To learn technology underlying the service design
- To learn advanced concepts such as service composition, orchestration and Choreography
- To know about various WS-* specification standards

UNIT I

9

Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation

UNIT II

9

Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration – Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer

UNIT III

9

Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task-centric business service design

UNIT IV

9

SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

UNIT V

9

WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS-Security

TOTAL: 45 PERIODS

MG2453 **RESOURCE MANAGEMENT TECHNIQUES** **L T P C**
3 0 0 3

UNIT I LINEAR PROGRAMMING: **9**
Principal components of decision problem – Modeling phases – LP Formulation and graphic solution – Resource allocation problems – Simplex method – Sensitivity analysis.

UNIT II DUALITY AND NETWORKS: **9**
Definition of dual problem – Primal – Dual relation ships – Dual simplex methods – Post optimality analysis – Transportation and assignment model shortest route problem.

UNIT III INTEGER PROGRAMMING: **9**
Cutting plan algorithm – Branch and bound methods, Multistage (Dynamic) programming.

UNIT IV CLASSICAL OPTIMISATION THEORY: **9**
Unconstrained external problems, Newton – Ralphson method – Equality constraints – Jacobean methods – Lagrangian method – Kuhn – Tucker conditions – Simple problems.

UNIT V OBJECT SCHEDULING: **9**
Network diagram representation – Critical path method – Time charts and resource leveling – PERT.

TOTAL: 45 PERIODS

REFERENCES:

1. Anderson 'Quantitative Methods for Business', 8th Edition, Thomson Learning, 2002.
2. Winston 'Operation Research', Thomson Learning, 2003.
3. H.A.Taha, 'Operation Research', Prentice Hall of India, 2002.
4. Vohra, 'Quantitative Techniques in Management', Tata McGraw Hill, 2002.
5. Anand Sarma, 'Operation Research', Himalaya Publishing House, 2003.

CS2032 **DATA WAREHOUSING AND DATA MINING** **L T P C**
3 0 0 3

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.

COURSE OBJECTIVES

- To understand the fundamentals of Data Warehousing with its architecture.
- To understand the Data Warehousing Business Analysis concepts.
- To understand the Data Mining concepts and pre - processing methods.
- To understand the Association rule mining and various Classification techniques in Data Mining.
- To understand the various Clustering methods in Data Mining.

PRE - REQUISITE: Data Base Management System

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Reporting and query tools and applications - Tool categories - The need for applications - Cognos impromptu - Online Analytical Processing - Need - Multidimensional data model - OLAP guidelines - Multidimensional versus multi relational OLAP - Categorization of OLAP tools - OLAP tools and the Internet.		
UNIT III	DATA MINING	9
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 - Data Preprocessing - Cleaning - Integration - Transformation - Reduction - Discretization - Concept Hierarchy Generation.		
UNIT IV	ASSOCIATION RULE MINING AND CLASSIFICATION	9
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 back Propagation - Support vector machines - Associative classification - Lazy learners - Other classification methods - Prediction.		
UNIT V	CLUSTERING, TRENDS IN DATA MINING AND APPLICATIONS	9
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 PERIODS 45

COURSE OUTCOMES

Upon the completion of the course, students will be able to

- understand the fundamentals of Data Warehousing with its architecture.
- learn Data Warehousing Business Analysis concepts.
- learn Data Mining concepts and Pre - processing methods.
- know the Association rule mining and various classification techniques in Data Mining.
- Be familiar with various Clustering methods in Data Mining.

TEXT BOOKS

1. Alex Berson and Stephen J. Smith, “Data Warehousing, Data Mining & OLAP”, Tata McGraw Hill, 2007.
2. Jiawei Han and Miche line Kamber, “Data Mining Concepts and Techniques”, 2nd Edition, Elsevier, 2011.

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1. Pang - Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction To Data Mining”, Person Education, 2007.
2. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
3. Daniel T.Larose, “Data Mining Methods and Models”, Wile - Inter science, 2006.
4. S. K. Mourya, Shalu Gupta, Data Mining and Data Warehousing, Alpha Science International Limited, 2013.
5. G. K. Gupta, Introduction to Data Mining With Case Studies, Eastern Economy, Third Edition 2013.

WEB LINKS

1. http://www.tutorialspoint.com/data_mining/dm_applications_trends.htm
2. http://home.deib.polimi.it/matteucc/Clustering/tutorial_html/
3. <http://www.youtube.com/watch?v=zqKFH7WNmf>



Mapping of Course Outcomes with Programme Outcomes (1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak														
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CO3	3	3	2	3	-	-	-	-	-	-	-	1	3	3
CO4	3	2	3	2	-	-	-	-	-	-	-	1	2	3
CO5	2	2	2	2	-	-	-	-	-	-	-	1	2	3

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. Daniel T.Larose, “Data Mining Methods and Models”, Wile-Interscience, 2006.

CS2033

REAL TIME SYSTEMS

L T P C

3 0 0 3

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 Perntice 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.

**CS2034 TCP/IP DESIGN AND IMPLEMENTATION L T P C
3 0 0 3**

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 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.

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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.

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UNIT V EVALUATION TECHNIQUES 9

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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 Perntice 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.

**CS2034 TCP/IP DESIGN AND IMPLEMENTATION L T P C
3 0 0 3**

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 – comparison – **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 and 2, Vth Edition
2. W. Richard Stevens "TCP/IP Illustrated" Vol 1. 2003.

REFERENCES:

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

CS2041 C# AND .NET FRAMEWORK L T P C
3 0 0 3

UNIT I 9
 Review of OOP Concepts - **Overview of .NET Framework** - Basic Elements of C# - Program Structure and simple Input and Output Operations – Operators and Expressions – **Statements** – **Arrays and Structures**.

UNIT II 9
 Inheritance - Namespace – **Polymorphism** – Interface and Overloading – Multiple Inheritance – Property – Indexes – Delegates – **Publish/Subscribe Design Patterns**- Operator Overloading-**Method Overloading**

UNIT III 9
 C# Concepts for creating Data Structures - **File Operation** – File Management systems – **Stream Oriented Operations**- Multitasking – Multithreading – **Thread Operation** – Synchronization.

TEXT BOOK:

1. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.

REFERENCES:

1. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.
2. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006

CS2040**ADVANCED OPERATING SYSTEMS****LT PC
3 0 0 3****AIM**

To understand the principles in the design of modern operating systems, distributed and multiprocessor operating systems

OBJECTIVES

- To get a comprehensive knowledge of the architecture of distributed systems.
- To understand the deadlock and shared memory issues and their solutions in distributed environments.
- To know the security issues and protection mechanisms for distributed environments.
- To get a knowledge of multiprocessor operating system and database operating systems.

UNIT I**9**

Architectures of Distributed Systems - System Architecture types - issues in distributed operating systems - communication networks – communication primitives. Theoretical Foundations - inherent limitations of a distributed system – lamp ports logical clocks – vector clocks – **casual ordering of messages** – global state – cuts of a distributed computation – termination detection. Distributed Mutual Exclusion – introduction – the classification of mutual exclusion and associated algorithms – **a comparative performance analysis.**

UNIT II**9**

Distributed Deadlock Detection -Introduction - deadlock handling strategies in distributed systems – **issues in deadlock detection and resolution** – control organizations for distributed deadlock detection – centralized and distributed deadlock detection algorithms –hierarchical deadlock detection algorithms. **Agreement protocols** – introduction-the system model, a classification of agreement problems, solutions to the Byzantine agreement problem, applications of agreement algorithms. Distributed resource management: introduction-architecture – mechanism for building distributed file systems – **design issues** – log structured file systems.

UNIT III**9**

Distributed shared memory-Architecture– algorithms for implementing DSM – memory coherence and protocols – design issues. Distributed Scheduling – introduction – issues in load distributing – **components of a load distributing algorithm** – stability – load distributing algorithm – performance comparison – selecting a suitable load sharing algorithm – **requirements for load distributing** -task migration and associated issues. Failure Recovery and Fault tolerance: introduction– basic concepts – classification of failures – backward and forward error recovery, backward error recovery- recovery in concurrent systems – **consistent set of check points** – synchronous and asynchronous check pointing and recovery – check pointing for distributed database systems- recovery in replicated distributed databases.

UNIT IV**9**

Protection and security -preliminaries, the access matrix model and its implementations.- safety in matrix model- advanced models of protection. Data security – cryptography: Model of cryptography, **conventional cryptography**- modern cryptography, private key cryptography, data encryption standard- **public key cryptography** – multiple encryption – authentication in distributed systems.

UNIT-V**9**

Multiprocessor operating systems - **basic multiprocessor system architectures** – inter connection networks for multiprocessor systems – caching – hypercube architecture. **Multiprocessor Operating System** - structures of multiprocessor operating system, operating system design issues- threads- **process synchronization and scheduling**.

Database Operating systems :Introduction- requirements of a database operating system Concurrency control : **theoretical aspects** – introduction, database systems – a concurrency control model of database systems- the problem of concurrency control – serializability theory- distributed database systems, concurrency control algorithms – introduction, basic synchronization primitives, lock based algorithms-timestamp based algorithms, optimistic algorithms – **concurrency control algorithms, data replication**.

TOTAL : 45 PERIODS**TEXT BOOK:**

1. Mukesh Singhal, Niranjana G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001

REFERENCES:

1. Andrew S.Tanenbaum, "Modern operating system", PHI, 2003
2. Pradeep K.Sinha, "Distributed operating system-Concepts and design", PHI, 2003.
3. Andrew S.Tanenbaum, "Distributed operating system", Pearson education, 2003.

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.

IT2024

USER INTERFACE DESIGN

L T P C
3 0 0 3

UNIT I INTRODUCTION 8

Human-Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.

UNIT II HUMAN COMPUTER INTERACTION 10

User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menu – Functions Of Menu– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus.

UNIT III WINDOWS 9

Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT IV MULTIMEDIA 9

Text For Web Pages – Effective Feedback– Guidance & Assistance– Internationalization– Accesssibility– Icons– Image– Multimedia – Coloring.

UNIT V WINDOWS LAYOUT– TEST 9

Prototypes – Kinds Of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Software Tools.

TOTAL:45 PERIODS

TEXT BOOKS:

1. Wilbent. O. Galitz ,“The Essential Guide To User Interface Design”, John Wiley& Sons, 2001.
2. Ben Sheiderman, “Design The User Interface”, Pearson Education, 1998.

REFERENCE:

1. Alan Cooper, “The Essential Of User Interface Design”, Wiley – Dream Tech Ltd., 2002.

UNIT IV **9**
 Working with XML – Techniques for Reading and Writing XML Data - Using XPath and Search XML - ADO.NET Architecture – ADO.NET Connected and Disconnected Models – XML and ADO.NET – Simple and Complex Data Binding– Data Grid View Class.

UNIT V **9**
 Application Domains – Remoting – Leasing and Sponsorship - .NET Coding Design Guidelines –Assemblies – Security – Application Development – Web Services - Building an XML Web Service - Web Service Client – WSDL and SOAP – Web Service with Complex Data Types – Web Service Performance.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. S. Thamarai Selvi and R. Murugesan “A Textbook on C# “, Pearson Education,2003.
2. Stephen C. Perry “ Core C# and .NET”, Pearson Education,2006.

REFERENCES:

1. Jesse Liberty, “Programming C#”, Second Edition, O’Reilly Press, 2002.
2. Robinson et al, “Professional C#”, Fifth Edition, Wrox Press, 2002.
3. Herbert Schildt, “The Complete Reference: C#”, Tata McGraw Hill, 2004.
4. Andrew Troelsen, “C# and the .NET Platform”, A! Press, 2003.
5. Thuan Thai and Hoang Q. Lam, “. NET Framework Essentials”, Second Edition, O’Reilly, 2002.

IT2352 **CRYPTOGRAPHY AND NETWORK SECURITY** **L T P C**
3 0 0 3

UNIT I **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 **9**
 Simple DES – Differential cryptanalysis – DES – Modes of operation – Triple DES – AES – RC4 – RSA – Attacks – Primality test – factoring.

UNIT III **9**
 Discrete Logarithms – Computing discrete logs – Diffie-Hellman key exchange – ElGamal Public key cryptosystems – Hash functions – Secure Hash – Birthday attacks - MD5 – Digital signatures – RSA – ElGamal – DSA.

UNIT IV **9**
 Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP, S/MIME – IP security – Web Security – SSL, TLS, SET.

UNIT V**9**

System security – Intruders – Malicious software – viruses – Firewalls – Security Standards.

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.

REFERENCES:

1. W. Mao, “Modern Cryptography – Theory and Practice”, Pearson Education, Second Edition, 2007.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing Third Edition – Prentice Hall of India, 2006

CS2035**NATURAL LANGUAGE PROCESSING****L T P C****3 0 0 3****UNIT I****9**

Introduction – Models -and Algorithms - The Turing Test -Regular Expressions Basic Regular Expression Patterns -Finite State Automata -Regular Languages and FSAs – Morphology -Inflectional Morphology - Derivational Morphology -Finite-State Morphological Parsing - Combining an FST Lexicon and Rules -Porter Stemmer

UNIT II**9**

N-grams Models of Syntax - Counting Words - Unsmoothed N-grams – Smoothing-Backoff - Deleted Interpolation – Entropy - English Word Classes - Tagsets for English - Part of Speech Tagging -Rule-Based Part of Speech Tagging - Stochastic Part of Speech Tagging - Transformation-Based Tagging -

UNIT III**9**

Context Free Grammars for English Syntax- Context-Free Rules and Trees - Sentence-Level Constructions -Agreement – Sub Categorization – Parsing – Top-down – Earley Parsing -Feature Structures - Probabilistic Context-Free Grammars

UNIT IV**9**

Representing Meaning - Meaning Structure of Language - First Order Predicate Calculus - Representing Linguistically Relevant Concepts -Syntax-Driven Semantic Analysis - Semantic Attachments - Syntax-Driven Analyzer - Robust Analysis - Lexemes and Their Senses - Internal Structure - Word Sense Disambiguation -Information Retrieval

UNIT V**9**

Discourse -Reference Resolution - Text Coherence -Discourse Structure - Dialog and Conversational Agents - Dialog Acts – Interpretation – Coherence -Conversational Agents - Language Generation – Architecture -Surface Realizations - Discourse Planning – Machine Translation -Transfer Metaphor – Interlingua – Statistical Approaches.

TOTAL: 45 PERIODS

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.Besterfield, et al., "Total Quality Management", Pearson Education Asia, 3rd 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.

UNIT I ELEMENTARY TCP SOCKETS 9

Introduction to Socket Programming – Overview of TCP/IP Protocols – Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write, close functions – Iterative Server – Concurrent Server.

UNIT II APPLICATION DEVELOPMENT 9

TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function – TCP echo Server (with multiplexing) – poll function – TCP echo Client (with Multiplexing).

UNIT III SOCKET OPTIONS, ELEMENTARY UDP SOCKETS 9

Socket options – getsockopt and setsockopt functions – generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets – Domain name system – gethostbyname function – Ipv6 support in DNS – gethostbyadr function – getservbyname and getservbyport functions.

UNIT IV ADVANCED SOCKETS 9

Ipv4 and Ipv6 interoperability – threaded servers – thread creation and termination – TCP echo server using threads – Mutexes – condition variables – raw sockets – raw socket creation – raw socket output – raw socket input – ping program – trace route program.

UNIT V SIMPLE NETWORK MANAGEMENT 9

SNMP network management concepts – SNMP management information – standard MIB's – SNMPv1 protocol and Practical issues – introduction to RMON, SNMPv2 and SNMPv3.

TOTAL : 45 PERIODS**TEXT BOOKS:**

1. W. Richard Stevens, "Unix Network Programming Vol-I", Second Edition, Pearson Education, 1998.
2. Mani Subramaniam, "Network Management: Principles and Practice", Addison Wesley, First Edition, 2001.

REFERENCES:

1. D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), Second Edition, Pearson Education, 2003.
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Third Edition, Addison Wesley, 1999.

UNIT I	WIRELESS COMMUNICATION	7
Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation - MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks		
UNIT II	WIRELESS LAN	9
IEEE 802.11 Standards – Architecture – Services – Mobile Ad hoc Networks- WiFi and WiMAX - Wireless Local Loop		
UNIT III	MOBILE COMMUNICATION SYSTEMS	11
GSM-architecture-Location tracking and call setup- Mobility management- Handover-Security-GSM SMS –International roaming for GSM- call recording functions-subscriber and service data mgt --Mobile Number portability -VoIP service for Mobile Networks – GPRS –Architecture-GPRS procedures-attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing		
UNIT IV	MOBILE NETWORK AND TRANSPORT LAYERS	9
Mobile IP – Dynamic Host Configuration Protocol-Mobile Ad Hoc Routing Protocols– Multicast routing-TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP- TCP over 2.5 / 3G wireless Networks		
UNIT V	APPLICATION LAYER	9
WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WMLScripts - WTA - iMode- SyncML		

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2003.
2. William Stallings, "Wireless Communications and Networks", Pearson Education, 2002.

REFERENCES:

1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
3. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.

UNIT I	5
Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i). Movable Property ii. Immovable Property and iii. Intellectual Property.	
UNIT II	10
IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.	
UNIT III	10
International convention relating to Intellectual Property – Establishment of WIPO– Mission and Activities – History – General Agreement on Trade and Tariff (GATT).	
UNIT IV	10
Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.	
UNIT V	10
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.	

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Subbaram N.R. “Handbook of Indian Patent Law and Practice “, S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES:

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. www.ipmatters.net/features/000707_gibbs.html.

UNIT I	9
INTRODUCTION	
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 I	5
Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i). Movable Property ii. Immovable Property and iii. Intellectual Property.	
UNIT II	10
IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures.	
UNIT III	10
International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT).	
UNIT IV	10
Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.	
UNIT V	10
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.	
TOTAL: 45 PERIODS	

TEXT BOOKS:

1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES:

1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. www.ipmatters.net/features/000707_gibbs.html.

UNIT I	9
INTRODUCTION	
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, COLOURING 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 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 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.

IT2042

INFORMATION SECURITY

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

AIM

To study the critical need for ensuring Information Security in Organizations

OBJECTIVES

- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

UNIT IV NEURO FUZZY MODELING 9

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE 8

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.
2. N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press, 2006.

REFERENCES:

1. Elaine Rich & Kevin Knight, Artificial Intelligence, Second Edition, Tata Mcgraw Hill Publishing Comp., 2006, New Delhi.
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
3. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
4. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
5. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.
6. Amit Konar, "Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain", CRC Press, 2008.

IT2023

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 Process 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 BOOKS:

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, Analysis and Machine 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.

**CS2055 SOFTWARE QUALITY ASSURANCE L T P C
3 0 0 3**

UNIT I FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE 9
The Role of SQA – SQA Plan – SQA considerations – SQA people – Quality Management – **Software Configuration Management**

UNIT II MANAGING SOFTWARE QUALITY 9
Managing Software Organizations – Managing Software Quality – **Defect Prevention** – Software Quality Assurance Management

UNIT III SOFTWARE QUALITY ASSURANCE METRICS 9
Software Quality – Total Quality Management (TQM) – **Quality Metrics** – Software Quality Metrics Analysis

UNIT IV SOFTWARE QUALITY PROGRAM 9
Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance Planning – An Overview – Purpose & Scope.

UNIT V SOFTWARE QUALITY ASSURANCE STANDARDIZATION 9
Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's CMM

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mordechai Ben-Menachem / Garry S Marliiss, "Software Quality", Vikas Publishing House, Pvt, Ltd., New Delhi.(UNIT III to V)
2. Watts S Humphrey, " Managing the Software Process", Pearson Education Inc.(UNIT I and II)

REFERENCES:

1. Gordon G Schulmeyer, "Handbook of Software Quality Assurance", Third Edition, Artech House Publishers 2007
2. Nina S Godbole, "Software Quality Assurance: Principles and Practice", Alpha Science International, Ltd, 2004

**IT2403 SOFTWARE PROJECT MANAGEMENT L T P C
3 0 0 3**

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.

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
Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing 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.

REFERENCES:

1. Decision Support Systems – V.S. Janakiraman & K. Sarukesi
2. Decision Support systems and Data warehouse Systems by Efrem G Mallach- Mc Graw Hill

CS 2063**GRID COMPUTING****L T P C
3 0 0 3****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- Grid
ICE – 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 Middlewares - Case Studies-Recent version of Globus Toolkit
and gLite - 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
Infrascture , 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.

UNIT III TCP AND ATM CONGESTION CONTROL 12

TCP Flow control – TCP Congestion Control – **Retransmission** – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – 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 INTEGRATED AND DIFFERENTIATED SERVICES 8

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline – FQ – PS – **BRFQ** – GPS – WFQ – **Random Early Detection** – Differentiated Services.

UNIT V PROTOCOLS FOR QOS SUPPORT 8

RSVP – Goals & Characteristics, Data Flow, RSVP operations – Protocol Mechanisms – **Multiprotocol Label Switching** – Operations, Label Stacking – Protocol details – RTP – Protocol Architecture – Data Transfer Protocol – **RTCP**.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. William Stallings, "High speed networks and internet", Second Edition, Pearson Education, 2002.

REFERENCES:

1. Warland, Pravin Varaiya, "High performance communication networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., , 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
3. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.

CS2061

ROBOTICS

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

UNIT I SCOPE OF ROBOTS 4

The scope of industrial Robots - **Definition of an industrial robot** - Need for industrial robots - **applications**.

UNIT II ROBOT COMPONENTS 9

Fundamentals of Robot Technology - **Automation and Robotics** - Robot anatomy - Work volume - Precision of movement - **End effectors** - Sensors.

UNIT III ROBOT PROGRAMMING 9

Robot Programming - Methods - **interlocks textual languages**. Characteristics of Robot level languages, **characteristic of task level languages**.

UNIT IV ROBOT WORK CELL 9

Robot Cell Design and Control - **Remote Center compliance** - Safety in Robotics.

UNIT V FUTURE TRENDS**14**

Advanced robotics, Advanced robotics in Space - Specific features of space robotics systems - long-term technical developments, Advanced robotics in under - water operations. Robotics Technology of the Future - Future Applications.

TOTAL : 45 PERIODS**TEXT BOOK**

1. Barry Leatham - Jones, "Elements of industrial Robotics" PITMAN Publishing, 987.

REFERENCES

1. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel Nicholas G.Odrey, "Industrial Robotics Technology, Programming and Applications ", McGraw Hill Book Company 1986.
2. Fu K.S. Gonzalez R.C. and Lee C.S.G., "Robotics Control Sensing, Vision and Intelligence " McGraw Hill International Editions, 1987.
3. Bernard Hodges and Paul Hallam, " Industrial Robotics", British Library Cataloging in Publication 1990.
4. Deb, S.R. Robotics Technology and flexible automation, Tata Mc GrawHill, 1994.

CS2053**SOFT COMPUTING****L T P C
3 0 0 3****UNIT I FUZZY SET THEORY****10**

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II OPTIMIZATION**8**

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III ARTIFICIAL INTELLIGENCE**10**

Introduction, Knowledge Representation – Reasoning, Issues and Acquisition; Propositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainty Basic knowledge Representation Issues Knowledge acquisition – Heuristic Search: Techniques for Heuristic search Heuristic Classification - State Space Search: Strategies Implementation of Graph Search Search based on Recursion Patent-directed Search Production System and Learning.

UNIT IV SOFTWARE QUALITY PROGRAM 9
Software Quality Program Concepts – Establishment of a Software Quality Program – Software Quality Assurance Planning – An Overview – Purpose & Scope.

UNIT V SOFTWARE QUALITY ASSURANCE STANDARDIZATION 9
Software Standards–ISO 9000 Quality System Standards - Capability Maturity Model and the Role of SQA in Software Development Maturity – SEI CMM Level 5 – Comparison of ISO 9000 Model with SEI's CMM

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Mordechai Ben-Menachem / Garry S Marliiss, "Software Quality", Vikas Publishing House, Pvt, Ltd., New Delhi.(UNIT III to V)
2. Watts S Humphrey, " Managing the Software Process", Pearson Education Inc.(UNIT I and II)

REFERENCES:

1. Gordon G Schulmeyer, "Handbook of Software Quality Assurance", Third Edition, Artech House Publishers 2007
2. Nina S Godbole, "Software Quality Assurance: Principles and Practice", Alpha Science International, Ltd, 2004

**IT2403 SOFTWARE PROJECT MANAGEMENT L T P C
3 0 0 3**

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.

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UNIT V**9**

Distributed Shared Memory-Introduction-Design and implementation issues-Sequential consistency and Ivy case study Release consistency and Munin case study-Other consistency models.

CORBA Case Study- **Introduction**-CORBA RMI-**CORBA services.**

TOTAL: 45 PERIODS**TEXT BOOK:**

1. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2005.

REFERENCES:

1. A.tS. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
2. M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.
3. Mukesh Singhal, "Advanced Concepts In Operating Systems", McGrawHill Series in Computer Science, 1994.
4. Nancy A. Lynch, "Distributed Algorithms", The Morgan Kaufmann Series in Data Management System, Morgan Kaufmann Publishers, 2000.

CS2062**QUANTUM COMPUTING****L T P C****3 0 0 3****UNIT I****FOUNDATION****9**

Overview of traditional computing – Church-Turing thesis – circuit model of computation – **reversible computation** – quantum physics – **quantum physics and computation** – Dirac notation and Hilbert Spaces – **dual vectors** – operators – the spectral theorem – functions of operators – tensor products – Schmidt decomposition theorem

UNIT II**QUBITS AND QUANTUM MODEL OF COMPUTATION****9**

State of a quantum system – time evolution of a closed system – composite systems – measurement – mixed states and general quantum operations – **quantum circuit model** – quantum gates – **universal sets of quantum gates** – unitary transformations – quantum circuits

UNIT III**QUANTUM ALGORITHMS – I****9**

Superdense coding – **quantum teleportation** – applications of teleportation – probabilistic versus quantum algorithms – phase kick-back – **the Deutsch algorithm** – the Deutsch-Jozsa algorithm – Simon's algorithm – Quantum phase estimation and quantum Fourier Transform – **eigenvalue estimation**

UNIT IV**QUANTUM ALGORITHMS – II****9**

Order-finding problem – **eigenvalue estimation approach to order finding** – Shor's algorithm for order finding – **finding discrete logarithms** – hidden subgroups – Grover's quantum search algorithm – amplitude amplification – quantum amplitude estimation – quantum counting – **searching without knowing the success probability**

REFERENCES:

1. Decision Support Systems – V.S. Janakiraman & K. Sarukesi
2. Decision Support systems and Data warehouse Systems by Efrem G Mallach- Mc Graw Hill

CS 2063

GRID COMPUTING

L T P C
3 0 0 3

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- Grid ICE – JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems- Ganglia and GridMon

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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 Middlewares - Case Studies-Recent version of Globus Toolkit and gLite - 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 Infrascture , 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.

UNIT IV**9**

Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V**9**

Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL: 45 PERIODS**TEXT BOOKS:**

1. Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.
2. R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.
3. Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.
4. K.L.Sharma, (1997) "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi.

REFERENCES:

1. Sharma, Brij Kishore, " Introduction to the Constitution of India:., Prentice Hall of India, New Delhi.
2. U.R.Gahai, "Indian Political System ", New Academic Publishing House, Jalaendhar.
3. R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.

IT2033**BIO INFORMATICS****L T P C
3 0 0 3****UNIT I****9**

Introduction to molecular biology – the genetic material – gene structure – protein structure – chemical bonds – molecular biology tools – genomic information content

UNIT II**9**

Data searches – simple alignments – gaps – scoring matrices – dynamic programming – global and local alignments – database searches – multiple sequence alignments
Patterns for substitutions – estimating substitution numbers – evolutionary rates – molecular clocks – evolution in organelles

UNIT III**9**

Phylogenetics – history and advantages – phylogenetic trees – distance matrix methods – maximum likelihood approaches – multiple sequence alignments – Parsimony – ancestral sequences – strategies for faster searches – consensus trees – tree confidence – comparison of phylogenetic methods – molecular phylogenies

UNIT IV**9**

Genomics – prokaryotic genomes: prokaryotic gene structure – GC content - gene density – eukaryotic genomes: **gene structure** – open reading frames – GC content – gene expression – **transposition** – repeated elements – gene density

UNIT V**9**

Amino acids – polypeptide composition – secondary structure – tertiary and quaternary structure – **algorithms for modeling protein folding** – structure prediction – predicting RNA secondary structures

Proteomics – protein classification – experimental techniques – inhibitors and drug design – ligand screening – **NMR structures** – empirical methods and prediction techniques – post-translational modification prediction

TOTAL: 45 PERIODS**TEXT BOOK:**

1. D. E. Krane and M. L. Raymer, “Fundamental concepts of Bioinformatics”, Pearson Education, 2003.

REFERENCES:

1. Arthur M. Lesk, “Introduction to Bioinformatics”, Second Edition, Oxford University Press, 2005.
2. T. K. Attwood, D. J. Parry-Smith, and S. Phukan, “Introduction to Bioinformatics”, Pearson Education, 1999.
3. Vittal R. Srinivas, “Bioinformatics – A Modern Approach”, Prentice-Hall of India Pvt. Ltd., 2005.

IT2064**SPEECH PROCESSING****L T P C
3 0 0 3****UNIT I MECHANICS OF SPEECH****9**

Speech production: **Mechanism of speech production**, Acoustic phonetics - Digital models for speech signals - Representations of speech waveform: **Sampling speech signals, basics of quantization**, delta modulation, and Differential PCM - **Auditory perception: psycho acoustics.**

UNIT II TIME DOMAIN METHODS FOR SPEECH PROCESSING**9**

Time domain parameters of Speech signal – Methods for extracting the parameters Energy, **Average Magnitude**, Zero crossing Rate – **Silence Discrimination using ZCR** and energy – **Short Time Auto Correlation Function** – Pitch period estimation using Auto Correlation Function.

UNIT III FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING**9**

Short Time Fourier analysis: Fourier transform and linear filtering interpretations, **Sampling rates** - Spectrographic displays - **Pitch and formant extraction** - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Vocoder - Homomorphic speech analysis: **Cepstral analysis of Speech**, Formant and Pitch Estimation, Homomorphic Vocoders.