CS16301 **COMPUTER ARCHITECTURE** **3 0 0 3**

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 acquire knowledge about the concept of pipelining.
- To understand the concept of virtual and catch memory.
- To apply knowledge about 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, and USB), I/O devices and processors.

TOTAL HOURS 45

COURSE OUTCOMES

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

- understand instruction and addressing modes.
- design arithmetic and logic unit.
- design and analyses pipelined control units.
- evaluate performance of memory systems.
- understand parallel processing architectures.

TEXT BOOKS

1. David A. Patterson and John L. Hennessey, "Computer organization and design', Morgan Kauffman / Elsevier, Fifth edition, 2014.
2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.

REFERENCES

1. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", VI edition, Mc Graw-Hill Inc, 2012.
2. William Stallings "Computer Organization and Architecture" , Seventh Edition , Pearson Education, 2006.
3. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
4. William Stallings, "Computer Organization and Architecture – Designing forPerformance", Sixth Edition, Pearson Education, 2003.
5. John P. Hayes, "Computer Architecture and Organization", Third Edition, TataMcGraw Hill, 1998.

WEB LINKS

1. https://www.tutorialspoint.com/computer_organization/index.asp
2. http://nptel.ac.in/courses/106103068/1
3. http://web.cs.iastate.edu/~prabhu/Tutorial/title.html

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	PSO 1	PSO 2
CO1	1	1	1	1	1	-	-	-	1	1	1	1	1	1
CO2	2	2	2	2	2	-	-	-	1	1	1	1	2	2
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

CS16302 OBJECT ORIENTED PROGRAMMING WITH C++ 3 0 0 3

COURSE OBJECTIVES

- To get a clear understanding of object-oriented concepts.
- To understand object oriented programming through C++.
- To develop the problem solving skills by applying object-oriented concepts inheritance and virtual classes.
- To create programs using streams and file handling
- To learn templates and exception handling in C++

UNIT I PRINCIPLES OF OOP 9

Programming Paradigms- Basic concepts and benefits of OOP- Structure of C++ program - Applications of C++- Tokens- Keywords- Identifiers-constants- variables - Data types - Basic, User defined ,Derived - Dynamic initialization -Reference variables- Scope resolution operator- Function Prototyping- Inline function- Default arguments – Function overloading.

UNIT II CLASSES, OBJECTS AND CONSTRUCTORS 9

Class specification- Static data members and member functions - Array of objects- Objects as function arguments- Friend functions- Returning objects- Local classes - Constructors –Parameterized constructors- MultipleConstructors- Constructors with default arguments-Copy constructors- Destructors - Operator Overloading-Overloading unary and binary operator.

UNIT III INHERITANCE AND VIRTUAL CLASS 9

Introduction – types- Single Inheritance- Multiple Inheritance- Multi level inheritance- Hierarchical Inheritance- Hybrid Inheritance. Virtual base class – Abstract class – this pointer-Dynamic binding- virtual function – pure virtual function.

NIT IV STREAMS AND FILE HANDLING 9

Stream classes- Formatted and unformatted I/O operations- Manipulators- File handling - File open and close- File pointers and their manipulators- Sequential and random access-Error Handling.

UNIT V TEMPLATES AND EXCEPTION HANDLING 9

Class templates-Function templates- overloading of template functions- Exception Handling: Exception handling mechanism-throwing mechanism- catching mechanism- rethrowing an exception. Standard Template Library.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- explain the object-oriented concepts
- understand object oriented programming through C++.
- create programs using inheritance and virtual classes.
- develop programs using streams and file handling.
- know function and class template and way of handling exception.

TEXT BOOKS

1. E.Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, Sixth Edition, 2013

REFERENCES

1. B.Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
2. K.R.Venugopal, Rajkumar, T.Ravishankar, "Mastering C++ ",Tata McGraw Hill, 2007.
3. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2006
4. BjarneStroustrup, "The C++ Programming Language", Pearson Education, Fourth Edition, 2013.
5. K.S. Easwarakumar, " Object Oriented Data Structures Using C++", Vikas Publication House Pvt Ltd, First Edition, 2000.

WEB LINKS

1. http://www.desy.de/gna/html/cc/Tutorial/tutorial.html
2. http://thatchna.weebly.com/uploads/4/1/9/3/4193382/std_c_notes_03.pdf
3. https://www.youtube.com/watch?v=CzWZYwOvrcE

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

CS16303 DESIGN AND ANALYSIS OF ALGORITHMS 3 0 0 3

COURSE OBJECTIVES

- To study the principles of algorithm design.
- To know the importance of computational complexity of the algorithm.
- To become familiar with dynamic programming, divide and conquer, branch and bound and backtracking techniques.
- To understand the limitations of algorithm power.
- To study about notions of P, NP, NPC, and NP-hard.

UNIT I INTRODUCTION 9

Notion of an Algorithm – Fundamentals of Algorithmic Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive and Non-recursive algorithms

UNIT II BRUTE FORCE AND DIVIDE-AND-CONQUER 9

Brute Force - Closest-Pair and Convex-Hull Problems-Exhaustive Search - Traveling Salesman Problem- Knapsack Problem - Assignment problem. Divide and conquer methodology – Merge sort – Quick sort –Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication-Closest-Pair and Convex-Hull Problems.

UNIT III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 9

Computing a Binomial Coefficient – Warshall's and Floyd's algorithm – Optimal Binary Search Trees-Knapsack Problem and Memory functions. Greedy Technique– Prim's algorithm- Kruskal's Algorithm-Dijkstra's Algorithm-Huffman Trees.

UNIT IV ITERATIVE IMPROVEMENT 9

The Simplex Method-The Maximum-Flow Problem – Maxim Matching in Bipartite Graphs- The Stable marriage Problem.

UNIT V LIMITATIONS OF ALGORITHM POWER 9

Limitations of Algorithm Power-Lower-Bound Arguments-Decision Trees-P, NP and NP-CompleteProblems--Coping with the Limitations – Backtracking - n-Queens problem – Hamiltonian CircuitProblem –Subset SumProblem-Branch and Bound - Assignment problem – Knapsack Problem –Traveling Salesman Problem.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the significance of algorithms in problem solving process.
- analyze asymptotic runtime complexity of algorithms.
- describe and apply dynamic programming and divide and conquer algorithms.
- design efficient algorithms for new situations, using as building blocks the techniques learned.
- apply algorithm design techniques to solve certain np-complete problems.

TEXT BOOK

1. AnanyLevitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

REFERENCES

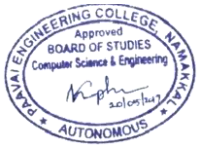
1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
4. Steven S. Skiena, "The Algorithm Design Manual", Second Edition, Springer, 2008.

WEBLINKS

1. http://www.personal.kent.edu/~rmuhamma/Algorithms/algorithm.html
2. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/index.htm

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



EC16308 DIGITAL PRINCIPLES AND SYSTEM DESIGN 3 0 0 3

COURSE OBJECTIVES

- To learn the basic concepts of boolean algebra and logic gates.
- To know about the analysis and design procedure for combinational circuits
- To familiarize the students with memory devices.
- To know about the analysis and design procedure for synchronous sequential circuits.
- To acquire knowledge about the analysis and design procedure of asynchronous sequential circuits.

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES 9

Review of binary number systems - Binary arithmetic – Binary codes – Boolean laws and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation methods – Implementation of Boolean functions using logic gates.

UNIT II COMBINATIONAL LOGIC 9

Combinational circuits - Analysis and design procedures - Circuits for arithmetic operations and Code conversion- Encoder - decoder – Multiplexer- Introduction to Hardware Description Language (HDL). HDL for combinational circuits.

UNITIII MEMORY AND PROGRAMMABLE LOGIC 9

Classification of memory-ROM-ROM organization-RAM-Static and Dynamic RAM-Memory decoding and expansion-Programmable logic devices-PLA,PAL.

UNIT V SYNCHRONOUS SEQUENTIAL LOGIC 9

Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters – HDL for Sequential Circuits.

UNIT V ASYNCHRONOUS SEQUENTIAL LOGIC 9

Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables - Race-free state assignment – Hazards

TOTAL PERIODS 45

COURSE OUTCOMES

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

- understand the basic concept of Boolean algebra and logic gates.
- design combinational logic circuits.
- evaluate the memory and programmable logic devices.
- analyze and design the synchronous sequential logic circuits.
- analyze and design the asynchronous sequential logic circuits.

TEXT BOOK

1. M.Morris Mano, “Digital Design”, 3rd edition, Pearson Education, 2007.

REFERENCES

1. Charles H.Roth, Jr. “Fundamentals of Logic Design”, 4th Edition, Jaico Publishing House, Cengage Earning, 5th ed, 2005.
2. Donald D.Givone, “Digital Principles and Design”, Tata McGraw-Hill, 2007.

WEB LINKS

1. http://nptel.ac.in/video.php?subjectid=117106086
2. http://www.electronics-tutorials.ws/combination/comb_1.html

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

EC16309 **DIGITAL LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

- To understand the concept of boolean theorems.
- To study the concept of combinational circuits using digital logic gates
- To learn the concept of combinational circuits using MSI devices.
- To simulate combinational and sequential logic circuits using VHDL/verilog.

LIST OF EXPERIMENTS

1. Verification of Boolean laws and theorems using logic gates
2. Design and verification of adders and sub tractors using basic gates.
3. Design and implementation of code converter: Binary to Gray code and Gray code to Binary code.
4. Design and implementation of 4-bit binary adder / subtractor using IC7483
5. Design and implementation of encoder and decoder using basic gates.
6. Design and implementation of multiplexers and Demultiplexers using basic gates.
7. Design and implementation of Shift registers.
8. Design and implementation of Synchronous and Asynchronous counters.
9. Simulation of Combinational circuits using Verilog HDL

TOTAL PERIODS 60

COURSE OUTCOMES

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

- evaluate the basic laws.
- analyse the combinational logic circuits using logic gates.
- analyse the combinational logic circuits using MSI devices.
- explain the working of sequential logic circuits.

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

CS16304 OBJECT ORIENTED PROGRAMMING LABORATORY 0 0 4 2

COURSE OBJECTIVES

- To acquire knowledge about the features of object oriented programming such as classes, objects, data abstraction.
- To explain the various concepts of overloading such as function overloading and operator overloading
- To introduce the levels of inheritance & ambiguity problems in them
- To familiarize the students with polymorphism& their implementation in C++.

LIST OF EXPERIMENTS

1. Simple C++ programs.
2. Programs using Functions and classes.
3. Friend Functions.
4. Function Overloading.
5. Operator Overloading.
6. Simple and Multiple Inheritances.
7. Multilevel & Hybrid Inheritance.
8. Virtual Functions.
9. Constructors and Destructors
10. File Handling.
11. Templates.
12. Exception Handling.

TOTAL PERIODS 60

COURSE OUTCOMES

At the of this course, students will be able to

- explain procedure as well as object oriented programming concepts and their differences.
- familiar with how to make programs using function overloading and operator overloading.
- get the capability to implement the different types of inheritance and done problems related to them.
- implement various types of polymorphism and the use of pointers for virtual functions.

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

SEMESTER IV

MA16401 PROBABILITY AND QUEUEING THEORY 3 2 0 4

COURSE OBJECTIVES

- To acquire knowledge of the random variables and manipulate.
- To understand the concepts of standard distributions methods.
- To analyse the relationship between the two random variables.
- To provide necessary basic concepts in probability and random processes related to communication engineering domain.
- To use various queuing theory models for real time situations.

UNIT I RANDOM VARIABLES 15

Axioms of probability – Conditional probability – Total probability – Baye's theorem - Random variable- Probability mass function – Probability density function – Properties – Moments – Moment generating functions and their properties.

UNIT II STANDARD DISTRIBUTION 15

Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions and their properties – Functions of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 15

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables.

UNIT IV RANDOM PROCESS AND MARKOV CHAIN 15

Classification – Stationary process – Poisson process – Markov Chain – Transition probabilities–Limiting Distributions.

UNIT V QUEUEING MODELS 15

Markovian models – (M/M/1), (M/M/C), finite and infinite capacity – (M/G/1) queue –Pollaczek – Khintchine Formula.

TOTAL PERIODS 75

COURSE OUTCOMES

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

- understand the basic probability concepts.
- know the standard distribution for real time applications.
- acquire skills in handling situations involving more than one random variable and functions of random variables.
- evolve with respect to time in a probabilistic manner.
- acquire the fundamental skills to analyze queuing models and systems.

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.

WEB LINKS

1. https://www.youtube.com/watch?v=IYdiKeQ9xEI
2. https://www.youtube.com/watch?v=xGkpXk-AnWU
3. https://www.youtube.com/watch?v=l-rRtmNpdkU
4. https://www.youtube.com/watch?v=J70dP_AECzQ
5. http://172.16.100.200/NPTEL/displayvideo.html?type1=111105041%2Fmod01lec16.mp4

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

COs	Programme Outcomes(POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
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

CS16401 **SOFTWARE ENGINEERING** **3 0 0 3**

COURSE OBJECTIVES

- To understand the 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 understand fundamental concepts of requirements engineering and analysis modeling.

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 – EvolutionaryProcess Models – Prototyping – The Spiral Model – The Concurrent Development Model– Specialized Process Models – the Unified Process - Agile Development.

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 **TESTINGTECHNIQUES** **9**

A strategic Approach for Software testing – Test Strategies for conventional software – Validation Testing–System Testing – The Art of Debugging. Testing Conventional Applications: Software testing Fundamentals –Internal and External Views Testing – White Box Testing – Basis Path Testing – Control Structure Testing – Black Box Testing – Model Based testing – Testing for Specialized Environments – Architectures and Applications –Patterns for Software Testing.

UNIT V **SOFTWARE PROJECT MANAGEMENT** 9

Software Cost Estimation – productivity – Estimation Techniques – Algorithmic Cost Modeling –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 Modeling –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 this course, the students will be able to

- identify the key activities in managing a software project.
- compare different process models.
- understand the Concepts of requirements engineering and Analysis Modeling.
- compare and contrast the various testing and maintenance.
- understand the concept of Software Project Management

TEXT BOOKS

1. RogerS.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. PankajJalote, "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 WitoldPedrycz,"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)	
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CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2
CO5	2	2	2	2	2	-	-	-	-	-	2	1	2	2

CS16402 **DATABASE MANAGEMENT SYSTEMS** **3 0 0 3**

COURSE OBJECTIVES

- To explore the fundamentals of database management systems.
- To make the students understand the relational model.
- To familiarize database design.
- To familiarize with the different types of transaction concepts.
- To make the students understand the implementation and security issues in databases.

UNIT 1 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-RDiagrams -- 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 l/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 solation Levels –ISQL 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 this course, the students will be able to

- use the relational model, ER diagrams.
- write queries in structural query language.
- design the database using various normal forms.
- understand the transaction concepts and locking protocols.

- implement database concepts with security.

TEXT BOOKS

1. Silberschatz, H.Korth and Sudarshan S., "Database System Concepts", 6th Edition, McGraw-Hill International, 2010.

REFERENCES

1. Elmasri R. and Shamakant B. Navathe, "Fundamentals of Database Systems", 6th Edition, AddisionWesley ,2011.
2. AtulKahate, "Introduction to Database Management Systems", Pearson Education, New Delhi, 2006.
3. Raghu Ramakrishnan, "Database Management Systems", Fourth Edition, Tata McGraw Hill, 2010.
4. G.K.Gupta, "Database Management Systems", Tata McGraw Hill, 2011.
5. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems",Eighth Edition, Pearson Education, 2006.

WEB LINKS

1. http://www.nptelvideos.in/2012/11/database-management-system.html
2. https://www.youtube.com/watch?v=1057YmExS-I
3. http://freevideolectures.com/Course/2668/Database-Management-System

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

CS16403 **SYSTEM SOFTWARE** **3 0 0 3**

COURSE OBJECTIVES

- To understand the relationship between system software and machine architecture
- To know the design and implementation of assemblers.
- To understand the major concept of loader and linker.
- To have an understanding of macro processors.
- To understand the major concept of interactive debugging systems and software tools.

UNIT I INTRODUCTION **8**

System software and machine architecture – The Simplified Instructional Computer (SIC) - Machine architecture- Data and instruction formats - addressing modes -instruction sets - I/O and programming.

UNIT II ASSEMBLERS **10**

Basic assembler functions - A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features- Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals–Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

UNIT III LOADERS AND LINKERS **9**

Basic loader functions - Design of an Absolute Loader – A Simple Bootstrap Loader -Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader -Machine- independent loader features –Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker.

UNIT IV MACRO PROCESSORS **9**

Basic macro processor functions - Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features -Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-Macro within Macro-Implementation example -MASM Macro Processor – ANSI C Macro language.

UNIT V SYSTEM SOFTWARE TOOLS **9**

Text editors - Overview of the Editing Process - User Interface – Editor Structure. -Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- identify the approach of different machine architecture.
- study of machine dependent and independent assembler algorithms and program relocation.
- design of various linker loader and program linking.
- study of machine independent macro processors.
- understand the text editors and debugging systems.

TEXT BOOKS

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd Edition, Pearson Education Asia, 2006.

REFERENCES

1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill 2000.
2. John J. Donovan "Systems Programming", Tata McGraw-Hill Edition, 2000.
3. John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, 2000shing company,1994

WEB LINKS

1. .http://study.com/academy/topic/systems-software.html
2. https://www.youtube.com/watch?v=VG9VopzV_T0
3. https://www.youtube.com/watch?v=6ipFf3vLifU&list=PLRjiB7KcljoS22wmROkUKZ8zD4_Fj8U2R

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

CS16404 **COMPUTER NETWORKS** **3 0 0 3**

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 AND 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 AND 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 this course, students will 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. Behrouz A. Forouzan, "Data communication and Networking", Fourth Edition, Tata McGraw – Hill, 2011
2. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, 2011.

REFERENCES

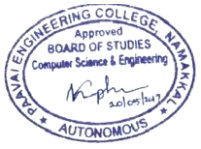
1. AndrewS.Tanenbaum, Computer Networks, PearsonEducation, 2008
2. James F. Kurose, Keith W. Ross, "Computer Networking – A Top-Down Approach Featuring the Internet", Fifth Edition, Pearson Education, 2009.
3. Nader. F. Mir, "Computer and Communication Networks", Pearson Prentice Hall Publishers, 2010.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

WEB LINKS

1. https://www.youtube.com/watch?v=3DZLItfbqtQ&list=PL1EC310A0BF4B2CA7
2. https://www.youtube.com/watch?v=zzXs0EnCin0
3. https://www.youtube.com/watch?v=aNqiTCZ-nko

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



CS16405 DATA BASE MANAGEMENT SYSTEMS LABORATORY 0 0 4 2

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 a query language

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 this course, students will 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)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO 2
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2

CS16406 **NETWORKS LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

- To learn socket programming.
- To be familiar with simulation tools.
- performance of the protocols in different layers
- To have hands on experience on various networking protocols.

LIST OF EXPERIMENTS

1. Implementation of Stop and Wait Protocol and Sliding Window Protocol.
2. Study of Socket Programming and Client – Server model
3. Write a code simulating ARP /RARP protocols.
4. Perform a case study about the different routing algorithms to select the network path with its optimum and economical during data transfer.
   - Link State routing
   - Distance vector
5. Applications using TCP Sockets like
   - Echo client and echo server
   - File transfer
   - Remote command execution
   - 5.4 Chat
6. Applications using TCP and UDP Sockets like
   - DNS
7. Applications using Raw Sockets like
   - Ping
   - 7.2. Trace route
8. Write a program to implement RPC (Remote Procedure Call)
9. Study of Network simulator (NS).and Simulation of Congestion Control Algorithms using NS
10. Study of TCP/UDP performance

TOTAL PERIODS 60

COURSE OUTCOMES

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

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

REFERENCE: Spoken-tutorial.org.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

SOFTWARE

- C / C++ / Java / Equivalent Compiler 30
- Network simulator like NS2/Glomosim/OPNET/ Equivalent

HARDWARE: Standalone desktops

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**	**PSO 2**
CO1	1	1	1	1	1	-	-	-	-	-	1	1	1	1
CO2	2	2	2	2	2	-	-	-	-	-	1	1	2	2
CO3	3	3	2	2	2	-	-	-	-	-	2	2	3	3
CO4	2	2	2	2	2	-	-	-	-	-	2	1	2	2

SEMESTER V

CS16501	THEORY OF COMPUTATION	3	2	0	4

COURSE OBJECTIVES

To enable the students to

- Introduce the mathematical foundations of computation using automata theory.
- Prove properties of regular languages and construct FA for regular expressions.
- Understand context free grammar and determine whether a given language is context - free language or not.
- Build CFG for pushdown automata.
- Design Turing machine for simple problems.

PRE - REQUISITE: Nil

UNIT I FINITE AUTOMATA 12

Introduction to automata theory - Formal definition of Finite automata - Deterministic Finite Automata (DFA) - Non - deterministic Finite Automata (NFA) - Finite Automata with Epsilon transitions - NFA to DFA conversions - DFA minimization.

UNIT II REGULAR EXPRESSIONS AND LANGUAGES 12

Regular Expression - regular sets - construction of Finite automata from regular expressions - pumping lemma for regular languages - Applications of pumping lemma - Proving languages not to be regular - Closure properties of regular languages.

UNIT III CONTEXT FREE GRAMMARS AND LANGUAGES 12

Introduction to grammars - Language generated by grammars - Chomsky classification of grammar - Context free grammars and languages - Derivations - leftmost and rightmost derivations - Parse Tree - Ambiguity in grammars and Languages - Simplification of CFG - Elimination of useless symbols - Unit productions - Null productions Normal forms - Chomsky Normal form - Greibach normal form - pumping lemma for context free grammar.

UNIT IV PUSHDOWN AUTOMATA 12

Introduction - Pushdown automata - Basic structure of PDA - Instantaneous description of pushdown automata - Acceptance by empty stack and final state - Equivalence of CFG and PDA.

UNIT V TURING MACHINE AND LANGUAGE DECIDABILITY 12

Turing machine introduction - definition - Programming Techniques for TM - Storage in finite Control - (Multiple Tracks, Subroutines, Checking off symbols) Designing a Turing machine for simple problems - Multitape Turing machine and multitrack Turing machine - Language decidability - Undecidable languages - Turing machine halting Problem - Rice theorem - Post correspondence problem.

TOTAL PERIODS: 60

COURSE OUTCOMES

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

- Analyze and design finite automata and minimize finite automata.
- Understand the properties of regular expressions, convert regular expression to finite automata.
- Understand CFG and simplification of grammar, normal forms.
- Understand PDA and equivalence of PDA and CFG.
- Understand the concept of Turing Machine and Language Decidability.

TEXT BOOKS

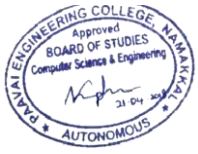
1. John E.Hopcroft, Rajeev Motwani and Jeffrey.D Ullman, Introduction to Automata Theory, Languages and Computations, Pearson Education, Third Edition, 2009.
2. John C.Martin, Introduction to Languages and the Theory of Computation, TMH, 2007.

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 an H.James Hoover, "Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
5. MichealSipser, "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 Programme Outcomes
(1/2/3 indicates strength of correlation) 3-strong, 2-Medium, 1-Weak

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

CS16502 **GRAPHICS AND MULTIMEDIA** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- Understand 2D graphics techniques and algorithms.
- Implement various3D graphics techniques.
- Implement the graphics programming concepts.
- Understand the basic concepts of Multimedia.
- Gain the knowledge of the various file formats in multimedia.

PRE - REQUISITE: Nil

UNIT I 2D PRIMITIVES 9

Introduction - Output primitives: Line (DDA, Bresenham‟s), Circle (Bresenham‟s, Midpoint) drawing algorithms - Filled Area primitives - Attributes of output primitives - Two dimensional geometric transformations: Translation - rotation - scaling - reflection and shearing - Two dimensional viewing - Clipping algorithm: Line (Cohen Sutherland, Liang Bar - sky - Clipping), Polygon (Sutherland Hodgeman Clipping), Curve - Point and Text clipping algorithms.

UNIT II 3D REPRESENTATION 9

3D transformations - Translation - rotation - scaling - reflection and shearing - 3D Viewing - Parallel and Perspective projections - Visible surface identification.

UNIT III GRAPHICS PROGRAMMING 9

Color Models - RGB - YIQ - CMY - HSV - Animations - General computer Animation - Raster - Key frame - Graphics programming using OPENGL - Basic graphics primitives - Drawing three dimensional objects - Drawing three dimensional scenes.

UNIT IV MULTIMEDIA 9

Introduction - Applications - Multimedia system Architecture - Multimedia data interface standards - Multimedia Databases - Compression and decompression: Types of Compression - Video image compression (JPEG, MPEG) - Audio compression.

UNIT V MULTIMEDIA FILE FORMAT AND INPUT/OUTPUT TECHNOLOGIES 9

Data File Format standards: TIFF file format - RIFF file format - MIDI file format - JPEG DIB File format - Multimedia input and output technologies(Video and Image display systems, Video image and Animation).

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Understand the basic concepts of computer graphics 2D modeling.
- Understand the 3D modeling techniques.
- Develop a program using computer graphics.

- Understand multimedia concepts.
- Understand multimedia file format.

TEXT BOOKS

1. Donald Hearn and Pauline Baker, Computer Graphics C version, Pearson Education, 2008.
2. Andleigh, Prabat K, and ThakrarKiran., "Multimedia Systems and Design", Prentice Hall of India, New Delhi, 2004.

REFERENCES

1. Ashok Banerji, AnandaGhosh, "Multimedia Technologies", Tata McGraw - Hill, New Delhi, 2009.
2. Halshall, Fred., "Multimedia Communications", Pearson Education (India), New Delhi, 2008.
3. Foley, Vandam, Feiner and Huges, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2003.
4. Steinmetz, Ralf and Nahrstedt, Klara., "Multimedia: Computing, Communications and Applications" Pearson Education, New Delhi, 2001.
5. Tay Vaughan, Multimedia: Making It Work, Tata McGraw Hill, 2008.

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

JAVA AND INTERNET PROGRAMMING **3 0 0 3**

CS16503

COURSE OBJECTIVES

To enable the students to

- Understand the concepts of Java fundamentals.
- Understand the importance of Multi thread Programming and IO.
- Develop an application using Applet and JDBC.
- Gain the knowledge about the client side scripting.
- Gain the knowledge about the server side scripting and web development application.

PRE - REQUISITE: Object Oriented Programming

UNIT I JAVA FUNDAMENTALS **9**

Review of OOP - Objects and classes in Java - Defining classes - Methods - Access Specifiers - Static members - Constructors - Finalize method - Arrays - Strings - Packages - Inheritance.

UNIT II CONCURRENT PROGRAMMING **9**

MULTI-THREADED PROGRAMMING: interrupting threads - thread states - thread properties - thread Synchronization. I/O AND EXPLORING JAVA.IO: Basics - Reading Console Input - Writing Console output - Native Methods - I/ O Classes and Interfaces - File - The Byte Streams - The Character Streams - Serialization.

UNIT III APPLETS, EVENT HANDLING AND AWT **9**

Applet Basics - Applet Architecture - Applet Display Methods - Parameter Passing - Event Handling Mechanisms - Event Classes - Event Listener - Working with Windows - Graphics - Colors and Fonts - AWT Controls - Layout Managers and Menus.

UNIT IV CLIENT - SIDE PROGRAMMING **9**

Scripting for content structuring - design - client side validation - dynamic page generation - adding interactivity - styles using HTML - DHTML - XHTML - CSS - Java Script.

UNIT V SERVER - SIDE PROGRAMMING **9**

Types of servers - Handling form data - validation - querying databases - information retrieval - Response generation - Session management - using Servlets and JSP.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Construct java program using concept of OOPs and packages in java.
- Construct java program using concept of I/O exploring java.io and multithreading.
- Develop the application of Applets, Event Handling and AWT.
- Create the UI in client - side programming.
- Acquire knowledge to configure the Servers.

TEXT BOOKS

1. Herbert Schildt, "Java The Complete Reference", 8th Edition, McGraw - Hill Osborne Media, 2011.
2. Paul Deitel, "Internet & World Wide Web: How to Program", Prentice Hall, 4th Edition, 2007.

REFERENCES

1. Cay S. Horstmann and Gary Cornell, "Core Java™, Vol I - Fundamentals" 8Th Edition, Prentice Hall, 2007.
2. Robert W. Sebesta, "Programming the World Wide Web", Addison - Wesley,Sixth Edition, 2010.
3. UttamK.Roy, "Web Technologies", Oxford University Press, 1st Edition, 2010.
4. B. Chapman, G. Jost, and Ruud van der Pas, "Using OpenMP", MIT Press, 2008.

WEB LINKS

1. www.javatpoint.com/java - oops - concepts.
2. www.w3resource.com.

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

CS16603 **CRYPTOGRAPHY AND NETWORK SECURITY** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- Know the number theory for the understanding of encryption algorithms.
- Learn the techniques used for message authentication and confidentiality maintenance.
- Understand the concepts of network security tools and applications.
- Learn the network security practices.
- Understand the concepts of system security.

PRE - REQUISITE: Computer Networks

UNIT I INTRODUCTION AND NUMBER THEORY 9

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

UNIT II SYMMETRIC CIPHERS 9

Block Ciphers and the Data Encryption Standard - Introduction to Finite Fields - Advanced Encryption Standard - More on Symmetric Ciphers - Confidentiality using Symmetric Encryption.

UNIT III PUBLIC - KEY ENCRYPTION AND HASH FUNCTION 9

Public - Key Cryptography and RSA - Key Management - Diffie - Hellman Key Exchange - Elliptic Curve Cryptography - Message Authentication and Hash Functions - Hash and MAC Algorithms – Digital Signatures and Authentication Protocols.

UNIT IV NETWORK SECURITY PRACTICE 9

Authentication Applications - Kerberos - X.509 Authentication Service - Electronic mail Security - Pretty Good privacy - S/MIME - IP Security - Web Security.

UNIT V SYSTEM SECURITY 9

Intruders - Intrusion Detection - Password Management - Malicious Software - Viruses and Related Threats – Virus Countermeasures - Distributed Denial of Service Attacks - Firewalls - Firewall Design Principles - SET for E - Commerce Transactions - Trusted Systems.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Demonstrate the fundamental representation of Network Security.
- Analyze and implement the cryptographic algorithms and protocols.
- Demonstrate the concepts of public key cryptosystems.
- Analyze the algorithms for Internet security.
- Demonstrate an ability to use techniques, skills, and modern computing tools to implement and organize.

TEXT BOOKS

1. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013. (I,II,III,V)
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002. (UNIT IV)

REFERENCES

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata McGraw Hill, 2007.
2. AtulKahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.
3. Bruce Schneider, "Applied Cryptography", John Wiley & Sons Inc, 2001.
4. W. Mao, Modern Cryptography - Theory and Practice, Pearson Education, 2007.
5. Stewart S. Miller, "Wi - Fi Security", McGraw - Hill 2003.
6. Charles B. Fleeter, Shari Lawrence Fleeter, "Security in Computing", Fourth Edition, Pearson Education, 2007.

WEB LINKS

1. http://www.securitydocs.com/
2. http://www.linuxsecurity.com/
3. http://www.itprc.com/security.htm

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	PO 10	PO 11	PO12	PSO 1	PSO 2
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

CS16505 GRAPHICS AND MULTIMEDIA LABOROTARY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- Understand the need of developing graphics applications.
- Learn the hardware involved in building graphics applications.
- Learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon etc.
- Learn the representation and transformation of graphical images and pictures.

LIST OF EXPERIMENTS

1. Implementation of Line Drawing Algorithms a) DDA b) Bresenham.
2. Implementation of Bresenham"s Circle and Ellipse Generation Algorithm.
3. Implementation of Two Dimensional Transformations.
4. Composite 2D Transformations.
5. Implementation of Cohen - Sutherland Line Clipping Algorithm.
6. Implementation of 3D Transformations.
7. Composite 3D Transformations.
8. Animation using Image Effects Generator.
9. Game development using Flash.
10. Video Editing.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- draw basic shapes such as lines, circle and ellipse.
- perform processing of basic shapes by various processing algorithms /techniques.
- apply the transformations to the basic shapes.
- apply the transformations to the basic shapes.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

SOFTWARE: Adobe Flash Player, Dreamweaver, Photoshop 7.0.

HARDWARE: Flavor of any WINDOWS and UNIX. Standalone desktops 30 Nos.

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

CS16506 JAVA AND INTERNET PROGRAMMING LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- Implement various of OOP using Java.
- Implement multithreading, Applet and event handling in solving real time problem.
- Develop the skill in usability of web page.
- Develop the skill in handling the web page using servlet or JSP.

LIST OF EXPERIMENTS:

1. Write a simple program in java using class, object, array of object and methods.
2. Write a program to implement method overloading and method overriding.
3. Program to implement inheritance, interface and abstract class in Java.
4. Program to implement Multithreading concept in Java.
5. Program to implement the concept of Synchronization and Serialization.
6. Design a simple Login Window Using AWT Controls (Button, Label, Text field) of Java.
7. Develop an Applet program in Java.
8. Create a web site using web development tool.
9. Create a web page with all types of Cascading style sheets.
10. Client Side Scripts for Validating Web Form Controls using JavaScript.
11. Client side scripting for roll over image and random image display using JavaScript.
12. By using servlet or JSP programming language handle the data, Validate the data and retrieve the information.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- Demonstrate object, class, inheritance, interface concept in java.
- Develop java program using the concept of multithreading, Applet and AWT.
- Develop an attitude to learn and implement the web technology concepts.
- Acquire knowledge in java web services.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

SOFTWARE: Java, Dream Weaver or Equivalent, MySQL or Equivalent, Apache Server Turbo C, C++.

HARDWARE: Flavor of any WINDOWS or LINUX and Standalone desktops 30 Nos.

CO/PO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes(POs)												Programme Specific Outcomes (PSOs)	
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	1	1	-	1	-	-	-	-	-	-	-	3	3
CO2	2	1	2	-	2	-	1	-	-	-	-	-	1	3
CO3	3	2	-	-	3	-	-	-	-	-	-	-	-	3
CO4	3	1	-	-	-	2	-	-	-	-	-	-	1	3

CS2307 **NETWORKS LAB** **L T P C**
0 0 3 2

1. Programs using TCP Sockets (like date and time server & client, echo server & client, etc..)
2. Programs using UDP Sockets (like simple DNS)
3. Programs using Raw sockets (like packet capturing and filtering)
4. Programs using RPC
5. Simulation of sliding window protocols
6. Experiments using simulators (like OPNET)
7. Performance comparison of MAC protocols
8. Performance comparison of Routing protocols
9. Study of TCP/UDP performance

TOTAL: 45 PERIODS

Requirement for a batch of 30 students

S.No.	Description of Equipment	Quantity required	Quantity available	Deficiency %
1.	SOFTWARE ➢ C++ Compiler ➢ J2SDK (freeware) ➢ Linux ➢ NS2/Glomosim/OPNET (Freeware)	30		
2.	Hardware ➢ PCs	30 Nos		

CS2308 **SYSTEM SOFTWARE LAB** **L T P C**
0 0 3 2

(Using C)

1. Implement a symbol table with functions to create, insert, modify, search, and display.
2. Implement pass one of a two pass assembler.
3. Implement pass two of a two pass assembler.
4. Implement a single pass assembler.
5. Implement a two pass macro processor
6. Implement a single pass macro processor.
7. Implement an absolute loader.
8. Implement a relocating loader.
9. Implement pass one of a direct-linking loader.
10. Implement pass two of a direct-linking loader.

11. Implement a simple text editor with features like insertion / deletion of a character, word, and sentence.
12. Implement a symbol table with suitable hashing

(For loader exercises, output the snap shot of the main memory as it would be, after the loading has taken place)

TOTAL:45 PERIODS

Requirement for a batch of 30 students

S.No.	Description of Equipment	Quantity required	Quantity available	Deficiency %
1.	Hardware – Pentium PC Desktops	30 Nos.		
2.	Software – Turbo C (Freely download)	Multiuser		

CS2309 **JAVA LAB** **L T P C**
0 0 3 2

1. Develop Rational number class in Java. Use JavaDoc comments for documentation. Your implementation should use efficient representation for a rational number, i.e. (500 / 1000) should be represented as (½).
2. Develop Date class in Java similar to the one available in java.util package. Use JavaDoc comments.
3. Implement Lisp-like list in Java. Write basic operations such as 'car', 'cdr', and 'cons'. If L is a list [3, 0, 2, 5], L.car() returns 3, while L.cdr() returns [0,2,5].
4. Design a Java interface for ADT Stack. Develop two different classes that implement this interface, one using array and the other using linked-list. Provide necessary exception handling in both the implementations.
5. Design a Vehicle class hierarchy in Java. Write a test program to demonstrate polymorphism.
6. Design classes for Currency, Rupee, and Dollar. Write a program that randomly generates Rupee and Dollar objects and write them into a file using object serialization. Write another program to read that file, convert to Rupee if it reads a Dollar, while leave the value as it is if it reads a Rupee.

CS16601 OBJECT ORIENTED ANALYSIS AND DESIGN 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- Understand the basic concepts of OOAD.
- Make utilization of software objects to build robust systems.
- To learn the UML design diagrams.
- Familiarize the object - oriented analysis and design concepts for developing object oriented Projects.
- Understand the quality issues in implementations.

PRE - REQUISITE: Nil

UNIT I INTRODUCTION 9

Introduction to OOAD - UML - Unified process(UP) phases - Case study - the Next Gen POS system - Inception Use case Modeling - Relating Use cases - include - extend and Generalization.

UNIT II MODEL 9

Elaboration - Domain Models - Finding conceptual classes and description classes - Associations - Attributes - Domain model refinement - Finding conceptual class hierarchies - Aggregation and Composition - UML activity diagrams and modeling.

UNIT III UML 9

System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram - Logical architecture refinement - UML class diagrams - UML interaction diagrams UML state diagrams and modeling - Operation contracts - Mapping design to code - UML deployment and component diagrams.

UNIT IV APPLICATIONS 9

GRASP: Designing objects with responsibilities - Creator - Information expert - Low Coupling - Controller - High Cohesion - Designing for visibility - Applying code sign patterns - adapter - singleton - factory and observer Patterns.

UNIT V IMPLEMENTATIONS 9

View layer - Designing Interface Objects - User interface design as a creative process - Designing View layer classes - Macro level process - Micro level process - Purpose of view layer interface - Software Quality Assurance - System Usability.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Perform a comprehensive object - oriented analysis and design of larger object - oriented software using the Unified Process (UP).
- Recognize the concepts and notations used for finding objects and classes.
- Demonstrate the functional behavior of UML diagrams.

- Depict the utility of object oriented methodologies.
- Determine the quality factors of object oriented design process.

TEXT BOOKS

1. Ali Bahrami, Object Oriented Systems Development, Tata McGraw - Hill, 2010.
2. John Deacon, “Object Oriented Analysis and Design”, Pearson Education, First Edition, 2009.

REFERENCES

1. Craig Larman,"Applying UML and Patterns: An Introduction to object - oriented Analysis and Design and iterative development”, Third Edition, Pearson Education,2005.
2. Mike O‟Docherty, “Object - Oriented Analysis & Design: Understanding System Development with UML 2.0”,John Wiley & Sons, 2005.
3. James Rumbaugh, Ivar Jacobson and Grady Booch, The Unified Modeling Language Reference Manual, Addison Wesley, 2006.
4. MichealBlaha, James Rambaugh, “Object - Oriented Modeling and Design with UML”,Second Edition, Prentice Hall of India Private Limited, 2007.

WEB LINKS

1. https://onlinecourses.nptel.ac.in/noc16_cs19.
2. http://nptel.iitg.ernet.in/.
3. www.tutorialspoint.com/object_oriented_analysis_design/.

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	PO 10	PO 11	PO12	PSO 1	PSO 2
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

CS16602 ARTIFICIAL INTELLIGENCE 3 0 0 3

COURSE OBJECTIVES

To enable the students to

- Learn the methods of different problem solving and searching.
- Know the concepts of knowledge representation.
- Understand about inferring the knowledge.
- Know the concepts of planning and learning.
- Understand about the expert system.

PRE - REQUISITE: Data Structures and algorithm , Calculus

UNIT I INTRODUCTION **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 logic - 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 - 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 PERIODS 45

COURSE OUTCOMES

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

- Demonstrate awareness of intelligent agents and problem solving using uninformed, informed and local search methods.
- Develop knowledge about usage of propositional logic and first order logic for making inferences.
- Use the knowledge and the process of inference to derive new facts.
- Describe the use of planning and explain about various learning methods.
- To gain knowledge about expert system concepts.

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. DeepakKhemani “Artificial Intelligence”, Tata McGraw Hill Education 2013.

WEB LINKS

1. http://nptel.ac.in/courses/106105078/.
2. http://nptel.ac.in/courses/106106126/.
3. https://www.youtube.com/watch?v=kWmX3pd1f10.

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	PO 10	PO 11	PO12	PSO 1	PSO 2
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

CS16605 OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY 0 0 4 2

COURSE OBJECTIVES

To enable the students to

- Learn how to identify objects, relationships, services and attributes through UML.
- Get familiarized on object oriented design process.
- Build a conceptual model during analysis and design.
- Be familiar with various testing techniques.

LIST OF EXPERIMENTS

1. Passport automation system.
2. Exam Registration.
3. Stock maintenance system.
4. Online course reservation system.
5. E - ticketing.
6. Software personnel management system.
7. Credit card processing.
8. E - book management system.
9. Recruitment system.
10. BPO Management System.

TOTAL PERIODS 60

COURSE OUTCOMES

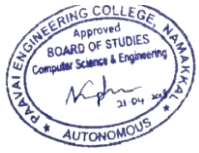
Upon the completion of the course, students will be able to

- Demonstrate the functional behavior of UML diagrams.
- Recognize the concepts and notations used for finding objects and classes.
- Depict the utility of object oriented methodologies.
- Compare and contrast various testing techniques.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS

SOFTWARE: Rational Suite (or) Argo UML (or) equivalent, Eclipse IDE and Junit.

HARDWARE: Flavor of any WINDOWS and Standalone desktops 30 Nos.



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	PO 10	PO 11	PO12	PSO 1	PSO 2
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

CS16606 **COMPILER DESIGN LABORATORY** **3 0 0 3**

COURSE OBJECTIVES

To enable the students 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. Study of LEX and YACC.
2. Lexical Analysis using LEX.
3. Syntax Analysis using YACC.
4. Construction of NFA from a given regular expression.
5. Construction of minimized DFA from a given regular expression.
6. Implementation of Symbol Table.
7. Implementation of Shift Reduce Parsing Algorithm.
8. Construction of LR Parsing Table.
9. Generation of Code for a given Intermediate Code.
10. Implementation of Code Optimization techniques.

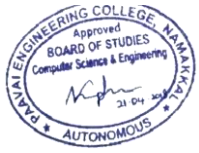
TOTAL PERIODS 60

COURSE OUTCOMES

Upon the completion of the course, students will 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.

RECOMMENDED SYSTEM/SOFTWARE REQUIREMENTS



SOFTWARE: Turbo C, LEX and YACC,UNIX.

HARDWARE: Flavor of any WINDOWS and UNIX. Standalone desktops 30 Nos.

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	PO 10	PO 11	PO12	PSO 1	PSO 2
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

CS16607 **ARTIFICIAL INTELLIGENCE LABORATORY** **0 0 4 2**

COURSE OBJECTIVES

To enable the students to

- Provide a strong foundation of fundamental concepts in artificial intelligence.
- Enable the students to apply AI techniques in applications which involve perception, reasoning and learning.
- Empowering humans to perform collaborative activities in complex and dynamic settings.
- Exploiting and integrating information coming from different (and possibly heterogeneous) information sources.

LIST OF EXPERIMENTS USING C/C++, PERFORM THE FOLLOWING EXPERIMENTS

1. Depth first search.
2. Breadth first search.
3. Best first search.
4. Travelling sales man problem.
5. Water jug problem.
6. Tower of Hanoi problem.
7. Eight puzzle problem.
8. A* search.
9. AO* search.
10. Design Expert System.

TOTAL PERIODS 60

COURSE OUTCOMES

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

- Demonstrate the use of different search techniques for problem solving.
- Develop solutions for some AI problems.
- Demonstrate the use of "Prolog" for predicate logic applications.
- Design an expert system.

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	3	3	-	-	-	-	-	-	-	2	1	3

CS16603 **CRYPTOGRAPHY AND NETWORK SECURITY** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- Know the number theory for the understanding of encryption algorithms.
- Learn the techniques used for message authentication and confidentiality maintenance.
- Understand the concepts of network security tools and applications.
- Learn the network security practices.
- Understand the concepts of system security.

PRE - REQUISITE: Computer Networks

UNIT I INTRODUCTION AND NUMBER THEORY 9

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

UNIT II SYMMETRIC CIPHERS 9

Block Ciphers and the Data Encryption Standard - Introduction to Finite Fields - Advanced Encryption Standard - More on Symmetric Ciphers - Confidentiality using Symmetric Encryption.

UNIT III PUBLIC - KEY ENCRYPTION AND HASH FUNCTION 9

Public - Key Cryptography and RSA - Key Management - Diffie - Hellman Key Exchange - Elliptic Curve Cryptography - Message Authentication and Hash Functions - Hash and MAC Algorithms – Digital Signatures and Authentication Protocols.

UNIT IV NETWORK SECURITY PRACTICE 9

Authentication Applications - Kerberos - X.509 Authentication Service - Electronic mail Security - Pretty Good privacy - S/MIME - IP Security - Web Security.

UNIT V SYSTEM SECURITY 9

Intruders - Intrusion Detection - Password Management - Malicious Software - Viruses and Related Threats – Virus Countermeasures - Distributed Denial of Service Attacks - Firewalls - Firewall Design Principles - SET for E - Commerce Transactions - Trusted Systems.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Demonstrate the fundamental representation of Network Security.
- Analyze and implement the cryptographic algorithms and protocols.
- Demonstrate the concepts of public key cryptosystems.
- Analyze the algorithms for Internet security.
- Demonstrate an ability to use techniques, skills, and modern computing tools to implement and organize.

TEXT BOOKS

1. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013. (I,II,III,V)
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002. (UNIT IV)

REFERENCES

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata McGraw Hill, 2007.
2. AtulKahate, "Cryptography and Network Security", Tata McGraw Hill, 2003.
3. Bruce Schneider, "Applied Cryptography", John Wiley & Sons Inc, 2001.
4. W. Mao, Modern Cryptography - Theory and Practice, Pearson Education, 2007.
5. Stewart S. Miller, "Wi - Fi Security", McGraw - Hill 2003.
6. Charles B. Fleeter, Shari Lawrence Fleeter, "Security in Computing", Fourth Edition, Pearson Education, 2007.

WEB LINKS

1. http://www.securitydocs.com/
2. http://www.linuxsecurity.com/
3. http://www.itprc.com/security.htm

Mapping of Course Outcomes with Programming Outcomes
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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 V GENERATING FUNCTIONS 10

Generating functions - Partitions of integers - Exponential generating function – Summation operator - Recurrence relations - First order and second order – Non-homogeneous recurrence relations - Method of generating functions.

TOTAL: 45 PERIODS

OUTCOMES:

Upon Completion of the course, the students should be able to:

- Write precise and accurate mathematical definitions of objects in graph theory.
- Use mathematical definitions to identify and construct examples and to distinguish examples from non-examples.
- Validate and critically assess a mathematical proof.
- Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
- Reason from definitions to construct mathematical proofs.

TEXT BOOKS:

1. Narsingh Deo, “Graph Theory: With Application to Engineering and Computer Science”, Prentice Hall of India, 2003.
2. Grimaldi R.P. “Discrete and Combinatorial Mathematics: An Applied Introduction”, Addison Wesley, 1994.

REFERENCES:

1. Clark J. and Holton D.A, “A First Look at Graph Theory”, Allied Publishers, 1995.
2. Mott J.L., Kandel A. and Baker T.P. “Discrete Mathematics for Computer Scientists and Mathematicians” , Prentice Hall of India, 1996.
3. Liu C.L., “Elements of Discrete Mathematics”, Mc Graw Hill, 1985.
4. Rosen K.H., “Discrete Mathematics and Its Applications”, Mc Graw Hill, 2007.

CS6703 GRID AND CLOUD COMPUTING L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand how Grid computing helps in solving large scale scientific problems.
- Gain knowledge on the concept of virtualization that is fundamental to cloud computing.
- Learn how to program the grid and the cloud.
- Understand the security issues in the grid and the cloud environment.

UNIT I INTRODUCTION 9

Evolution of Distributed computing: Scalable computing over the Internet – Technologies for network based systems – clusters of cooperative computers - Grid computing Infrastructures – cloud computing - service oriented architecture – Introduction to Grid Architecture and standards – Elements of Grid – Overview of Grid Architecture.

UNIT II GRID SERVICES **9**

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services.

UNIT III VIRTUALIZATION **9**

Cloud deployment models: public, private, hybrid, community – Categories of cloud computing: Everything as a service: Infrastructure, platform, software - Pros and Cons of cloud computing – Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.

UNIT IV PROGRAMMING MODEL **9**

Open source grid middleware packages – Globus Toolkit (GT4) Architecture , Configuration – Usage of Globus – Main components and Programming model - Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions, specifying input and output parameters, configuring and running a job – Design of Hadoop file system, HDFS concepts, command line and java interface, dataflow of File read & File write.

UNIT V SECURITY **9**

Trust models for Grid security environment – Authentication and Authorization methods – Grid security infrastructure – Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud, Key privacy issues in the cloud.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Apply grid computing techniques to solve large scale scientific problems.
- Apply the concept of virtualization.
- Use the grid and cloud tool kits.
- Apply the security models in the grid and the cloud environment.

TEXT BOOK:

1. Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, “Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet”, First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

REFERENCES:

1. Jason Venner, “Pro Hadoop- Build Scalable, Distributed Applications in the Cloud”, A Press, 2009
2. Tom White, “Hadoop The Definitive Guide”, First Edition. O’Reilly, 2009.
3. Bart Jacob (Editor), “Introduction to Grid Computing”, IBM Red Books, Vervante, 2005
4. Ian Foster, Carl Kesselman, “The Grid: Blueprint for a New Computing Infrastructure”, 2nd Edition, Morgan Kaufmann.
5. Frederic Magoules and Jie Pan, “Introduction to Grid Computing” CRC Press, 2009.
6. Daniel Minoli, “A Networking Approach to Grid Computing”, John Wiley Publication, 2005.
7. Barry Wilkinson, “Grid Computing: Techniques and Applications”, Chapman and Hall, CRC, Taylor and Francis Group, 2010.

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.

CS6711	SECURITY LABORATORY	L T P C 0 0 3 2

OBJECTIVES:

The student should be made to:

- Be exposed to the different cipher techniques
- Learn to implement the algorithms DES, RSA,MD5,SHA-1
- Learn to use network security tools like GnuPG, KF sensor, Net Strumbler

LIST OF EXPERIMENTS:

1. Implement the following SUBSTITUTION & TRANSPOSITION TECHNIQUES concepts:
   a) Caesar Cipher
   b) Playfair Cipher
   c) Hill Cipher
   d) Vigenere Cipher
   e) Rail fence – row & Column Transformation
2. Implement the following algorithms
   a) DES
   b) RSA Algorithm
   c) Diffiee-Hellman
   d) MD5
   e) SHA-1
5. Implement the SIGNATURE SCHEME - Digital Signature Standard
6. Demonstrate how to provide secure data storage, secure data transmission and for creating digital signatures (GnuPG).
7. Setup a honey pot and monitor the honeypot on network (KF Sensor)
8. Installation of rootkits and study about the variety of options
9. Perform wireless audit on an access point or a router and decrypt WEP and WPA.(Net Stumbler)
10. Demonstrate intrusion detection system (ids) using any tool (snort or any other s/w)

TOTAL: 45 PERIODS

OUTCOMES:

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

- Implement the cipher techniques
- Develop the various security algorithms
- Use different open source tools for network security and analysis

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

C / C++ / Java or equivalent compiler

GnuPG, KF Sensor or Equivalent, Snort, Net Stumbler or Equivalent

HARDWARE:

Standalone desktops - 30 Nos.

(or)

Server supporting 30 terminals or more.

CS6712 **GRID AND CLOUD COMPUTING LABORATORY** **L T P C**
0 0 3 2

OBJECTIVES:

The student should be made to:

- Be exposed to tool kits for grid and cloud environment.
- Be familiar with developing web services/Applications in grid framework
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop

LIST OF EXPERIMENTS:

GRID COMPUTING LAB

Use Globus Toolkit or equivalent and do the following:

1. Develop a new Web Service for Calculator.
2. Develop new OGSA-compliant Web Service.
3. Using Apache Axis develop a Grid Service.
4. Develop applications using Java or C/C++ Grid APIs
5. Develop secured applications using basic security mechanisms available in Globus Toolkit.
6. Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

CLOUD COMPUTING LAB

Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate.

1. Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
2. Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
3. Install a C compiler in the virtual machine and execute a sample program.
4. Show the virtual machine migration based on the certain condition from one node to the other.
5. Find procedure to install storage controller and interact with it.
6. Find procedure to set up the one node Hadoop cluster.
7. Mount the one node Hadoop cluster using FUSE.
8. Write a program to use the API's of Hadoop to interact with it.
9. Write a wordcount program to demonstrate the use of Map and Reduce tasks

TOTAL: 45 PERIODS

OUTCOMES:

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

- Use the grid and cloud tool kits.
- Design and implement applications on the Grid.
- Design and Implement applications on the Cloud.

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

SOFTWARE:

Globus Toolkit or equivalent
Eucalyptus or Open Nebula or equivalent

HARDWARE

Standalone desktops 30 Nos

CS16802 **PROJECT WORK** **0 0 12 6**

COURSE OBJECTIVES

To enable students to

- recognize the significance of proper scope and the problems
- understand the strategic plans, project prioritization methods and projects
- understand the importance of scheduling / allocating resources to a project
- develop strategies for developing and reinforcing high performanceteams
- understand the importance of project management as it effects strategy and business success

GUIDELINES

1. The students are expected to get formed into a team of convenient groups of not more than 3 memberson 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	-	-	-	-	-	-	-	1	2	3
CO2	3	2	2	3	-	-	-	-	-	-	-	1	2	3
CO3	3	2	2	1	-	-	-	-	-	-	-	1	1	2
CO4	3	2	3	2	-	-	-	-	-	-	-	1	2	3

CS16152 **BIG DATA AND ANALYTICS** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- Understand the Big Data and Hadoop.
- Acquire knowledge of HDFS and YARN.
- Provide Map reduce concepts and Interfacing.
- Gain knowledge about Eco system.
- Learn the fundamental concept of Data Analytics with R.

UNIT I INTRODUCTION TO BIG DATA AND HADOOP **8**

Types of Digital Data, - Introduction to Big Data - Big Data Analytics - Big data Technology landscape - History of Apache Hadoop - Analyzing - Data with Unix tools - analyzing Data with Hadoop - Hadoop Streaming – IBM Big Data Strategy - Introduction to Infosphere Big Insights and Big Sheets.

UNIT II HDFS (Hadoop Distributed File System) **10**

HDFS Architecture - Daemons Related to HDFS - Working with HDFS Command - Special Features of Hadoop Processing Data with Hadoop - Managing Resources and Applications with YARN - Introduction - Limitation of Hadoop1.0 - Hadoop 2: HDFS - Hadoop 2: YARN.

UNIT III MAP REDUCE **9**

Introduction - How Map Reduce Works - Types - Formats - Map Reduce Example - Word Count Example - Anatomy of a Map Reduce Job - Run, Failures - Job Scheduling - Shuffle and Sort - Task Execution - Map Reduce Using Java - Map Reduce Features.

UNIT IV HADOOP ECO SYSTEM **9**

Pig: Introduction to PIG - Execution Modes of Pig - Comparison of Pig with Databases - Grunt - Pig Latin - User Defined Functions - Data Processing operators. Mango DB: Recap of NoSQL databases - Mongo DB - CRUD - MongoDB - Arrays - Java Scripts - Cursors - Map Reduce Programming - Aggregations. Hive : Hive Shell - Hive Services - Hive Metastore - Comparison with Traditional Databases - Hive QL - Tables - Querying Data and User Defined Functions. Hbase: HBasics - Concepts - Clients - Example - Hbase Versus RDBMS .Cassandra: Cassandra - CQLSH - CRUD - Counter - List - Set - Map – Tracing .Big SQL : Introduction.

UNIT V DATA ANALYTICS WITH R **9**

Machine Learning: Introduction - Supervised Learning - Unsupervised Learning - Collaborative Filtering. Big Data Analytics with Big R.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Identify Big Data, Hadoop and its Business Implications.
- List the components of Hadoop Distributed File System.
- Manage Map Reduce in Hadoop Environment.
- Develop Big Data Solutions using Hadoop Eco System.
- Able to gain knowledge about Machine Learning Techniques using R

TEXT BOOKS

1. Tom White “Hadoop: The Definitive Guide” Third Edit on, O‟reily Media, 2012.
2. SeemaAcharya, SubhasiniChellappan, "Big Data Analytics" Wiley 2015.

REFERENCES

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis”, Springer, 2007.
2. Jay Liebowitz, “Big Data and Business Analytics” Auer Bach Publications, CRC press (2013).
3. Tom Plunkett, Mark Hornick, “Using R to Unlock the Value of Big Data: Big Data Analytics with Oracle R Enterprise and Oracle R Connector for Hadoop”, McGraw - Hill/Osborne Media (2013), Oracle press.

WEB LINKS

1. https://www.tutorialspoint.com/big_data_analytics/index.htm.
2. https://www.youtube.com/watch?v=3SK9iJNYehg.
3. https://www.youtube.com/watch?v=zez2Tv - bcXY.

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	PO 10	PO 11	PO12	PSO 1	PSO 2
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

GE2022 **TOTAL QUALITY MANAGEMENT** **L T P C**
3 0 0 3

UNIT I INTRODUCTION **9**

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

UNIT II TQM PRINCIPLES **9**

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

UNIT III TQM TOOLS & TECHNIQUES I **9**

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

UNIT IV TQM TOOLS & TECHNIQUES II **9**

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

UNIT V QUALITY SYSTEMS **9**

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

TOTAL: 45 PERIODS

TEXT BOOK:

1. Dale H.Besterfiled, et at., “Total Quality Management”, Pearson Education Asia, 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.

BA16254 **PRINCIPLES OF MANAGEMENT** **3 0 0 3**

COURSE OBJECTIVES

To enable the students to

- Understand history and development of management thought.
- Know the planning activities in management.
- Understand organizing, dimensions of organization structure, and choosing the right structural form.
- Know how to manage human resources.
- Understand various methods and techniques of control.

PRE - REQUISITE: Nil

UNIT I INTRODUCTION TO MANAGEMENT 9

Management: Meaning - Scope - Managerial Roles. Management: Science - Art or Profession - Universality of Management - Ancient roots of management theory - Classical schools of management thought - Behavioral School - Quantitative School - Systems Approach - Contingency Approach - Contemporary Management thinkers & their contribution.

UNIT II PLANNING 9

Characteristics of planning - Planning Process - Types of plans - Decision making - Decision making tools - Group decision making - Forecasting & MBO.

UNIT III ORGANIZING 9

Organizational structure and design - types of organizational structures - authority - delegation - decentralization and Reengineering - Organization Size - Technology - Environment - Power - control - choosing the right structural form.

UNIT IV MANAGING HUMAN RESOURCES 9

Human resource planning - Recruitment - selection - training & development - performance appraisal - managing Change - compensation and employee welfare - Leadership theory, Motivation Theory, Communication.

UNIT V CONTROLLING 9

Nature of organizational control - control process - Methods and techniques of control – Designing Control systems.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- Demonstrate history and development of management thought.
- Exhibit the planning activities in management.
- Know organizing, dimensions of organization structure, and choosing the right structural form.
- Gain knowledge how to manage human resources.
- Develop various methods and techniques of control.

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TEXT BOOKS

1. Management a Global & Entrepreneurial Perspective, Heinz Weihrich, Mark V. Cannice, Tata McGraw - Hill Education, 2010.
2. Management, James A.F. Stoner & R. Edward Freeman, Prentice - Hall of India Private Limited, New. Delhi, 5/e, 2010.

REFERENCES

1. Management, John R. Schermerhorn, Jr., Daniel G. Bachrach, Wiley India, 13/e, 2015.
2. Essentials of Management, Joseph L Massie, Prentice - Hall India, New York, 4/e, 2013.
3. Management, S.A.Sherlekar, Himalaya Publications, Mumbai, 1/e, 2012.
4. Principles of Management, L.M. Prasad, Sultan Chand & Sons, New Delhi, 9/e, 2015.

WEB LINKS

1. https://www.slideshare.net/ersmbalu/principles - of - management - lecture - notes.
2. mbaexamnotes.com/principles - of - management.html.
3. https://www.cliffsnotes.com/study - guides/principles - of - management.

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	PO 10	PO 11	PO12	PSO 1	PSO 2
CO1	2	3	3	3	-	-	-	-	-	-	-	3	3	3
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CO3	2	3	1	-	-	-	1	-	-	-	-	2	3	3
CO4	3	3	3	3	-	-	-	-	-	-	-	2	1	3
CO5	3	3	3	-	-	2	-	-	-	-	-	3	3	2

CS16151 **XML AND WEB SERVICES** **3 0 0**

3COURSE OBJECTIVES

To enable the students to

- Provide an overview on role of web services in commercial applications and the principles of web service Provision.
- Understand Internet Service Provision, the Web Service concepts and XML Technology.
- Understand and explore design and implementation of distributed services.
- Classify different forms and protocols of Web services.
- Describe the challenges of Securing Web Services.PRE - REQUISITE: Nil

UNIT I INTRODUCTION **9**

Introduction to Internet and WWW - Introduction to HTML - XML - CSS - Creating Markup with XML - benefits Advantages of XML over HTML - EDL - XML Standards - Document Type Definition (DTD) - Attribute Types - Conditional Sections - Whitespace Characters.

UNIT II XML TECHNOLOGY **9**

XML Schemas - DOM - DOM Components - Simple API for XML (SAX) - XML Path Language - Presentation Technologies - XSL - XFORMS - XHTML - Transformation - Extensible Style sheet Language Transformations (XSLT) - X link - X query - X Pointer - X Include and X Base.

UNIT III WEB SERVICES **9**

Evolution of Distributed Computing - CORBA - Java RMI - Microsoft DCOM - Message Oriented Middleware - Introduction to Web Services - Core Web Services Standards - Building Web Services Architecture - Web Services Communication Models - Implementation view - Web services technology stack - Logical view - Composition of web services - Deployment view - From application server to peer to peer - Process view - Life in the runtime.

UNIT IV WEB SERVICES BUILDING BLOCKS **9**

Transport protocols for web services - Messaging with web services - Protocols - SOAP - Describing web services - Anatomy of a SOAP message - SOAP Encoding - SOAP Message Exchange Model - SOAP Communication - SOAP Security. WSDL - Anatomy of WSDL - Manipulating WSDL - UDDI - Anatomy of UDDI.

UNIT V WEB SERVICES SECURITY **9**

Challenges of Securing Web Services - XML Security Standards - Web Services Security implementation in WCF - Rapid fire Cryptography - XML Encryption - XML Signature - Types of XML Signature - Canonicalization - Implementations of XML Signature - XML key management specification.

TOTAL PERIODS 45

COURSE OUTCOMES

- Upon the completion of the course, students will be able to
- Develop web based applications.

- Demonstrate the basics of web services.
- Understand the different forms and protocols of Web services.
- Describe the web service building blocks.

TEXT BOOKS

1. Deitel H M, Deitel P J, Nirto T R, Lin T M, XML How to Program, Pearson Edition, 2011.
2. Frank. P. Coyle, XML, Web Services And The Data Revolution, Pearson Education, 2002.
3. Eric Newcomer,Understanding Web Services: XML,WSDL,SOAP and UDDI,Addison Wesley,2002.

REFERENCES

1. Ramesh Nagappan , Robert Skoczylas and Rima Patel Sriganesh, Developing Java WebServices, Wiley PublishinInc., 2007.
2. Steve Graham and Doug Davis, Building Web services with Java, Pearson education 2000.
3. Charles F.Goldfarb and Paul Prescod, The XML Handbook, Pearson education asia, 2001.
4. Etbancarami, Web services Essential, O,,Reilly, 2006.

WEB LINKS

1. https://msdn.microsoft.com/en - us/library/ms996507.aspx.
2. http://www.tutorialspoint.com/webservices.

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	PO 10	PO 11	PO12	PSO 1	PSO 2
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

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.

UNIT II **9**

The Buffer Cache-Headers-Buffer Pool-Buffer Retrieval-Reading and Writing Disk Blocks - Advantages and Disadvantages. Internal Representation of Files-Inodes-Structure-Directories-Path Name to Inode- Super Block-Inode Assignment-Allocation of Disk Blocks -Other File Types.

UNIT III **9**

System Calls for the File System-Open-Read-Write-Lseek-Close-Create-Special files Creation -Change Directory and Change Root-Change Owner and Change Mode-Stat-Fstat-Pipes-Dup-Mount-Unmount-Link-Unlink-File System Abstraction-Maintenance.

UNIT IV **9**

The System Representation of Processes-States-Transitions-System Memory-Context of a Process-Saving the Context-Manipulation of a Process Address Space-Sleep Process Control-signals-Process Termination-Awaiting-Invoking other Programs-The Shell-System Boot and the INIT Process.

UNIT V **9**

Memory Management Policies-Swapping-Demand Paging-a Hybrid System-I/O Subsystem-Driver Interfaces-Disk Drivers-Terminal Drivers.

TEXT BOOK:

1. Maurice J. Bach, "The Design of the Unix Operating System", Pearson Education, 2002.

REFERENCES:

1. Uresh Vahalia, "UNIX Internals: The New Frontiers", Prentice Hall, 2000.
2. John Lion, "Lion's Commentary on UNIX", 6th edition, Peer-to-Peer Communications, 2004.
3. Daniel P. Bovet & Marco Cesati, “Understanding the Linux Kernel”, O’REILLY, Shroff Publishers &Distributors Pvt. Ltd, 2000.
4. M. Beck et al, “Linux Kernel Programming”, Pearson Education Asia, 2002

MA2264 **NUMERICAL METHODS** **L T P C**
3 1 0 4

AIM:

With the present development of the computer technology, it is necessary to develop efficient algorithms for solving problems in science, engineering and technology. This course gives a complete procedure for solving different kinds of problems occur in engineering numerically.

OBJECTIVES:

At the end of the course, the students would be acquainted with the basic concepts in numerical methods and their uses are summarized as follows:

i. The roots of nonlinear (algebraic or transcendental) equations, solutions of large. system of linear equations and eigen value problem of a matrix can be obtained numerically where analytical methods fail to give solution

CS6003 **AD HOC AND SENSOR NETWORKS** **L T P C**
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of adhoc routing protocols.
- Be expose to the TCP issues in adhoc networks.
- Learn the architecture and protocols of wireless sensor networks.

UNIT I INTRODUCTION **9**

Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS **9**

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS **9**

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS **9**

Single node architecture: hardware and software components of a sensor node - WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V WSN ROUTING, LOCALIZATION & QOS **9**

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks
- Analyze the protocol design issues of ad hoc and sensor networks
- Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues
- Evaluate the QoS related performance measurements of ad hoc and sensor networks

TEXT BOOK:

1. C. Siva Ram Murthy, and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols ", Prentice Hall Professional Technical Reference, 2008.

.

REFERENCES:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
3. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.
5. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

CS6004 CYBER FORENSICS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the security issues network layer and transport layer
- Be exposed to security issues of the application layer
- Learn computer forensics
- Be familiar with forensics tools
- Learn to analyze and validate forensics data

UNIT I NETWORK LAYER SECURITY &TRANSPORT LAYER SECURITY 9

IPSec Protocol - IP Authentication Header - IP ESP - Key Management Protocol for IPSec . **Transport layer Security:** SSL protocol, Cryptographic Computations – TLS Protocol.

UNIT II E-MAIL SECURITY & FIREWALLS 9

PGP - S/MIME - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions.

UNIT III INTRODUCTION TO COMPUTER FORENSICS 9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT IV EVIDENCE COLLECTION AND FORENSICS TOOLS 9

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. **Current Computer Forensics Tools:** Software/ Hardware Tools.

UNIT V ANALYSIS AND VALIDATION 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Discuss the security issues network layer and transport layer
- Apply security principles in the application layer
- Explain computer forensics
- Use forensics tools
- Analyze and validate forensics data

REFERENCES:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
3. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005
4. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.
5. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

CS6004 CYBER FORENSICS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the security issues network layer and transport layer
- Be exposed to security issues of the application layer
- Learn computer forensics
- Be familiar with forensics tools
- Learn to analyze and validate forensics data

UNIT I NETWORK LAYER SECURITY &TRANSPORT LAYER SECURITY 9

IPSec Protocol - IP Authentication Header - IP ESP - Key Management Protocol for IPSec . **Transport layer Security:** SSL protocol, Cryptographic Computations – TLS Protocol.

UNIT II E-MAIL SECURITY & FIREWALLS 9

PGP - S/MIME - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions.

UNIT III INTRODUCTION TO COMPUTER FORENSICS 9

Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation – Data Acquisition.

UNIT IV EVIDENCE COLLECTION AND FORENSICS TOOLS 9

Processing Crime and Incident Scenes – Working with Windows and DOS Systems. **Current Computer Forensics Tools:** Software/ Hardware Tools.

UNIT V ANALYSIS AND VALIDATION 9

Validating Forensics Data – Data Hiding Techniques – Performing Remote Acquisition – Network Forensics – Email Investigations – Cell Phone and Mobile Devices Forensics

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Discuss the security issues network layer and transport layer
- Apply security principles in the application layer
- Explain computer forensics
- Use forensics tools
- Analyze and validate forensics data

TEXT BOOKS:

1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
2. Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2008.

REFERENCES:

1. John R.Vacca, "Computer Forensics", Cengage Learning, 2005
2. Richard E.Smith, "Internet Cryptography", 3rd Edition Pearson Education, 2008.
3. Marjie T.Britz, "Computer Forensics and Cyber Crime": An Introduction", 3rd Edition, Prentice Hall, 2013.

CS6005 ADVANCED DATABASE SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn different types of databases.
- Be exposed to query languages.
- Be familiar with the indexing techniques.

UNIT I PARALLEL AND DISTRIBUTED DATABASES 9

Inter and Intra Query Parallelism – Architecture – Query evaluation – Optimization – Distributed Architecture – Storage – Catalog Management – Query Processing - Transactions – Recovery - Large-scale Data Analytics in the Internet Context – Map Reduce Paradigm - run-time system for supporting scalable and fault-tolerant execution - paradigms: Pig Latin and Hive and parallel databases versus Map Reduce.

UNIT II ACTIVE DATABASES 9

Syntax and Sematics (Starburst, Oracle, DB2) – Taxonomy – Applications – Integrity Management – Workflow Management – Business Rules – Design Principles – Properties – Rule Modularization – Rule Debugging – IDEA methodology – Open Problems.

UNIT III TEMPORAL AND OBJECT DATABASES 9

Overview – Data types – Associating Facts – Temporal Query Language – TSQL2 – Time Ontology – Language Constructs – Architecture – Temporal Support – Object Database and Change Management – Change of Schema – Implementing Database Updates in O2 – Benchmark Database Updates – Performance Evaluation.

UNIT IV COMPLEX QUERIES AND REASONING 9

Logic of Query Languages – Relational Calculi – Recursive rules – Syntax and semantics of Data log – Fix point semantics – Implementation Rules and Recursion – Rule rewriting methods – Compilation and Optimization – Recursive Queries in SQL – Open issues.

UNIT V SPATIAL, TEXT AND MULTIMEDIA DATABASES 9

Traditional Indexing Methods (Secondary Keys, Spatial Access Methods) – Text Retrieval – Multimedia Indexing – 1D Time Series – 2d Color images – Sub pattern Matching – Open Issues – Uncertainties.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
2. Nelson, Phillips, Enfinger, Steuart, "Computer Forensics and Investigations", Cengage Learning, India Edition, 2008.

REFERENCES:

1. John R.Vacca, "Computer Forensics", Cengage Learning, 2005
2. Richard E.Smith, "Internet Cryptography", 3rd Edition Pearson Education, 2008.
3. Marjie T.Britz, "Computer Forensics and Cyber Crime": An Introduction", 3rd Edition, Prentice Hall, 2013.

CS6005 ADVANCED DATABASE SYSTEMS L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn different types of databases.
- Be exposed to query languages.
- Be familiar with the indexing techniques.

UNIT I PARALLEL AND DISTRIBUTED DATABASES 9

Inter and Intra Query Parallelism – Architecture – Query evaluation – Optimization – Distributed Architecture – Storage – Catalog Management – Query Processing - Transactions – Recovery - Large-scale Data Analytics in the Internet Context – Map Reduce Paradigm - run-time system for supporting scalable and fault-tolerant execution - paradigms: Pig Latin and Hive and parallel databases versus Map Reduce.

UNIT II ACTIVE DATABASES 9

Syntax and Sematics (Starburst, Oracle, DB2) – Taxonomy – Applications – Integrity Management – Workflow Management – Business Rules – Design Principles – Properties – Rule Modularization – Rule Debugging – IDEA methodology – Open Problems.

UNIT III TEMPORAL AND OBJECT DATABASES 9

Overview – Data types – Associating Facts – Temporal Query Language – TSQL2 – Time Ontology – Language Constructs – Architecture – Temporal Support – Object Database and Change Management – Change of Schema – Implementing Database Updates in O2 – Benchmark Database Updates – Performance Evaluation.

UNIT IV COMPLEX QUERIES AND REASONING 9

Logic of Query Languages – Relational Calculi – Recursive rules – Syntax and semantics of Data log – Fix point semantics – Implementation Rules and Recursion – Rule rewriting methods – Compilation and Optimization – Recursive Queries in SQL – Open issues.

UNIT V SPATIAL, TEXT AND MULTIMEDIA DATABASES 9

Traditional Indexing Methods (Secondary Keys, Spatial Access Methods) – Text Retrieval – Multimedia Indexing – 1D Time Series – 2d Color images – Sub pattern Matching – Open Issues – Uncertainties.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Design different types of databases.
- Use query languages.
- Apply indexing techniques.

TEXT BOOK:

1. Raghu Ramakrishnan “Database Management System”, Mc Graw Hill Publications, 2000.

REFERENCES:

1. Carlo Zaniolo, Stefano Ceri “Advanced Database Systems”, Morgan Kauffmann Publishers.VLDB Journal, 1997
2. Abraham Silberschatz, Henry F. Korth and S. Sudharshan, “Database System Concepts”, Sixth Edition, Tata McGraw Hill, 2011

BM6005 **BIO INFORMATICS** **L T P C**
3 0 0 3

OBJECTIVES:

The student should be made to:

- Exposed to the need for Bioinformatics technologies
- Be familiar with the modeling techniques
- Learn microarray analysis
- Exposed to Pattern Matching and Visualization

UNIT I INTRODUCTION **9**

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

UNIT II DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS **9**

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

UNIT III MODELING FOR BIOINFORMATICS **9**

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

UNIT IV PATTERN MATCHING AND VISUALIZATION **9**

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

UNIT 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.

CS16452 SERVICE ORIENTED ARCHITECTURE 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand of the basic principles of service orientation.
- acquire knowledge in web service oriented analysis.
- learn technology underlying the service design.
- apply advanced concepts such as ASP.NET web forms, ASP.NET web services.
- know about various WS specification standards.

UNIT I BASICS OF SOA 9

Fundamental SOA – Evolution of SOA – SOA Timeline, Continuing evolution of SOA, ROOTS of SOA – Comparing SOA to past Architectures – SOA vs. Client server architecture, SOA vs. Distributed internet architecture, SOA vs. Hybrid web service architecture, service orientation and object orientation.

UNIT II WEB SERVICES 9

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

UNIT III SERVICE DESIGN 9

Introduction to Service oriented analysis –benefits of a Business-centric SOA -Deriving business services – Service modeling – Step by Step process - Services vs. Services candidates, process description – Service Oriented Design -WSDL language basics –SOAP language basics –Steps to composing SOA - Entity-centric business service design - Application service design -Task-centric business service design

UNIT IV SOA PLATFORMS 9

SOA platform basics –Basic Platform Building blocks, Common SOA platform Layers, Relationship between SOA layers and Technologies, Fundamental service technology architecture - SOA support in J2EE – Platform Overview Primitive SOA Support, Support for Service Orientation principles, Contemporary SOA support - SOA support in .NET Common Language Runtime -ASP.NET web forms -ASP.NET web Services

UNIT V BUILDING SOA-BASED APPLICATIONS 9

WS-BPEL basics –Process elements, partnerLinks and partnerLinks elements,partnerLink Type element, variable element,getvariableProeperty,sequence element, invoke element, receive element, reply element,reply element, Switch case and otherwise elements,assign,copy,from and to elements, WS-Coordination overview -WS- Policy, WS-Security

TOTAL PERIODS 45

COURSE OUTCOMES

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

- remember the basics of SOA.
- know about the service layers of web services.
- understand and discuss service and design in SOA.
- analyze the basic platforms of SOA.
- describe the various applications of SOA.

TEXT BOOKS

1. Thomas Erl "Service -Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2008.

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.

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

CS16453 **DIGITAL IMAGE PROCESSING** **3 0 0 3**

COURSE OBJECTIVES

To enable students to

- learn basic concepts of image processing.
- be exposed to simple image enhancement techniques.
- be familiar with image filtering techniques.
- compress the images using various coding techniques.
- learn to represent image in form of features.

UNIT I DIGITAL IMAGE FUNDAMENTALS 8

Introduction – Origin – Steps in Digital Image Processing – Components – Elements of Visual Perception- Image Sensing and Acquisition – Image Sampling and Quantization – Relationships between pixels- Mathematical tools used in digital image processing.

UNIT II IMAGE ENHANCEMENT 10

Basic intensity transformation functions–Histogram processing–Basics of Spatial Filtering–Smoothing and sharpening Spatial Filtering – Filtering in the Frequency Domain: Preliminary concepts – Discrete Fourier Transform – properties of 2-D DFT- Characteristics of Frequency domain – Image smoothing and Image Sharpening using frequency domain filters -Ideal, Butterworth and Gaussian filters.

UNIT III IMAGE RESTORATION AND SEGMENTATION 9

Noise models – Mean Filters – Order Statistics – Adaptive filters – Band reject Filters – Band pass Filters – Notch Filters – Optimum Notch Filtering. Segmentation: Point, Line and Edge - Detection – Region based Segmentation - Morphological watersheds.

UNIT IV IMAGE COMPRESSION 9

Compression: Fundamentals – Image Compression methods – Huffman coding – Golomb coding – Arithmetic coding - LZW coding – Run-Length coding – Symbol based coding.

UNIT V IMAGE REPRESENTATION AND RECOGNITION 9

Boundary following – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description –Shape number – Fourier Descriptor- Regional Descriptors – Topological feature, Texture – use of principal components for descriptions -Patterns and Pattern classes – Recognition based on decision theoretic methods – Structural methods.

TOTAL PERIODS 45

COURSE OUTCOMES

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

- remember digital image fundamentals.
- enhance the image quality.
- apply image enhancement and restoration techniques.
- use image compression and enhancement techniques.
- represents features of images.

TEXT BOOKS

1. Rafael C. Gonzales, Richard E. Woods, "Digital Image Processing", Third Edition, Pearson Education, 2010.

REFERENCES

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, "Digital Image Processing Using MATLAB", Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011.
2. Anil Jain K. "Fundamentals of Digital Image Processing", PHI Learning Pvt. Ltd., 2011.
3. Malay K. Pakhira, "Digital Image Processing and Pattern Recognition", First Edition, PHI Learning Pvt. Ltd., 2011.
4. Willliam K Pratt, "Digital Image Processing", John Willey, 2002.

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

UNIT IV WAVELETS AND IMAGE COMPRESSION 9

Wavelets – Subband coding - Multiresolution expansions - **Compression:** Fundamentals – Image Compression models – Error Free Compression – Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding – Lossy Compression – Lossy Predictive Coding – Compression Standards.

UNIT V IMAGE REPRESENTATION AND RECOGNITION 9

Boundary representation – Chain Code – Polygonal approximation, signature, boundary segments – Boundary description – Shape number – Fourier Descriptor, moments- Regional Descriptors – Topological feature, Texture - Patterns and Pattern classes - Recognition based on matching.

TOTAL: 45 PERIODS

OUTCOMES:

Upon successful completion of this course, students will be able to:

- Discuss digital image fundamentals.
- Apply image enhancement and restoration techniques.
- Use image compression and segmentation Techniques.
- Represent features of images.

TEXT BOOK:

1. Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.

REFERENCES:

1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata McGraw Hill Pvt. Ltd., 2011.
2. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011.
3. Willliam K Pratt, “Digital Image Processing”, John Willey, 2002.
4. Malay K. Pakhira, “Digital Image Processing and Pattern Recognition”, First Edition, PHI Learning Pvt. Ltd., 2011.
5. http://eeweb.poly.edu/~onur/lectures/lectures.html.
6. http://www.caen.uiowa.edu/~dip/LECTURE/lecture.html

EC6703 EMBEDDED AND REAL TIME SYSTEMS L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the architecture and programming of ARM processor.
- Be familiar with the embedded computing platform design and analysis.
- Be exposed to the basic concepts of real time Operating system.
- Learn the system design techniques and networks for embedded systems

UNIT I INTRODUCTION TO EMBEDDED COMPUTING AND ARM PROCESSORS 9

Complex systems and micro processors– Embedded system design process –Design example: Model train controller- Instruction sets preliminaries - ARM Processor – CPU: programming input and output-supervisor mode, exceptions and traps – Co-processors- Memory system mechanisms – CPU performance- CPU power consumption.

UNIT II EMBEDDED COMPUTING PLATFORM DESIGN 9

The CPU Bus-Memory devices and systems–Designing with computing platforms – consumer electronics architecture – platform-level performance analysis - Components for embedded programs- Models of programs- Assembly, linking and loading – compilation techniques- Program level performance analysis – Software performance optimization – Program level energy and power analysis and optimization – Analysis and optimization of program size- Program validation and testing.

UNIT III PROCESSES AND OPERATING SYSTEMS 9

Introduction – Multiple tasks and multiple processes – Multirate systems- Preemptive real-time operating systems- Priority based scheduling- Interprocess communication mechanisms – Evaluating operating system performance- power optimization strategies for processes – Example Real time operating systems-POSIX-Windows CE.

UNIT V SYSTEM DESIGN TECHNIQUES AND NETWORKS 9

Design methodologies- Design flows - Requirement Analysis – Specifications-System analysis and architecture design – Quality Assurance techniques- Distributed embedded systems – MPSoCs and shared memory multiprocessors.

UNIT V CASE STUDY 9

Data compressor - Alarm Clock - Audio player - Software modem-Digital still camera - Telephone answering machine-Engine control unit – Video accelerator.

TOTAL: 45 PERIODS

OUTCOMES:

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

- Describe the architecture and programming of ARM processor.
- Outline the concepts of embedded systems
- Explain the basic concepts of real time Operating system design.
- Use the system design techniques to develop software for embedded systems
- Differentiate between the general purpose operating system and the real time operating system
- Model real-time applications using embedded-system concepts

TEXT BOOK:

1. Marilyn Wolf, “Computers as Components - Principles of Embedded Computing System Design”, Third Edition “Morgan Kaufmann Publisher (An imprint from Elsevier), 2012.

REFERENCES:

1. Jonathan W.Valvano, “Embedded Microcomputer Systems Real Time Interfacing”, Third Edition Cengage Learning, 2012.
2. David. E. Simon, “An Embedded Software Primer”, 1st Edition, Fifth Impression, Addison-Wesley Professional, 2007.
3. Raymond J.A. Buhr, Donald L.Bailey, “An Introduction to Real-Time Systems- From Design to Networking with C/C++”, Prentice Hall,1999.
4. C.M. Krishna, Kang G. Shin, “Real-Time Systems”, International Editions, Mc Graw Hill 1997
5. K.V.K.K.Prasad, “Embedded Real-Time Systems: Concepts, Design & Programming”, Dream Tech Press, 2005.
6. Sriram V Iyer, Pankaj Gupta, “Embedded Real Time Systems Programming”, Tata Mc Graw Hill, 2004.

CS6006 **GAME PROGRAMMING** **L T P C**
3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the concepts of Game design and development.
- Learn the processes, mechanics and issues in Game Design.
- Be exposed to the Core architectures of Game Programming.
- Know about Game programming platforms, frame works and engines.
- Learn to develop games.

UNIT I 3D GRAPHICS FOR GAME PROGRAMMING 9

3D Transformations, Quaternions, 3D Modeling and Rendering, Ray Tracing, Shader Models, Lighting, Color, Texturing, Camera and Projections, Culling and Clipping, Character Animation, Physics-based Simulation, Scene Graphs.

UNIT II GAME ENGINE DESIGN 9

Game engine architecture, Engine support systems, Resources and File systems, Game loop and real-time simulation, Human Interface devices, Collision and rigid body dynamics, Game profiling.

UNIT III GAME PROGRAMMING 9

Application layer, Game logic, Game views, managing memory, controlling the main loop, loading and caching game data, User Interface management, Game event management.

UNIT IV GAMING PLATFORMS AND FRAMEWORKS 9

2D and 3D Game development using Flash, DirectX, Java, Python, Game engines - DX Studio, Unity.

UNIT V GAME DEVELOPMENT 9

Developing 2D and 3D interactive games using DirectX or Python – Isometric and Tile Based Games, Puzzle games, Single Player games, Multi Player games.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Discuss the concepts of Game design and development.
- Design the processes, and use mechanics for game development.
- Explain the Core architectures of Game Programming.
- Use Game programming platforms, frame works and engines.
- Create interactive Games.

TEXT BOOKS:

1. Mike Mc Shaffrfy and David Graham, “Game Coding Complete”, Fourth Edition, Cengage Learning, PTR, 2012.
2. Jason Gregory, “Game Engine Architecture”, CRC Press / A K Peters, 2009.
3. David H. Eberly, “3D Game Engine Design, Second Edition: A Practical Approach to Real-Time Computer Graphics” 2nd Editions, Morgan Kaufmann, 2006.

REFERENCES:

1. Ernest Adams and Andrew Rollings, “Fundamentals of Game Design”, 2nd Edition Prentice Hall / New Riders, 2009.
2. Eric Lengyel, “Mathematics for 3D Game Programming and Computer Graphics”, 3rd Edition, Course Technology PTR, 2011.
3. Jesse Schell, The Art of Game Design: A book of lenses, 1st Edition, CRC Press, 2008.

CS6007 **INFORMATION RETRIEVAL** **L T P C**
3 0 0 3

OBJECTIVES:

The Student should be made to:

- Learn the information retrieval models.
- Be familiar with Web Search Engine.
- Be exposed to Link Analysis.
- Understand Hadoop and Map Reduce.
- Learn document text mining techniques.

UNIT I INTRODUCTION **9**

Introduction -History of IR- Components of IR - Issues –Open source Search engine Frameworks - The impact of the web on IR - The role of artificial intelligence (AI) in IR – IR Versus Web Search - Components of a Search engine- Characterizing the web.

UNIT II INFORMATION RETRIEVAL **9**

Boolean and vector-space retrieval models- Term weighting - TF-IDF weighting- cosine similarity – Preprocessing - Inverted indices - efficient processing with sparse vectors – Language Model based IR - Probabilistic IR –Latent Semantic Indexing - Relevance feedback and query expansion.

UNIT III WEB SEARCH ENGINE – INTRODUCTION AND CRAWLING **9**

Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement - search engine optimization/spam – Web Search Architectures - crawling - meta-crawlers- Focused Crawling - web indexes –- Near-duplicate detection - Index Compression - XML retrieval.

UNIT IV WEB SEARCH – LINK ANALYSIS AND SPECIALIZED SEARCH **9**

Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity - Hadoop & Map Reduce - Evaluation - Personalized search - Collaborative filtering and content-based recommendation of documents and products – handling “invisible” Web - Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval.

UNIT V DOCUMENT TEXT MINING **9**

Information filtering; organization and relevance feedback – Text Mining -Text classification and clustering - Categorization algorithms: naive Bayes; decision trees; and nearest neighbor - Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, students will be able to

- Apply information retrieval models.
- Design Web Search Engine.
- Use Link Analysis.
- Use Hadoop and Map Reduce.
- Apply document text mining techniques.

TEXT BOOKS:

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and Berthier Ribeiro - Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011.
3. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.
4. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010.

REFERENCES:

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series ", 2nd Edition, Springer, 2004.
3. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and First Edition, Gate Mustru Publishing, 2008.

IT6006 **DATA ANALYTICS** **L T P C**
3 0 0 3

OBJECTIVES:

The Student should be made to:

- Be exposed to big data
- Learn the different ways of Data Analysis
- Be familiar with data streams
- Learn the mining and clustering
- Be familiar with the visualization

UNIT I INTRODUCTION TO BIG DATA **8**

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting - Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT II DATA ANALYSIS **12**

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction - Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT III MINING DATA STREAMS **8**

Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window - Realtime Analytics Platform(RTAP) applications - case studies - real time sentiment analysis, stock market predictions.

TEXT BOOKS:

1. C. Manning, P. Raghavan, and H. Schütze, Introduction to Information Retrieval , Cambridge University Press, 2008.
2. Ricardo Baeza -Yates and Berthier Ribeiro - Neto, Modern Information Retrieval: The Concepts and Technology behind Search 2nd Edition, ACM Press Books 2011.
3. Bruce Croft, Donald Metzler and Trevor Strohman, Search Engines: Information Retrieval in Practice, 1st Edition Addison Wesley, 2009.
4. Mark Levene, An Introduction to Search Engines and Web Navigation, 2nd Edition Wiley, 2010.

REFERENCES:

1. Stefan Buettcher, Charles L. A. Clarke, Gordon V. Cormack, Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.
2. Ophir Frieder "Information Retrieval: Algorithms and Heuristics: The Information Retrieval Series ", 2nd Edition, Springer, 2004.
3. Manu Konchady, "Building Search Applications: Lucene, Ling Pipe", and First Edition, Gate Mustru Publishing, 2008.

IT6006 **DATA ANALYTICS** **L T P C**
3 0 0 3

OBJECTIVES:

The Student should be made to:

- Be exposed to big data
- Learn the different ways of Data Analysis
- Be familiar with data streams
- Learn the mining and clustering
- Be familiar with the visualization

UNIT I INTRODUCTION TO BIG DATA 8

Introduction to Big Data Platform – Challenges of conventional systems - Web data – Evolution of Analytic scalability, analytic processes and tools, Analysis vs reporting - Modern data analytic tools, Stastical concepts: Sampling distributions, resampling, statistical inference, prediction error.

UNIT II DATA ANALYSIS 12

Regression modeling, Multivariate analysis, Bayesian modeling, inference and Bayesian networks, Support vector and kernel methods, Analysis of time series: linear systems analysis, nonlinear dynamics - Rule induction - Neural networks: learning and generalization, competitive learning, principal component analysis and neural networks; Fuzzy logic: extracting fuzzy models from data, fuzzy decision trees, Stochastic search methods.

UNIT III MINING DATA STREAMS 8

Introduction to Streams Concepts – Stream data model and architecture - Stream Computing, Sampling data in a stream – Filtering streams – Counting distinct elements in a stream – Estimating moments – Counting oneness in a window – Decaying window - Realtime Analytics Platform(RTAP) applications - case studies - real time sentiment analysis, stock market predictions.

UNIT IV FREQUENT ITEMSETS AND CLUSTERING 9

Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT V FRAMEWORKS AND VISUALIZATION 8

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications:

TOTAL: 45 PERIODS

OUTCOMES:

The student should be made to:

- Apply the statistical analysis methods.
- Compare and contrast various soft computing frameworks.
- Design distributed file systems.
- Apply Stream data model.
- Use Visualisation techniques

TEXT BOOKS:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

REFERENCES:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

CS6008 HUMAN COMPUTER INTERACTION L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the foundations of Human Computer Interaction.
- Be familiar with the design technologies for individuals and persons with disabilities.
- Be aware of mobile HCI.
- Learn the guidelines for user interface.

UNIT I FOUNDATIONS OF HCI 9

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

UNIT IV FREQUENT ITEMSETS AND CLUSTERING 9

Mining Frequent itemsets - Market based model – Apriori Algorithm – Handling large data sets in Main memory – Limited Pass algorithm – Counting frequent itemsets in a stream – Clustering Techniques – Hierarchical – K- Means – Clustering high dimensional data – CLIQUE and PROCLUS – Frequent pattern based clustering methods – Clustering in non-euclidean space – Clustering for streams and Parallelism.

UNIT V FRAMEWORKS AND VISUALIZATION 8

MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed file systems – Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications:

TOTAL: 45 PERIODS

OUTCOMES:

The student should be made to:

- Apply the statistical analysis methods.
- Compare and contrast various soft computing frameworks.
- Design distributed file systems.
- Apply Stream data model.
- Use Visualisation techniques

TEXT BOOKS:

1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012.

REFERENCES:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with advanced analystics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

CS6008 HUMAN COMPUTER INTERACTION

L	T	P	C
3	0	0	3

OBJECTIVES:

The student should be made to:

- Learn the foundations of Human Computer Interaction.
- Be familiar with the design technologies for individuals and persons with disabilities.
- Be aware of mobile HCI.
- Learn the guidelines for user interface.

UNIT I FOUNDATIONS OF HCI 9

The Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

UNIT II DESIGN & SOFTWARE PROCESS 9

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III MODELS AND THEORIES 9

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV MOBILE HCI 9

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

UNIT V WEB INTERFACE DESIGN 9

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

L: 45, T: 0, TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Design effective dialog for HCI.
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
- Develop meaningful user interface.

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004 (UNIT I , II & III).
2. Brian Fling, “Mobile Design and Development”, First Edition , O’Reilly Media Inc., 2009 (UNIT –IV).
3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O’Reilly, 2009.(UNIT-V).

CS6009 NANO COMPUTING L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn nano computing challenges.
- Be familiar with the imperfections.
- Be exposed to reliability evaluation strategies.
- Learn nano scale quantum computing.
- Understand Molecular Computing and Optimal Computing.

UNIT I NANOCOMPUTING-PROSPECTS AND CHALLENGES 9

Introduction - History of Computing - Nanocomputing - Quantum Computers – Nanocomputing Technologies - Nano Information Processing - Prospects and Challenges - Physics of Nanocomputing : Digital Signals and Gates - Silicon Nanoelectronics - Carbon Nanotube Electronics - Carbon Nanotube Field-effect Transistors – Nanolithography.

UNIT II DESIGN & SOFTWARE PROCESS 9

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III MODELS AND THEORIES 9

Cognitive models –Socio-Organizational issues and stake holder requirements –Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV MOBILE HCI 9

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

UNIT V WEB INTERFACE DESIGN 9

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

L: 45, T: 0, TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Design effective dialog for HCI.
- Design effective HCI for individuals and persons with disabilities.
- Assess the importance of user feedback.
- Explain the HCI implications for designing multimedia/ ecommerce/ e-learning Web sites.
- Develop meaningful user interface.

TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004 (UNIT I , II & III).
2. Brian Fling, “Mobile Design and Development”, First Edition , O’Reilly Media Inc., 2009 (UNIT –IV).
3. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O’Reilly, 2009.(UNIT-V).

CS6009 NANO COMPUTING L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn nano computing challenges.
- Be familiar with the imperfections.
- Be exposed to reliability evaluation strategies.
- Learn nano scale quantum computing.
- Understand Molecular Computing and Optimal Computing.

UNIT I NANOCOMPUTING-PROSPECTS AND CHALLENGES 9

Introduction - History of Computing - Nanocomputing - Quantum Computers – Nanocomputing Technologies - Nano Information Processing - Prospects and Challenges - Physics of Nanocomputing : Digital Signals and Gates - Silicon Nanoelectronics - Carbon Nanotube Electronics - Carbon Nanotube Field-effect Transistors – Nanolithography.

UNIT II NANOCOMPUTING WITH IMPERFECTIONS 9

Introduction - Nanocomputing in the Presence of Defects and Faults - Defect Tolerance - Towards Quadrillion Transistor Logic Systems.

UNIT III RELIABILITY OF NANOCOMPUTING 9

Markov Random Fields - Reliability Evaluation Strategies - NANOLAB - NANOPRISM - Reliable Manufacturing and Behavior from Law of Large Numbers.

UNIT IV NANOSCALE QUANTUM COMPUTING 9

Quantum Computers - Hardware Challenges to Large Quantum Computers - Fabrication, Test, and Architectural Challenges - Quantum-dot Cellular Automata (QCA) - Computing with QCA - QCA Clocking - QCA Design Rules.

UNIT V QCADESIGNER SOFTWARE AND QCA IMPLEMENTATION 9

Basic QCA Circuits using QCA Designer - QCA Implementation - Molecular and Optical Computing: Molecular Computing - Optimal Computing - Ultrafast Pulse Shaping and Tb/sec Data Speeds.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Discuss nano computing challenges.
- Handle the imperfections.
- Apply reliability evaluation strategies.
- Use nano scale quantum computing.
- Utilize Molecular Computing and Optimal Computing.

TEXT BOOK:

1. Sahni V. and Goswami D., Nano Computing, McGraw Hill Education Asia Ltd. (2008), ISBN (13): 978007024892.

REFERNCES:

1. Sandeep K. Shukla and R. Iris Bahar., Nano, Quantum and Molecular Computing, Kluwer Academic Publishers 2004, ISBN: 1402080670.
2. Sahni V, Quantum Computing, McGraw Hill Education Asia Ltd. 2007.
3. Jean-Baptiste Waldner, Nanocomputers and Swarm Intelligence, John Wiley & Sons, Inc. 2008, ISBN (13): 978-1848210097.

IT6011 KNOWLEDGE MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

The student should be made to:

- Learn the Evolution of Knowledge management.
- Be familiar with tools.
- Be exposed to Applications.
- Be familiar with some case studies.

UNIT III OBJECT ORIENTED DATABASES 9

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

UNIT IV EMERGING SYSTEMS 9

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

UNIT V CURRENT ISSUES 9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

IT2043 KNOWLEDGE MANAGEMENT L T P C

3 0 0 3

UNIT I KNOWLEDGE MANAGEMENT 9

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

UNIT II KNOWLEDGE MANAGEMENT SYSTEM LIFE CYCLE 9

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

UNIT III CAPTURING KNOWLEDGE 9

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

UNIT IV KNOWLEDGE CODIFICATION 9

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

UNIT V KNOWLEDGE TRANSFER AND SHARING 9

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

TOTAL: 45 PERIODS

TEXT BOOK:

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

REFERENCES:

1. Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, "Knowledge Engineering and Management", Universities Press, 2001.
2. C.W. Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol 1 and 2, 2003

CS2030 HIGH PERFORMANCE MICROPROCESSORS L T P C
3 0 0 3

AIM

To do a detailed study of CISC and RISC principles, study the architecture & special features of the Pentium processors and typical RISC processors and to study the architecture of special purpose processors.

OBJECTIVES

- To study the principles of CISC
- To study the Pentium processor family
- To study the principles of RISC
- To study the architecture & special features of typical RISC processors.
- To study the architecture & function of special purpose processors.

UNIT I CISC PRINCIPLES 9

Classic CISC microprocessors, Intel x86 Family: Architecture - register set - Data formats - Addressing modes - Instruction set - Assembler directives – Interrupts - Segmentation, Paging, Real and Virtual mode execution – Protection mechanism, Task management 80186, 286, 386 and 486 architectures.

UNIT I INTRODUCTION 9

An Introduction to Knowledge Management - The foundations of knowledge management- including cultural issues- technology applications organizational concepts and processes- management aspects- and decision support systems. The Evolution of Knowledge management**:** From Information Management to Knowledge Management - Key Challenges Facing the Evolution of Knowledge Management - Ethics for Knowledge Management.

UNIT II CREATING THE CULTURE OF LEARNING AND KNOWLEDGE SHARING 8

Organization and Knowledge Management - Building the Learning Organization. Knowledge Markets: Cooperation among Distributed Technical Specialists – Tacit Knowledge and Quality Assurance.

UNIT III KNOWLEDGE MANAGEMENT-THE TOOLS 10

Telecommunications and Networks in Knowledge Management - Internet Search Engines and Knowledge Management - Information Technology in Support of Knowledge Management - Knowledge Management and Vocabulary Control - Information Mapping in Information Retrieval - Information Coding in the Internet Environment - Repackaging Information.

UNIT IV KNOWLEDGEMANAGEMENT-APPLICATION 9

Components of a Knowledge Strategy - Case Studies (From Library to Knowledge Center, Knowledge Management in the Health Sciences, Knowledge Management in Developing Countries).

UNIT V FUTURE TRENDS AND CASE STUDIES 9

Advanced topics and case studies in knowledge management - Development of a knowledge management map/plan that is integrated with an organization's strategic and business plan - A case study on Corporate Memories for supporting various aspects in the process life -cycles of an organization.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Use the knowledge management tools.
- Develop knowledge management Applications.
- Design and develop enterprise applications.

TEXT BOOK:

1. Srikantaiah.T. K., Koenig, M., “Knowledge Management for the Information Professional” Information Today, Inc., 2000.

REFERENCE:

1. Nonaka, I., Takeuchi, H., “The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation”, Oxford University Press, 1995.

CS6010 SOCIAL NETWORK ANALYSIS L T P C

3 0 0 3

OBJECTIVES:

The student should be made to:

- Understand the concept of semantic web and related applications.
- Learn knowledge representation using ontology.
- Understand human behaviour in social web and related communities.
- Learn visualization of social networks.

UNIT I INTRODUCTION **9**

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION **9**

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

UNIT III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS **9**

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

UNIT IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES **9**

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS **9**

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

TOTAL: 45 PERIODS

OUTCOMES:

Upon completion of the course, the student should be able to:

- Develop semantic web related applications.
- Represent knowledge using ontology.
- Predict human behaviour in social web and related communities.
- Visualize social networks.

TEXT BOOKS:

1. Peter Mika, “Social Networks and the Semantic Web”, First Edition, Springer 2007.
2. Borko Furht, “Handbook of Social Network Technologies and Applications”, 1st Edition, Springer, 2010.

REFERENCES:

1. Guandong Xu ,Yanchun Zhang and Lin Li, “Web Mining and Social Networking – Techniques and applications”, First Edition Springer, 2011.

2. Dion Goh and Schubert Foo, “Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively”, IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, “Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling”, IGI Global Snippet, 2009.
4. John G. Breslin, Alexander Passant and Stefan Decker, “The Social Semantic Web”, Springer, 2009.

CS6013 FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT **L T P C 3 0 0 3**

OBJECTIVE:

This program can be offered with all Undergraduate programs/courses for all engineering streams. The FSIPD program aims to improve student‘s awareness and understanding of the basic concepts involved in Integrated product Development (IPD) by providing exposure to the key product development concepts. Students, who complete this program, will stand a better chance to be considered for jobs in the Engineering industry.

COURSE OBJECTIVES:

After completing this program, the student will be able to obtain the technical skills needed to effectively play the entry level design engineer role in an engineering organization.

The student will be able to:

- Understand the global trends and development methodologies of various types of products and services
- Conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- Understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- Understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- Gain knowledge of the Innovation & Product Development process in the Business Context

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT **9**

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends - Introduction to Product Development Methodologies and Management - Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies - Product Life Cycle - Product Development Planning and Management

UNIT II REQUIREMENTS AND SYSTEM DESIGN **9**

Requirement Engineering - Types of Requirements - Requirement Engineering - Traceability Matrix and Analysis - Requirement Management - System Design & Modeling - Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design

2. Dion Goh and Schubert Foo, “Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively”, IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, “Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling”, IGI Global Snippet, 2009.
4. John G. Breslin, Alexander Passant and Stefan Decker, “The Social Semantic Web”, Springer, 2009.

CS6013 FOUNDATION SKILLS IN INTEGRATED PRODUCT DEVELOPMENT **L T P C 3 0 0 3**

OBJECTIVE:

This program can be offered with all Undergraduate programs/courses for all engineering streams. The FSIPD program aims to improve student‘s awareness and understanding of the basic concepts involved in Integrated product Development (IPD) by providing exposure to the key product development concepts. Students, who complete this program, will stand a better chance to be considered for jobs in the Engineering industry.

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- Understand the global trends and development methodologies of various types of products and services
- Conceptualize, prototype and develop product management plan for a new product based on the type of the new product and development methodology integrating the hardware, software, controls, electronics and mechanical systems
- Understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- Understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- Gain knowledge of the Innovation & Product Development process in the Business Context

UNIT I FUNDAMENTALS OF PRODUCT DEVELOPMENT **9**

Global Trends Analysis and Product decision - Social Trends - Technical Trends- Economical Trends - Environmental Trends - Political/Policy Trends - Introduction to Product Development Methodologies and Management - Overview of Products and Services - Types of Product Development - Overview of Product Development methodologies - Product Life Cycle - Product Development Planning and Management

UNIT II REQUIREMENTS AND SYSTEM DESIGN **9**

Requirement Engineering - Types of Requirements - Requirement Engineering - Traceability Matrix and Analysis - Requirement Management - System Design & Modeling - Introduction to System Modeling - System Optimization - System Specification - Sub-System Design - Interface Design

UNIT III DESIGN AND TESTING 9

Conceptualization - Industrial Design and User Interface Design - Introduction to Concept generation Techniques – Challenges in Integration of Engineering Disciplines - Concept Screening & Evaluation - Detailed Design - Component Design and Verification – Mechanical, Electronics and Software Subsystems - High Level Design/Low Level Design of S/W Program - Types of Prototypes, S/W Testing- Hardware Schematic, Component design, Layout and Hardware Testing – Prototyping - Introduction to Rapid Prototyping and Rapid Manufacturing - System Integration, Testing, Certification and Documentation

UNIT IV SUSTENANCE ENGINEERING AND END-OF-LIFE (EOL)SUPPORT 9

Introduction to Product verification processes and stages - Introduction to Product validation processes and stages - Product Testing standards and Certification - Product Documentation - Sustenance - Maintenance and Repair – Enhancements - Product EoL - Obsolescence Management - Configuration Management - EoL Disposal

UNIT V BUSINESS DYNAMICS ENGINEERING SERVICES INDUSTRY 9

The Industry - Engineering Services Industry - Product development in Industry versus Academia - The IPD Essentials - Introduction to vertical specific product development processes - Manufacturing/Purchase and Assembly of Systems - Integration of Mechanical, Embedded and S/W systems – Product development Trade-offs - Intellectual Property Rights and Confidentiality - Security and configuration management.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

The students will be able to

- Define, formulate and analyze a problem
- Solve specific problems independently or as part of a team
- Develop documentation, test specifications and coordinate with various teams to validate and sustain up to the EoL (End of Life) support activities for engineering customer
- Work independently as well as in teams
- Manage a project from start to finish

COURSE MATERIAL AND PEDAGOGY:

- NASSCOM has agreed to prepare / revise the course materials [selected teachers Anna University from major disciplines will be included in the process] as PPT slides for all theUNITS. The PPTs can be printed and given to each student if necessary at a Nominal Fee. This is the best possible material for this special course.
- NASSCOM will train the teachers of Anna University to enable them to teach this course. Atraining programme for nearly 3500 teachers needs to be organized. The team
  is exploring use of technology including the EDUSAT facility at Anna University.
- The course is to be offered as an elective to all UG Students both in the Constituent Colleges and Affiliated colleges of Anna University.

TEXT BOOKS [INDIAN ECONOMY EDITIONS]:

1. Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", TataMcGraw Hill, Fifth Edition, New Delhi, 2011
2. John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill,Eleventh Edition, New Delhi, 2005.

REFERENCES:

1. Hiriyappa B, “Corporate Strategy – Managing the Business”, Authorhouse, USA, 2013
2. Peter F Drucker, “People and Performance”, Butterworth – Heinemann [Elsevier],Oxford, UK, 2004.
3. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Conceptsand Practice”, Prentice Hall India, New Delhi, 2003
4. Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design",McGraw Hill Education, Seventh Edition, New Delhi, 2013.

MG6088 SOFTWARE PROJECT MANAGEMENT L T P C
3 0 0 3

OBJECTIVES:

- To outline the need for Software Project Management
- To highlight different techniques for software cost estimation and activity planning.

UNIT I PROJECT EVALUATION AND PROJECT PLANNING 9

Importance of Software Project Management – Activities Methodologies – Categorization of Software Projects – Setting objectives – Management Principles – Management Control – Project portfolio Management – Cost-benefit evaluation technology – Risk evaluation – Strategic program Management – Stepwise Project Planning.

UNIT II PROJECT LIFE CYCLE AND EFFORT ESTIMATION 9

Software process and Process Models – Choice of Process models - mental delivery – Rapid Application development – Agile methods – Extreme Programming – SCRUM – Managing interactive processes – Basics of Software estimation – Effort and Cost estimation techniques – COSMIC Full function points - COCOMO II A Parametric Productivity Model - Staffing Pattern.

UNIT III ACTIVITY PLANNING AND RISK MANAGEMENT 9

Objectives of Activity planning – Project schedules – Activities – Sequencing and scheduling – Network Planning models – Forward Pass & Backward Pass techniques – Critical path (CRM) method – Risk identification – Assessment – Monitoring – PERT technique – Monte Carlo simulation – Resource Allocation – Creation of critical patterns – Cost schedules.

UNIT IV PROJECT MANAGEMENT AND CONTROL 9

Framework for Management and control – Collection of data Project termination – Visualizing progress – Cost monitoring – Earned Value Analysis- Project tracking – Change control- Software Configuration Management – Managing contracts – Contract Management.

UNIT V STAFFING IN SOFTWARE PROJECTS 9

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham-Hackman job characteristic model – Ethical and Programmed concerns – Working in teams – Decision making – Team structures – Virtual teams – Communications genres – Communication plans.

TOTAL: 45 PERIODS

OUTCOMES:

- At the end of the course the students will be able to practice Project Management principles while developing a software.

TEXTBOOK:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

SEMESTER VIII

CS16801 SOFTWARE PROJECT MANAGEMENT 3 0 0 3

COURSE OBJECTIVES

To enable students to

- understand the importance of project planning and project evaluation techniques.
- acquire knowledge in software effort estimation and calculating the project duration.
- analyze the risk and allocate the resources.
- gain knowledge about the monitoring and controlling the software projects and its quality.
- learn the fundamental concept of managing people and contracts.

UNIT I INTRODUCTION TO PROJECT PLANNING AND EVALUATION 9

Project Definition – Importance of Software Project Management – Software Projects Vs Other Projects – Activities Covered by SPM – Setting Objectives – Stepwise Project Planning – Cost Benefit Evaluation Techniques.

UNIT II SOFTWARE EFFORT ESTIMATION AND ACTIVITY PLANNING 9

Software Effort Estimation : Agile Methods – Extreme Programming – Scrum - Problems with over and under estimates – Software effort estimation techniques – Bottom-up estimating – Top down estimating – Estimating by analogy – Albrecht function point analysis.

Activity Planning : Objectives of Activity planning - Project Schedules – Project and Activities – Sequencing and Scheduling – Activity on Arrow Networks – Forward Pass – Backward Pass – Identifying Critical Path -Activity Float – Shortening Project Duration.

UNIT III RISK MANAGEMENT AND RESOURCE ALLOCATION 9

Risk Management : Categories of Risk – A Framework for dealing Risk – Risk Identification – Risk Assessment – Risk Planning - Risk Management – Risk Evaluation -Applying the PERT technique. Resource Allocation : The nature of resources - Identifying Resource Requirements – Scheduling Resources-Creating critical paths – counting the cost - Publishing the resource schedule – The Scheduling Sequence.

UNIT IV MONITORING AND CONTROLLING OF PROJECTS AND ITS QUALITY 9

Monitoring and Controlling of Software Projects : Collecting the data – Visualizing Progress - Cost monitoring - Earned value analysis – Prioritizing monitoring. Software Quality : The importance of Software Quality – Software Quality Definition– ISO9126 – Product Vs Process Quality Management – Process Capability Models – Techniques to help enhance software quality

UNIT V MANAGING PEOPLE AND CONTRACTS 9

Managing people : Selection Process – instruction in the best methods – Motivational theories : Maslows Hierarchy of Needs – The Oldham - Hackman Job characteristic model – Becoming a Team – Decision Making –Managing Contracts: Types of Contract – Stages in contract placement – Typical terms of a Contract.

TOTAL PERIODS 45

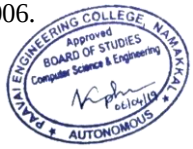
COURSE OUTCOMES

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

- select the project by applying various evaluation techniques.
- find the project duration by scheduling the activities.
- evaluate the risk and allocate the resources accordingly.
- monitor the progress of project and find the quality of project.
- motivate people and establishing a contract.

TEXT BOOKS

1. Bob Hughes, Mikecotterell, "software project management", Fifth edition, TataMcgraw Hill, 2009.
2. Watts s humphrey, "managing the software process", pearson education inc, 2006.



REFERENCES

1. Walker Royce, "software project management", pearson education ,1999.
2. Nina s godbole, "software quality assurance: princles and practise", alpha science international ltd, 2004.
3. Gordon g schulmeyer," handbook of software quality assurance", 3rd edition, attech house publishers, 2007.
4. Ramesh, gopalaswamy, "managing global projects", tatamcgraw hill,2001.

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

CS2064 AGENT BASED INTELLIGENT SYSTEMS L T P C
3 0 0 3

UNIT I INTRODUCTION 9

Definitions - Foundations - History - Intelligent Agents-Problem Solving-Searching - Heuristics -Constraint Satisfaction Problems - Game playing.

UNIT II KNOWLEDGE REPRESENTATION AND REASONING 9

Logical Agents-First order logic-First Order Inference-Unification-Chaining- Resolution Strategies-Knowledge Representation-Objects-Actions-Events

UNIT III PLANNING AGENTS 9

Planning Problem-State Space Search-Partial Order Planning-Graphs-Nondeterministic Domains-Conditional Planning-Continuous Planning-MultiAgent Planning.

UNIT IV AGENTS AND UNCERTAINITY 9

Acting under uncertainty – Probability Notation-Bayes Rule and use - Bayesian Networks-Other Approaches-Time and Uncertainty-Temporal Models- Utility Theory - Decision Network – Complex Decisions.

UNIT V HIGHER LEVEL AGENTS 9

Knowledge in Learning-Relevance Information-Statistical Learning Methods-Reinforcement Learning-Communication-Formal Grammar-Augmented Grammars-Future of AI.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Stuart Russell and Peter Norvig, “Artificial Intelligence - A Modern Approach”,2nd Edition, Prentice Hall, 2002

REFERENCES:

1. Michael Wooldridge, “An Introduction to Multi Agent System”, John Wiley, 2002.
2. Patrick Henry Winston, Artificial Intelligence, 3rd Edition, AW, 1999.
3. Nils.J.Nilsson, Principles of Artificial Intelligence, Narosa Publishing House, 1992

GE2025 PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

UNIT I ENGINEERING ETHICS 9

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

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 9

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

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY 9

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

UNIT IV RESPONSIBILITIES AND RIGHTS 9

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

UNIT V GLOBAL ISSUES 9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

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

REFERENCES:

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

GE2023 FUNDAMENTALS OF NANOSCIENCE L T P C
3 0 0 3

UNIT I INTRODUCTION 10

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

UNIT II PREPARATION METHODS 10

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

UNIT 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, "Crpyptography 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

TEXT BOOKS:

1. D. Jurafsky and J. Martin "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition",
2. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing",

REFERENCE:

1. James Allen. "Natural Language Understanding", Addison Wesley, 1994.

IT2061 SYSTEM MODELING AND SIMULATION L T P C
3 0 0 3

UNIT I INTRODUCTION TO SIMULATION 9

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

UNIT II MATHEMATICAL MODELS 9

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

UNIT III ANALYSIS OF SIMULATION DATA 9

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

UNIT IV VERIFICATION AND VALIDATION 9

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

UNIT V SIMULATION OF COMPUTER SYSTEMS AND CASE STUDIES 9

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

TOTAL: 45 PERIODS

TEXT BOOKS:

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

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. Gonzaleaz R.C. and Lee C.S.G., "Robotics Control Sensing, Visioon 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: Prepositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainity 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 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.

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GE6083	DISASTER MANAGEMENT	L T P C
		3 0 0 3

OBJECTIVES:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity.

UNIT I INTRODUCTION TO DISASTERS 9

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR) 9

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT IV DISASTER RISK MANAGEMENT IN INDIA 9

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS 9

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TOTAL: 45 PERIODS

OUTCOMES:

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management

TEXTBOOK:

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerable India: A Geographical Study of Disasters, IIAS and Sage Publishers, New Delhi, 2010.

REFERENCES

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009.