

COURSE OBJECTIVE(S):

1. To know the basics of algorithmic problem solving
2. To read and write simple Python programs.
3. To develop Python programs with conditionals and loops.
4. To define Python functions and call them.
5. To use Python data structures -- lists, tuples, dictionaries.
6. To do input/output with files in Python.

Prerequisite: Nil

UNIT I ALGORITHMIC PROBLEM SOLVING

9

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, guess an integer number in a range, Towers of Hanoi.

UNIT II DATA, EXPRESSIONS, STATEMENTS

9

Python interpreter and interactive mode; values and types: int, float, boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III CONTROL FLOW, FUNCTIONS

9

Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV LISTS, TUPLES, DICTIONARIES

9


Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V FILES, MODULES, PACKAGES

9

Files and exception: text files, reading and writing files, format operator; command line arguments, date and time, errors and exceptions, handling exceptions, debugging, modules, packages; Illustrative programs: word count, copy file.

TOTAL: 45 hrs.


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COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Develop algorithmic solutions to simple computational problems
2. Read, write, execute by hand simple Python programs.
3. Structure simple Python programs for solving problems.
4. Decompose a Python program into functions.
5. Represent compound data using Python lists, tuples, dictionaries.
6. Read and write data from/to files in Python Programs.


TEXT BOOKS:

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016
(<http://greenteapress.com/wp/think-python/>)
2. Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

REFERENCES:

1. John V Guttag, —Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, —Introduction to Programming in Python: An Inter-Disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, —Exploring Python , Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Kenneth A. Lambert, —Fundamentals of Python: First Programs , CENGAGE Learning, 2012.
5. Charles Dierbach, —Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition, 2013.
6. Paul Gries, Jennifer Campbell and Jason Montojo, —Practical Programming: An Introduction to Computer Science using Python 3 , Second edition, Pragmatic Programmers, LLC, 2013.

Course Outcomes	PSO1	PSO2	PSO3	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1 Develop algorithmic solutions to simple computational problems	3			3	3										
CO2 Read, write, execute by hand simple Python programs	3		1		3		3			3					
CO3 Structure simple Python programs for solving problems	3		1					2		3					
CO4 Decompose a Python program into functions.	3	2		3			2	2		1					
CO5 Represent compound data using Python lists, tuples, dictionaries.	3			3	1			2							


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COURSE OBJECTIVE(S):

1. To write, test, and debug simple Python programs.
2. To implement Python programs with conditionals and loops.
3. Use functions for structuring Python programs.
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python.

LIST OF PROGRAMS:

1. To Implement python scripts using Variables and operators
2. To Demonstrate Operator precedence to evaluate an expression
3. Display grade of a student using elif statement
4. Implement Floyd triangle using for loop
5. Checks the given number is prime or not using while loop
6. Compute the GCD of Numbers using functions
7. Finding factorial of a given number using recursive function.
8. Takes a list of words and returns the length of longest one using strings
9. To perform linear and binary search using strings
10. To implement list as arrays (multiply 2 matrices)
11. To demonstrate use of list & related functions
12. To demonstrate use of tuple, set& related functions
13. To demonstrate use of Dictionary& related functions
14. Finding most frequent words in a text read from a file
15. Programs that take command line arguments (word count)

PLATFORM NEEDED

Python 3 interpreter for Windows/Linux

COURSE OUTCOMES:

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

1. Write, test, and debug simple Python programs.
2. Implement Python programs with conditionals and loops.


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CO1	Identify the different components of a web page that can be used for mining	3			3	3										
CO2	Apply machine learning concepts to web content mining	3		1		3		3			3					
CO3	Design a system to collect information available on the web to build Recommendersystems	3		1					2		3					
CO4	Analyze social media data using appropriate data/web mining techniques	3	2		3			2	2		1					
CO5	Build a simple search engine using available open source tools	3			3	1			2							

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PREREQUISTE: NIL

OBJECTIVES:

The student should be conversant with the evolution of environmentalism and the importance of environmental studies, various natural resources and the current threats to their sustainability, significance and protection of bio diversity and various forms of environmental degradation and international conventions and protocols for the protection of environment and concept of sustainability.

UNIT – I Introduction to Environment and Ecosystem 9

Definition, scope and importance of environment – need for public awareness. Atmosphere – composition of atmosphere (troposphere, stratosphere, mesosphere and thermosphere) Biosphere – Hydrosphere – Lithosphere. Concept of ecosystem – structure and functions of ecosystem- producers, consumers and decomposers - Energy flow –Ecological Succession-Food chains-Food webs- Ecological pyramids-Introduction, types, characteristic features -structures and function of forest, grassland and aquatic ecosystems (ponds and rivers) - Case Studies in current scenario.

UNIT - II Natural Resources and Biodiversity 9


Forest resources-Water resources-Mineral resources-Food resources-Energy resources-Land resources. Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographically classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

UNIT -III Environmental Pollution 9

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

UNIT –IV Social Issues, Human Population and the Environment 9

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies role of non-governmental organization environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – Wasteland reclamation – consumerism and waste products – environment protection act –environmental legislation- central and state pollution control boards.


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Definition of sustainability -Components of sustainability History and emergence of the concept of sustainable development – Our Common Future - Objectives of Sustainable Development - Millennium Development Goals - Environment and Development linkages – Globalization and environment - Sustainability indicators-Hurdles to Sustainability

TOTAL HOURS:45

COURSE OUTCOMES:

- CO1:** The students will demonstrate relationship among environment and ecosystem
- CO2:** The students will identify and analyze effects of pollution on ecosystem
- CO3:** The students will identify and analyze social issues and sustainable development.

TEXT BOOK:

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

REFERENCES

- 1) R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
- 2) Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
- 3) Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
- 4) Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005)


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PREREQUISITES: NIL

COURSE OBJECTIVE(S):

- To introduce basic postulates of Boolean algebra and shows the correlation between Boolean expressions
- To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits
- To introduce the concept of memories and programmable logic devices.
- To illustrate the concept of synchronous and asynchronous sequential circuits

UNIT I BOOLEAN ALGEBRA AND LOGIC GATES

9

Review of binary number systems - Binary arithmetic – Binary codes – Boolean algebra and theorems - Boolean functions – Simplifications of Boolean functions using Karnaugh map and tabulation method – Logic gates

UNIT II COMBINATIONAL LOGIC

9

Combinational circuits – Analysis and design procedures - Circuits for arithmetic operations – Code conversion -Decoders and encoders - Multiplexers and demultiplexers–Comparator.

UNIT III SYNCHRONOUS AND ASYNCHRONOUS SEQUENTIAL LOGIC

9

Sequential circuits – Flip flops – Analysis and design procedures - State reduction and state assignment - Shift registers – Counters Analysis and design of asynchronous sequential circuits - Reduction of state and flow tables – Hazards-Hazard free realizations.

UNIT IV PROGRAMMABLE LOGIC DEVICES, MEMORY AND LOGIC FAMILIES

9

Memories: ROM, PROM, EPROM, PLA, PLD, FPGA, Introduction to Flash Memory. Digital Logic Families: TTL, ECL, CMOS.

UNIT V VHDL


9

VHDL program structure-operators-Data flow modeling-Design of combinational and sequential circuits (Examples: Adders, subtractors, multiplexers/ Demultiplexers, Encoder/ Decoder, FF's, Counters)

TOTAL HOURS: 45

COURSE OUTCOMES

- Solve the Postulates of Boolean algebra using different techniques
- Designing the Combinational and sequential circuits
- Applying the concept of synchronous and asynchronous circuit
- Knowledge in VHDL for VLSI Design


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TEXT BOOK (S):

- 1) M.Morris Mano, "Digital Design", 3rd edition, Pearson Education, 2007.

REFERENCE(S):

- 1) Charles H.Roth, Jr. "Fundamentals of Logic Design", 4th Edition, Jaico Publishing House, Latest Edition.
- 2) Donald D.Givone, "Digital Principles and Design", Tata McGraw-Hill, 2007
- 3) Charles H.Roth,Lizy Kurian John,"Digital System Design using VHDL"2nd edition PWS Publishing Company,2008



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PREREQUISITES: OBJECT ORIENTED PROGRAMMING**OBJECTIVES**

- Learn the Linear Data Structures like Lists, Stacks, and Queues.
- Be Familiar with Non - Linear Data Structures such as Trees, Heaps, and Balanced Trees.
- Solve Problems using Graph Data Structures.
- Develop the ability to use Sorting, Searching and Hashing algorithms efficiently.

UNIT I LINEAR DATA STRUCTURES

9

Abstract Data Types - Linear List - Single Linked List - Circular Linked List - Doubly Linked List - Circular Doubly Linked List - Applications of Linked List - Polynomial Operations - Stack - Applications of Stack - Evaluation of Postfix Expression - Converting Infix to Postfix - Balancing Parenthesis - Queue - Representation of Queues - Application of Queues - **CPU Scheduling**

UNIT II TREES AND HEAPS

9

Tree - Binary Tree - Representation of Linked List - Linear and Linked List Implementation - Tree Traversals - Expression Trees - Binary Search Tree - Operations on Binary Search Tree - Heaps - Operations of Heaps - Threaded Binary Trees. Priority Queues - Binary Heap - **Leftist Heap - Binomial Queues.**

UNIT III BALANCED TREES

9

AVL Trees - Splay Trees - Top-down Splay - Red-Black Trees - B-Tree - **B⁺ Trees - k-D Trees**

UNIT IV GRAPHS

9

Representation of Graphs - Breadth First Search - Depth First Search - Application of Graph Structures: Shortest Path Problem: **Floyd Warshall - Bellman Ford - Dijkstra's Algorithm** - Topological Sorting - Minimum Spanning Trees: Prim's Algorithm - Kruskal's Algorithm.

UNIT V SORTING, SEARCHING AND HASH TECHNIQUES

9

Sorting Algorithms - Insertion Sort - Selection Sort - Shell Sort - Bubble Sort - Quick Sort - Merge Sort - Radix Sort - Searching: Linear Search - Binary Search Hashing: Hash Functions - Separate Chaining - Open Addressing - Rehashing - Extendible Hashing.

Total Hours: 45**COURSE OUTCOMES:**

At the end of the course the students are able to

CO1: Implement various Abstract Data Types to Solve Real life Problems by using Linear Data Structures.

CO2: Apply the different Non-Linear Data Structures to Problem Solutions.

CO3: Implement graph data structures to solve problems

CO4: Apply Sorting, Searching and Hashing algorithms to the small and large data sets.

TEXT BOOKS:

- 1) Debasis Samanta, "CLASSIC DATA STRUCTURES", Second Edition, PHI Learning Private Limited Publishers, 2011.
- 2) Mark Allen Weiss, "DATA STRUCTURES AND ALGORITHM ANALYSIS IN C++", 4/E Pearson Education, 2013.
- 3) Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "FUNDAMENTALS OF DATA STRUCTURES IN C++", Computer Science Press, New York, 2007.

REFERENCES BOOKS:

- 1) Rohit Khurana, "DATA STRUCTURES AND OBJECT ORIENTED PROGRAMMING WITH C++", First Edition, Vikas Publishing House Pvt Ltd, 2012.
- 2) Richard F.Gilberg & Behrouz A.Forouzan, "DATA STRUCTURES: A PSEUDOCODE APPROACH WITH C", Second Edition, Cengage Learning Publishers.



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OBJECTIVE(S):

- To have insight into the basic structure of computers.
- To understand the design and organization of computer systems.
- To comprehend the importance of the memory and I/O organization.
- To familiarize basic concepts of Parallelism.

UNIT-I BASIC STRUCTURE OF COMPUTERS

9

Functional units – Basic operational concepts – Bus structures – Performance - Memory Locations and Addresses – Instructions and instruction sequencing - Addressing modes – Basic I / O Operations – Stacks and Queues – Sub routines.

UNIT-II COMPUTER ARITHMETIC AND CONTROL UNIT

9

Addition and Subtraction of Signed Numbers – Design of Fast Adders – Multiplication of Positive Numbers – Signed Operand Multiplication and Fast Multiplication – Integer Division - Floating point Numbers and operations - Control Units - Fundamental concepts – Execution of a complete instruction – Hardwired control – Micro programmed control.

UNIT-III PIPELINING

9

Basic concepts – Data hazards – Instruction hazards - Unconditional branches – Conditional branches – Branch Prediction – Influence on instruction sets – Data path and control considerations - Super scalar operations – Performance considerations.

UNIT-IV MEMORY & I/O ORGANIZATION

9

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Accessing I/O devices – Interrupts – Direct Memory Access – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB).

UNIT-V PARALLELISM


9

ILP – Concepts & Challenges – Compiler Techniques – Reducing branch costs – Dynamic scheduling - Parallel Processing and Performance - Hardware Multithreading - Vector (SIMD) Processing - Shared-Memory Multiprocessors - Cache Coherence - Message-Passing Multi computers - Parallel Programming for Multiprocessors - Performance Modeling.

TOTAL: 45**COURSE OUTCOMES:**

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

- CO1:** Understand Basic operational concepts and design of ALU of Digital Computer.
- CO2:** Design and analyze the performance of pipelined control unit.
- CO3:** Understand memory hierarchy and I/O Organization.
- CO4:** Perceive knowledge on Instruction Level Parallelism and Parallel Processing.


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TEXT BOOKS:

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky & Naraig Manjikian- "Computer Organization and Embedded Systems", Sixth Edition, Tata McGraw Hill, 2012.
2. John L. Hennessy and David A. Patterson, - "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

REFERENCE BOOKS:

1. David A. Patterson and John L. Hennessy, -"Computer Organization and Design: The Hardware / Software interface", Third Edition, Elsevier, 2005.
2. William Stallings, - "Computer Organization and Architecture – Designing for Performance", Sixth Edition, Pearson Education, 2003.
3. John P. Hayes, - "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
4. V.P. Heuring, H.F. Jordan, - "Computer Systems Design and Architecture", Second Edition, Pearson Education, 2004.


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PREREQUISITES: NIL

OBJECTIVE(S):

- To verify the digital circuits using logical IC's.
- To study the methods for simplifying Boolean expressions and designing the digital circuits practically.
- To Implement of combinational and sequential circuits

LIST OF EXPERIMENTS

1. Verification of Boolean theorems using digital logic gates
2. Design and implementation of Adder/Subtractor, Encoders/Decoders, Code Converters using basic gates.
3. Design and implementation of 4-bit binary adder / subtractor using MSI Circuits.
4. Design and implementation of parity generator / checker using basic gates and MSI Circuits
5. Design and implementation of Magnitude Comparator
6. Design and implementation of Multiplexers/Demultiplexers
7. Design and implementation of Shift registers
8. Design and implementation of Synchronous and Asynchronous counters
9. Simulation of Adder/Subtractor, using Hardware Description Language (VHDL/ Verilog HDL software required)
10. Simulation of Encoders/Decoders using Hardware Description Language (VHDL/ Verilog HDL software required)
11. Simulation of Shift Registers using HDL (VHDL/ Verilog HDL software required)
12. Simulation of Counters using HDL (VHDL/ Verilog HDL software required)

COURSE OUTCOMES

- Verification of digital circuits using logical IC's
- Simplification of Boolean expression and implementing those circuits practically
- Implementation of combinational and sequential circuits
- Programming fundamentals in VHDL


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DATA STRUCTURES LAB

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PREREQUISITES: OBJECT ORIENTED PROGRAMMING LAB

OBJECTIVES:

- Efficiently implement the different Linear Data Structures
- Learn and Expose Non-Linear Data Structures.
- Explains the basic algorithms for shortest paths and minimum spanning trees
- Learn to implement Sorting and Searching and hashing Algorithms.

DATA STRUCTURE USING C++:

1. Implementation of Linked List, Stack, and Queue.
2. Implementation of Applications of Linked List and Stack.
3. Implementation of Binary Search Tree.
4. Implementation of AVL Tree.
5. Implementation of Heap
6. Implementation of Shortest Path Algorithm.
7. Implementation of Minimum Spanning Tree.
8. Implementation of Sorting Algorithms.
9. Implementation of Searching Algorithms.
10. Implementation of hashing

COURSE OUTCOMES:

At the End of the course the students will be able to

CO1: Implement C++ programs for manipulating Stacks, Queues, Lists ADT with its Applications.

CO2: Apply the different Non-Linear Data Structures for Implementing Solutions to Practical Problems.

CO3: Ability to apply and implement Graph Data Structures for Real Time Applications.

CO4: Analyze and Implement various Searching and Sorting and hashing Algorithms.


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**PREREQUISITE: FUNDAMENTALS OF COMPUTING & C PROGRAMMING,
OBJECT ORIENTED PROGRAMMING, JAVA PROGRAMMING**

OBJECTIVE(S):

- To create Java programs that leverage the object-oriented features such as Abstraction, Inheritance and Interfaces.
- To implement error-handling techniques using exception handling.
- To create an event-driven GUI Applications using Swing components.
- To implement I/O functionality to read and write the files.

LIST OF EXPERIMENTS:

Solving Simple problems using

1. Class, Methods
2. Type casting, Static and Final Keyword
3. Polymorphism: Method overloading & Constructor overloading
4. Inheritance (overriding)
5. Interfaces
6. Abstract class
7. Packages
8. Exception handling
9. Threads (single and multithreads)
10. String Handling functions
11. JDBC
12. Applet
13. Event Handling.
14. Swings
15. File handling and I/O handling

TOTAL: 45

COURSE OUTCOMES:

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

- CO1:** Write a programs that use the fundamental program constructs, including packages & interfaces
- CO2:** Create &access database connection and handling exceptions.
- CO3:** Design a GUI-based event handling application using Applets &Swings.
- CO4:** Understand the I/O functionality to read & write in the files.


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OBJECTIVES:

- To understand the concept of logic and hence to construct valid mathematical arguments.
- To master combinatorics which deals with the counting principles.
- To identify the basic properties of graph and model simple applications.
- To expose the basic properties and concepts of algebraic structures such as semigroups, monoids, groups and specially lattices and also the theory of Boolean algebra.

UNIT I LOGIC AND PROOFS**9+3**

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

UNIT II COMBINATORICS**9+3**

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

UNIT III GRAPHS**9 +3**

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

UNIT IV ALGEBRAIC STRUCTURES**9+3**

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

UNIT V LATTICES AND BOOLEAN ALGEBRA**9+3**

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

TOTAL = 45+15=60**COURSE OUTCOMES**

At the end of the course the students are able to

- CO 1:** Expertise the knowledge of logics helps to verify the correctness of computer Programs and to draw conclusions from scientific experiments.
- CO 2:** Understand and demonstrate the basic concept of an algorithm and its applications in combinatorial mathematics.
- CO 3:** Acquaint the graph theory concepts serves as the base for network analysis.
- CO 4:** Internalize the abstract algebraic structure which provides the ability to deal the Theory of sequential machines, formal languages, and syntactic analysis.


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TEXT BOOKS

1. Kenneth H. Rosen, "Discrete Mathematics and its Applications", Seventh edition, Special Indian edition, Tata McGraw – Hill Pub. Co. Ltd., New Delhi, 2011.
2. T. Veerarajan, "Discrete Mathematics with Graph Theory and Combinatorics", Tata McGraw–Hill Pub. Co. Ltd, New Delhi.

REFERENCES:

1. Trembly J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw–Hill Pub. Co. Ltd, New Delhi, thirtieth re-print 2007.
2. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Fourth Edition, Pearson Education Asia, Delhi, 2007.
3. Thomas Koshy, "Discrete Mathematics with Applications", Elsevier Publications, 2006.


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PREREQUISITE: FUNDAMENTS OF COMPUTING AND C PROGRAMMING

OBJECTIVE(S):

- Acquire basic Knowledge on computer operating system structures and functioning
- Impart knowledge on scheduling, process synchronization and deadlocks
- Be familiar with different memory management techniques and storage management
- Understand security and protection mechanisms in operating systems.

UNIT-I PROCESSES AND THREADS

9

Introduction to operating systems – computer system organization –computer system architecture – operating system structures: OS Services - system calls – system programs – system structure. Processes: Process concept – Process scheduling – Operations on processes – Interprocess communication – Communication in client-server systems. Case study: IPC in Linux. Threads: Multi-threading models – Threading issues. Case Study: Pthreads library.

UNIT-II CPU SCHEDULING AND PROCESS SYNCHRONIZATION

9

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

UNIT-III MEMORY MANAGEMENT

9

Memory Management: Introduction – Swapping – Contiguous memory allocation– Paging – Segmentation – Segmentation with paging. Virtual Memory: Introduction – Demand paging — **copy on write** – Page replacement – Allocation of frames – Thrashing. Case Study: Memory management in Linux.

UNIT-IV STORAGE MANAGEMENT

9

Mass-Storage Structure: Introduction– Disk Structure - disk attachment- Disk scheduling – Disk management – Swap-space management – RAID– stable storage. Case study: I/O in Linux. File-System Interface: File concept – Access methods – Directory and Disk structure – File-system mounting – file sharing - Protection. File-System Implementation: Files-system structure – File-System Implementation - Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery. Case studies: File system in Linux – **file system in Windows 7**.

UNIT-V PROTECTION, SECURITY AND VIRTUAL MACHINES

9

Protection: Goals of protection – Principles of Protection – Domain of Protection – Access Matrix – Implementation of the Access Matrix – Access Control- Revocation of Access Rights – Capability Based Systems – Language Based Protection. Security: The Security problem – Program Threats – System and Network Threats – cryptography as a security tool –User Authentication - implementing Security Defenses – Firewalling to protect systems and networks – Computer-Security Classifications. Virtual


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Machines: Introduction – Benefits and features – Types of Virtual Machines and their implementations – Virtualization and Operating System components.

TOTAL: 45

COURSE OUTCOMES:

At the end of the course student should be able to


- CO1:** Gain extensive knowledge and apply the concepts of process management
- CO2:** Determine the efficiency of CPU Scheduling Algorithms
- CO3:** Demonstrate and implement memory management, and paging techniques.
- CO4:** Illustrate disk management functionalities and file systems.
- CO5:** Be familiar with protection and security mechanism.

TEXT BOOK:

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

REFERENCE BOOKS:

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education/PHI 2001.
2. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2004


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PREREQUISITES: FUNDAMENTALS OF COMPUTING & PROGRAMMING, DATA STRUCTURES AND ALGORITHMS

OBJECTIVE(S):

- Learn the fundamentals of data models and conceptualize and depict a database system using ER diagram.
- Make a study of SQL and relational database design.
- Know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure.
- To know the internal storage structures, indexing and advanced database concepts.

UNIT-I INTRODUCTION

7

Purpose of Database System – Views of data - Database Languages – Data Models – Database System Architecture – Database users and Administrator – Entity Relationship model (E-R Model) – E-R Diagrams.

UNIT-II RELATIONAL MODEL

9

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

UNIT-III DATABASE DESIGN

9

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

UNIT-IV TRANSACTION MANAGEMENT

9

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

UNIT-V DATA STORAGE & ADVANCED DATABASES

11

Overview of Physical Storage Media – Magnetic Disks – Tertiary storage – File Organization – Organization of Records in Files – Indexing and Hashing – Ordered Indices – B tree - B+ tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – measures of query cost – Database Tuning - OODB & XML Databases – **Introduction to mobile & web databases.**

TOTAL: 45


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COURSE OUTCOMES:

At the end of the course student should be able to

- CO 1: Gain and design extensive knowledge on various data models and ER diagram.
- CO 2: Recognize and develop sophisticated queries and authorization techniques to extract information from database
- CO 3: Analyze and eliminate all kind of dependency in a database schema via normalization techniques.
- CO 4: Apply concurrency control and recovery mechanism.
- CO 5: Understand the internal storage structures using different file and indexing techniques & advanced database concepts

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6th Edition, Tata McGraw Hill, 2013.
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2012.

REFERENCE BOOKS:

1. Ramez Elmasri, Shamkant B. Navathe, "Database Systems", 6th Edition, Pearson, 2014.
2. Raghu Ramakrishnan, J.Gehrke, "Database Management Systems", 3rd Edition, McGraw Hill, 2014.
3. Shio Kumar Singh, "Database Systems Concepts, Design and Applications", 2nd Edition, Pearson, 2011.


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COURSE OBJECTIVES:

- Provide an overview of software engineering and software process models.
- Collect and analyze the user requirements using UML notations and diagrams.
- Understand the different design techniques and software architectural styles.
- Learn implementation standards and testing strategies.
- Know the concepts of quality control and how to ensure good quality software.

UNIT I SOFTWARE PROCESS MODELS

9

Introduction–Software Engineering Paradigm – life cycle models: The waterfall model – incremental- spiral - WINWIN spiral – evolutionary model – prototyping - object oriented - The Concurrent Development Model - Specialized Process Models - The Unified Process - **System engineering – computer based system –verification –validation.**

UNIT II REQUIREMENTS ENGINEERING

9

Functional and Non-Functional Requirements - **User requirements, System requirements**, Software Requirements Document – Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management - Modeling Notations - Requirements and Specification Languages.

UNIT III ANALYSIS AND DESIGN MODELING

9

The Analysis Concepts - Design Process and Concepts - Modular Design- Design Heuristic - Architectural Design - Data Design - User Interface Design - Real Time Software Design - System Design - Real Time Executives - Data Acquisition System - Monitoring and Control System.

UNIT IV IMPLEMENTATION & TESTING

9

Programming Standards and Procedures - Programming Guidelines – Documentation- Software testing fundamentals-Internal and external views of Testing-**white box testing**- basis path testing- control structure testing-**black box testing**- Regression Testing – Unit Testing – Integration Testing – Validation Testing – **System Testing and Debugging. Case studies: Testing Tools – Selenium-Watir**

UNIT V QUALITY & MAINTENANCE

9

Software Evolution - Verification and Validation - Critical Systems Validation - Metrics for Process, Project and Product - Quality Management - Process Improvement - Risk Management - Configuration Management - Software Cost Estimation.

Total Hours: 45


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COURSE OUTCOMES

At the end of the course the students are able to


- CO1:** Compare and analyze the various life cycle models of software process and describe the process of requirement engineering.
- CO2:** Prepare Software Requirement document and build requirement model then design the method for software architecture.
- CO3:** Formulate various implementation and testing strategies in a system.
- CO4:** Familiarize various quality measurements for a software system.

TEXT BOOKS

1. Roger S.Pressman, "Software Engineering: A Practitioner's Approach", 8th Edition, McGraw Hill International Edition, 2014
2. Ian Sommerville, "Software Engineering", 10th Edition, Pearson Education Asia, 2015.
3. Shari Lawrence Pfleeger and Joanne M. Atlee, "Software Engineering: Theory and Practice", 4th Edition, Pearson Education, 2010.

REFERENCES BOOKS

1. Watts S.Humphrey, "A Discipline for Software Engineering", Pearson Education, 2007.
2. James F.Peters and Witold Pedrycz, "Software Engineering, An Engineering Approach", Wiley-India, 2007.
3. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.
4. S.A.Kelkar, "Software Engineering", Prentice Hall of India Pvt, 2007.
5. Zaigham Mahmood, Saqib Saeed: Software Engineering framework for the cloud computing Paradigms, Springer, 2013.


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COURSE OBJECTIVES:

- To understand the architecture and data structures of Unix Kernel
- To learn the functions and implementations of various system calls.
- To acquire knowledge on concepts of process management
- To understand the concepts of Memory management & IO

UNIT I INTRODUCTION

9

General Overview of the System: History – System structure – User perspective –Operating System Services – Assumptions about Hardware. Introduction to the Kernel Architecture of the UNIX Operating System – Introduction to System Concept - The Buffer Cache - Buffer headers – Structure of the Buffer Pool – Scenarios for Retrieval of a Buffer– Reading and Writing Disk Blocks – Advantages and Disadvantages of the Buffer Cache.

UNIT II FILE SUBSYSTEMS

9

Internal Representation of Files: Inodes – Structure of a Regular File – Directories –Conversion of a Path Name to an Inode – Super Block – Inode Assignment to a New File – Allocation of Disk Blocks.

UNIT III SYSTEM CALLS FOR THE FILE SYSTEM

9

Open – Read – Write – File And Record Locking – Adjusting the Position of File I/O – lseek – close – File Creation – Creation of Special Files – Changing Directory – Root – Owner - Mode – stat and fstat – Pipes – dup – Mounting And Un mounting File Systems – link – unlink.

UNIT IV PROCESSES

9

Process States and Transitions – Layout of System Memory – The Context of Process- Saving the Context of a Process – Manipulation of the Process Address Space - Process Control -process Creation – Signals – Process Termination – Awaiting Process Termination – Invoking other programs – User Id of a Process – Changing the size of a Process – Shell – System Boot and the INIT Process– Process Scheduling.

UNIT V MEMORY MANAGEMENT AND I/O

9


Memory Management Policies - Swapping – Demand Paging - The I/O Subsystem: Driver Interface – Disk Drivers – Terminal Drivers.

TOTAL: 45 PERIODS**COURSE OUTCOMES:****At the end of the course the students are able to**

- CO1:** Identify the data structure for kernel and methods for managing the buffer cache.
CO2: Design and implement the subsystems of an operating system.
CO3: Implement the various system calls for Unix OS.
CO4: Analyse process and memory management.

TEXT BOOK:

1. Bach M.J. The Design of the Unix Operating System, Prentice Hall of India, 2011


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REFERENCE BOOKS:

1. B. Goodheart, J. Cox, —The Magic Garden Explained, Prentice Hall of India, 1986.
2. S. J. Leffler, M. K. Mckusick, M. J. Karels and J. S. Quarterman., —The Design and Implementation of the 4.3 BSD Unix Operating System , Addison Wesley, 1998.
3. Robert Love, "Linux Kernel Development", III Edition, Addison Wesley, 2010, Narosa Publishers, New Delhi, 2011.



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COURSE OBJECTIVE:

- Illustrate the basic kinds of finite automata and their capabilities.
- Devise the regular expression and context-free languages.
- Ability to describe and transform regular expressions and grammars.

UNIT I INTRODUCTION TO AUTOMATA

9

Mathematical preliminaries and notations – Central concepts of automata theory – Finite automata - Deterministic Finite Automata - Nondeterministic Finite Automata –Equivalence of DFA and NFA – Finite Automata with Epsilon transitions - Application of FA.

UNIT II REGULAR EXPRESSIONS

9

Regular languages: Regular Expressions – Finite Automata and Regular Expressions – Applications of Regular Expressions - Regular Grammars

UNIT III PROPERTIES OF LANGUAGES

9

Properties of regular languages: Pumping lemma for regular languages – Closure properties of regular languages – Decision properties of Regular languages - Equivalence and Minimization of Finite Automata.

UNIT IV CONTEXT FREE LANGUAGES

9

Context Free languages: Context Free Grammars – Parse Trees - Ambiguity in Grammars and languages – Applications of Context Free Grammars - Pushdown automata (PDA) – Languages of a PDA - Equivalence of PDA's and CFG's

UNIT V PROPERTIES OF CONTEXT FREE LANGUAGES

9

Properties of Context Free Languages: Normal Forms (CNF, GNF) for Context Free Grammars - Pumping lemma for CFL's - Closure properties of CFL – Decision properties of CFL's.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of the course the students are able to

CO1: Design a finite automaton to recognize a given regular language

CO2: Construct regular expressions and grammars.

CO3: Convert grammars to normal forms and eliminate ambiguities

TEXT BOOK:

1. John E. Hopcroft and Rajeev Motwani and Jeffrey D. Ullman, "Introduction to Automata Theory, Languages and Computation", third edition, Pearson Education, New Delhi, 2013.
2. Peter Linz, "An Introduction to Formal Language and Automata", fifth edition, Narosa Publishers, New Delhi, 2011.


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REFERENCE BOOKS:

1. S.N.Sivanadam , M.Janaki Meena, " Theory of Computation" , I.K.International Publishing House Pvt.Ltd, ISBN: 9789380026206, 2009.
2. Michael Sipser, "Introduction to the Theory of Computation", third edition, PWS Publications, Boston, 2013.



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COURSE OBJECTIVE:

- Learn the characteristics of hardware devices
- Understand the troubleshooting fundamentals of computer hardware and software
- Know the installation, assembling and configuration management of computer hardware and software
- Familiarize the students with types of problems in Hardware peripherals.

Unit I Introduction

9

Introduction - Computer organization – Number systems and codes – Memory – Arithmetic and Logic Unit – Control unit – Instruction prefetch – Interrupts – Input/Output techniques – Device controllers – Error detection techniques – Microprocessor – Personal computer concepts – Advanced system concepts – Microcomputer concepts – Operating system – Multitasking and multiprogramming – Virtual memory – Cache memory – Modern PC and user.

Unit II Peripheral Devices

9

Introduction – Keyboard – CRT display monitor – Printer – Magnetic storage devices – Floppy disk drive – Hard disk drive – Special types of disk drives – Mouse and trackball – Modem – Fax modem – CD ROM drive – Scanner – Digital camera – Digital versatile disk – Special peripherals.

Unit III PC Hardware Overview

9

Introduction – Hardware BIOS DOS interaction – The PC family – PC hardware – Inside the system box – Motherboard logic – Memory space – Peripheral interfaces and controllers – Keyboard interface – CRT display controller – Floppy disk controller – Hard disk controller.

Unit IV Installation and Preventive Maintenance

9

Introduction – System configuration – Pre installation planning – Installation practice – Routine checks – PC assembling and integration – BIOS setup – Engineering versions and compatibility – Preventive maintenance – Disk operating system – Virus – Data recovery.

Unit V Troubleshooting


9

Introduction – Computer faults – Nature of faults – Types of faults – Diagnostic programs and tools – Microprocessor and firmware – Programmable LSI's – Bus faults – Faults elimination process – Systematic troubleshooting – Symptoms observation and analysis – Fault diagnosis – Fault rectification – Troubleshooting levels – Serial port problems – FDC problems – HDC problems – Display adapter problems – FDD, HDD, CD-ROM problems

Total Hours:45**COURSE OUTCOMES**

At the end of the course the students are able to

- CO1** Identify the purpose and operation of the major components of a computer
- CO2** Diagnose and correct the common failures in a computer
- CO3** Install and accurately troubleshoot the device drivers
- CO4** Assemble and disassemble the components of a computer


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TEXT BOOK

- 1.B. Govindarajalu, IBM PC Clones Hardware, Troubleshooting and Maintenance, TMH, 2008

REFERENCE BOOK

1. Jean Andrews, A+ Guide to Managing and Maintaining Your PC, Cengage Learning, 2013
2. Peter Abel, Niyaz Nizamuddin, IMB PC Assembly Language and Programming, Pearson Education, 2007
3. Michael Meyers, Introduction to PC Hardware and Troubleshooting, McGraw Hill, 2003



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OBJECTIVES

- To impart the knowledge of basic probabilistic theory.
- To learn one dimensional discrete and continuous probability distributions occurring in natural phenomena.
- To extend the probability theory to two dimensional random variable and to study the statistical measures.
- To study the classification and analysis of few discrete random processes.
- To acquire the skills to analyze queueing models.

UNIT I PROBABILITY AND RANDOM VARIABLE**9 + 3**

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, Applications of mgf.

UNIT II PROBABILITY DISTRIBUTIONS**9 + 3**

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

UNIT III TWO-DIMENSIONAL RANDOM VARIABLES**9 + 3**

Joint distributions - Marginal and Conditional distributions - Covariance - Correlation and Linear regression - Central limit theorem (Statement and applications only for independent and identically distributed random variables).

UNIT IV RANDOM PROCESSES**9 + 3**

Classification - Stationary process - Poisson process - Markov process - Discrete parameter Markov chain - Chapman Kolmogorov Equations-Application problems for each process.

UNIT V QUEUEING THEORY**9 + 3**

Markovian queues - Little's formula - Models: (M/M/1): (∞ /FIFO), (M/M/s): (∞ /FIFO), (M/M/1): (k/FIFO), (M/M/s): (k/FIFO) - Non-Markovian Queues: Pollaczek-Khinchin formula - (M/G/1): (∞ /GD).

TOTAL HOURS: 45 + 15 = 60**COURSE OUTCOMES**

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

CO 1: Imbibe the knowledge of basic probability improves the quality of interpretation and decision making in real time problems of uncertainty.

CO2: Learn the concept of two dimensional random variables which helps to understand and analyse the statistical measures which describes an outcome of a random experiment.

CO 3: Understand and characterize the random variable phenomenon which evolve with respect to time in a probabilistic approach.

CO 4: Construct and solve queuing models that are suitable for practical problems encountered in daily life.

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TEXT BOOKS

1. Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 1st Indian Reprint, 2007. (2nd edition:eBook ISBN: 9780128010358)
2. Gross, D., Shortle, J.F., Thompson, J.M. and Harris, C.M., Fundamentals of Queuing Theory, 4th Edition, John Wiley and Sons, New York, 2016.

REFERENCES

1. HweiHsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill, New Delhi, 9th Reprint, 2010.
2. Veerarajan.T., "Probability, Statistics and Random Processes", Tata McGraw-Hill publishing company Limited, New Delhi, 2014.
3. Kandasamy.P, Thilagavathy, K., &Gunavathi.K., "Probability, Statistics and Queueing Theory", S.Chand& Company Ltd., New Delhi, 2014.
4. Gupta.S.C., &Kapoor,V.K., "Fundamentals of mathematical statistics", 10th edition(Reprint), Sultan Chand & Sons publishers, New Delhi, 2002.


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COURSE OBJECTIVES

- Summarize the architecture and assembly language programming of microprocessors
- Defend the architecture and assembly language programming of microcontrollers
- Demonstrate the concept of interrupts and interfacing with various peripherals.
- Integrate the features of a microcontroller and its timer applications.
- Justify the architectural features of 801XX with 8086 processor

UNIT I	8086 MICROPROCESSOR	9
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Intel 8086 microprocessor – Architecture - Minimum and Maximum mode Configuration – Signals (Pin Configuration) - Instruction Set-Addressing Modes-Assembly Language Programming-Assembler Directives- Interrupts And Interrupt Service Routines.

UNIT II	MEMORY AND I/O INTERFACING	9
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Memory interfacing and I/O interfacing with (8086) – parallel communication interface – serial communication interface – timer-keyboard/display controller – interrupt controller – DMA controller (8257).

UNIT III	8051 MICROCONTROLLERS	9
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Architecture of 8051 Microcontroller (Pin Configuration) – I/O ports – memory – counters and timers- serial data I/O – interrupts.

UNIT IV	INTERFACING WITH 8051	9
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Interfacing with keyboards, LEDs, 7 segment LEDs, LCDs, Interfacing with ADCs. Interfacing with DACs - Stepper Motor.

UNIT V	MICROPROCESSOR TECHNOLOGY	9
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Architecture of Intel 80286,80386,80486 –Features of Pentium I and II processors

Total Hours : 45

Text Books

- 1 Yn-cheng Liu, Glenn A. Gibson, "Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design", second edition, Prentice Hall of India , 2006
- 2 Kenneth J. Ayala, 'The 8051 microcontroller Architecture, Programming and applications' second edition , Penram international.
- 3 Mohamed Ali Mazidi, Janice Gillispie Mazidi, " The 8051 microcontroller and embedded systems using Assembly and C", second edition, Pearson education /Prentice hall of India , 2007.
- 4 The Intel Microprocessor Architecture, Programming and Interfacing, Barry B. Brey ,6th edition, Pearson education, 2002.



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Reference Books

1. Douglas V.Hall, "Microprocessors and Interfacing: Programming and Hardware", second edition, Tata Mc Graw Hill, 2006.
2. A.K.Ray & K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Tata Mc Graw Hill, 2006.
3. Peter Abel, "IBM PC Assembly language and programming", fifth edition, Pearson education / Prentice Hall of India Pvt. Ltd, 2007.

Course outcomes:

- Recognize the basic Microprocessor architecture and its concepts.
- Outline the concepts of peripheral interfacing mechanisms.
- Design various assembly language programming using microprocessors and microcontroller.
- Extend the real world interfacing with microcontroller.
- Extrapolate the architectural features of 801XX with 8086 processor.



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COURSE OBJECTIVES:

- Understand the fundamentals of modeling and design.
- Develop the OO system modeling in terms of a state and interaction modeling
- Understand the development stages of modeling and design
- Design and development of system specific design and application modeling
- Understand the design and development of implementation modeling

UNIT - 1 INTRODUCTION, MODELING CONCEPTS, CLASS MODELING STATE MODELING 9

What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modeling history. Modeling as Design Technique: Modeling; abstraction; The three models. Class Modeling: Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips.

Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips. State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips.

UNIT - 2 ADVANCED STATE MODELING, INTERACTION MODELING 9

Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models.

UNIT - 3 PROCESS OVERVIEW, SYSTEM CONCEPTION, DOMAIN ANALYSIS 9

Process Overview: Development stages; Development life cycle. System Conception: Devising a system concept; elaborating a concept; preparing a problem statement. Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis

UNIT - 4 APPLICATION ANALYSIS, SYSTEM DESIGN 9

Application Analysis: Application interaction model; Application class model; Application state model; adding operations. Overview of system design; Estimating performance; Making a reuse plan; Breaking a system in to sub-systems; Identifying concurrency; Allocation of sub-systems; Management of data storage; Handling global resources; Choosing a software control strategy; Handling boundary conditions; Setting the trade-off priorities; Common architectural styles; Architecture of the ATM system as the example.

UNIT - 5 CLASS DESIGN, IMPLEMENTATION MODELING & LEGACY SYSTEMS 9

Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example. Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; realizing associations; Testing. Legacy Systems: Reverse engineering; Building the class models; Building the interaction model; Building the state model; Reverse engineering tips; Wrapping; Maintenance.

TOTAL HOURS: 45


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COURSE OUTCOMES

At the end of the course the students are able to

- CO1:** Apply fundamental Object Oriented (OO) modeling and design in solving complex problems and Analyze problem scenario and identify classes/ Objects, their properties and associations.
- CO2:** Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, state chart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation
- CO3:** Propose the appropriate strategies to incorporate standard quality parameters in the design of a system.
- CO4:** Construct models to show the importance of system Modeling and Design in solving complex problems.

TEXT BOOKS:

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, 2nd Edition, Pearson Education, 2005.
2. Frank Buschmann, Regine Meunier, Hans Rohnert, Peter Sommerlad, Michael Stal: Pattern-Oriented Software Architecture, A System of Patterns, Volume 1, John Wiley and Sons, 2007.

REFERENCE BOOKS:

1. Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3rd Edition, Pearson Education, 2007.
2. Brahma Dathan, Sarnath Ramnath: Object-Oriented Analysis, Design, and Implementation, Universities Press, 2009.



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PREREQUISITES: NIL

OBJECTIVES:

- Acquire knowledge on Display Devices and OpenGL Programming.
- Design and develop Two Dimensional Graphics.
- Learn Three Dimensional Graphics and Visible Surface Detection Methods.
- Gain knowledge on Multimedia Data Structures and Databases.
- Use Compression Techniques and Multimedia Applications in Real World Problems.

UNIT I INTRODUCTION TO GRAPHICS

9

Overview of Display Devices-Introduction to OpenGL - Point Functions - Line Functions - Fill-Area Functions - **Character Functions** - Color Functions - Output Primitives - Line Drawing Algorithms - DDA, Bresenham's Algorithm - Circle Generating Algorithm - Mid-Point Circle Algorithm - Ellipse generating Algorithm - Mid-Point Ellipse Algorithm.

UNIT II TWO DIMENSIONAL GRAPHICS

9

Coordinate Systems - Two Dimensional Geometric Transformations -OpenGL Functions for Two Dimensional Geometric Transformation -**Two Dimensional Viewing - Two Dimensional Viewing Pipeline - Clipping Window**- OpenGL Functions for Two DimensionalViewing - Clipping Algorithms - Line Clipping Algorithms - Cohen Sutherland - **Nicholl-Lee-Nicholl** - Polygon Clipping Algorithm - Sutherland Hodgeman Algorithm - **Curve Clipping** - Text Clipping.

UNIT III THREE DIMENSIONAL GRAPHICS

9

Three Dimensional Geometric Transformations - **Affine Transformations** - OpenGL Functions for Three Dimensional Geometric Transformation- **ThreeDimensional Viewing - Three Dimensional Viewing Pipeline** - OpenGL Functions for Three DimensionalViewing - Visible Surface Detection Methods - Depth Buffer Method - A-Buffer Method - BSP Tree Method - **Ray Casting Method - Wire Frame Visibility Method** - Color Models -RGB Color Model - CMY and CMYK Color Models - HSV and HLS Color Models.

UNIT IV MULTIMEDIA BASICS

9

Components of Multimedia - Multimedia Software Tools - File Formats - Multimedia Data Structures - KD Trees - Insertion - Deletion - Search - Elements - Multimedia Databases - Design and Architecture - Text/Document Database - Precision and Recall - Retrieval Technique - Video Database - Video Segmentation - Video Standards - Audio Database - General Model - Capturing Audio Content - Indexing Audio Content.



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Media Compression - Lossless Compression - Compression Algorithms - Run Length - VLC - Lossless Image Compression - Introduction to Lossy Compression - **Multimedia Application Classes - Types - Virtual Reality Design - Components - Design Issues** - Multimedia Authoring Systems - **Hypermedia Application Design Consideration - User Interface Design - Augmented Reality.**

TOTAL HOURS: 45**COURSE OUTCOMES:**

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

CO1: Create Interactive Computer Graphics using OpenGL.

CO2: Develop Two Dimensional Transformations and Clipping Algorithms.

CO3: Design and Apply Three Dimensional Graphics and Visible Surface Detection Methods.

CO4: Explore different Multimedia Data Structures and Databases.


CO5: Apply Compression Techniques and Multimedia Applications in Real Time Problems.

TEXTBOOKS:

1. Donald D. Hearn, M. Pauline Baker and Warren Carithers, "Computer Graphics with OpenGL", Fourth Edition, Prentice Hall, 2010.
2. V.S.Subramanian, "Principles of Multimedia Database Systems", Harcourt India Pvt Ltd., 2001
3. Prabhat K Andleigh, Kiran Thakrar, "Multimedia Systems Design", First Edition, PHI, 2008.

REFERENCES:

1. Ze-Nian Li and Mark S Drew, "Fundamentals of Multimedia", Pearson Prentice Hall, 2004.
2. Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications and Applications", Pearson Education, 2009.


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PREREQUISITES: Computer Networks

OBJECTIVES:

- Understand the basic network architecture models and its importance.
- Provide fundamental knowledge on protocols in various layers.
- Learn network security technologies and telephony protocols.
- Develop various network environment protocols.

UNIT I INTRODUCTION

9

Network Communication Architecture and Protocols: OSI Network Architecture - Definition and Overview of TCP/IP Protocols -TCP/IP Architecture Model – Other Network Architecture Models: IBM SNA, Network Protocols: Definition and Overview.

UNIT II USER SUPPORT PROTOCOLS

9

Application Layer Protocols: BOOTP – DHCP - S-HTTP - IMAP & IMAP 4 - LDAP, MIME – NAT – NNTP – NTP – Rlogin – TELNET – TFTP - Presentation Layer Protocols: LPP - Session Layer Protocols: RPC.

UNIT III TRANSPORT AND NETWORK SUPPORT PROTOCOLS

9

Transport Layer Protocols: TCP, UDP, RDP, RUDP, Network Layer Protocols: BGP, EGP, IP, IPV6, ICMP & ICMP6, IRDP, Mobile IP, Multicasting Protocols: BGMP, DVMRP, IGMP, MARS, MBGP, MPLS Protocols: MPLS, Data Link Layer Protocols: ARP, InARP, IPCP & IPv6CP, RARP.

UNIT IV SECURITY AND TELEPHONY PROTOCOLS

9

AAA Protocols: Kerberos, RADIUS, SSH, Secured Routing Protocols: IPSec, IPSecAH, IPSec ESP, IPSec IKE, IPSec ISAKMP, TLS, Voice over IP and VOIP Protocols: VOIP, RTSP, SAP, SDP, SIP, Media/CODEC: RTP, RTCP.

UNIT V NETWORK ENVIRONMENT PROTOCOLS

9

Wide Area Network and WAN Protocols: ATM, ATM layer, AAL, SONET/SDH, BISDN, ISDN, PPP, BAP, BACP, Local Area Network and LAN Protocols: Ethernet Protocol, Virtual LAN Protocols - Wireless LAN Protocols, Metropolitan Area Network and MAN Protocol: IEEE 802.16, Storage Area Network and SAN Protocols: FC & FCP, FCIP, NDMP, SCSI.

TOTAL HOURS: 45



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COURSE OUTCOME:

At the end of the course the students are able to

- CO1:** Understand the basics of OSI and TCP/IP protocols.
- CO2:** Analyze the various layers of network protocols.
- CO3:** Acquire knowledge on network security and telephony protocols.
- CO4:** Apply different network environment protocols.

TEXT BOOK:

1. Javvin, "Network Protocols", Javvin Technologies Inc , Fourth edition, 2007.

REFERENCES:

1. Behrouz A. Forouzan, "Data communication and Networking", 5th Edition, Tata McGraw-Hill, 2013.
2. Andrew S. Tanenbaum, David J. Wetherall, "Computer Networks", 5th Edition, PHI Learning, 2014.
3. William Stallings, "Data and Computer Communication", 9th Edition, Pearson Education, 2014.
4. Larry L Peterson, Bruce S Davie, "Computer Networks", 5th Edition, Morgan Kaufmann Publisher, 2012.
5. Prakash C Gupta, "Data Communications and Computer Networks", 2nd Edition, PHI Learning, 2013.



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PREREQUISITE: Java Programming

OBJECTIVES:

- To learn advanced Java programming concepts like Servlets, Session management and JDBC in Servlets.
- To develop java Beans Application in Java
- To understand the concepts of EJB and implementation of EJB
- To understand the concept of RMI and ORB
- To understand the basic concepts of JSP and javamail API

UNIT I Servlets and Session Management

9

Servlet overview – the Java web server – your first servlet – servlet chaining – server side includes- Session management – security – HTML forms – using JDBC in servlets – applet to servlet communication.

UNIT II Java Beans Application Development

9

Java Beans: The software component assembly model- The java beans development kit- developing beans – notable beans – using infobus - Glasgow developments - Application Builder tool- JAR files-Introspection-Bound Properties-Persistence-customizers - java beans API.

UNIT III Enterprise Java Beans

9

EJB: EJB architecture- EJB requirements – design and implementation – EJB session beans- EJB entity beans- EJB Clients – deployment tips, tricks and traps for building distributed and other systems – implementation and future directions of EJB-Variable in perl- perl control structures and operators – functions and scope

UNIT IV RMI and Object Request Broker

9

RMI – Overview – Developing applications with RMI: Declaring & Implementing remote interfaces-stubs & skeletons, Registering remote objects, writing RMI clients –Pushing data from RMI Servlet – RMI over Inter-ORB Protocol

UNIT V Java Server Pages and Javamail API

9

JSP –Introduction JSP-Examining MVC and JSP -JSP scripting elements & directives-Working with variables scopes-Error Pages - using Java Beans in JSP Working with Java Mail-Understanding Protocols in Javamail-Components-Javamail API-Integrating into J2EE-Understanding Java Messaging Services-Transactions

Total Hours :45

Course Outcomes:

- CO1:** Understand the advanced concepts of Java programming such as Servlets, Session management and JDBC in servlets.
- CO2:** Design and develop java beans Application and implementation of EJB in Java
- CO3:** Develop and Implement the RMI and ORB protocol
- CO4:** Understand and deploy the application using JSP and javamail API.



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TEXT BOOKS:

1. H. Schildt, 2014, Java 2 Complete Reference, 9th Edition, Tata McGraw Hill, New Delhi.
2. J. McGovern, R. Adatia, Y. Fain, 2003, J2EE 1.4 Bible, Wiley-dreamtech India Pvt. Ltd, New Delhi

REFERENCE(S):

1. K. Moss, 1999, Java Servlets, Second edition, Tata McGraw Hill, New Delhi.
2. R. Callaway, 1999, Inside Servlets, Addison Wesley, Boston
3. Joseph O'Neil, 2010, Java Beans from the Ground Up, Tata McGraw Hill, New Delhi.
4. Tom Valesky, Enterprise Java Beans, Addison Wesley.
5. Cay S Horstmann & Gary Cornell, Core Java Vol II Advanced Features, Addison Wesley.


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OBJECTIVES

- To study the idea of intelligent agents and search methods.
- To study about representing knowledge.
- To study the reasoning and decision making in uncertain world.
- To construct plans and methods for generating knowledge.
- To study the concepts of hybrid expert systems.

UNIT I INTRODUCTION

9

Introduction to Intelligent System (IS): An intelligent agent – **key events and history of AI/IS** – Natural language processing – Typical Intelligent Agents - Problem Solving Approach to Typical AI problems. Searching for solutions: Uniformed search strategies – Informed search strategies.

UNIT II PROBLEM SOLVING METHODS AND KNOWLEDGE REASONING

10

Constraint Satisfaction Problems (CSP) - Optimal Decisions in Games - Alpha, Beta pruning – **First Order Predicate Logic – Resolution- Unification –Forward Chaining -Backward Chaining - Knowledge Engineering Process.**

UNIT III UNCERTAIN KNOWLEDGE AND REASONING

8

Uncertainty – Acting under uncertainty – Basic probability notation – Axioms of probability – Baye’s rule – Probabilistic reasoning – Making simple decisions.

UNIT IV PLANNING AND LEARNING

9

Planning: Planning problem – Partial order planning – Planning and acting in non-deterministic domains – Learning: Learning decision trees – Knowledge in learning – Neural networks – Reinforcement learning – Passive and active.

UNIT V DEVELOPING INTELLIGENT AGENT SYSTEM

9

Agents and Multi-Agent Systems - Architectural Design: Specifying the Agent Types - Architectural Design: Specifying the Interactions - Agents, Capabilities and Processes.

Total hours : 45**COURSE OUTCOMES:**

Upon successful completion of this course, the student will able to

CO1: Understand and Solve problems using search techniques: Uninformed and Informed.

CO2: Represent knowledge using propositional calculus and predicate calculus and understand forward and backward chaining, knowledge engineering process.

CO3: Solve uncertainty problems and acquire decision making capability based on reasoning.

CO 4: Analyze and design a neural network system with planning and learning strategies.

CO 5: Design intelligent agent system applications.


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TEXT BOOKS

1. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", Third Edition, Pearson Education, 2010 / PHI.
2. Lin Padgham and Michael Winikoff, "Developing Intelligent Agent Systems A practical guide", First Edition, John Wiley & sons Ltd, 2004.

REFERENCE BOOKS

1. Jerry Kaplan, "Artificial Intelligence – what everyone needs to know", first edition, oxford university press, 2016.
2. George F.Luger, 'Artificial Intelligence – Structures and Strategies for Complex Problem Solving', Sixth Edition, Pearson Education, 2009.
3. Elain Rich and Kevin Knight, 'Artificial Intelligence', Third Edition, Tata McGraw Hill, 2008.



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PREREQUISITE: Object Oriented Programming.

OBJECTIVE(S):

- To understand the fundamentals of .NET Programming
- To develop real time applications using C#

UNIT-I C# LANGUAGE FUNDAMENTALS

9

The Building Block of the .NET Platform (CLR,CTS, and CLS) – Overview of Assemblies - The Anatomy of a Simple C# Program - Defining Classes and Creating Objects - The System Console Class-Establishing Member Visibility - Default Values of Class Member Variables-Member Variable Initialization Syntax-Static Keyword - Method Parameter Modifiers - Iteration Constructs - Decision Constructs and the Relational / Equality Operators - Understanding Value Types and Reference Types-Boxing and Unboxing - Working with .NET Enumerations - Overriding Some Default Behaviors of System. Object - The System Data Types - String Data Type - .NET Array Types - Custom Namespaces.

UNIT-II OBJECT ORIENTED PROGRAMMING WITH C#

9

Understanding the C# Class Type - Reviewing the Pillars of OOP - The First Pillars: C#'s Encapsulation Services, The Second Pillar: C#'s Inheritance Support - Programming for Containment/Delegation - The Third Pillar: C#'s Polymorphic Support-C# Casting Rules - Understanding Object Lifetime - Basics of Object Lifetime - Role of Application Roots - Garbage Collection - Building Finalizable and Disposable Types. Exception Handling - Throwing a Generic Exception - Catching Exceptions.

UNIT-III INTERFACES, COLLECTIONS, DELEGATES, EVENTS AND LAMDA EXPRESSION

9

Defining Interfaces in C#-Implementing an Interface in C# - Contrasting Interfaces to Abstract Base Classes-Building Interface Hierarchies - Building Enumerable Types (IEnumerable and IEnumerator) Building Cloneable Objects (ICloneable) -Building Comparable Objects (IComparable) -The Interfaces of the System - Collections Namespace - Defining a Delegate in C# -Simplest Possible Delegate Example-Enabling Multicasting -C# Events - Lamdas Expression.

UNIT-IV DEVELOPING WINDOW APPLICATION FORMS

9

Windows Forms Types - Application Class- Functionality of the Control Class - Functionality of the Form Class- Building Windows Applications - Working with StatusStrips - Working with ToolStrips - Building an MDI Application - Basic Controls.

UNIT-V ADO.NET AND ASP.NET

9

ADO.NET Overview – Using Database Connections, Commands, The Data Reader, The DataSet Class, ASP.NET Introduction – Web Forms – ADO.NET and Data Binding-ASP.NET Features – User and Custom Controls – Master Pages- Site Navigation – Security.

TOTAL HOURS: 45

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COURSE OUTCOMES:

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

CO1: Understand anatomy of C# Programming.

CO2: Develop Console application using object oriented concepts, advanced features in C#.

CO3: Develop Window form application with Database connectivity.

CO4: Build Applications using ADO.NET AND ASP.NET.

TEXT BOOKS:

1. Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework" Apress, Sixth Edition, 2012 ISBN: 978-1-4302-4233-8
2. Christian Nagel et al. "Professional C# 2012 with .NET 4.5", Wiley India, 2012.

REFERENCE BOOKS:

1. Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2. E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2004.
3. O'Reilly "Programming C# 5.0", O'Reilly Media ISBN: 978-1-4493-2041-6 | ISBN 10:1-4493-2041-4, October 2012.
4. Michael Schmalz "C# Database Basics" O'Reilly Media ISBN:978-1-4493-0998-5, 2012



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COURSE OBJECTIVES:

- Develop the code in assembly language programming.
- Test the developed code using 8086 processors and 8051 controllers.
- Demonstrate the interface peripherals with microprocessor and microcontroller
- Integrate the peripherals for real world applications.
- Design the various ALU for analysis of microprocessor and microcontroller

LIST OF EXPERIMENTS**I. 8086 based Experiments**

1. 16 bit arithmetic operation using 8086.
2. Generate a Fibonacci series using 8086.
3. Searching Largest Number and Smallest Number in an array using 8086.
4. To generate factorial of number using 8086.
5. String manipulation using 8086.

II. 8051 based experiments

6. 8-bit arithmetic operations using 8051 microcontroller
7. Design of simple ALU using 8051 microcontroller.
8. Searching Largest Number and smallest number in an array using 8051.
9. Solve the logic equations using 8051 microcontroller.

III. Interfacing Experiments with 8086/8051

10. Traffic light controller
11. Stepper motor interfacing
12. 8279 keyboard/display controller
13. ADC and DAC interfacing

Course Outcomes

- Generate the code for arithmetic operations in assembly language
- Generalize the developed code using 8086 processors and 8051 controllers.
- Reorganize the Interfacing peripherals with microprocessor and microcontroller
- Interpolate the peripherals for real world applications.
- Propose the various ALU for analysis of microprocessor and microcontroller

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COURSE OBJECTIVES:

- Learn the basics of OO analysis and design skills
- Be exposed to the UML design diagrams
- Learn to map designing to coding modules
- Be familiar with the various testing techniques

List of Experiments

To develop a mini-project by following the 5 exercises listed below

1. To develop a problem statement.
2. Identify Use Cases and develop the Use Case model.
3. Identify the conceptual classes and develop a domain model with UML Class diagram.
4. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence diagrams.
5. Draw relevant state charts and activity diagrams.
6. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, Logical architecture diagram with UML package diagram notation.
7. Develop and test the Technical services layer.
8. Develop and test the Domain objects layer.
9. Develop and test the User interface layer.

Suggested List of Applications

1. Fundamental of UML diagrams and notations
2. A business perspective-of-sales system
3. E-bookshop
4. Online auction system
5. Student information system
6. Software personnel management system
7. Conference Management System

COURSE OUTCOMES

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

- CO 1:** Use the UML analysis and design diagrams
- CO 2:** Apply appropriate design patterns
- CO 3:** Design and implement applications using OO concepts
- CO 4:** Validating the code and design

TOTAL HOURS: 45

COURSE OBJECTIVES:

- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them enrich their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their career.
- To enhance the performance of the students in the recruitment processes, self Enhancement and launching startups.

Unit I

7

Listening Audios and answering MCQs - Watching video clips on famous speeches, motivational videos, documentaries and answering MCQs - Listening Comprehension and TED talks.

Unit II

10

Prepared talk – Extempore - story knitting - Picture Talk – Brainstorming – Debates - Group Discussions - Elevator Speech - Mock HR Interviews - Story Narration – Miming - Short Skits.

Unit III

12

Reading Comprehension - Verbal Analogy - Classification - Alphabet Test - Logical Sequence of Words - Statement & Conclusions - Statement & Courses of Action - Situation Reaction Test - Theme Detection - Deriving Conclusions from Passages.

Unit IV

7

Business Letters - Email Writing (hints development) - Essay Writing - Paragraph Writing - Paraphrasing.

Unit V

9

Vocabulary Test (GRE, TOEFL, TOEIC & CAT Exam words) - Confused Pair of words - Contronyms - One Word Substitution - Sequencing of Sentences – Sentence correction.

Total : 45 Hours

Course Outcomes:

On completion of the course, the students shall have the ability to:


- CO1: Comprehend the various strategies of listening and its significance.
 CO2: Articulate their views clearly and concisely with self-confidence and persuasiveness.
 CO3: Understand the prevailing practices of testing in the recruitment process by the corporate the institutional selection processes.
 CO4: Communicate the corporate and social requirements in an impressive written mode.
 CO5: Enhance their verbal skills in the screening tests competently both for recruitment and Pursuing higher studies as well.

Text Books:

1. Agarwal R. S., A Modern Approach to Verbal and Non-verbal Reasoning, Chand & Co., New Delhi, 2012.

References:

1. Lingua: Essays for TOEFL/IELTS, Dreamtech Press, New Delhi, 2016.
2. Lily Mangalam, Global English Comprehension, Allied Publishers Pvt. Ltd., New Delhi, 2014.
3. Sharon Weiner Green and Ira K. Wolf, Barron's GRE, Glagotia Publications Pvt. Ltd., 18th Edition, New Delhi, 2011.
4. Mohamed Elias, R. Gupta's IELTS/TOEFL Essays, Ramesh Publishing House, 6th Edition, New Delhi, 2016.



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PREREQUISITES: Computer Networks**OBJECTIVES**

- To learn the basics of Wireless voice and data communications technologies.
- To understand the working knowledge on various telephone and satellite networks.
- To study the working principles of wireless LAN and its standards.
- To explore knowledge on various Mobile Computing algorithms.
- To learn the skills in working with Wireless application Protocols to develop mobile content applications.

UNIT I	WIRELESS COMMUNICATION FUNDAMENTALS	11
Introduction - Wireless transmission – Applications – History – Simplified Reference model - Frequencies for radio transmission - Signals - Antennas - Signal Propagation - Multiplexing - Modulations - Spread spectrum - Cellular Systems - MAC - SDMA - FDMA - TDMA - CDMA – Comparison of S/T/F/CDMA.		
UNIT II	TELECOMMUNICATION NETWORKS	10
Telecommunication systems - GSM - GPRS – DECT - TETRA – UMTS – IMT 2000 – Satellite Systems- Broadcast Systems - DAB - DVB.		
UNIT III	WIRELESS LAN	9
Wireless LAN - Infra red vs Radio Transmission - Infrastructure and Ad-hoc Network - IEEE 802.11 standards - Architecture - Services - HIPERLAN - Blue Tooth.		
UNIT IV	MOBILE NETWORK LAYER & TRANSPORT LAYER	8
Mobile IP - Dynamic Host Configuration Protocol - Mobile Adhoc Networks - Routing - DSDV – DSR - AODV - Traditional TCP - Classical TCP improvements – VANET		
UNIT V	APPLICATION LAYERS	7
WAP – Architecture – WDP – WTLS – WTP – WSP – WAE – WML – WMLScript – WTA – Mobile Security		

TOTAL HOURS: 45



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COURSE OUTCOMES

At the end of the course the students are able to

- CO1:** Understand the working principles of wireless and mobile communication networks.
- CO2:** Apply data communicating methods and networking protocols for mobile and wireless network environments.
- CO3:** Know the various mobile technologies available for communication like Bluetooth, infrared, various network architectures like GSM, CDMA etc
- CO4:** Gain sound knowledge to develop wireless applications using script and markup languages.

TEXT BOOK

1. Jochen Schiller, "Mobile Communications", PHI / Pearson Education, Second Edition, 2012.

REFERENCES

1. Prasant Kumar Pattnaik, Rajib Mall, "Fundamentals of Mobile Computing", PHI Learning Pvt. Ltd, New Delhi, 2012.
2. William Stallings, "Wireless Communications and Networks", PHI / Pearson Education, 2010.
3. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", PHI / Pearson Education, 2011.
4. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, New York, 2003.
5. Hazyszt of Wesolowshi, "Mobile Communication Systems", John Wiley and Sons Ltd, 2010.



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COURSE OBJECTIVES

- Understand the phases of compiler.
- Learn the role of a parser and different ways of recognizing and parsing of tokens.
- Perceive the various storage allocation techniques.
- Acquaint how to generate and optimize the code.

UNIT I LEXICAL ANALYSIS

9

Compilers - Phases of a Compiler - Role of lexical analyzer - Lexical errors - Input Buffering - Specification of Tokens - Recognition of Tokens – A Language For Specifying Lexical Analysis.

UNIT II SYNTAX ANALYSIS

9

Role of the parser - Top Down parsing - Recursive Descent Parser - Predictive Parser - LL(1) Parser -Shift Reduce Parser - LR Parser – Operator Precedence - Construction of SLR Parsing table - LALR Parser – YACC.

UNIT III SYNTAX-DIRECTED TRANSLATION AND RUNTIME ENVIRONMENT

9

Syntax Directed Definitions – Construction of Syntax Trees – S-Attributed Definitions – L-Attributed Definitions - Source Language Issues- Storage Organization - Storage allocation – Access to Nonlocal Names – Parameter Passing.

UNIT IV INTERMEDIATE CODE GENERATION

9

Intermediate languages – Declarations – Assignment Statements – Boolean Expressions – Flow control statements – Back patching – Procedure Calls.

UNIT V CODE GENERATION AND OPTIMIZATION


9

Issues in design of a code generator – The target machine – Instruction costs – Basic Blocks and Flow Graphs - A simple code generator - DAG representation of Basic Blocks - Introduction to optimization – Peephole Optimization. Principal Sources of Optimization – Optimization of Basic Blocks – Global Data Flow analysis.

TOTAL HOURS: 45**COURSE OUTCOMES**

At the end of the course the students are able to

- CO1: Recognize tokens from language specification.
- CO2: Parse the generated tokens using top down and bottom up parsers.
- CO3: Design semantic rules into a parser that performs attribution while parsing.
- CO4: Represent the intermediate code for the source languages.
- CO5: Apply the various optimization techniques.



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TEXT BOOK

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D.Ullman, —Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education, 2014(reprint).

REFERENCES

1. Dhamdhare D M, "Compiler Construction Principles and Practice" second edition, Macmillan India Ltd., New Delhi, 2005.
2. Jean Paul Tremblay, Paul G Serenson, "The Theory and Practice of Compiler Writing", McGraw Hill, New Delhi, 2007.
3. Dick Grone, Henri E Bal, Cerial J H Jacobs and Keen Gangendoen, Modern Compiler Design", John Wiley, New Delhi, 2009.
4. Steven S. Muchnick, "Advanced Compiler Design Implementation", First Edition Elsevier Science India, Morgan Kaufmann Publishers, 2008



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PREREQUISITES: Object Oriented Programming, Java Programming,

OBJECTIVES

- To provide an overview of working principles of internet, web related functionalities.
- To understand and practice embedded dynamic scripting on client side Internet Programming.
- To understand and apply the fundamentals core java, packages, database connectivity for computing.
- To acquire the knowledge on server side programming.
- To learn to develop web services using AJAX.

UNIT I INTRODUCTION

9

Internet Standards – Introduction to WWW – WWW Architecture - Overview of HTTP, HTTP request – response – Generation of dynamic web pages. UI DESIGN: Markup Language (HTML): Introduction to HTML and HTML5 - Formatting and Fonts –Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms. Cascading Style Sheet (CSS): The need for CSS, Introduction to CSS – Basic syntax and structure -Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds – Manipulating text - Margins and Padding - Positioning using CSS

UNIT II JAVASCRIPT, JQUERY

9

Introduction to JavaScript - Syntax - Variables and data types - JavaScript Control Statements - Operators - Literals - Functions - Objects - Arrays - Built in objects - Event handling - **Fundamentals of JQuery - JQuery selectors - JQuery methods to access HTML attributes - Traversing - Manipulators - Events – Effects.**

UNIT III DOM,XML

9

Introduction to the Document Object Model - DOM History and Levels - Intrinsic Event Handling - Modifying Element Style - The Document Tree - Properties of window - DOM Collections - **Using Timer and Dynamic Styles to Create Animated Effects.XML** – Introduction-Form Navigation-XML Documents- XSL – XSLT.

UNIT-IV SERVER SIDE PROGRAMMING

9


Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- Multi- tire application Installing and Configuring Apache Tomcat Web Server **DATABASE CONNECTIVITY:** JDBC perspectives, JDBC program example - **JSP:** Understanding Java Server Pages-JSP Standard Tag Library(JSTL)-Creating HTML forms by embedding JSP code.

UNIT V INTRODUCTION AJAX and WEB SERVICES

9

AJAX:Client Server Architecture-XML Http Request Object-Call Back Methods. Introduction to Web Services: UDDI, SOAP, WSDL, Service Provider, Service Consumer, Web Service Architecture, **Case Study:** Developing and deploying web services.

TOTAL HOURS: 45


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COURSE OUTCOMES

At the end of the course the students are able to


- CO1: Acquire knowledge about functionalities of World Wide Web.
- CO2: Explore markup languages features and create interactive web pages using them.
- CO3: Learn and design Client side validation using scripting languages.
- CO4: Design web page and connect to the databases.
- CO5: Create, describe, publish and consume the Web Services.

TEXT BOOKS

1. Harvey M. Deitel and Paul J. Deitel, Internet & World Wide Web How to Program, Pearson Education, 2012.
2. Jeffrey C. Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education, 2007.

REFERENCE BOOKS

1. Robert. W. Sebesta, "Programming the World Wide Web", Pearson Education, Fourth Edition, 2007.
2. Kogent Learning Solutions Inc., "Html5 Black Book: Covers CSS3, JavaScript, XKL, XHTML, AJAX, PHP and jQuery", Dreamtech Press, 2011.
3. Joe Fawcett, Danny Ayers, Liam R. E. Quin, "Beginning XML", John Wiley & Sons Publisher, Fifth Edition, 2012
4. Achyut S Godbole and Atul Kahate, "Web Technologies", Second Edition, Tata McGraw Hill, 2012.
5. Bates, "Developing Web Applications", Wiley, 2006.


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PREREQUISITES: Nil

OBJECTIVES

- Learning compiler construction tools.
- Designing the different phases of a compiler.
- Employing storage allocation strategies.

LIST OF EXPERIMENTS

1. Symbol table creation from a list of declarations
2. Lexical analyzer to recognize patterns in C (ex. Identifiers, constants, comments, operators etc.)
3. Tokenizer using LEX tool.
4. Count the number of lines, words, blank spaces and characters in a file.
5. Computation of FIRST and FOLLOW.
6. Construction of LR Parsing Table.
7. Construct an operator precedence parse table.
8. Evaluation of arithmetic expression with LEX and YACC.
9. Syntax tree creation from —if statement.
10. Three address code generation for assignment statement with array references.
11. Three address code generation for Conditional Expression.
12. Translation of three address code to assembly language with fixed number of registers.
13. Storage allocation strategies.
14. Construction of DAG.
15. Code Optimization techniques (Constant Propagation, Constant Folding).

COURSE OUTCOMES


TOTAL HOURS: 45

At the end of the course the students are able to

- CO1: Construct a token recognizer using LEX and YACC.
CO2: Demonstrate parsing and construct a syntax tree for control statements.
CO3: Generate intermediate code for the intermediate language.
CO4: Implement storage allocation strategies and flow graph.
CO5: Translate the source to target code and optimize it.

SOFTWARE REQUIRED

Operating System: Windows & Linux
Tools : Lex, YAAC
Language : C


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OBJECTIVE(S):

The student should be made to:

- Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- Understand how to work with various mobile application development frameworks.
- Can able to draw basic graphical primitive on the mobile application.
- Learn the basic and important design concepts and issues of development of mobile applications.
- Understand how to work with GPS location tracking information.

LIST OF EXPERIMENTS:

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multithreading
8. Develop a native application that uses GPS location information.
9. Implement an application that creates an alert upon receiving a message.
10. Write a mobile application that creates alarm clock

TOTAL: 45**COURSE OUTCOMES:**

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

CO1: Design and Implement various mobile applications using emulators.

CO2: Deploy applications to hand-held devices

CO3: Develop an application using basic graphical primitives and databases.

CO4: Construct an application using multi threading and RSS feed and Make use of location identification using GPS in an application.

LIST OF EQUIPMENTS:

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


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PREREQUISITES: Nil

OBJECTIVES

- Be familiar with Web page design using HTML / DHTML and style sheets
- Understand the importance of the web as a medium of communication.
- Use JavaScript to access and use web services for dynamic content
- Implement and understand how to interpret basic web analytics.
- Learn to create dynamic web pages using server side scripting.

LIST OF EXPERIMENTS

1. Create a html program for web site with forms, frames, links, tables etc
2. Create a script that asks the user for a name, then greets the user with "Hello" and the user name on the page
3. Create a script that collects numbers from a page and then adds them up and prints them to a blank field on the page.
4. Create a script that prompts the user for a number and then counts from 1 to that number displaying only the odd numbers.
5. Create a script that will check the field in Assignment for data and alert the user if it is blank. This script should run from a button.
6. Create a CSS style sheet and use it to display the document.
7. Creating simple application to access data base using JDBC Formatting HTML with CSS.
8. Design a programs in Java to create three-tier applications using JSP and Databases
9. Create a web application that functions as a simple hand calculator, but also keeps a "paper trail" of all your previous work.
10. Design a program to implement web service for calculator application
11. Design a program to implement Ajax.
12. Implement RMI concept for building any remote method of your choice.

TOTAL HOURS: 45

COURSE OUTCOMES

At the end of the course the students are able to

CO1: Design Web pages using HTML/DHTML and style sheets

CO2: Create dynamic web pages using server side scripting.

CO3: Design and Implement database applications.

CO4: Develop the simple GUI interfaces to interact with users and real time applications.

SOFTWARE REQUIREMENTS

Operating System: Linux / Windows

Programming Language & IDE: HTML 5, JDK 1.7, Coffee Cup Editor, PHP, Notepad++.

Server: Apache Tomcat Server / XAMP / LAMP

Backend: MYSQL / SQLite


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PREREQUISITES: Design and Analysis of Algorithm, Computer Networks

OBJECTIVES

- Understand the need and fundamentals of parallel and distributed computing paradigms.
- Learn the organization and mapping of parallel processors.
- Build application using remote procedure call.
- Explore knowledge in distributed transaction processing.

UNIT I INTRODUCTION TO PARALLEL COMPUTING

9

Parallel Processing Terminology - Scope of Parallel Computing - The PRAM model of Parallel Computation - PRAM Algorithms - Parallel reduction - Prefix Sum - List Ranking - Preorder Tree Traversal - Merging Two Sorted List - Graph Coloring.

UNIT II PARALLEL PROCESSOR ORGANIZATION AND MAPPING

9

Processor Organization : Mesh Networks - Binary Tree Networks - Hypertree Networks - Pyramid Networks - Butterfly Networks - Hypercube Networks - Cube Connected Cycle Networks - Shuffle Exchange Networks - Mapping data to Processors : Ring into 2D Mesh - 2D Mesh into 2D Mesh - Complete Binary Tree into 2D Mesh - Binomial Tree into 2D Mesh - Computing Graph into Hypercube - Complete Binary Tree into Hypercube.

UNIT III DISTRIBUTED COMPUTING PARADIGM

9

Introduction to Distributed Computing System - Distributed Computing System Models - Distributed Operating System - Issues in Designing a Distributed Operating System - Introduction to Distributed Computing Environment (DCE) - Network Types - Communication Protocols - Internetworking

UNIT IV MESSAGE PASSING AND REMOTE PROCEDURE CALL

9

Desirable issues of a Good Message Passing - Issues in IPC by message passing - Multi Datagram Messages - Encoding and Decoding of Message Data - Group Communication - The RPC Model - Transparency of RPC - Implementing RPC mechanism - Stub Generation - RPC Messages - Communication Protocols for RPCs - Client-Server Binding.

UNIT V DISTRIBUTED TRANSACTION PROCESSING

9


Transactions - Nested Transactions - Locks - Optimistic Concurrency Control - Timestamp Ordering - Comparison - Flat and Nested Distributed Transactions - Atomic Commit protocols - Concurrency Control in Distributed Transactions.

TOTAL HOURS: 45

COURSE OUTCOMES

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

- CO1:** Apply parallel programming algorithms for real world problems.
CO2: Acquire knowledge on different processor organization and its mapping.
CO3: Develop applications by incorporating distributed computing architectures.
CO4: Design various communication protocols using remote procedure call.
CO5: Implement and deploy the application using distributed transaction processing.


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TEXT BOOK

1. Michael Quinn, "Parallel Computing - Theory and Practice", Second Edition, Tata McGraw Hill, 2012.
2. Distributed Operating System: Concepts and Design, Pradeep K. Sinha, PHI , 2012.

REFERENCES

1. Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar, "Introduction to Parallel Computing", Second Edition, Pearson Education, 2009.
2. George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems, Concepts and Design, Pearson Education, 3rd Edition 2011.
3. Haggit Attiya and Jennifer Welch, "Distributed Computing - Fundamentals, Simulations and Advanced Topics", Second Edition, Wiley, 2012.
4. Norman Matloff, "Parallel Computing for Data Science -With Examples in R, C++ and CUDA", Chapman and Hall/CRC, 2015.
5. Wan Fokkink, "Distributed Algorithms: An Intuitive Approach", MIT Press, 2013.
6. M.L. Liu, "Distributed Computing -Principles and Applications", First Edition, Pearson Education, 2011.



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PREREQUISITES: Nil

OBJECTIVES

- Understand the importance of ANN, Fuzzy and GA .
- Learn the various soft computing algorithms.
- Build application using soft computing algorithms
- Explore to hybrid techniques and its applications

UNIT - I INTRODUCTION

9

Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks- basic models - important technologies - applications. Fuzzy logic: Introduction - crisp sets- fuzzy sets - crisp relations and fuzzy relations: Cartesian product of relation - classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction - biological background - traditional optimization and search techniques - Genetic basic concepts.

UNIT - II NEURAL NETWORKS

9

McCulloch-Pitts neuron - linear separability - hebb network - supervised learning network: perceptron networks - adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative autoassociative memory network & iterative associative memory network – unsupervised learning networks: Kohonen self organizing feature maps, LVQ – CP networks, ART network

UNIT – III FUZZY LOGIC

9

Membership functions: features, fuzzification, methods of membership value assignments- Defuzzification: lambda cuts - methods - fuzzy arithmetic and fuzzy measures: fuzzy arithmetic - extension principle - fuzzy measures - measures of fuzziness -fuzzy integrals - fuzzy rule base and approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.

UNIT – IV GENETIC ALGORITHM

9

Genetic algorithm and search space - general genetic algorithm – operators - Generational cycle - stopping condition – constraints - classification - genetic programming – multilevel optimization – real life problem- advances in GA.

Neuro-fuzzy hybrid systems - genetic neuro hybrid systems - genetic fuzzy hybrid and fuzzy genetic hybrid systems - simplified fuzzy ARTMAP - Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

TOTAL HOURS: 45**COURSE OUTCOMES**

At the end of the course the students are able to

- CO1:** Acquire knowledge on Artificial Neural Networks, Fuzzy Logic and Genetic Algorithms.
- CO2:** Apply soft computing techniques to real-life situations.
- CO3:** Design of various soft computing based networks and controllers.
- CO4:** Apply genetic programming to real world problems.
- CO5:** Discuss and integrate various soft computing techniques.

TEXT BOOKS

1. J.S.R.Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education 2004.
2. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011.

REFERENCES

1. S.Rajasekaran and G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications", Prentice-Hall of India Pvt. Ltd., 2006.
2. George J. Klir, Ute St. Clair, Bo Yuan, "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997.
3. David E. Goldberg, "Genetic Algorithm in Search Optimization and Machine Learning" Pearson Education India, 2013.
4. James A. Freeman, David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.
5. Simon Haykin, "Neural Networks Comprehensive Foundation" Second Edition, Pearson Education, 2005.


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OBJECTIVES

- To understand the characteristics and significances of Pervasive Computing and the solutions those are in use.
- To realize the sensing technologies of pervasive environment.
- To design and implement pervasive applications in collaboration with different technologies.

UNIT I INTRODUCTION TO PERVASIVE COMPUTING 9

Pervasive Computing and its significances – Research trends in pervasive computing and networking. Mobile Agent Technology - Mobile Agent Security - Mobile Agent Platforms - Sensor Networks - Sensor Network Applications Elements of a Context-Aware Pervasive System – Sensing, Thinking, Acting.

UNIT II ELEMENTS OF PERVASIVE COMPUTING 9

Adhoc and Sensor Network – Properties of an Adhoc networks – Unique features of Sensor Network – Constraint Resources – Mobility - Mobile Sensor Cooperation: Mobility to Enhance Functionality, Mobility to Enhance Dependability, - Cooperation across Mobile Entities: Cooperative Path Planning, Data-Based Agreement for Coordination.

UNIT III AUTONOMIC AND PROTOCOLS 9

Pervasive Networks Architecture - Protocols – Auto configuration: Neighborhood discovery, Topology discovery, MAC Schedule Construction. Energy Efficient Communication: Multi-hop routing, Communication scheduling, Sleep Scheduling, Clustering.

UNIT IV PERVASIVE APPROACHES AND SOLUTIONS 9

Approaches and Solutions – Deployment and Configuration, Routing, Fault Tolerant and Reliability. Mobile and wireless security issues: Detectability, Resource depletion, physical intercept problem, Theft of service.


UNIT V PERVASIVE LEARNING TOOLS AND TECHNOLOGIES 9

Pervasive Learning Tools and Technologies - Emerging Technologies and Systems for Pervasive Learning - Integration of Real-World Practice and Experience with Pervasive Learning - Smart Devices, Systems and Intelligent Environments: Smart Home, Smart Car, Smart Laboratory.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

At the end of the course the students are able to

- CO1: Outline the basic significances and performance requirements of pervasive computing.
 CO2: Understand the basic pervasive computing elements and autonomic behavior of sensors.
 CO3: Examine and analyze various pervasive approaches and possible solutions.
 CO4: Design and develop diversified smart applications using pervasive computing techniques.



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TEXT BOOKS:

1. Mohammad S., Obaidat, Mieso Denko, Isaac Woungang, Pervasive Computing and Networking, John Wiley & Sons, First Edition, 2011.
2. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, Tata McGraw Hill, New Delhi, 2005.

REFERENCE:

1. Rahul Banerjee, "Lecture Notes in Pervasive Computing", Outline Notes, BITS - Pilani, 2012.
2. Genco, S. Sorce, "Pervasive Systems and Ubiquitous Computing", WIT Press, 2012
3. StefenPoslad, "Ubiquitous Computing: Smart Devices, Environments and Interactions", Wiley, Second Edition, 2010


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OBJECTIVES:

- To understand the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the widely used Machine learning algorithm
- To understand graphical models of machine learning algorithms

UNIT I**INTRODUCTION**

9

Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

UNIT II**LINEAR MODELS**

9

Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines

UNIT III**TREE AND PROBABILISTIC MODELS**

9

Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map

UNIT IV**DIMENSIONALITY REDUCTION AND EVOLUTIONARY MODELS**

9

Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process

Markov Chain Monte Carlo Methods – Sampling – Proposal Distribution – Markov Chain Monte Carlo – Graphical Models – Bayesian Networks – Markov Random Fields – Hidden Markov Models – Tracking Methods

TOTAL: 45 PERIODS

COURSE OUTCOMES

At the end of the course the students are able to


- CO1: Distinguish between, supervised, unsupervised and semi-supervised learning
- CO2: Apply the suitable machine learning strategy to real-world applications.
- CO3: Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
- CO4: Modify existing machine learning algorithms to improve classification efficiency
- CO5: Design systems that uses the appropriate graph models of machine learning

TEXT BOOK:

- 1.Stephen Marsland, —Machine Learning – An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
- 2.Tom M Mitchell, —Machine Learning, First Edition, McGraw Hill Education, 2013.

REFERENCE BOOKS:

- 1.Peter Flach, —Machine Learning: The Art and Science of Algorithms that Make Sense of Data, First Edition, Cambridge University Press, 2012.
- 2.Jason Bell, —Machine learning – Hands on for Developers and Technical Professionals, First Edition, Wiley, 2014
- 3.Ethem Alpaydin, —Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014


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PREREQUISITES: Web Programming

OBJECTIVE(S):

- To understand the Web Service architecture
- To understand the Web Service Building Blocks
- To understand the development of deployment of web services
- To understand the security issues of XML

UNIT I XML TECHNOLOGY FAMILY 9

XML – Benefits – Advantages of XML over HTML – EDI – Databases – XML based standards – Structuring with schemas – DTD – XML schemas – XML processing – DOM – SAX – Presentation technologies – XSL – XFORMS – XHTML – Transformation – XSLT – XLINK – XPATH – X query.

UNIT II ARCHITECTING WEB SERVICES 9

Business motivations for web services – B2B – B2C – Technical motivations – Limitations of CORBA and DCOM – Service oriented architecture (SOA) – Architecting web services – Implementation view – Web services technology stack – Logical view – Composition of web services – Deployment view – From application server to peer to peer – Process view – Life in the runtime.

UNIT III WEB SERVICES BUILDING BLOCKS 9

Transport protocols for web services – Messaging with web services – Protocols – SOAP – Describing web services – WSDL – Anatomy of WSDL – Manipulating WSDL – Web service policy – Discovering web services – UDDI – Anatomy of UDDI – Web service inspection – Ad hoc discovery – Securing web services.

UNIT IV IMPLEMENTING XML IN E-BUSINESS 9

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

UNIT V XML SECURITY 9

Security Overview - Canonicalization - XML Security Framework - XML Encryption - XML Digital Signature - XKMS Structure - Guidelines for Signing XML Documents - XML in Practice.

Total 45 Hrs

COURSE OUTCOMES:

At the end of the course students should be able to

- CO1: Assess and evaluate the role of XML.
 CO2: Understand architecting web services.
 CO3: Deploy and publish web services.
 CO4: Understand XML Security framework and XML Documents



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TEXT BOOKS

1. Ron Schmelzer&Travis Vandersypen, "XML and Web Services Unleashed", Pearson Education, 2002.
2. frank p.coyle, "xml, web services and the data revolution", pearson education, 2002

REFERENCES:

1. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services", Pearson Education, 2004.
2. <https://www.w3.org/standards/xml/security>


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Prerequisite: Computer Networks

OBJECTIVES

- Learn the fundamentals of Cryptography.
- Comprehend the Mathematical Foundations of Security Principles.
- Describe the principles of Public Key Cryptosystem, Hash Function, Key Management and Internet Security.
- Gain knowledge about Security in Network and Program.

UNIT - I SYMMETRIC KEY ENCRYPTION

9

Overview - Classical Encryption Techniques - Block Ciphers and Data Encryption Standard - Block Cipher Operations - Advanced Encryption Standard: AES Structure, AES Transformation Function.

UNIT - II NUMBER THEORY AND PUBLIC KEY ENCRYPTION

10

Basic Concepts in Number Theory: The Euclidean Algorithm, Modular Arithmetic, Prime Numbers, Fermat's and Euler's Theorem, Testing for Primality, The Chinese Remainder Theorem, Discrete Logarithms - Public Key Cryptography and RSA - Cryptographic Hash Functions: Applications, Secure Hash Algorithm (SHA) - Digital Signature Overview.

UNIT - III KEY MANAGEMENT AND INTERNET SECURITY

8

Key Management and Distribution - Authentication Applications: Kerberos - Electronic Mail Security: PGP, IP Security Overview.

UNIT - IV SECURITY IN NETWORKS

9

Threats in Networks - Firewalls: Design, Types, and Configuration - Intrusion Detection System: Types, Goals, Strengths and Limitations, Short.

UNIT - V PROGRAM SECURITY

9

Secure Programs - Nonmalicious Program Errors - Viruses and other Malicious Code - Targeted Malicious Code - Control against Program Threats.

TOTAL: 45

COURSE OUTCOMES

At the end of the course the students are able to,

- CO1:** Apply Cryptographic Algorithms for Secure Data Transmission.
- CO2:** Understand the Mathematical aspects behind Security.
- CO3:** Apply Key Management and Authentication Techniques to provide Secure Communication.
- CO4:** Understand the importance of Firewalls and Intrusion Detection System.
- CO5:** Discover and identify abnormalities within the Network caused by Worms, Viruses and Program threats.

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TEXT BOOKS

1. William Stallings, "Cryptography and Network Security, Sixth Edition, Prentice Hall, New Delhi, 2014.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Security in Computing" Fifth Edition, Prentice Hall, 2015.

REFERENCE BOOKS

1. Behrouz A Forouzan, "Cryptography and Network Security", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010.
2. Atul Kahate, "Cryptography and Network Security", Third Edition, McGraw Hill Education Pvt. Ltd., New Delhi, 2013.



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OBJECTIVE(S):

- To make familiar with the various concepts of data warehouse architecture, Online Analytical Processing (OLAP), Meta data, Data mart, and multidimensional data models.
- To sail along with the various approaches in data mining.
- To familiarize with data mining algorithms and its application in various fields.


Prerequisite: Database Management Systems

UNIT-I	DATA WAREHOUSE & OLAP TECHNOLOGY	9
Data Warehouse Overview - Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation - Data Warehousing to Data Mining.		
UNIT-II	DATA MINING	9
Introduction - Kinds of data - Data Mining Functionalities - Interestingness of Patterns - Classification of Data Mining Systems - Data Mining Task Primitives - Integration of a Data Mining System with a Data Warehouse - Issues - Data Preprocessing.		
UNIT-III	ASSOCIATION RULE MINING	9
Mining Frequent Patterns- Associations and Correlations - Frequent item set Mining Methods – Mining Various Kinds of Association Rules - Correlation Analysis - Constraint Based Association Mining.		
UNIT-IV	CLASSIFICATION	9
Basic Concepts - Classification and Prediction - Issues - Decision Tree Induction – Bayesian Classification - Rule Based Classification - Classification by Back propagation - Support Vector Machines – Associative Classification - Prediction.		
UNIT-V	CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING	9
Cluster Analysis - Types of Data - Categorization of Major Clustering Methods – k-Means - Partitioning Methods - Hierarchical Methods - Density-Based Methods - Grid Based Methods - Model-Based Clustering Methods - Clustering High Dimensional Data - Constraint – Based Cluster Analysis - Outlier Analysis - Data Mining Applications - Trends in Data Mining - Case study : DBMiner , WEKA Tool.		
		TOTAL: 45

COURSE OUTCOMES:

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

- CO1:** Have an extensive knowledge on concepts of data warehousing and differentiate OLTP and OLAP.
- CO2:** Discover and measure interesting patterns from different kinds of databases.
- CO3:** Apply the technique of association finding to solve real life problems.
- CO4:** Compare and contrast the various classifiers.
- CO5:** Able to explore recent trends in data mining and its applications.



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TEXT BOOKS:

1. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier, 2007.

REFERENCES BOOKS:

1. Alex Berson and Stephen J. Smith, "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction To Data Mining", Pearson Education, 2007.
3. K.P. Soman, Shyam Diwakar and V. Ajay, "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
4. G. K. Gupta, "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
5. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.


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OBJECTIVE(S):

- To learn the characteristics of mobile applications.
- To learn about the intricacies of UI required by mobile applications.
- To study about the design aspects of mobile application.
- To learn development of mobile applications.

Prerequisites: Java Programming

UNIT –I	GETTING STARTED WITH MOBILITY	9
Mobility landscape, Mobile platforms – Apple iPhone Platform- Google Android Platform – Eclipse Simulator, Mobile apps development, setting up the mobile app development environment along with an emulator - Case Study on Mobile App development.		
UNIT-II	BUILDING BLOCKS OF MOBILE APPS – I	9
App user interface designing – mobile UI resources (Layout, UI elements, Drawable Menu), Activity- states and life cycle, interaction amongst activities. App functionality beyond user interface - Threads, ASync task, Services – states and lifecycle, Notifications.		
UNIT-III	BUILDING BLOCKS OF MOBILE APPS – II	9
Broadcast receivers, Telephony and SMS APIs , Native data handling – on-device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access (via Internet/Intranet)		
UNIT-IV	SPRUCING UP MOBILE APPS	9
Graphics and animation – custom views, canvas, animation APIs, multimedia – Audio/video playback and record, location awareness, and native hardware access (sensors such as accelerometer and gyroscope)		
UNIT-V	TESTING MOBILE APPS AND TAKING APPS TO MARKET	9
Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps, JUnit for Android, Robotium, MonkeyTalk, Versioning, signing and packaging mobile apps, distributing apps on mobile market place.		

TOTAL: 45



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COURSE OUTCOMES:

At the end of the course students should be able to

CO1: Familiarize with Mobile apps development aspects.

CO2: Design and implement the user interfaces for mobile applications

CO3: Develop useful mobile applications using Google Android and Eclipse simulator.

CO4: Develop mobile applications using graphics and animation


CO5: Perform testing, signing, packaging and distribution of mobile apps

TEXT BOOK:

1. Anubhav Pradhan, Anil V Deshpande, "Mobile Apps Development", First Edition,
Wiley India, (2013)

REFERENCE BOOKS:

1. Barry Burd , "Android Application Development All in one for Dummies", First Edition , Wiley India ,(2011)
2. Lauren Darcey , Shane Conder, "Teach Yourself Android Application Development In 24 Hours", Second Edition, Wiley India , (2012)


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OBJECTIVES:

- To understand the concept of cloud and utility computing.
- To understand the various issues in cloud computing.
- To familiarize themselves with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To be able to set up a private cloud.

UNIT-I INTRODUCTION

8

Introduction - Historical Development - Cloud Computing Architecture – The Cloud Reference Model – Cloud Characteristics – Cloud Deployment Models: Public, Private, Community, Hybrid Clouds - Cloud Delivery Models: IaaS, PaaS, SaaS – Open Source Private Cloud Software: Eucalyptus, Open Nebula, Open Stack.

UNIT-II VIRTUALIZATION

9

Data Center Technology - Virtualization - Characteristics of Virtualized Environments - Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing – Pros and Cons of Virtualization - Implementation Levels of Virtualization - Tools and Mechanisms: Xen, VMWare, Microsoft Hyper-V.

UNIT-III CLOUD COMPUTING MECHANISM

9

Cloud Infrastructure Mechanism: Cloud Storage, Cloud Usage Monitor, Resource Replication – Specialized Cloud Mechanism: Load Balancer, SLA Monitor, Pay-per-use Monitor, Audit Monitor, Failover System, Hypervisor, Resource Cluster, Multi Device Broker, State Management Database – Cloud Management Mechanism: Remote Administration System, Resource Management System, SLA Management System, Billing Management System.

UNIT-IV HADOOP AND MAP REDUCE

10

Apache Hadoop – Hadoop Map Reduce – Hadoop Distributed File System- Hadoop I/O- Developing a Map Reduce Application - Map Reduce Types and Formats - Map Reduce Features– Hadoop Cluster Setup – Administering Hadoop.

UNIT-V SECURITY IN THE CLOUD

9

Basic Terms and Concepts – Threat Agents – Cloud Security Threats – Cloud Security Mechanism: Encryption, Hashing, Digital Signature, Public Key Infrastructure, Identity and Access Management, Single Sign-on, Cloud Based Security Groups, Hardened Virtual Server Images

TOTAL: 45**COURSE OUTCOMES:**

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

- CO1:** Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- CO2:** Choose the appropriate technologies, algorithms and approaches for the related issues in cloud.
- CO3:** Identify the architecture, infrastructure and delivery models of cloud computing.
- CO4:** Understand and apply Map and Reduce Programming.
- CO5:** Understand the core issues of cloud computing such as security, privacy and interoperability.


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TEXT BOOK:

1. Thomas Erl, Zaigham Mahood, Ricardo Uttini, "Cloud Computing, Concept, Technology and Architecture", Prentice Hall, 2013.

REFERENCE BOOKS:

1. Toby Velte, Anthony Velte, Robert C. Elsenpeter, - Cloud Computing, A Practical Approach Tata McGraw-Hill Edition, 2010.
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, - Mastering Cloud Computing, Tata McGraw-Hill, 2013.
3. Arshdeep Bahga, Vijay Madiseti, - Cloud Computing: A Hands- On Approach , Universities Press, 2014.
4. Tom White, - Hadoop: The Definitive Guide, O'Reilly Media, 4th Edition, 2015.
5. James E Smith and Ravi Nair, -Virtual Machines, Elsevier, 2005.
6. John Rittinghouse and James Ransome, Cloud Computing, Implementation, Management and Strategy, CRC Press, 2010.



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OBJECTIVE(S):

The student should be made to:

- Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.
- Understand how to work with various mobile application development frameworks.
- Can able to draw basic graphical primitive on the mobile application.
- Learn the basic and important design concepts and issues of development of mobile applications.
- Understand how to work with GPS location tracking information.

LIST OF EXPERIMENTS:

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of database.
6. Develop an application that makes use of RSS Feed.
7. Implement an application that implements Multithreading
8. Develop a native application that uses GPS location information.
9. Implement an application that creates an alert upon receiving a message.
10. Write a mobile application that creates alarm clock

TOTAL: 45 COURSE

OUTCOMES:

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


CO1: Design and Implement various mobile applications using emulators. **CO2:** Deploy applications to hand-held devices

CO3: Develop an application using basic graphical primitives and databases.

CO4: Construct an application using multi threading and RSS feed and Make use of location identification using GPS in an application.

LIST OF EQUIPMENTS:

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


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OBJECTIVE(S):

- Building and design of the foundational enterprise IT architecture
- To evolving technology, continued improvements in enterprise applications and establishing baseline metrics is important to the sustenance of key infrastructure elements of software enterprise applications
- A Unified meta-model of elements can lead to effective business analysis from an idea that originated in order to bring rigid engineering concepts to building enterprise IT systems, Enterprise Architecture (EA) is evolving into a business-driven
- To formally capture and implement the dynamic and static elements of an enterprise to manage enterprise change

UNIT I INTRODUCTION

8

Introduction to Enterprise Applications and their Types, Software Engineering Methodologies, Life Cycle of Raising an Enterprise Application, Introduction to Skills Required to Build an Enterprise Application, Key Determinants of Successful Enterprise Applications, and Measuring the Success of Enterprise Applications.

UNIT II INCEPTING ENTERPRISE APPLICATIONS

9

Inception of Enterprise Applications, Enterprise Analysis, Business Modeling, Requirements Elicitation, Use Case Modeling, Prototyping, Non Functional Requirements, Requirements Validation, Planning and Estimation.

UNIT III ARCHITECTING AND DESIGNING ENTERPRISE APPLICATIONS


10

Concept of Architecture, Views and Viewpoints, Enterprise Architecture, Logical Architecture, Technical Architecture - Design, Different Technical Layers, Best Practices, Data Architecture and Design – Relational, XML, and Other Structured Data Representations, Infrastructure Architecture and Design Elements - Networking, Internetworking, and Communication Protocols, IT Hardware and Software, Middleware, Policies for Infrastructure Management, Deployment Strategy, Documentation of Application Architecture and Design.

UNIT IV CONSTRUCTING ENTERPRISE APPLICATIONS

9

Construction Readiness of Enterprise Applications - Defining a Construction Plan, Defining a Package Structure, Setting up a Configuration Management Plan, Setting up a Development Environment, Introduction to the Concept of Software Construction Maps, Construction of Technical Solutions Layers, Methodologies of Code Review, Static Code Analysis, Build and Testing, Dynamic Code Analysis – Code Profiling and Code Coverage.


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UNIT V TESTING AND ROLLING OUT ENTERPRISE APPLICATIONS

9

Types and Methods of Testing an Enterprise Application, Testing Levels and Approaches, Testing Environments, Integration Testing, Performance Testing, Penetration Testing, Usability Testing, Globalization Testing and Interface Testing, User Acceptance Testing, Rolling out an Enterprise Application.

Total 45 Hrs

TEXT BOOK

1. Raising Enterprise Applications: A Software Engineering Perspective, Anubhav Pradhan Satheesha B. Nanjappa Senthil K. Nallasamy Veerakumar Esakimuthu, 1st Edition, Wiley India Pvt Ltd, 2010, ISBN:9788126519460.

REFERENCE BOOKS

1. Raffaele Garofalo, "Building Enterprise Applications with Windows Presentation Foundation and the Model View ViewModel Pattern", 1st Edition, Microsoft Press, 2011
2. Dominic Duggan, "Enterprise Software Architecture and Design Entities, Services, and Resources", 1st Edition, Wiley India Pvt Ltd, 2012
3. Martin Fowler, "Patterns of Enterprise Application Architecture", 1st Edition, Pearson/ Goels Computer Hut Publisher,



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OBJECTIVE(S):

- To Understand the BI concept and frame work
- To Understand Transaction Processing and Analytical applications and describe the need for Business Intelligence
- To identify the metrics, indicators and make recommendations to achieve the business goal

UNIT I INTRODUCTION TO BUSINESS INTELLIGENCE**9**

Introduction to digital data and its types – structured, semi-structured and unstructured, Introduction to OLTP and OLAP (MOLAP, ROLAP, HOLAP), BI Definitions & Concepts, BI Framework, Data Warehousing concepts and its role in BI, BI Infrastructure Components – BI Process, BI Technology, BI Roles & Responsibilities, Business Applications of BI, BI best practices

UNIT II BASICS OF DATA INTEGRATION (EXTRACTION TRANSFORMATION LOADING)**9**

Concepts of data integration, needs and advantages of using data integration, introduction to common data integration approaches, Meta data - types and sources, Introduction to data quality, data profiling concepts and applications, introduction to ETL using Pentaho data Integration (formerly Kettle).

UNIT III INTRODUCTION TO MULTI-DIMENSIONAL DATA MODELING**9**

Introduction to data and dimension modeling, multidimensional data model, ER Modeling vs. multi dimensional modeling, concepts of dimensions, facts, cubes, attribute, hierarchies, star and snowflake schema, introduction to business metrics and KPIs, creating cubes using Microsoft Excel

UNIT IV BASICS OF ENTERPRISE REPORTING**9**

A typical enterprise, Malcolm Baldrige - quality performance framework, balanced scorecard, enterprise dashboard, balanced scorecard vs. enterprise dashboard, enterprise reporting using MS Access / MS Excel, best practices in the design of enterprise dashboards.

UNIT IV BI AND MOBILITY**9**

Understanding BI and Mobiltiy, BI and Cloud Computing, Business Intelligence for ERP systems, Social CRM and BI, Case Study-Good Food Restaurants, TenTo Ten Retails stores.

Total 45 Hrs**TEXT BOOKS**

1. Business Intelligence by David Loshin
2. Business intelligence for the enterprise by Mike Biere.
3. Fundamentals of Business Analytics by R.N.Prasad And Seema Acharya Wiley India,2011.

REFERENCE BOOKS

1. Business intelligence roadmap by Larissa Terpeluk Moss, Shaku Atre
2. An introduction to Building the Data Warehouse – IBM
3. Business Intelligence For Dummies – Swain Scheps
4. Successful Business Intelligence: Secrets to making Killer BI Applications by Cindi Howson
5. Information dashboard design by Stephen Few

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OBJECTIVE(S):

- Understand logical and physical components of a storage infrastructure
- To study different types of storage area networks
- To gain knowledge in different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities
- To gain knowledge in information security and identify different storage virtualization technologies

Pre requisites: Computer Networks, Database Systems

UNIT I INTRODUCTION TO STORAGE TECHNOLOGY

9

Review data creation and the amount of data being created and understand the value of data to a business, challenges in data storage and data management, Solutions available for data storage, Core elements of a data center infrastructure, role of each element in supporting business activities.

UNIT II STORAGE SYSTEMS ARCHITECTURE

9

Hardware and software components of the host environment, Key protocols and concepts used by each component, Physical and logical components of a connectivity environment, Major physical components of a disk drive and their function, logical constructs of a physical disk, access characteristics, and performance Implications, RAID, RAID levels, Compare and contrast integrated and modular storage systems, High-level architecture and working of an intelligent storage system

UNIT III INTRODUCTION TO NETWORKED STORAGE

9

Evolution of networked storage, Architecture, components, and topologies of FC -SAN, NAS, and IP-SAN, FCoE, iSCSI Benefits of the different networked storage options, understand the need for long-term archiving solutions and describe how CAS full fill the need, understand the appropriateness of the different networked storage options for different application environments.

UNIT IV INFORMATION AVAILABILITY, MONITORING & MANAGING DATACENTER

9

Business Continuity- Information Availability, RTO and RPO, Identify single points of failure in a storage infrastructure and list solutions to mitigate these failures, Architecture of backup/recovery and the different backup/ recovery topologies, Data Deduplication, Local and Remote replication technologies. Monitoring the storage infrastructure, Information Life cycle Management.

UNIT V SECURING STORAGE AND STORAGE VIRTUALIZATION

9

Information security, Critical security attributes for information systems, Storage security domains, List and analyzes the common threats in each domain, Virtualization technologies, block-level and file-level virtualization technologies and processes.

TOTAL: 45**COURSE OUTCOMES:**

At the end of the course student should be able to

- CO1: Ability to identify the key requirements of data center.
- CO2: Analyze the different storage systems architecture.
- CO3: Analyze different storage networking technologies.



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CO4: Ability to identify key challenges in managing information and also describe the different role in providing disaster recovery and business continuity capabilities.

CO5: Ability to identify and analyzes the common threats in different domains.

REFERENCE BOOKS:

1. EMC Corporation, Information Storage and Management, Wiley, India, 2nd Edition, 2012.
2. Robert Spalding, "Storage Networks: The Complete Reference", Tata McGraw Hill, Osborne, 2003.
3. Marc Farley, "Building Storage Networks", Tata McGraw Hill ,Osborne, 2001.


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OBJECTIVE(S):

The student should be able to

- Know the basic Constructs of Agile Software Development
- Understand agile software development practices
- Demonstrate Agile development and testing techniques
- Know the benefits and pitfalls of working in an Agile team

UNIT-I FUNDAMENTALS OF AGILE

9

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools

UNIT-II AGILE SCRUM FRAMEWORK

9

Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management

UNIT-III AGILE TESTING

8

The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester

UNIT-IV AGILE SOFTWARE DESIGN AND DEVELOPMENT

10

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control

UNIT-V INDUSTRY TRENDS

9

Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies

Total 45 Hrs


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COURSE OUTCOMES:

At the end the student will be able to

CO1: Understand Agile development using Test Driven Development

CO2: Understand the Agile Scrum framework.

CO3: Perform testing activities within an Agile project

CO4: Apply design principles and refactoring to achieve Agility


CO5: Deploy automated build tools, version control and continuous integration

TEXT BOOKS:

1. Agile Software Development with Scrum By Ken Schawber, Mike Beedle Pearson Publisher, 1st Edition, 2001.
2. Agile Testing: A Practical Guide for Testers and Agile Teams By Lisa Crispin, Janet Gregory, Addison Wesley Publisher, 1st Edition, 2009.

REFERENCE BOOKS:

1. Agile Software Development, Principles, Patterns and Practices By Robert C. Martin, Prentice Hall Publisher, 1st Edition, 2006.
2. Agile Software Development: The Cooperative Game By Alistair Cockburn Addison Wesley Publisher, 2nd Edition, 2008.
3. User Stories Applied: For Agile Software By Mike Cohn Publisher: Addison Wesley, 1st Edition, 2004.


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PREREQUISITE: Software Engineering

OBJECTIVE(S):

- To develop an awareness of the need for project planning and management
- To learn about the stages in the software development lifecycle and associated activities.
- To know about the procedures needed to schedule , monitor and control the project.
- Discuss and where appropriate apply the principles of project risk management.
- Understand the key concepts relating to managing projects.

UNIT-I FUNDAMENTALS

9

Conventional software management - Evolution of software economics - Improving software economics - Conventional Vs Modern Software Project Management.

UNIT-II SOFTWARE MANAGEMENT PROCESS FRAMEWORK

9

Lifecycle phases - Artifacts of the process - Model based software architectures -Workflows of the process - Checkpoints of the process.

UNIT-III SOFTWARE MANAGEMENT

9

Iterative Process Planning - Organization and Responsibilities - Process automation - Process control and process instrumentation - Tailoring the process.

UNIT-IV SOFTWARE EFFORT ESTIMATION AND ACTIVITY PLANNING

9

Basics for Effort Estimation - Techniques - Expert judgment - Estimation by Analogy - Albrecht Function Point Analysis - COCOMO Cost Estimation Model – Activity planning –Objectives-Project schedules-Network planning models-Forward and Backward pass – Identifying the critical path.

UNIT-V SOFTWARE RISK AND RECENT TRENDS

9

Introduction - Categories - Risk Identification - Risk Assessment - Risk Planning Risk Management – Evaluating Risk – Agile Project Management – Scrum Case Study - Tools for Agile Project Management.

Total 45 Hrs

COURSE OUTCOMES:

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

- CO1: Understand about software Economics.
- CO2: Analyze various software process models.
- CO3: Acquire activity planning skills.
- CO4: Apply software estimation techniques.
- CO5: Acquire knowledge in Risk evaluation and agile methodologies.

TEXT BOOKS:


1. Bob Hughes, Mike Cotterell, "Software Project Management", Fifth Edition, Tata McGraw Hill, 2011.
2. Walker Royce, "Software Project Management A Unified Framework", Pearson Education, 2004.
3. Ken Schawber, MikerBeedle, "Agile Software Development with Scrum", Pearson Education, 2008.



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REFERENCE BOOKS:

1. RishabhAnand , "Software Project Management" S.K. Kataria& Sons- 2013 .
2. S.A. Kelkar, "Software Project Management: A Concise Study Paperback " , Phi 2013.
3. Ramesh Gopaldaswamy, - "Managing Global Software Projects", Tata McGraw Hill, 2001.
4. Humphrey Watts, "Managing the software process", Addison Wesley, 1989.
5. Ashfaque Ahmed "Software Project Management Process Driven Approach", Auerbach Publications, 2011.


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PREREQUISITES: Computer Networks

OBJECTIVE(S):

- Learn the architecture and design issues in Ad Hoc and Sensor Network.
- Familiarize different types of MAC protocols in Ad Hoc Networks.
- Know the fundamental of routing protocols in Ad Hoc Networks.
- Understand the basic concepts of WSN.
- Imparts knowledge of routing in WSN

UNIT I INTRODUCTION

9

Fundamentals of Wireless Communication Technology – Ad Hoc and Sensor Network Concepts and Architecture – Characteristics of Ad Hoc and Sensor Network – Design Issues and Challenges in Ad Hoc and Sensor Network – Applications of Ad Hoc and Sensor Network - Cognitive Radio – Underwater Wireless Sensor Network.

UNIT II MAC PROTOCOLS FOR AD HOC NETWORKS

9

Classifications – Contention based Protocols: MACAW – MACA by Invitation. Contention based Protocols with Reservation Mechanism: Distributed Packet Reservation Multiple Access Protocol – Collision Avoidance Multiple Access Protocol – Hop Reservation Multiple Access Protocol – Soft Reservation with Multiple Access Priority Assignment – Five Phase Reservation Protocol – Real Time Medium Access Protocol. Contention based MacProtocols with Scheduling Mechanism: Distributed Priority Scheduling and Medium access in Ad Hoc Networks – Distributed Wireless ordering Protocol.

UNIT III ROUTING PROTOCOLS IN AD HOC NETWORKS

9

Classifications - Table Driven Routing Protocols: DSDV – WRP – CHGS . On Demand Routing Protocols: DSR – AODV – TORA – LAR . Hybrid Routing Protocols: - Core Extraction Distributed Ad Hoc Routing Protocol – ZRP. Power Aware Routing Protocols: Power aware Routing Metrics – Minimal Energy Consumption Per Packet–Maximize Network Connectivity – Minimum Cost per Packet.

UNIT IV WIRELESS SENSOR NETWORKS

9

Data Dissemination – Data Gathering – MAC Protocols for Sensor Networks: Self Organizing – Hybrid TDMA/FDMA - CSMA based MAC protocol. Location Discovery: Indoor and Sensor Network Localization –Quality of a Sensor Network: Coverage and Exposure.

UNIT V ROUTING IN WIRELESS SENSOR NETWORKS

9

Directed Diffusion – Sequential Assignment Routing – Minimum Cost forwarding – Coherent and Non-Coherent Processing – Energy Aware Routing – Hierarchical Routing – Cluster based Routing Protocol – LEACH – TEEN –PEGASIS – MECN.

Total 45 Hrs


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COURSE OUTCOMES:

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

- CO1: Explain the concepts, architecture and applications of Ad Hoc and WSN.
- CO2: Analyze the MAC protocol design concepts in Ad Hoc networks.
- CO3: Design Ad Hoc routing protocols with respect to some protocol design issues.
- CO4: Identify different MAC protocols and evaluate the QOS related performance measurement of Sensor Networks.
- CO5: Recognize various routing protocols and its issues in WSN.

TEXT BOOKS:

- 1) C. Siva Ram Murthy and B.S. manoj, "Ad Hoc Wireless Networks – Architectures and Protocols", Pearson Education, 2012.
- 2) Carlos de Morais Cordeiro, Dharma Prakash Agrwal, Ad Hoc and Sensor Network: Theory and Applications, 2nd Edition, World Scientific Publishing Co, 2011.

REFERENCES:

- 1) Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.
- 2) C.K.Toth, "Ad Hoc Mobile Wireless Networks", Pearson Education, 2007.
- 3) Kazem Sohraby, Daniel Minoli, Taieb Znati, "Wireless Sensor Networks: Technology, Protocols and Applications", Wiley Interscience A John Wiley & sons, INC., Publication, 2007.
- 4) Amiya Nayak, Ivan Stojmenovic, "Wireless Sensor and Actuator Networks – Architecture and Protocols", Pearson Education, 2010.
- 5) Thomas Krag and Sebastin Buettrich, "Wireless Mesh Networking", O'Reilly Publishers, 2007



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PREREQUISITES: Software Engineering

OBJECTIVE(S):

- To know the basics of ERP
- To understand the key implementation issues of ERP
- To know the performance and business modules of ERP
- To foresee the scope and future trends in ERP.

UNIT-1 INTRODUCTION

9

ERP: An Overview, Enterprise – An Overview, Benefits of ERP, ERP and Related Technologies, Business Process Reengineering (BPR), Data Warehousing, Data Mining, OLAP, SCM, CRM.

UNIT-II ERP IMPLEMENTATION

10

Implementation Challenges – Strategies – ERP Implementation Lifecycle, Implementation Methodology, Vendors and Consultants, Contracts with Vendors, Consultants and Employees, Data migration, project management and monitoring.

UNIT-III ERP IN ACTION AND BUSINESS MODULES

9

Operation and maintenance-performance-maximizing ERP system, Business modules in an ERP Package- Finance, Manufacturing, Human Resources, Plant Maintenance, Materials Management, Quality Management, Sales and Distribution

UNIT-IV THE ERP MARKET

9

ERP Market Place, SAP AG, PeopleSoft, Baan, JD Edwards, Oracle, QAD,SSA Global – Lawson Software – Epicor – Intutive.

UNIT-V ERP – PRESENT AND FUTURE

8

EIA, ERP and E-Business, ERP and Internet, ERP-II, Total quality management, Future Directions, Trends in ERP, ERP case study.

Total 45 Hrs

COURSE OUTCOMES:

At the end of the course the students are able to

- CO1: Comprehend the benefits of ERP, Business Process Reengineering and its related terminologies.
- CO2: Understand various underlying factors governing the implementation of ERP system.
- CO3: Understand the various ERP packages business modules that help in decide the place of ERP System in market.
- CO4: Acquire knowledge about the Components of ERP market.
- CO5: Understand and accommodate to the changing trends of ERP




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TEXT BOOK:

1. Alexis Leon, "ERP Demystified", Second Edition, Tata McGraw Hill, New Delhi, 2008.

REFERENCE BOOKS:

1. Leon – "Enterprise resource planning", Tata McGraw Hill, 2010.
2. Mary Sumner, "Enterprise Resource Planning", Pearson Education, 2007.
3. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI, New Delhi, 2003
4. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology, USA, 2001.


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OBJECTIVE(S):

- Define basic concepts in modeling and simulation (M&S)
- Introduce students to the simulation and modeling techniques
- Provide students with opportunities to develop basic simulation and modeling skills with respect to carrying out research projects using any simulation method on the computer.

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 Hrs**COURSE OUTCOMES:**

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

- CO1:Classify various simulation models and give practical examples for each category
- CO2:Construct a model for a given set of data and motivate its validity
- CO3:Generate and test random number variates and apply them to develop simulation models
- CO4:Analyze output data produced by a model and test validity of the model
- CO5.Explain parallel and distributed simulation methods

TEXT BOOKS:

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

REFERENCES:

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


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OBJECTIVE(S):

- Understand the concept of semantic web and related applications
- Learn knowledge representation, modeling and aggregation using ontology.
- Realize human behavior in social web and related communities.
- Explore knowledge on visualization and application 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 KNOWLEDGE REPRESENTATION, MODELLING AND AGGREGATING

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 - Modeling 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 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 behavior 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



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COURSE OUTCOMES:

At the end of the course student should be able to

- CO1:** Develop semantic web related applications.
- CO2:** Represent knowledge using ontology.
- CO3:** Predict human behaviour in social web and related communities.
- CO4:** 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.



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PREREQUISITES: Object-Oriented Systems Analysis and Design

OBJECTIVES:

- To understand the global trends and development methodologies of various types of products and services
- To 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
- To understand requirement engineering and know how to collect, analyze and arrive at requirements for new product development and convert them in to design specification
- To understand system modeling for system, sub-system and their interfaces and arrive at the optimum system specification and characteristics
- To 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

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.

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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 Software Systems – Product Development Trade-offs – Intellectual Property Rights and Confidentiality – Security and Configuration Management.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1: Define, formulate and analyze a problem

CO2: Solve specific problems independently or as part of a team

CO3: Gain knowledge of the Innovation & Product Development process in the Business Context

CO4: Work independently as well as in teams and can manage a project from start to finish

TEXTBOOKS:

1. NASSCOM Student Handbook, "Foundation Skills in Integrated Product Development".
2. Karl T Ulrich and Stephen D Eppinger, "Product Design and Development", Tata McGraw Hill, Fifth Edition, 2011.
3. John W Newstorm and Keith Davis, "Organizational Behavior", Tata McGraw Hill, Eleventh Edition, 2005.

REFERENCES:

1. Hiriyappa B,- Corporate Strategy Managing the Business, Author House, 2013.
2. Peter F Drucker, People and Performance Butterworth – Heinemann [Elsevier], Oxford, 2004.
3. Vinod Kumar Garg and Venkita Krishnan N K, —Enterprise Resource Planning – Concepts, Second Edition, Prentice Hall, 2003.
4. Mark S Sanders and Ernest J McCormick, "Human Factors in Engineering and Design", McGraw Hill Education, Seventh Edition, 2013

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PREREQUISITES: Computer Networks

OBJECTIVES:

- To provide an overview of various network architectures, physical media, and QoS Services
- To understand the protocols for packet - switched networks.
- To gain the knowledge of Circuit-switched network and Services.
- To realize the performance of ATM and Frame Relay
- To develop a comprehensive understanding of multimedia networking and Optical networks

UNIT I Overview

9

History of Communication Networks - Networking Principles - Future Networks - Network Services and Layered Architectures: Applications - Traffic Characterization and Quality of Service - Network Services - High Performance Networks - Network Elements - Basic Network Mechanism - Layered Architecture - Open Data Network Model.

UNIT II Packet - Switched Networks

9

OSI and IP Models - Ethernet (IEEE 802.3) - Token Ring (IEEE 802.5) - FDDI - DQDB – Frame Relay - Internet and TCP/IP Networks: Internet Protocol - TCP and UDP - Internet Success and Limitation - Performance of TCP/IP Networks.

UNIT III Circuit - Switched Networks

9

Performance of Circuit - Switched Networks - SONET - Dense Wave Division Multiplexing (DWDM) - Fiber to the Home - Digital Subscriber Line (DSL) - Intelligent Networks – CATV – QoS - Integrated Services – Differentiated Services

UNIT IV Asynchronous Transfer Mode

9

Main Features of ATM - Addressing – Signaling and Routing - ATM Header Structure - ATM Adaptation Layer - Management and Control - BISDN - Internetworking with ATM- ATM Networks. – Frame Relay

UNIT V Optical and Multimedia Networks

9

Link Level Design - Channel Access - Network Design - Optical Networks - Optical Links - Optical LANs - Optical Paths and Networks. Switching - Switch Performance Measures - Time - and Space - Division Switching - Modular Switch Designs - Packet Switching - Distributed Buffer - Shared Buffer - Output Buffer - Input Buffer. – Global Multimedia Networks

TOTAL: 45 PERIODS

COURSE OUTCOMES

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

- CO1:** Explain high performance network basic needs.
CO2: Describe high performance network protocols for switched networks.
CO3: Illustrate the Circuit-switched network mechanisms and management.
CO4: Analyze performance of network related issues in ATM.
CO5: Describe advanced concepts in wireless & optical network.

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TEXT BOOK

1. Walrand.J, P.Varaiya, "High- Performance Communication Networks", Morgan Kaufmann Publishers, Second Edition, 2006.

REFERENCES

1. Anurag Kumar, D. Manjunath, Joy Kuri, "Communication Networking- An Analytical Approach", Morgan Kaufmann, 2011.
2. Andrew S. Tanenbaum, "Computer networks", PHI Private limited, New Delhi
3. William Stallings"ISDN and Broadband ISDN with Frame Relay and ATM,", Pearson, Fourth Edition,2005.
4. J.F. Kurose & K.W. Ross, "Computer Networking- A Top Down Approach", Pearson, Fifth Edition, 2012.
5. Nader F.Mir, "Computer and Communication Networks", Pearson Education, 2009.


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PREREQUISITES: Software Engineering

OBJECTIVES:

- To understand the basics of software quality
- To learn various metrics of software quality
- To introduce concepts behind designing of test cases
- To learn the procedure of debugging a given software

UNIT – I INTRODUCTION TO SOFTWARE QUALITY 9

Ethical Basis for Software Quality – Total Quality Management Principles – Software Processes and Methodologies – Quality Standards, Practices & Conventions – Improving Quality with Methodologies – Structured/Information Engineering – Measuring Customer Satisfaction – Software Quality Engineering – Defining Quality Requirements – Management Issues for Software Quality – Data Quality Control – Benchmarking and Certification.

UNIT – II SOFTWARE QUALITY METRICS AND RELIABILITY 9

Writing Software Requirements and Design Specifications – Software Metrics – Lines of Code, Cyclomatic Complexity, Function Points, Feature Points – Software Cost Estimation – Reliability Models – Reliability Growth Models – OO Metrics.

UNIT – III TEST CASE DESIGN 9

Testing as an Engineering Activity – Testing Fundamentals – Defects – Strategies and Methods for Black Box Test Case Design – Strategies and Methods for White-Box Test Case design – Test Adequacy Criteria – Evaluating Test Adequacy Criteria – Levels of Testing and different types of testing – OO Testing - Agile Testing.

UNIT – IV TEST MANAGEMENT 9

Testing and Debugging Goals and Policies – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – Reporting Test Results – The role of three groups in Test Planning and Policy Development – Process and the Engineering Disciplines – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT – V CONTROLLING AND MONITORING 9

Measurement and Milestones for Controlling and Monitoring – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans – Reporting review results.

TOTAL HOURS: 45


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COURSE OUTCOMES:

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


- CO1:** Analyze software documentations using inspections and walkthrough
- CO2:** Associate various software metrics to estimate the software cost
- CO3:** Apply various testing strategies to test and manage software
- CO4:** Understand the principles behind SCM and identify the issues.

TEXT BOOKS:

1. Stephen Kan, "Metrics and Models in Software Quality", Addison-Wesley, Second Edition, 2004.
2. Ilene Burnstein, "Practical Software Testing", Springer International Edition, Chennai, 2003.

REFERENCES:

1. Milind Limaye, "Software Quality Assurance", McGraw Hill, 2011.
2. M G Limaye, "Software Testing – Principles, Techniques and Tools", McGraw Hill, 2011.
3. Edward Kit, "Software Testing in the Real World – Improving the Process", Pearson Education, New Delhi, 1995.
4. Elfriede Dustin, "Effective Software Testing", Pearson Education, New Delhi, 2003.
5. RenuRajani and Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, New Delhi, 2003.


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PREREQUISITE: Data Warehousing and Data Mining

OBJECTIVES:

- To use the knowledge management tools.
- To apply knowledge management models in various business scenarios.
- To design and develop enterprise applications.

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 - Knowledge Discovery - The Evolution of Knowledge management - Key Challenges - Ethics.

UNIT II CULTURE OF LEARNING AND KNOWLEDGE SHARING 9

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

UNIT III KNOWLEDGE MANAGEMENT TOOLS 9

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 KNOWLEDGE MANAGEMENT-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), Role of Knowledge Management in Social Network Analysis.

UNIT V FUTURE TRENDS AND CASE STUDIES 9

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


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COURSE OUTCOMES:

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

- CO1:** Learn the Evolution of Knowledge management.
- CO2:** Apply knowledge management models and technologies to business situations.
- CO3:** Explore various knowledge management tools.
- CO4:** Exposed to various fields of applications.
- CO5:** Use a knowledge management system for an organization.

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.



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OBJECTIVES:

- To learn the concepts of Web design patterns and page design.
- To understand and learn the scripting languages with design of web applications.
- To learn the maintenance and evaluation of web design management

UNIT I SITE ORGANIZATION AND NAVIGATION

9

User Centered Design – Web Medium – Web Design Process – Basics of Web Design – Introduction to Software used for Web Design – DREAM WEAVER, FLASH – Evaluating Process – Site Types and Architectures – Navigation Theory – Basic Navigation Practices – Search Sitemaps.

UNIT II ELEMENTS OF PAGE DESIGN

9

Browser Compatible Design Issues - Pages and Layout – Templates – Text – Color – Images – Graphics and Multimedia – GUI Widgets and Forms – Web Design Patterns – Creation and Editing of site map – Bootstrap Design tool - CSS style – Forms – Tools like Insert, Rollover etc., in DREAM WEAVER.

UNIT III SCRIPTING LANGUAGES AND ANIMATION USING FLASH

9

Client side scripting :AngularJS Designing a Simple Web Application –Introduction to MACROMEDIA FLASH, Importing Other File Formats to Flash –Saving and Exporting Flash Files, Frame by Frame Animation–Motion Tweening –Shape Tweening.

UNIT IV PRE-PRODUCTION MANAGEMENT

9

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

UNIT V PRODUCTION, MAINTENANCE AND EVALUATION

9

Design and Construction –Testing, Launch and Handover –Maintenance –Review and Evaluation –Case Study: Using the Skills and Concepts Learn with the ADOBE IMAGE READY, DREAM EAVER, FLASH, and Scripts, Develop Portfolios in the Form of Web Pages which have to be uploaded in Free Public Domains.

TOTAL: 45 PERIODS**COURSE OUTCOMES:**

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

- CO1:** Identify the various issues of web design process and evaluation.
- CO2:** Determine templates for web pages and layout.
- CO3:** Develop simple web applications using scripting languages.
- CO4:** Determine the various issues of web project development.
- CO5:** Address the core issues of webpage maintenance and evaluation.



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TEXT BOOKS:

1. Ashley Friedlein, —Web Project Management , Morgan Kaufmann Publishers, 2001.
2. H.M. Deitel, P.J. Deitel, A.B. Goldberg, —Internet and World Wide Web—How to Program , Third Edition, Pearson Education, 2004.

REFERENCE BOOKS:

1. Themas A. Powell, —The Complete Reference—Web Design , Tata McGraw Hill, Third Edition, 2003.
2. Lynda Weinman and Garo Green, Dreamweaver 3 Hands —on Training, Pearson Education, 2004.
3. Joel Sklar, —Principles of Web Design , Thomson Learning, 2001.
4. Van Duyne, Landay and Hong, —The Design of Sites: Patterns for Creating Winning Websites , second Edition, Prentice Hall, 2006.
5. Lynch, Horton and Rosenfeld, —Web Style Guide: Basic Design Principles for Creating Websites , Second Edition, Yale University Press, 2002.
6. Deke McClelland, —Photoshop 7 Bible , Professional Edition, Wiley John and Son Inc., 2000.
7. Curtis Hillman, —Flash Web Design , First Edition, New Riders Publishing, 2000


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PREREQUISITES: Cryptography and Security in Computing

OBJECTIVE(S):

- To know the fundamentals of cyber forensics and the role of forensic specialist.
- To learn investigation strategies to uncover hidden information in digital systems.
- To understand ethics and legality of hacking.
- To get familiarized with different scanning and enumeration methodologies and tools.

UNIT -I Fundamentals of Cyber Forensics 9

Introduction to computer forensics - Use of computer forensics in law enforcement - Computer forensics services - Benefits of professional forensics methodology - Anatomy of Digital Investigation - Information Security Investigations - Corporate Cyber Forensics - Scientific method in forensic analysis - Investigating large scale Data breach cases - Analyzing Malicious software.

UNIT-II Cyber Forensics Investigation 9

Introduction – Investigation Tools – eDiscovery – Digital Evidence Collection – Evidence Preservation – E-Mail Investigation – E-Mail Tracking – IP Tracking – E-Mail Recovery – Search and Seizure Computers – Recovering deleted evidences – Password Cracking – Cracking with GPU Systems – Hashcat.

UNIT – III Data Acquisition, Validation and Report Writing 9

Data Acquisition – Finding Lost Files – Document Analysis – Validating Forensic Data – Addressing Data-Hiding Techniques – Performing Remote Acquisitions - Case Management and Report Writing – Building a Forensics Workstation

UNIT – IV Ethical Hacking 9

Introduction to Ethical Hacking - Footprinting and Reconnaissance - Scanning Networks - Enumeration - System Hacking - Malware Threats – Sniffing - Types and phases of Penetration– Penetration Testing Tools.

UNIT-V Ethical Hacking in Web 9

Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers – Hacking Web Applications – SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms.

TOTAL: 45 Hours

COURSE OUTCOMES:

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

- CO1:** Analyze the role of forensics in preventing various forms of fraud.
CO2: Examine digital evidences such as the data acquisition, identification analysis.
CO3: Analyze and validate forensic data.
CO4: Defend a computer against a variety of security attacks using scanning and penetration testing tools.
CO5: Protect personal data, Secure computer networks and know safe internet usage.


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TEXT BOOKS:

1. Michael Graves, "Digital Archaeology: The Art and Science of Digital Forensics", Addison-Wesley Professional, 2014.
2. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.

REFERENCE BOOKS:

1. John R. Vacca, Computer Forensics: Computer Crime Scene Investigation, 2nd Edition, Charles River Media, 2005.
2. Albert J. Marcella and Frederic Guillosoy, **Cyber Forensics: From Data to Digital Evidence**, Wiley, 2015.
3. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series: Computer Forensics), 2010.
4. Marjie T. Britz, "Computer Forensics and Cyber Crime", 2nd Edition, Pearson, 2017.
5. Michael T. Simpson, Kent Backman, James E. Corley, "Hands-On Ethical Hacking and Network Defense", Cengage Learning, 2012.
6. Patrick Engebretson, "The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy", Syngress Media, Second Revised Edition, 2013.
7. Jon Erickson, "Hacking: The Art of Exploitation", No Starch Press, Second Edition, 2008
8. Bill Nelson, Amelia Phillips and Christopher Steuart, —Guide to Computer Forensics and Investigations , Fourth Edition, Cengage, 2013.
9. Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts, Published by Dr. Ali Jahangiri, 2009.

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PREREQUISITES: Computer Networks

OBJECTIVE(S):

- To know the difference between traditional networks and software defined networks.
- To know the reduced complexity of network operation.
- To obtain skills about data centers and programming.
- To understand the faster time to revenue for new applications.

UNIT -I SDN: Introduction

9

Traditional Switch Architecture - Evolution of Switches and Control Planes - Centralized and Distributed Control and Data Plane - Data Center Innovation, Data Center Needs – The Genesis of SDN - How SDN Works: Fundamental Characteristics of SDN, SDN Operation, SDN Devices.

UNIT-II Openflow and SDN Controller

10

OpenFlow Overview: The OpenFlow switch, The OpenFlow Controller, The OpenFlow protocol, The Controller-switch secure channel, Open Flow 1.0 and OpenFlow Basics - SDN Controllers and concepts.

UNIT – III Data Centers

9

Multitenant and Virtualized Multitenant Data center – SDN Solutions for the Data Center Network – VLANs – EVPN – VxLAN – NVGRE – The Juniper SDN Framework – IETF SDN Framework – Open Daylight Controller/Framework.

UNIT-IV Programming SDN

10

Network Programmability: Management Interface – The Application-Network Divide – The Command-Line Interface – NETCONF and NETMOD – SNMP – XMPP – Google’s Protocol buffers – Thrift – JSON – I2RS. Modern Orchestration: OpenStack – CloudStack – Puppet.

UNIT-V Network Function Virtualization (NFV) and SDN Application

7

Concepts – Implementation – Applications of NFV – SDN Applications: WAN – Service Provider and Carrier Networks – Campus Networks – Hospitality Networks – Mobile Networks – Inline Network Function – Optical Networks.

TOTAL: 45 Hours

COURSE OUTCOMES:

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

- CO1:** Compare and contrast between traditional switch architecture and software defined networks.
- CO2:** Understand the functionality of Openflow protocol and SDN controllers.
- CO3:** Illustrate use of SDN in Data Centers and other environments.
- CO4:** Use software programs to perform varying and complex networking tasks.
- CO5:** Expand the knowledge learned and apply it to solve real world problems.


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TEXT BOOKS:

1. Paul Goransson, Chuck Black, and Timothy Culver: Software Defined Networks A Comprehensive Approach, Second Edition, Elsevier, 2014.
2. Thomas D. Nadeau & Ken Gray: SDN Software Defined Networks O'Reilly publishers, Second edition, 2017.

REFERENCE BOOKS:

1. FEI HU, "Network Innovation through OpenFlow and SDN: Principles and Design", CRC Press, Taylor & Francis Group, 2014.
2. Siamak Azodolmolky, —Software Defined Networking with Open Flow, Packet Publishing, 2013.
3. VivekTiwari, —SDN and Open Flow for Beginners , Amazon Digital Services, Inc., 2013.

ONLINE REFERENCES:

1. Open Networking Foundation (ONF) Documents, <https://www.opennetworking.org>.
2. OpenFlow standards, <http://www.openflow.org>.
3. Online Reading lists, including: <http://www.nec-labs.com/~lume/sdn-reading-list.html>.


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