



## B.TECH – COMPUTER SCIENCE & ENGINEERING Course Structure R-20

### Semester-V

S.No.	Class	Course Code	Name of the Subject	L	T	P	C
1	PC	C55PC1	Object Oriented Analysis and Design	3	0	0	3
2	PC	C55PC2	Python Programming	3	0	0	3
3	PC	C55PC3	Computer Networks	3	0	0	3
4	PC	C55PC4	Compiler Design	3	0	0	3
5	PE	C55PE5	A. Distributed Databases B. Distributed Computing C. Network Protocols D. Information Theory & Coding E. Software Process and Project Management F. Artificial Intelligence	3	0	0	3
6	OE	C55OE6	Open Elective I	3	0	0	3
7	PC	C55PC7	Object Oriented Analysis and Design Lab	0	0	2	1
8	PC	C55PC8	Python Programming Lab	0	0	2	1
9	PW	C55PW9	Project I	0	0	2	1
10	MC	MC005	MOOCs/Online Course	0	0	0	S
<b>TOTAL</b>							<b>21</b>

**Project I:** Student should develop back end database tables for any chosen database application. It can be extension of project work carried out in VI semester with back end connections. The table developed should be more than a six-table database. Students can form a minimum of two and maximum of 4 in a group. The allocated teachers should guide in framing the problem, teach the back end technologies like Oracle during the lab hours allotted to them. The departmental academic committee based on the rubrics framed will do the evaluation of the project.

**Mandatory Course:MOOCs/Online Course**

The student should register for any one of the MOOCs course offered by NPTEL, COURSERA, UDEMY, student should submit the completion certificate to clear this course.



## B.TECH – COMPUTER SCIENCE & ENGINEERING Course Structure R-20

### Semester-VI

S.No	Class	Course Code	Name of the Subject	L	T	P	C
1	HS	CHSM2	Fundamentals of Management	3	0	0	3
2	PC	C56PC1	Data Warehousing and Data Mining	3	0	0	3
3	PC	C56PC2	Web Technologies	3	0	0	3
4	PE	C56PE3	A. Advanced Databases B. Mobile Computing C. Wireless Networks D. Cryptography E. Software Requirements Estimation F. Machine Learning	3	0	0	3
5	PE	C56PE4	A. Introduction to Analytics B. Cloud Computing C. Mobile Ad hoc Networks D. Network Security E. Design Patterns F. Deep Learning	3	0	0	3
6	HS	CHSE3	Advance Communication Skills Lab	0	0	4	2
7	PC	C56PC5	Data Warehousing and Data Mining Lab	0	0	2	1
8	PC	C56PC6	Web Technologies Lab	0	0	2	1
9	PW	C56PW7	Project –II	0	0	4	2
10	MC	MC006	1. Personality Development/Skill Development 2. Technical Events 3. Internships	0	0	0	S
<b>TOTAL</b>							<b>21</b>

**Project –II:** This project is extension of project work carried out in V semester with backend connections. Front end should be developed with .NET or Python or Java framework. The departmental academic committee based on the rubrics framed will do the evaluation of the project.

**Mandatory Course :** The satisfactory report should be submitted either for 1 or 2 or 3 given below.  
**1. Personality Development/Skill Development:** Student should participate in personality development/communication skills programme, student should submit the completion certificate for clearing this course.  
**2. Technical Events:** The student should participate in any technical event organized by any College/Organization/Industry and submit the participation certificate for clearing this course.  
**3. Internships:** The Student should submit the completion certificate from the respective organization. Where he/she performs their internship.



## COMPUTER SCIENCE & ENGINEERING

**B.Tech.V Semester**

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

### OBJECT ORIENTED ANALYSIS AND DESIGN -C55PC1

#### Course Objective:

A student is able to take up the case studies and model in it. Different views with respect user requirements such as use case, logical, component and deployment and preparation of document of the project for the unified Library application.

#### Course Outcomes:

**Upon completion of Course the students will be able to:**

- |  |    |
|--|----|
| 1. List the importance and use of basic principles in object-oriented modeling.  | L4 |
| 2. Develop pictorial representation by making use of basic structural modeling concepts for any application development. | L4 |
| 3. Distinguish different system behavioral modeling techniques.  | L4 |
| 4. Categorize advanced behavioral modeling for visualizing flow control of objects and activities.                       | L4 |
| 5. Develop and design a document using UML for simple and complex scenarios of the unified Library System.               | L6 |

#### UNIT I

**Introduction to UML:** Importance of modeling, principles of modeling, object-oriented modeling, the conceptual model of the UML, Architecture, Software Development Life Cycle.

#### UNIT II

##### Basic Structural Modeling:

Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.

#### UNIT III

**Basic Behavioral Modeling-I:** Interactions, Interaction diagrams.

**Basic Behavioral Modeling – II:** Use cases, Use case Diagrams, Activity Diagrams.

#### UNIT IV

Advanced Behavioral Modeling: Events and signals, state machines, processes and Threads, time and space, state chart diagram Architectural Modeling: Component, Deployment, Component diagrams, and Deployment diagrams.

#### UNIT V

Patterns and Frameworks, Activity Diagrams. Case Study: The Unified library application.

#### Text Books:

1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education 2ndEdition.

**Reference Books:**

1. Meilir Page-Jones: Fundamentals of Object-Oriented Design in UML Pearson Education.
2. Pascal Rogues: Modeling Software Systems Using UML2, WILEY- Dreamtech India Pvt.Ltd.
3. Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: UML 2 Toolkit, WILEY- Dream tech India Pvt.Ltd.



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### PYTHON PROGRAMMING - C55PC2

#### Course Objective:

To understand and learn the concepts of basic python programming, as it is a current programming constructs used for real time applications.

#### Course Outcomes:

Upon completion of Course the students will be able to:

1. Apply different data types for solving problems. L3
2. Apply operators & develop Expressions & analyze the control flow structures. L4
3. Analyze the scope of variables in functions ,global and local variable usage. L4
4. Implement Packages and create modules by applying the concepts of importing, name spacing. L3
5. Implement OOP principles - classes, methods, inheritance, overriding, and data hiding in Python. L3

#### UNIT I

##### INTRODUCTION

Introduction to Python, History, Need of Python Programming, features Applications, python environment setup, Basic syntax, Variables, Data Types, Keywords, Input-Output, Indentation, script structure, Running Python Scripts.

##### UNIT II OPERATORS

Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations, Conditional statements if, if-else Looping Control Structures for, while Control Statements: Break, Continue, Pass.

##### UNIT III FUNCTIONS

Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables.

##### DATA STRUCTURES

Lists, Tuples, dictionaries, sets, Sequences, Comprehensions.

##### UNIT IV FILES

File input/output, Text processing file functions.

##### MODULES

Creating modules, import statement, from. Name spacing, Packages, using packages, implementing packages: numpy, pandas, Django framework, iterator tools, scipy, matplotlib lib.

##### UNIT V

##### Object Oriented Programming in Python

Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding.

##### Error and Exception Handling

Difference between an error and Exception, Handling Exception, try except block, Raising Exceptions, User Defined Exceptions.

**Text Books:**

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
2. Wesley J. Chun -Core Python Programming, Second Edition, Prentice Hall.

**Reference Books:**

1. Allen Downey, -Think Python, Second Edition, Green Tea Press.
2. Introduction to Computation & Programming Using Python, Spring 2013 Edition, By John V.Guttag.
3. Programming in Python 3: A Complete Introduction to the Python Language (Developer's Library), by Mark Summerfield, 2ndEdition.



## COMPUTER SCIENCE & ENGINEERING

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### COMPUTER NETWORKS (C55PC3)

#### Course Objective:

To provide students an in depth understanding of the components required to build different types of networks and choose therequired functionality at each layer for a given application

#### Course Outcomes:

##### Upon completion of the course the student will be able to:

1. Compare and contrast different network models and their significance in networking architecture. L4
2. Develop elementary protocols by applying the knowledge of principles of framing and error control to design robust and reliable data link layer protocols. L4
3. Make use of various routing algorithms and analyze them to design efficient and scalable network architectures. L4
4. Analyze and compare the Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) in terms of their features and evaluate congestion control algorithms. L4
5. Utilize the knowledge on how to address and resolve issues related to application layer protocols, ensuring seamless interaction and data exchange in online environment. L3

#### UNIT I

**Introduction:** OSI, TCP/IP, and other network models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

**Physical Layer:** Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrowband, broadband ISDN and ATM.

#### UNIT II

**Data link layer:** Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Slip, Data link layer in HDLC, Internet, ATM.

**Medium Access sub layer:** ALOHA, MAC addresses, Carrier sense multiple access. IEEE 80.X Standard Ethernet, wireless LANs. Bridges.

#### UNIT III

**Network Layer:** Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broadcast, Multicast, distance vector routing. Dynamic routing – Broadcast routing. Rotary for mobility, The Network layer on the internet and in the ATM Networks.

#### UNIT IV

**Transport Layer:** Transport Services, Connection management, TCP and UDP protocols; Congestion Control Algorithms – General Principles – of Congestion prevention policies ATM AAL Layer Protocol.

#### UNIT V

Application Layer – Domain name system, SNMP, Electronic Mail (SMTP, POP3, IMAP, MIME) the World WEB, HTTP.

**Text Books:**

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI.

**Reference Books:**

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.
3. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH





## COMPUTER SCIENCE & ENGINEERING

**B.Tech. V Semester**

**L/T/P C  
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### COMPILER DESIGN (C55PC4)

#### Course Objectives:

Learn the process of designing and developing a compiler for a target machine.

#### Course Outcomes:

**Upon completion of course the student will be able to:**

- |   |    |
|---|----|
| 1. Analyze and comprehend the lexical analyzer generator specifying rules and patterns for token recognition. | L4 |
| 2. Develop top-down and bottom-up parser for a programming language with a specific context-free grammar.     | L6 |
| 3. Assess the complexities involved in generation of various SDDs during intermediate code generation.        | L5 |
| 4. Frame and apply dynamic programming code generation techniques.  | L3 |
| 5. Evaluate the effectiveness of machine-independent optimization techniques in application scenarios.        | L5 |

#### UNIT I

Introduction, Language Processors, the structure of a compiler, programming language basics. Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Recognition of Tokens, The Lexical- Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

#### UNIT II

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Top-Down Parsing, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, /More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators.

#### UNIT III

Syntax – Directed Translation: Syntax – Directed Definitions, Evaluation Orders for SDD's, Applications of Syntax-Directed Translation, Syntax-Directed Translation Schemes, and Implementing L – Attributed SDD's. Intermediate-Code Generation: Variants of Syntax Trees, Three – Address Code, Types and Declarations, Type Checking, Control Flow, Back patching, Switch – Statements, Intermediate Code for Procedures.

#### UNIT IV

**Run-Time Environments:** Storage organization, Stack Allocation of Space, Access to Nonlocal Data on the Stack, Heap Management, Introduction to Garbage Collection, Introduction to Trace – BasedCollection.

**Code Generation:** Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Dynamic Programming Code-Generation.

#### UNIT V

Machine-Independent Optimizations: The Principle Sources of Optimization, Introduction to Data – Flow Analysis, Foundations of Data-Flow Analysis, Constant Propagation, Partial Redundancy Elimination, Loops in Flow Graphs.

**Text Books:**

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson.

**Reference Books:**

1. Compiler Construction-Principles and Practice, Kenneth C Loudon, Cengage Learning.
2. Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
3. The Theory and Practice of Compiler writing, J. P. Tremblay and P. G. Sorenson, TMHWriting compilers and interpreters, R. Mak, 3rd edition, Wiley student edition. Lex & yacc – John R. Levine, Tony Mason, Doug Brown, O'reilly.



**COMPUTER SCIENCE & ENGINEERING**

**B.Tech. V Semester**

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

**DISTRIBUTED DATABASES (C55PE5A)**

**Course Objective:**

Apply methods and techniques for distributed query processing and optimization and understand the broad concepts of distributed transaction process.

**Course Outcomes:**

**Upon completion of the Course, the student will be able to:**

- |   |    |
|---|----|
| 1. Distinguish and articulate potential challenges and problems from the insights gained to frame a Distributed Database Systems.   | L4 |
| 2. Utilize query decomposition techniques and demonstrate their ability to Effectively optimize distributed queries, improving query performance within distributed database systems. | L3 |
| 3. Analyze and evaluate distributed concurrency control mechanisms and algorithms, including time-stamped and optimistic approaches.  | L4 |
| 4. Apply the knowledge to describe the principles of fault tolerance in distributed systems and explain site failures and network partitioning.                                       |    |
| 5. Analyze the concepts of distributed object database management systems(OODBMS) and the key architectural issues involved.  | L4 |

**UNIT I**

**Introduction:** Distributed Data Processing, Distributed Database System, Promises of DDBSs, Problem areas.

**Distributed DBMS Architecture:**

Architectural Models for Distributed DBMS, DDMBS Architecture.

**Distributed Database Design:**

Alternative Design Strategies, Distribution Design issues, Fragmentation, Allocation.

**UNIT II**

**Query processing and decomposition:**

Query processing objectives, characterization of query processors, layers of query processing, query decomposition, localization of distributed data.

**Distributed query Optimization:**

Query optimization, centralized query optimization, distributed query optimization algorithms.

**UNIT III**

**Transaction Management:**

Definition, properties of transaction, types of transactions, distributed concurrency control: serializability, concurrency control mechanisms & algorithms, time - stamped & optimistic concurrency control Algorithms, deadlock Management.

**UNIT IV**

**Distributed DBMS Reliability:**

Reliability concepts and measures, fault-tolerance in distributed systems, failures in Distributed DBMS, local & distributed reliability protocols, site failures and network partitioning.

**Parallel Database Systems:**

Parallel database system architectures, parallel data placement, parallel query processing, load balancing, database clusters.

**UNIT V****Distributed Object Database Management Systems:**

Fundamental object concepts and models, object distributed design, architectural issues, object management, distributed object storage, object query Processing.

**Object Oriented Data Model:**

Inheritance, object identity, persistent programming languages, persistence of objects, comparison OODBMS and ORDBMS

**Text Books:**

1. M. Tamer Ozsu and Patuck Valduriez: Principles of Distributed Database Systems, Pearson Edition. Asia, 20.
2. Stefano Ceri and Giuseppe Pelagatti: Distributed Databases, McGraw Hill.

**Reference Book:**

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennife Widom:- Database Systems: The Complete Bookl, Second Edition, Pearson International Edition



## COMPUTER SCIENCE & ENGINEERING

**B.Tech. V Semester**

**L/T/P C**

**3/0/0 3**

### DISTRIBUTED COMPUTING (C55PE5B)

#### Course Objective:

Introduce the fundamental problems, concepts, and approaches in the design and analysis of distributed computing systems and applications.

#### Course Outcomes:

**Upon completion of the course, the student will be able to:**

- |   |    |
|---|----|
| 1. Analyze distributed system and computing paradigms.                      | L4 |
| 2. Apply the inter process communication concepts to develop socket APIs.   | L3 |
| 3. Develop client server paradigms and imply to build group communication.  | L5 |
| 4. Illustrate the phenomenon of distributed objects, internet applications. | L3 |
| 5. Categorization of the Grid generations.                                  | L5 |

#### UNIT I

##### Distributed Computing an Introduction:

The different forms of computing, The strengths and weaknesses of Distributed computing, Basics of Operating Systems, Network basics, Software Engineering Basics.

##### Distributed Computing Paradigms:

Paradigms and Abstractions, Paradigms for Distributed Applications. Trade-offs

#### UNIT II

##### Inter Process Communication:

Event Synchronization, Timeouts and Threading, Text based Protocols, Request-Response Protocols, Connection-Oriented versus Connection less IPC

##### The Socket API:

The Socket Metaphor on IPC, The datagram Socket API, The Stream-Mode Socket API, Sockets with Non blocking I/O Operations, Secure Socket API.

#### UNIT III

##### The Client-Server Paradigm:

Client-Server Paradigm Issues, Connection-Oriented and Connectionless Servers, Iterative Server and Concurrent Server, Stateful Servers.

##### Group Communication:

Unicasting versus Multicasting, An Archetypal Multicast API, Connectionless versus Connection-Oriented Multicast, Reliable Multicasting versus Unreliable Multicasting, The Java Basic Multicast API

#### UNIT IV

##### Distributed Objects:

Message Passing versus Distributed Objects, An Archetypal Distributed Object Architecture, Distributed Object Systems, Remote Procedure Calls, Remote Method Invocation.

##### Internet Applications:

Applets, Servlets, Web Services, The Simple Object Access Protocol(SOAP)

## **UNIT V**

### **The Grid: past, present, future:**

The Grid, Beginnings of the Grid, A community Grid model, Building blocks of the Grid, Grid applications and application middleware

### **The Grid: A new infrastructure for 21st century science:**

Technology trends, Infrastructure and tools, Grid architecture, Authentication, authorization, and policy.

### **The evolution of the Grid:**

The evolution of the Grid: the first generation, The evolution of the Grid: the second generation, The evolution of the Grid: the third generation

### **Text Books:**

1. Distributed Computing, Principles and Applications, M.L.Liu, Pearson Education, 2004
2. Grid Computing Making the Global Infrastructure a Reality, Fran Berman, Anthony J.G. Hey, Geoffrey C. Fox, Wiley Series

### **Reference Books:**

1. Grid Computing – Making the global infrastructure a reality, Fran Berman, Geoffrey C
2. Fox, Anthony J G Hey, Wiley India, 2010.
3. A Networking Approach to Grid Computing, D.Minoli, Wiley & sons, 2006.
- 4 Grid Computing: A Practical Guide to Technology and Applications, A.Abbas, Firewall Media, 2008.



## **COMPUTER SCIENCE & ENGINEERING**

**B.Tech.V Semester**

**L/T/P C**

**3/0/0 3**

### **NETWORK PROTOCOLS (C55PE5C)**

#### **Course Objective:**

Understand different network protocols, their architectures, various network security issues and WAN, LAN protocols.

#### **Course Outcomes:**

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

- |  |    |
|--|----|
| 1. Compare & contrast the different network architectures and protocols. | L4 |
| 2. Design different TCP / IP protocols.                                  | L5 |
| 3. Demonstrate various network security technologies and protocols.      | L3 |
| 4. Understand and organize wan protocols.                                | L5 |
| 5. Analyze various LAN protocols.  | L4 |

#### **UNIT I**

Tcp/Ip Protocols: BOOTP, DHCP, DNS, Finger, FTP, HTTP, S-HTTP, IMAP and IMAP4, MIME (S-MIME), NAT, NNTP, POP and POP3, rlogin, RMON, SLP, SMTP, SNMP, SNMPv1, SNMPv2, SNMPv3, SNTP, TELNET, URL,

#### **UNIT II**

Whois (and RWhois), XMPP, X Window/X Protocol, RPC, ITOT, RDP, RUDP, TCP, UDP, BGP (BGP4), EGP, ICMP and ICMPv6, IP, IPv6, IRDP, Mobile IP, NARP, NHRP, OSPF, RIP, RIPng, RSVP, BGMP, DVMRP, IGMP, MARS, MBGP, MOSPF, MSDP, ARP and InARP, IPCP and IPv6CP, RARP.

#### **UNIT III**

Network Security Technologies and Protocols Kerberos: Network Authentication Protocol – RADIUS: Remote Authentication Dial In User Service – SSH: Secure Shell Protocol – L2F: Layer 2 Forwarding Protocol – L2TP: Layer 2 Tunneling Protocol – PPTP: Point-to-Point Tunneling Protocol – DiffServ: Differentiated Service Architecture – GRE: Generic Routing

#### **UNIT IV**

WAN Protocols: ATM: Asynchronous Transfer Mode Reference Model and Protocols – SONET/SDH: Synchronous Optical Network and Synchronous Digital Hierarchy – EoS: Ethernet over SONET/SDH – BISDN: Broadband Integrated Services Digital Network (Broadband ISDN) – ISDN: Integrated Services Digital Network – PPP: Point-to-Point Protocols – FTP: File Transfer Protocol – PAP: Password Authentication Protocol – PoS: Packet over SONET/SDH – Frame Relay: WAN Protocol for Internetworking – LAPF: Link Access Procedure for Frame Mode Services – HDLC: High Level Data Link Control.

#### **UNIT V**

LAN Protocols: Ethernet: IEEE 80.3 Local Area Network protocols – Fast Ethernet: 10Mbps Ethernet (IEEE 80.3u)- Gigabit (100 Mbps) Ethernet: IEEE 80.3z (100Base-X) and 80.3ab (100Base-T)- 10-Gigabit Ethernet: IEEE 80.3ae and 80.3an – WLAN: Wireless LAN by IEEE 80.11 protocols – IEEE 80.11i: WLAN Security Standard – IEEE 80.1X: EAP over LAN(EAPOL) for LAN/WLAN Authentication and Key Management – WPAN: Wireless Personal Area Network Communication Protocols – IEEE 80.15.1 and the Bluetooth for WPAN Communications.

**Text Books:**

1. Jielin Dong, Network Protocols Handbook, 4th Edition, Javvin Press, 207.

**References Books:**

1. Bruce Hartpence, Packet Guide to Core Network Protocols, OReilly Media, Inc., 201.
2. Walter Y. Chen, Home Network Basis: Transmission Environments and Wired/Wireless Protocols, Prentice Hall, 20.
3. Ana Minaburo , Laurent Toutain, Local Networks and the Internet: From Protocols to Interconnection, John Wiley and Sons, 201.





## COMPUTER SCIENCE & ENGINEERING

B.Tech. V Semester

L/T/P C  
3/0/0 3

### INFORMATION THEORY AND CODING (C55PE5D)

#### Course Objective:

Explain entropy, mutual information and characteristics of various types of noisy communication channels, discuss various source coding schemes and channel coding techniques for error-free transmission of message over a noisy communication channel.

#### Course Outcomes:

##### Upon completion of the course, the student will:

1. Understand the concept to information and entropy. L2
2. Demonstrate the properties of codes and understand Shannon's theorem for coding. L3
3. Compute channel capacity and apply mechanism for sharing mutual information. L3
4. Compare the finite geometric codes. L4
5. Analysis of Convolutional Codes. L4

#### UNIT I

**Information And Sources:** The Definition of Information, The Zero-memory Information Source, Properties of Entropy, Extensions of a Zero-memory Source, The Markov Information Source

#### UNIT II

**Properties Of Codes:** Uniquely Decodable Codes, Instantaneous Codes, Construction of an Instantaneous code, Kraft Inequality—Statement

**Coding Information Sources:** The Average Length of a Code, Method of Encoding for Special Sources, Shannon's Theorem for Markov Sources, Coding without Extensions, Finding Binary Compact Codes—Huffman Code.

#### UNIT III

**Channels And Mutual Information:** Information Channels, Probability Relations in a Channel, A Priori and A Posteriori Entropies, A Generalization of Shannon's Theorem, Mutual Information, Properties of Mutual Information, Noiseless Channels and Deterministic Channels, Cascaded Channels, Reduced Channels and Sufficient Reductions, Additivity of Mutual Information, Mutual Information of Several Alphabets, Channel Capacity, Conditional Mutual Information

#### UNIT IV

**Finite Geometry Codes:** Euclidean geometry, Majority Logic Decodable Cyclic codes based on Euclidean geometry, Projective geometry and projective geometry codes, Modifications of Majority-Logic Decoding, Single-Burst-Error-Correcting codes, Interleaved codes, Phased-Burst-Error-Correcting-Codes.

#### UNIT V

**Application Of Convolutional Codes:** Applications of viterbi Decoding, Sequential Decoding, Majority-Logic-Decoding, Burst-Error-Correction, Convolutional Codes in ARQ Systems.

#### Text Books:

1. N. Abramson, Information and Coding, McGraw Hill, 1963.
2. Shu Lin and D.J. Costello Jr., Error Control Coding, Prentice Hall, 1983.

**Reference Books:**

1. Principles of Communication Systems-Herbert Taub, Donald L schilling, Goutham Saha, 3<sup>rd</sup> Edition, McGraw Hill, 2008.
2. Digital and analog communication systems-Sam Shanmugam, John Wiley, 2005.
3. Digital communication—Simon Haykin, John Wiley, 2005.
4. Communication Systems-B.P.Lathi, BS Publications 2006



## COMPUTER SCIENCE & ENGINEERING

**B.Tech.V Semester**

**L/T/P C**

**3/0/0 3**

### SOFTWARE PROCESS AND PROJECT MANAGEMENT (C55PE5E)

**Course Objective:**

The objective of the course is to focus of principles, techniques, methods & tools for model- based management of software projects. Assurance of product quality and process adherence (Quality assurance), as well as experience based creation & improvement of models.

**Course Outcomes:**

**Upon completion of the course, the student will be able to:**

- |   |    |
|---|----|
| 1. Compare The waterfall model , RAD model, Iterative model, Spiral model, Prototype model and COCOMO model.      | L4 |
| 2. Analyze principles of moderns of ware management and improving software economics.                             | L4 |
| 3. Demonstrate life cycle phases and model based software architectures.  | L4 |
| 4. Analyze work flows of the process and Line-of-Business organization.   | L4 |
| 5. Develop future software project management, project control, process instrumentation and various case studies. | L5 |

**UNIT I**

**Conventional Software Management**

The waterfall model, RAD model, Iterative model, Spiral model, Prototype model and COCOMO model, conventional software management performance.

**Evolution of Software Economics:**

Software economics, pragmatic software cost estimation.

**UNIT II**

**Improving Software Economics**

Reducing software product size, improving software process, improving team effectiveness. Improving automation, Achieving required quality, peer inspections. The old way and the new the principles of conventional software engineering. Principles of modern software management, transitioning to an iterative process.

**UNIT III**

**Life Cycle Phases**

Engineering and production stages, inception, elaboration, construction, transition phases. Artifacts of the process: the artifact sets. Management artifacts, engineering artifacts, programmatic artifacts. Model based software architectures: A Management perspective and technical perspective.

**UNIT IV**

**Work Flows of the Process**

Software process workflow, Inter trans workflows. Checkpoints of the process: Major Mile stones, Minor Milestones, periodic status assessments. Iterative process planning work breakdown structures, planning guidelines, cost and scheduled estimating, interaction, planning process, pragmatic planning. Evolution of Project Organization, Project Organizations and responsibilities, Line-of-Business organization.

## **UNIT V**

### **Project Control and Process Instrumentation:**

The seven core metrics, management indicators, and quality indicators. Life cycle expectations, pragmatic software Metrics, Metrics Automation. Tailoring the Process: Process discriminates, example.

### **Future Software Project Management**

Modern project profiles next generation software economics modern process transitions.

### **Case Study**

The Command Center Processing and Display System. Replacement (CCPDS-R).

### **Text Books:**

1. Software Project Management. Walker Royce, Pearson Education.

### **Reference Books:**

1. Applied Software Project Management, Andrew Stebian, & Jennifer Greene, O'Reilly 206.
2. Software Engineering Project Management. Richard H. Thayer & Edward Yourdon, Second edition, Wiley India, 204.
3. Software Project Management in Practice Pankaj Jalote Pearson education.
4. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, Tata MC Graw Hill.



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### ARTIFICIAL INTELLIGENCE (C55PE5F)

#### Course Objectives:

To provide students an in depth understanding of different types of AI agents, various AI search algorithms, fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation, reasoning.

#### Course Outcomes:

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

1. Gain Knowledge on AI Phenomenon, and make use of state space representations, apply heuristic techniques to solve problems. L3
2. Apply knowledge representation issues to build Predicate logic and Knowledge rules. L3
3. Utilize the effectiveness of statistical reasoning methods, including Bayesian networks and fuzzy logic in specific contexts. L3
4. Compare and contrast different slot-and-filler structures for representing Knowledge. L4
5. Implement hierarchical planning techniques to model and solve multi-level planning scenarios. L4

#### UNIT I

##### What is Artificial Intelligence?

The AI Problems, The Underlying Assumption, What is an AI Technique?

##### Problems, Problem Spaces. And Search

Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the Design of Search Programs, Additional problems

##### Heuristic Search Techniques

Generate-and-Ted, Hill Climbing, Rest-first Search, Problem Reduction, Constraint Satisfaction, Means-ends Analysis

#### UNIT II

##### Knowledge Representation Issues:

Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation, the Frame Problem

##### Using Predicate Logic

Representing Simple Facts in Logic, Representing Instance and ISA Relationships, Computable Functions and Predicates, Resolution, Natural Deduction

##### Representing Knowledge Using Rules

Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning, Matching, Control Knowledge IP

#### UNIT III

##### Symbolic Reasoning under Uncertainty:

Introduction to Non monotonic Reasoning, Logics for Non monotonic Reasoning, Implementation Issues, Augmenting a Problem-solver, Implementation: Depth-first Search, Implementation: Breadth-first Search

##### Statistical Reasoning

Probability and Bayesian Theorem, Certainty Factors and Rule-based Systems, Bayesian Networks, Dempster-Shafer Theory, Fuzzy Logic

## **UNIT IV**

**Weak Slot-and-Filler Structures:** Semantic Nets, Frames

**Strong Slot-and-Filler Structures:** Conceptual Dependency, Scripts, CYC 216

## **UNIT V**

### **Game Playing**

The Minimax Search Procedure, Adding Alpha-beta Cutoffs, Additional Refinements, Iterative Deepening, References on Specific Games

### **Planning:**

An Example Domain: The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques

### **Text Book:**

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.

### **Reference Books:**

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice Hall, 2010.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.



## COMPUTER SCIENCE & ENGINEERING

**B.Tech V Semester**

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

### EMBEDDED SYSTEMS DESIGN (C055OE6)

#### COURSE OBJECTIVES:

1. To provide an overview of Design Principles of Embedded System.
2. To provide clear understanding about the role of firmware, operating systems in correlation with Hardware systems.

#### COURSE OUTCOMES:

**Upon completion of the course, the student will be able to:**

- |  |    |
|--|----|
| 1. Understands the Embedded Systems Vs. General Computing Systems. | L4 |
| 2. Formulates typical Embedded System.                             | L6 |
| 3. Model the trends in Embedded Industry.                          | L3 |
| 4. Make use of the concepts of RTOS based Embedded System Design.  | L3 |
| 5. Analyze Task Communication in RTOS.                             | L4 |

#### UNIT – I:

**Introduction to Embedded Systems:** Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

#### UNIT – II:

**Typical Embedded System:** Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS). Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

#### UNIT – III:

**Trends in Embedded Industry:** Processor Trends in Embedded Systems, Embedded OS Trends, Development Language Trends, Open Standards, Frameworks & Alliances, Bottlenecks, Development Platform Trends, Cloud, Internet Of Things (IoT) & Embedded Systems. Communication Interface: Onboard and External Communication Interfaces.

#### UNIT –IV:

**RTOS Based Embedded System Design:** Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

#### UNIT –V:

**Task Communication:** Shared Memory, Message Passing, Remote Procedure, Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS

#### TEXT BOOKS

1. Introduction to Embedded Systems - Shibu K.V, Mc Graw Hill.

## **REFERENCE BOOKS**

1. Embedded Systems - Raj Kamal, Mc Graw Hill Education.
2. Embedded System Design - Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems - Lyla, Pearson, 2013
4. An Embedded Software Primer - David E. Simon, Pearson Education.





## COMPUTER SCIENCE & ENGINEERING

**B.Tech. V Semester**

**L/T/P C**

**0/0/2 1**

### OBJECT-ORIENTED ANALYSIS AND DESIGN LAB (C55PC7)

#### Course Objective:

Learn the basics of object oriented analysis and design skills. Be exposed to the UML design diagrams and to map design to code, be familiar with the various testing techniques.

#### Course Outcomes:

**Upon completion of Course the students will be able to:**

- |  |    |
|--|----|
| 1. Understand the functioning of the Rational Rose or Umbrello software. | L4 |
| 2. Design the UML diagrams for the E- Ticketing System.                  | L6 |
| 3. Develop the various UML diagrams for any real time applications.      | L6 |

#### List of Experiments:

Consider the following three case studies:

Online course reservation system E-ticketing Library Management System.

#### Week 1

Familiarizations with Rational Rose or Umbrella, for each case study develop a problem statement.

#### Week 2, 3 & 4:

For each case study:

- 1) Identify and analyze events
- 2) Identify Use cases
- 3) Develop an event table
- 4) Identify & analyze domain classes
- 5) Represent use cases and a domain class diagram using Rational Rose
- 6) Develop a CRUD matrix to represent relationships between use cases and problem domain classes

#### Week 5 & 6:

For each case study:

- 1) Develop Use case diagrams
- 2) Develop elaborate Use case descriptions & scenarios
- 3) Develop prototypes (without functionality)
- 4) Develop system sequence diagrams

#### Week 7, 8, 9 & 10:

For each case study:

- 1) Develop high-level sequence diagrams for each use case
- 2) Identify MVC classes/objects for each use case
- 3) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
- 4) Develop detailed design class model (use GRASP patterns for responsibility assignment)
- 5) Develop three-layer package diagrams for each case study

**Week 11 & 12:**

For each case study:

- 1) Develop Use case Packages
- 2) Develop component diagrams
- 3) Identify relationships between use cases and represent them
- 4) Refine domain class model by showing all the associations among classes

**Week 13 onwards:**

For each case study:

- 1) Develop sample diagrams for other UML diagrams – state chart diagrams, activity diagrams, and deployment diagrams.



## COMPUTER SCIENCE & ENGINEERING

**B.Tech. V Semester**

**L/T/P C  
0/0/2 1**

### PYTHON PROGRAMMING LAB (C55PC8)

#### Course Objective:

1. Write and execute the programs based on operators, functions, simple data structures, basic packages using python programming constructs.

#### Course Outcomes:

**After completion of course the student will be able to:**

1. Evaluate the outcomes of using different operators in specific scenarios. L5
2. Analyze the differences in usage, capabilities, and limitations between various predefined functions available. L4
3. Analyze and compare the suitability of different Python modules and data structures for solving specific types of computing problems. L4
4. Evaluate the effectiveness and efficiency of OOP in Python by assessing code readability, reusability, and maintainability compared to non-OOP approaches for solving programming problems. L5

#### List of programs

1. Write a python program to print -Hello Worldl.
2. Running instructions in Interactive interpreter and a Python Script.
3. Write a Python Programming to demonstrate the Indentation.
4. Write a Python program to calculate number of days between two dates.
5. Write a python program that takes 2 numbers as command line arguments and prints its product.
6. Write a Python program to test whether a given letter is a vowel or not.
7. Write a Python program to create a pattern.  
\*  
\*\*  
\*\*\*  
\*\*\*\*  
\*\*\*\*\*
8. Write a Python program to count the number 6 in a given list.
9. Write a python program to find the sum of the first n positive integers.
  10. Write a Python program to calculate the sum of the digits in an integer
  11. Write a Python program that prints all the numbers from 0 to 50 except multiples of 10
  12. Write a Python program to check if a number is positive, negative or zero.
  13. Write a Python program that will accept the base and height of a triangle and compute the area.
  14. Write a Python program to compute the greatest common divisor (GCD) of two positive integers.
  15. Write a Python program Make a Simple Calculator
  16. Write a Python program to count the number of even and odd numbers from a series of numbers.
  17. Write a Python function to calculate the factorial of a number (a non-negative integer). The function should accept the number as an argument.
  18. Write a Python function that accepts a string and calculate the number of upper case letters and lower case letters.
  19. Write a Python function that checks whether a passed string is palindrome or not.

20. Write a Python program to get the Fibonacci series between 0 to 50 using recursion
21. Write a Python program to calculate the value of 'a' to the power 'b' using recursion.
22. Write a Python program to get the factorial of a non-negative integer using recursion
23. Write a Python program to calculate the length of a string.
24. Write a Python program to count occurrences of a substring in a string.
25. Write a Python program to count and display the vowels of a given text.
26. Write a program to count the numbers of characters in the string and store them in a dictionary data structure
27. Write a program to use split and join methods in the string and trace a birthday with a dictionary data structure.
28. Write a program combine lists that combines these lists into a dictionary.
29. Write a Python program for binary search.
30. Write a Python program to sort a list of elements using the bubble sort algorithm
31. Write a Python program to sort a list of elements using the quick sort algorithm.
32. Write a Python program to count the frequency of words in a file.
33. Write a Python program to print last n lines of a file.
34. Write a Python program to combine each line from first file with the corresponding line in second file.
35. Write a Python program to assess if a file is closed or not.
36. Write a Python program to get the Python version you are using.
37. Write a Python program to display the current date and time.
38. Write a Python program to print the calendar of a given month and year.
39. Write a Python class which has two methods get\_String and print\_String. get\_String accepts a string from the user and print\_String prints the string in uppercase.
40. Write a Python class named Rectangle constructed by length and width and a method which will compute the area of a rectangle.
41. Solve the following linear equations using scipy library  $X+3y+5z=10$   $2x+5y+z=8$   $2x+3y+8z=3$
42. Find the determinant for a  $2 \times 2$  matrix using scipy library module.
43. Find the mean and variance for the following data using scipy [2,23,45,56,78,89,13,33,66,89]
44. Draw a bar chart with the following data using matplotlib lib Men\_mean=[20,35,30,35,27] Women\_mean=[25,32,34,20,25], Men\_std=[2,3,4,1,2] Women\_std=[3,5,2,3,3]
45. Using matplotlib lib and scipy libraries, apply the following operations on an image.
  - a) Display the image crop image
  - b) flip
  - c) rotate
  - d) Display the statistical information of the image
  - e) Turn upside down



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### COMPUTER SCIENCE & ENGINEERING

**B.Tech. VI Semester**

**L/T/P C**

**3/0/0 3**

#### DATA WAREHOUSING AND DATA MINING (C56PC1)

**Course Objectives:**

Learn data warehouse principles and data mining concepts .

**Course Outcomes:**

**Upon completion of Course the students will be able to:**

- |   |    |
|---|----|
| 1. Analyze fundamental concepts, key characteristics, architecture, logical data modeling, and various analysis techniques, encompassing OLAP concepts and server architectures.  | L4 |
| 2. Apply foundational knowledge in Data Mining, and use in Data preprocessing techniques and demonstrate understanding of Data Transformation and apply proficiency in exploring measures of similarity and Dissimilarity for analyzing data. | L3 |
| 3. Apply a comprehensive understanding to define problems, utilize APRIORI principles for generating frequent item sets, focusing in compact representations like maximal and closed frequent item sets.                                      | L3 |
| 4. Analyze problem definitions, employ general strategies for solving classification problems, and assess classifier performance and various classification techniques including their characteristics.                                       | L4 |
| 5. Analysis of clustering algorithms, addressing key issues and techniques and conducting a thorough analysis of strengths and weaknesses.  | L4 |

#### **UNIT I**

**Data warehouse:** Introduction to Data warehouse, Difference between operational database systems and data warehouses. Data warehouse Characteristics, Data warehouse Architecture and its Components, Extraction – Transformation – Loading, Logical (Multi – Dimensional), Data Modeling, Schema Design, Star and Snow – Flake Schema, Fact Constillation, Fact Table, OLAP Cube, OLAP Operations, OLAP Server Architecture – ROLAP, MOLAP and HOLAP.

#### **UNIT II**

**Introduction to Data Mining:** Introduction, What is Data Mining, Definition, KDD, Challenges, Data Mining Tasks, Data Preprocessing, Data Cleaning, Missing data, Dimensionality Reduction, Feature Subset Selection, Discretization and Binarization, Data Transformation; Measures of Similarity and Dissimilarity- Basics.

#### **UNIT III**

**Association Rules:** Problem Definition, Frequent Item Set Generation, The APRIORI Principle, Support and Confidence Measures, Association Rule Generation; APRIORI Algorithm, The Partition Algorithms, FP-Growth Algorithms, Compact Representation of Frequent Item Set- Maximal Frequent Item Set, Closed Frequent Item Set.

#### **UNIT IV**

**Classification:** Problem Definition, General Approaches to solving a classification problem, Evaluation of Classifiers, Classification techniques, Decision Trees-Decision tree Construction, Methods for Expressing attribute test conditions, Measures for Selecting the Best Split, Algorithm

for Decision tree Induction; Naïve – Bayes Classifier, Bayesian Belief Networks; K- Nearest neighbor classification-Algorithm and Characteristics.

#### **UNIT V**

Clustering: Problem Definition, Clustering Overview, Evaluation of Clustering Algorithms, Partitioning Clustering-K-Means Algorithm, K-Means Additional issues, PAM Algorithm; Hierarchical Clustering-Agglomerative Methods and divisive methods, Basic Agglomerative Hierarchical Clustering Algorithm, Specific techniques, Key Issues in Hierarchical Clustering, Strengths and Weakness; Outlier Detection.

#### **Text Books:**

1. Data Mining- Concepts and Techniques- Jiawei Han, Micheline Kamber, Morgan Kaufman Publishers, Elsevier, 2 Edition,206.
2. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Stein banch, Pearson Education.

#### **Reference Books:**

1. Data Mining Techniques, Arun K Pujari, 3rd Edition, Universities Press.
2. Data Warehousing Fundamentals, Paulraj Ponnaiah, Wiley Student Edition.
3. The Data Warehousing Life Cycle Toolkit – Ralph Kimbal. Wiley Student Edition.
4. Data Mining, Vikaram Pudi, P Radha Krishna, Oxford University Press.



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**COMPUTER SCIENCE & ENGINEERING**

**B.Tech.VI Semester**

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

**WEB TECHNOLOGIES (C56PC2)**

**Course Objective:**

To understand the concepts of PHP Language, processing of XML data with Java, server side programming with Java servlets and JSP.

**Course Outcomes:**

**Upon completion of the subject the student will be able to:**

- |  |    |
|--|----|
| 1. Develop a web application using PHP and MySQL to Recall and reproduce PHP syntax and Identify different data types in PHP and explain the purpose and use of control structures, role of functions in PHP to handle file permissions, error checking, and security considerations when working with file operations in PHP. | L3 |
| 2. Make use of XML and their concepts to store, navigate, transport, manipulate, and parse the content and Implement XML parsing using DOM and SAX parsers in Java.  | L3 |
| 3. Identify the components of the Servlet API. Recall the basic concepts of servlets, such as the servlet lifecycle and deployment and Apply knowledge of servlet parameters to read and process client data, initialization parameters in servlets. Analyze HTTP request and response handling in servlets.                   | L3 |
| 4. Develop JSP pages with appropriate declarations, directives, and expressions and implement database connectivity in JSP using JDBC.   | L3 |
| 5. Apply knowledge of JavaScript to create and use functions, create a simple AJAX application dynamically update web page content Implement event handlers for various user interactions on web pages.  | L3 |

**UNIT I**

**Introduction to PHP:** Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, Reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads, Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

**UNIT II**

**XML:** Introduction to XML, Defining XML tags, their attributes and values, Document Type Definition, XML Schemas, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

**UNIT III**

**Introduction to Servlets:** Common Gateway Interface (CGI), Lifecycle of a Servlet, deploying a servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request & Responses, Using Cookies and Sessions, connecting to a database using JDBC.

**UNIT IV**

**Introduction to JSP:** The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP.

**UNIT V**

**Client-side Scripting:** Introduction to Javascript: Javascript language – declaring variables, the scope of variables, functions, event handlers (click, onsubmit etc.), Document Object Model, Form validation. Simple AJAX application.

**Text Books:**

1. Web Technologies, Uttam K Roy, Oxford University Press.
2. The Complete Reference PHP – Steven Holzner, TataMcGraw-Hill.

**Reference Books:**

1. Web Programming, building internet applications, Chris Bates 2nd edition, WileyDreamtech.
2. Java Server Pages –Hans Bergsten, SPD O'Reilly Java Script, D. Flanagan,O'Reilly,SPD.
3. Beginning Web Programming-Jon Duckett WROX.
4. Programming World Wide Web, R. W. Sebesta, Fourth Edition, Pearson.
5. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.





## COMPUTER SCIENCE & ENGINEERING

**B.Tech. VI Semester**

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

### ADVANCED DATABASES (C56PE3A)

**Course Objective:**

Learn the foundation in advanced database concepts from an industry perspective.

**Course Outcomes:**

**Upon completion of the course, the student will:**

- |  |    |
|--|----|
| 1. Analyze the impact and performance of database.   | L4 |
| 2. Compare and contrast Object –oriented databases with Object –Relational data bases to implement storage strategies for XML data and understand its applications in a database system. | L4 |
| 3. Analyze the usability and effectiveness of directory-based information retrieval systems.   | L4 |
| 4. Analyze the impact of standardization on collaboration, code maintance, and over all software quality.  | L4 |
| 5. Make use of statistical methods for detecting and preventing security breaches.   | L3 |

**UNIT I**

Database system Architecture: computer-system architecture, and describes the influence of the underlying computer system on the database system.

Parallel databases: explores a variety of parallelization techniques, including I/O parallelism, inter query and intra query parallelism, and interoperation and intra operation parallelism. Query optimization, Design of parallel Systems, Parallelism on Multi Core Processors.

**UNIT II**

Object Based Databases: Complex data types, Structured types and Inheritance in SQL, Table Inheritance, Array and Multi set types in SQL, Object-Identity and Reference types in SQL, Implementing O-R features, Persistent Programming Languages, Object-Oriented versus Object-Relational.

XML Databases: Structure of XML data, XML document schema, Querying and Transformation, API to XML, Storage of XML data, XML applications.

**UNIT III**

Information Retrieval: Relevance ranking using Terms, Relevance using Hyperlinks, Synonyms, Homonyms and Ontologies, Indexing of Documents, Measuring Retrieval Effectiveness, Crawling and Indexing the web, Beyond ranking of pages, Directories and Categories.

**UNIT IV**

Advance application Development: Performance Tuning, Performance Benchmarks, Other Issues in Application Development, Standardization.

Spatial and Temporal data Mobility: Motivation, Time in Databases, Spatial and Geographical Data Geographic Data, Multimedia Databases, Mobility and Personal databases.

Advance Transaction Processing: Transaction-Processing Monitors, Transactional Workflows, E-commerce, Main-memory databases, Real-Time Transaction Systems, Long-Duration Transactions.

**UNIT V**

Introduction to database security issues, Discretionary access control based on granting and revoking privileges; Mandatory access control and role based access control for multilevel security. SQL Injection, Introduction to statistical Database Security, Introduction to flow control, Encryption and Public Key Infrastructures, Privacy issues and preservation, challenges to maintaining database security.

**Text Books:**

1. Database Systems concepts 6<sup>th</sup> edition silberschatz-korth-surdarshan Tata Mc Graw Hill Publications (Indian Edition)
2. Fundamentals of Database systems seventh edition Pearson Publications by Ramez Elmasri, Shamakanth.B. Navathe

**Reference Books:**

1. Distributed Databases Stefeno Ceri & Guisepe Pelagatti TataMCgrewHill Edition.



## COMPUTER SCIENCE & ENGINEERING

**B.Tech. VI Semester**

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

### MOBILE COMPUTING (C56PE3B)

**Course Objective:**

Computer systems perspective on the converging areas of wireless networking, embedded systems, and software, and to introduce selected topics of current research interest in the field.

**Course Outcomes:**

**Upon completion of the course, the student will:**

- |  |    |
|--|----|
| 1. Identify mobile communications and limitations of mobile devices.                 | L3 |
| 2. Illustrate the architecture of GSM protocol and MAC layer.                        | L3 |
| 3. Compare and contrast various mobile IP network layer and mobile transport layer.  | L4 |
| 4. Demonstrate database hoarding techniques and data dissemination for broadcasting. | L3 |
| 5. Compare & contrast the Adhoc networks and related concepts.                       | L4 |

**UNIT I**

**MOBILE COMMUNICATIONS: AN OVERVIEW:** Mobile Communication, Mobile Computing, Mobile Computing Architecture, Mobile Devices, Mobile System Networks, Data Dissemination, Mobility Management, Security.

**MOBILE DEVICES AND SYSTEMS:**

Cellular Networks and Frequency Reuse, Mobile Smart phones, Smart Mobiles, and Systems, Handheld pocket Computers, Handheld Devices, Smart Systems, Limitations of Mobile Devices.

**UNIT II**

**GSM AND OTHER 2G ARCHITECTURES:**

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

**Medium Access Control (MAC):** Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA,.

**UNIT III**

**Mobile IP Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP, VoIP, TCP over 2.5G/3G Mobile Networks

**Mobile Transport Layer:** Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

**UNIT IV**

**DATABASES AND MOBILE COMPUTING:**

Database Hoarding Techniques, Data Caching, Client-Server Computing for Mobile Computing and Adaptation, Adaptation Software for Mobile Computing, Power-aware Mobile Computing, Context-aware Mobile Computing

**DATA DISSEMINATION AND SYSTEMS FOR BROADCASTING:** Classification of Data Delivery Mechanisms, Data Dissemination, Digital Audio Broadcasting (DAB), Digital Video Broadcasting.

**UNIT V****Mobile Adhoc Networks (MANETs):**

Introduction to Mobile Ad-hoc Network, MANET, Routing and Routing Algorithms

**MOBILE WIRELESS SHORT-RANGE NETWORKS AND MOBILE:**

Wireless LAN, 802.11 Architecture, and Protocol Layers, Wireless Application Protocol (WAP), Wireless Application Protocol-WAP 2.0

**MOBILE APPLICATION DEVELOPMENT PLATFORMS:**

Windows Mobile and CE, Windows Phone 7, Android, Symbian

**Text Books:**

1. Mobile Computing by Raj Kamal second edition Oxford Higher Education.

**Reference Books:**

1. Jochen Schiller, -Mobile Communications, Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, -Handbook of Wireless Networks and Mobile Computing, Wiley, 2002, ISBN 0471419028.
3. Reza Behravanfar, -Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, ISBN: 0521817331, Cambridge University Press, Oct 2004.
4. Jochen Schiller, -Mobile Communications, Addison-Wesley, Second Edition, 2009.
5. Ad hoc Wireless Networks, Architectures and Protocols, C.Siva Ram Murthy and B.S.Manoj.



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**COMPUTER SCIENCE & ENGINEERING**

**B.Tech.VI Semester**

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

**WIRELESS NETWORKS (C56PE3C)**

**Course Objectives:**

Learn about the issues and challenges in the design of wireless ad hoc networks. The working of MAC and Routing Protocols for ad hoc and sensor networks.

**Course Outcomes:**

**On successful completion of the course the students will be able to:**

- |  |    |
|--|----|
| 1. Identify the various issues and applications of Adhoc wireless networks.  | L3 |
| 2. Analyze the working of MAC protocols for Ad-hoc wireless networks.  | L4 |
| 3. Compare and contrast the working of various On-Demand Routing protocols.  | L4 |
| 4. Analyze the challenges in designing Transport layer Protocols for Ad-hoc networks, Compare and contrast the working of Transport protocols. | L4 |
| 5. Design the issues in designing Security Protocols for Ad-hoc networks focusing on the working performance of various security protocols.    | L5 |

**UNIT I**

**Introduction:**

Fundamentals Of Wireless Communication Technology, The Electromagnetic Spectrum, Radio Propagation Mechanisms, Characteristics Of The Wireless Channel, Modulation Techniques, Multiple Access Techniques, Error Control,

Wireless LANs and PANs:

Fundamentals of Wlans, IEEE802.11 Standard, Hiper lan Standard, Bluetooth, Home rf

**UNIT II**

**MAC Protocols for Ad hoc wireless Networks:** Issues in designing a MAC protocol for Ad hoc wireless Networks, Design goals of a MAC protocol for Ad-hoc wireless Networks, Classification of MAC Protocols, Contention based protocols, Contention based protocols with reservation mechanisms, Contention-Based MAC protocols With Scheduling Mechanisms, MAC protocols That Use Directional Antennas, Other MAC protocols.

**UNIT III**

**Routing protocols for Ad-hoc Wireless Networks:** Issues in Designing a Routing Protocol for Ad-hoc Wireless Networks, Classification of Routing Protocols. Table driven routing Protocols, On-Demand Routing Protocols. Hybrid Routing Protocols, Routing Protocols With Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power-Aware Routing Protocols

**UNIT IV**

**Transport Layer And Security Protocols For Ad Hoc Wireless Networks:**

Issues in Designing a Transport Layer Protocol for Ad-hoc wireless Networks, Design Goals of a Transport Layer Protocol for Adhoc wireless Networks, Classification of Transport Layer Solutions, TCP over Ad-hoc wireless Networks, Other Transport Layer Protocols For Ad Hoc Wireless Networks, Security In Ad Hoc Wireless Networks, Network Security Requirements, Issues And Challenges In Security Provisioning, Network Security Attacks, Key Management, Secure Routing In Ad Hoc Wireless Networks.

**UNIT V****Quality Of Service In Ad Hoc Wireless Networks:**

Issues And Challenges In Providing Qos In Ad Hoc Wireless Networks, Classifications Of Qos Solutions, Mac layer Solutions, Network Layer Solutions, Qos Frameworks For Ad Hoc Wireless Networks.

**Text Book:**

1. Ad hoc Wireless Networks– C. Siva Ram Murthy & B.S. Manoj, 2<sup>nd</sup>Edition, Pearson Education, 2005.

**Reference Books:**

1. Ad hoc Wireless Networks – Ozan K. Tonguz and Gianguigi Ferrari, JohnWiley, 2006.
2. Ad hoc Wireless Networking – Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du, Kluwer Academic Publishers, 2004.
3. Adhoc Mobile Wireless Networks - C.K. Toh, Protocols and Systems, Prentice-Hall PTR, 2000.



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**COMPUTER SCIENCE & ENGINEERING**

**B.Tech. VI Semester**

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

**CRYPTOGRAPHY (C56PE3D)**

**Course Objective:**

Describe goals and design principles for and common structures of secret key primitives such as block and stream ciphers and message authentication codes.

**Course Outcomes:**

**Upon completion of the Course, the student will be able to:**

- |  |    |
|--|----|
| 1. Analyze Number Theory, Finite Fields and various algorithms.  | L4 |
| 2. Apply techniques to generate pseudo random sequences, use stream ciphers to for encrypting and decrypting the data. | L3 |
| 3. Design and analysis of stream ciphers.  | L4 |
| 4. Identify the algorithms of Public-Key Cryptosystems.  | L3 |
| 5. Analyze various algorithms developed for hashing functions.   | L4 |

**UNIT I**

**Basic Concepts of Number Theory and Finite Fields:**

Divisibility and the divisibility algorithm, Euclidean algorithm, Modular arithmetic, Groups, Rings and Fields, Finite fields of the form  $GF(p)$ , Polynomial arithmetic, Finite fields of the form  $GF(2^n)$ .

**UNIT II**

**Classical Encryption Techniques:**

Symmetric cipher model, Substitution techniques, Transposition techniques, Steganography

**SYMMETRIC CIPHERS:**

Traditional Block Cipher structure, Data Encryption Standard (DES), AES Cipher.

**UNIT III**

**Pseudo-Random-Sequence Generators and Stream Ciphers:**

Linear Congruential Generators, Linear Feedback Shift Registers, Design and analysis of stream ciphers, Stream ciphers using LFSRs.

**UNIT IV**

**Number theory:**

Prime Numbers, Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, discrete logarithm.

**Principles of Public-Key Cryptosystems:**

The RSA algorithm, Diffie - Hellman Key Exchange, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

**UNIT V**

**One-Way Hash Functions:**

Background, N-Hash, MD4, MD5, Secure Hash Algorithm [SHA], One way hash functions using symmetric block algorithms, Using public key algorithms, Choosing a one-way hash functions, Message Authentication Codes. Digital Signature Algorithm, Discrete Logarithm Signature Scheme.

**Text Books:**

1. William Stallings, —Cryptography and Network Security Principles and Practice, Pearson Education Inc., 6th Edition, 2014, ISBN: 978-93-325-1877-3
2. Bruce Schneier, —Applied Cryptography Protocols, Algorithms, and Source code in C, Wiley Publications, 2nd Edition, ISBN: 9971-51-348-X

**Reference Books:**

1. Cryptography and Network Security, Behrouz A. Forouzan, TMH, 2007.
2. Cryptography and Network Security, Atul Kahate, TMH, 2010.





## COMPUTER SCIENCE & ENGINEERING

**B.Tech.VI Semester**

**L/T/P C**

**3/0/0 3**

### SOFTWARE REQUIREMENTS ESTIMATION (C56PE3E)

**Course Objective:**

Understand good practices for requirements engineering, requirements elicitation, elicitation techniques, analysis models, software quality attributes. software estimation , size estimation , schedule and cost estimation.

**Course Outcomes:**

**Upon completion of the Course, the student will:**

- |   |    |
|---|----|
| 1. Able to build a software using good practices of engineering.                                  | L3 |
| 2. Analyze the developed models for a software.   | L4 |
| 3. Illustrate make estimations, across modules of a software.                                     | L3 |
| 4. Apply cost estimations based on schedule and effort for developing efficient software modules. | L3 |
| 5. Design various tools that exist for software estimation.                                       | L5 |

**UNIT I**

**Software Requirements: What and Why:**

Essential Software requirement, Good practices for requirements engineering, Improving requirements processes, Software requirements and risk management.

**Software Requirements Engineering:**

Requirements elicitation, requirements analysis documentation, review, elicitation techniques, analysis models, Software quality attributes, risk reduction through prototyping, setting requirements priorities, verifying requirements quality.

**UNIT II**

**Software Requirements Management:**

Requirements management Principles and practices, Requirements attributes, Change Management Process, Requirement Traceability Matrix, Links in requirements chain.

**Software Requirements Modeling:**

Use Case Modeling, Analysis Models, Dataflow diagram, state transition diagram, class diagrams, Object analysis, Problem Frames.

**UNIT III**

**Software Estimation:** Components of Software Estimations, Estimation methods, Problems associated with estimation, Key project factors that influence estimation.

**Size Estimation:** Two views of sizing, Function Point Analysis, Mark II FPA, Full Function Points, LOC Estimation, Conversion between size measures.

**UNIT IV**

**Effort, Schedule and Cost Estimation:** What is Productivity? Estimation Factors, Approaches to Effort and Schedule Estimation, COCOMO II, Putnam Estimation Model, Algorithmic models, Cost Estimation.

**UNIT V**

**Tools for Requirements Management and Estimation Requirements Management Tools:** Benefits of using a requirements management tool, commercial requirements management tool, Rational Requisite pro, Caliber – RM, implementing requirements management automation.  
**Software Estimation Tools:** Desirable features in software estimation tools, IFPUG, USC's COCOMO II, SLCM (Software Life Cycle Management) Tools.

**Text Books:**

1. Swapna Kishore, Rajesh Naik, Software Requirements and Estimation, 1st Edition, Tata Mc Graw Hill, 20.

**Reference Book:**

1. Karl E. Weigers, Software Requirements, 2nd Edition, Microsoft Press, 20.



## COMPUTER SCIENCE & ENGINEERING

**B.Tech. VI Semester**

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

### MACHINE LEARNING (C56PE3F)

**Course Objective:**

Understand formulate machine learning problems corresponding to different applications and range of machine learning algorithms along with their strengths and weaknesses.

**Course Outcomes:**

**Upon completion of the Course, the student will:**

- |  |    |
|--|----|
| 1. Apply the concepts of concept learning to solve well posed problems.  | L3 |
| 2. Apply decision tree learning, Artificial Neural Networks and evaluation hypothesis for the machine learning problems. | L3 |
| 3. Compare and contrast Bayesian, Computational Instance-based learning techniques.                                      | L3 |
| 4. Choose correct Learning set of rules for machine learning problems using analytical learning.                         | L3 |
| 5. Apply inductive and analytical approaches to learn reinforcement learning and Q learning.                             | L3 |

**UNIT I**

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning.

Concept Learning And The General To Specific Ordering –Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

**UNIT II**

Decision Tree Learning – Introduction, Decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning.

Artificial Neural Networks – Introduction, Neural network representation, appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm.

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses

**UNIT III**

Bayesian Learning – Overview of -Bayes theorem principle, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum Description Principle, Bayes optimal Classifier, Gibbs algorithm, Navie Baysean Classifier.

Computational Learning Theory – Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space,

Instance-Based Learning- Introduction, k -Nearest Neighbour Learning, Locally Weighted

Regression, Radial Basis Functions, Case Based Reasoning, Remark son Lazy and Eager Learning

#### **UNIT IV**

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, and Learning Rule.Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL.

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG, Remarks on Explanation- Based Learning-Discovering new features,

#### **UNIT V**

Combining Inductive and Analytical Learning – Motivation, Inductive- Analytical approaches to Learning, Reinforce learning task and Q Learning.

#### **Text Books:**

1. Machine Learning – Tom M. Mitchell, -MGH.
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC).

#### **Reference Books:**

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge University Press.
2. Richard o.Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,20
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995



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### COMPUTER SCIENCE & ENGINEERING

**B.Tech.VI Semester**

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

#### INTRODUCTION TO ANALYTICS (C56PE4A)

**Course Objective:**

Understand the overview of analytics, descriptive statistical & multivariate Analysis, clustering & regression techniques.

**Course Outcomes:**

**On completion of course the student will be able to:**

- |   |    |
|---|----|
| 1. Utilize the concepts of Big Data, Data Science, and Descriptive Statistics for comprehensive Understanding.  | L3 |
| 2. Assess complex multivariate datasets, ensure data quality, and effectively reduce dimensionality for more manageable and meaningful analyses.                                    | L5 |
| 3. Select appropriate techniques and models for different scenarios such as clustering, regression analysis.  | L5 |
| 4. Interpret advanced understanding of predictive modeling techniques, including both traditional and cutting-edge methods, while addressing complex challenges in various domains. | L5 |
| 5. Analyze and extract insights from text, web, and social media data, while considering ethical considerations and staying informed about the latest trends in the field.          | L4 |

**Unit-I**

**Introduction:** Big Data and Data Science, Big Data Architectures, Small Data, What is Data?

**What Can We Do With Data?:** A Project on Data Analytics - A Little History on Methodologies for Data Analytics, The KDD Process, The CRISP-DM Methodology

**Descriptive Statistics:** Scale Types, Descriptive Univariate Analysis - Univariate Frequencies, Univariate Data Visualization, Univariate Statistics, Common Univariate Probability Distributions, Descriptive Bivariate Analysis

**Unit-II**

**Descriptive Multivariate Analysis:** Multivariate Frequencies, Multivariate Data Visualization, Multivariate Statistics - Location Multivariate Statistics, Dispersion Multivariate Statistics, Infographics and Word Clouds

**Data Quality and Preprocessing:** Data Quality - Missing Values, Redundant Data, Inconsistent Data, Noisy Data, Outliers.

Converting to a Different Scale Type - Converting Nominal to Relative, Converting Ordinal to Relative or Absolute, Converting Relative or Absolute to Ordinal or Nominal

Converting to a Different Scale, Data Transformation,

Dimensionality Reduction - Attribute Aggregation, Principal Component Analysis, Independent Component Analysis, Attribute Selection, Filters, Wrappers, Embedded, Search Strategies

**Unit-III**

**Clustering:** Distance Measures - Differences between Values of Common Attribute Types, Distance Measures for Objects with Quantitative Attributes, Distance Measures for Non-conventional Attributes, Clustering Validation

**Regression:** Predictive Performance Estimation - Generalization, Model Validation, Predictive Performance Measures for Regression Finding the Parameters of the Model - Linear Regression, Empirical Error, The Bias-variance Trade-off, Shrinkage Methods, Ridge Regression, Lasso Regression, Methods that use Linear Combinations of Attributes, Principal Components Regression, Partial Least Squares Regression, Technique and Model Selection

#### **Unit-IV**

**Additional Predictive Methods:** Search-based Algorithms - Decision Tree Induction Algorithms, Decision Trees for Regression, Model Trees, Multivariate Adaptive Regression Splines, Optimization-based Algorithms - Artificial Neural Networks, Back propagation, Deep Networks and Deep Learning Algorithms, Support Vector Machines, SVM for Regression

**Advanced Predictive Topics:** Ensemble Learning - Bagging, Random Forests, AdaBoost, Algorithm Bias,

Non-binary Classification Tasks - One-class Classification, Multi-class Classification, Ranking Classification, Multi-label Classification, Hierarchical Classification

#### **Unit-V**

**Applications for Text, Web and Social Media:** Working with Texts - Data Acquisition, Feature Extraction, Tokenization, Stemming, Conversion to Structured Data, Is the Bag of Words Enough?, Remaining Phases, Trends, Sentiment Analysis, Web Mining

Recommender Systems - Feedback, Recommendation Tasks, Recommendation Techniques, Knowledge-based Techniques, Content-based Techniques, Collaborative Filtering Techniques, Final Remarks

Social Network Analysis - Representing Social Networks, Basic Properties of Nodes, Degree, Distance, Closeness, Betweenness, Clustering Coefficient, Basic and Structural Properties of Networks, Diameter, Centralization, Cliques, Clustering Coefficient, Modularity, Trends and Final Remarks

#### **Text Book(s):**

1. A General Introduction to Data Analytics João Mendes Moreira André C.P.L.F. de Carvalh wiley publishers.

#### **Reference:**

1. Introduction to Business Analytics using simulation, Jonathan P.Pinder, Academic Press (Elsevier).
2. Data mining and predictive Analytics: Daniel T Larose, Chatnal D Larose, Wiley.



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**COMPUTER SCIENCE & ENGINEERING**

**B.Tech. VI Semester**

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**CLOUD COMPUTING (C56PE4B)**

**Course Objective:**

To provide students an in depth understanding of the knowledge of Cloud Computing concepts, technologies, architecture and applications by introducing the state-of-the-art in Cloud Computing fundamental issues, technologies, applications.

**Course Outcomes:**

**Upon completion of the course, the student will be able to:**

- |  |    |
|--|----|
| 1. Analyze Challenges and Risks in cloud computing while migrating the applications into the cloud.  | L4 |
| 2. Apply the principles of Integration as a Service (IaaS) to address the challenges of SaaS paradigms and identify business drivers for enterprise cloud adoption, including the cloud supply chain.                        | L3 |
| 3. Make use of infrastructure as a service (IAAS), Platform and software as a service.   | L3 |
| 4. Apply architectural principles to design and manage federated cloud computing environments, including SLA management and performance prediction for HPC on clouds.  | L3 |
| 5. Identify the strategies for organizational readiness and change management in the cloud era, addressing data security, legal issues, and achieving production readiness for cloud service through practical case studies. | L3 |

**UNIT I**

**Introduction to Cloud Computing:** Cloud Computing in a Nutshell, Roots of Cloud Computing, Layers and Types of Clouds, Desired Features of a Cloud, Cloud Infrastructure Management, Infrastructure as a Service Providers, Platform as a Service Providers, Challenges and Risks

**Migrating into a Cloud:** Introduction, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud

**UNIT II**

**Enriching the 'Integration as a Service' Paradigm for the Cloud Era:** The Onset of Knowledge Era, The Evolution of SaaS, The Challenges of SaaS Paradigm, Approaching the SaaS Integration Enigma, New Integration Scenarios, The Integration Methodologies, SaaS Integration Products and Platforms, SaaS Integration Services, Businesses-to-Business Integration (B2Bi) Services, A Framework of Sensor—Cloud Integration, SaaS Integration Appliances

**The Enterprise Cloud Computing Paradigm:** Issues for Enterprise Applications on the Cloud, Transition Challenges, Enterprise Cloud Technology and Market Evolution, Business Drivers Toward a Marketplace for Enterprise Cloud Computing, The Cloud Supply Chain

**UNIT III**

**Infrastructure as a Service (IAAS) & Platform and Software as a Service (PAAS / SAAS):** Virtual machines provisioning and Migration services, On the Management of Virtual machines for Cloud Infrastructures, Enhancing Cloud Computing Environments using a cluster as a Service, Secure Distributed Data Storage in Cloud Computing. Aneka, Comet Cloud, T-Sytems, Workflow Engine for Clouds, Understanding Scientific Applications for Cloud Environments.

**UNIT IV**

**Monitoring, Management and Applications:** An Architecture for Federated Cloud Computing, SLA Management in Cloud Computing, Performance Prediction for HPC on Clouds, Best Practices in Architecting Cloud Applications in the AWS cloud, Building Content Delivery networks using Clouds, Resource Cloud Mashups.

**UNIT V**

**Governance and Case Studies:** Organizational Readiness and Change management in the Cloud age, Data Security in the Cloud, Legal Issues in Cloud computing, Achieving Production Readiness for Cloud Services.

**Text Books:**

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.

**Reference Books:**

1. A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Tata McGraw Hill, 2011.
2. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
3. Cloud Computing: Implementation, Management and Security, John W. Rittinghouse, James F. Ransome, CRC Press, 2012.
4. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'Reilly, SPD, 2011.
5. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, 2011.
6. Distributed and Cloud Computing, Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Elsevier, 2012.





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**COMPUTER SCIENCE & ENGINEERING**

**B.Tech.VI Semester**

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3/0/0 3**

**MOBILE ADHOC NETWORKS (C56PE4C)**

**Course Objective:**

Analyze the various design issues and challenges in the layered architecture of Ad hoc wireless networks

**Course Outcomes:**

**Upon completion of the course, the student will:**

- |   |    |
|---|----|
| 1. Analyze the applications of Mobile Adhoc Networks.   | L4 |
| 2. Illustrate addressing the design issues of MAC protocols.  | L3 |
| 3. Analyze the challenges of transmission control protocols and compare its performance over other protocols. | L4 |
| 4. Apply different protocols to develop energy management system.   | L3 |
| 5. Create optimize and integrate cross layer design issues.   | L5 |

**UNIT I**

**Introduction:** Fundamentals of Wireless Networks, Wireless Internet, What Are Ad Hoc Networks?

**MAC Layer Protocols:** Important Issues and Need for Medium Access, Classification of MAC Protocols

**UNIT II**

**Routing Protocols:** Design Issues of Routing Protocols for Ad Hoc, Classification of Routing Protocols, Proactive Routing Protocols, Hybrid Routing Protocols.

**Multi cast Routing Protocols:** Issues in Design of Multicast Routing Protocols, Classification of Multicast Routing Protocols, QoS Routing, Energy-Efficient Multicast Routing Protocols, Location-Based Multicast Routing Protocols

**UNIT III**

**Transport Protocols:** TCP's Challenges and Design Issues in Ad Hoc Networks, TCP Performance over MANETs, Ad Hoc Transport Protocols,

**Quality of Service:** Challenges, Classification of QoS Solutions, QoS-Enabled Ad Hoc on-Demand Distance Vector Routing Protocol, QoS Frameworks for Ad Hoc Wireless Networks, INSIGNIA, INORA

**UNIT IV**

**Energy Management Systems:** Introduction, Energy-Efficient Routing Protocol, Transmission Power-Management Schemes, Transmission Power Control, AODV Protocol, Local Energy-Aware Routing Based on AODV, Power-Aware Routing Based on AODV, Lifetime Prediction Routing Based on AODV

**UNIT V**

**Cross-Layer Design Issues:** A Definition of Cross-Layer Design, Cross-Layer Design Principle, Proposals Involving Cross-Layer Design, Proposals for Implementing Cross-Layer Interactions, **Cross-Layer Design:** Is It Worth Applying It? Pitfalls of the Cross-Layer Design Approach, Performance Objectives.

**Applications and Recent Developments:** Typical Applications, Applications and Opportunities, Challenges, Most Recent Developments in the Field.

**Text Books:**

1. Ad hoc Mobile Wireless Networks principles, Protocols, and Applications 2ed, SubirKumar, T.G. Basavaraj, C.Puttamaddappa CRC publications

**Reference Books:**

1. C.Siva Ram Murthy and B. S. Manoj, Ad hoc Wireless Networks Architecture and Protocols, 2<sup>nd</sup>edition, Pearson Edition, 2007.
2. Charles E. Perkins, Ad hoc Networking, Addison – Wesley, 2000.
3. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan stojmenovic, Mobile ad-hoc networking, Wiley-IEEE press, 2004.
4. Mohammad Ilyas, The handbook of ad-hoc wireless networks, CRC press, 2002.
5. T. Camp, J. Boleng, and V. Davies — A Survey of Mobility Models for Ad-hocNetwork
6. Research, -Wireless Communication, and Mobile comp. Special Issue on Mobile Ad- hoc Networking Research, Trends and Applications, Vol. 2, no. 5, 2002, pp. – 502.



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**COMPUTER SCIENCE & ENGINEERING**

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3/0/0 3**

**NETWORK SECURITY (C56PE4D)**

**Course Objective:**

Understand the practical survey of network security applications and standards; emphasis is on applications that are widely used on the Internet and for corporate networks, and on standards (especially Internet standards) that have been widely deployed.

**Course Outcomes:**

**Upon completion of course, the student will be able to:**

- |   |    |
|---|----|
| 1. Apply security mechanisms across transport layer.  | L3 |
| 2. Understand and Evaluate the security mechanism involved across a wireless network.                             | L5 |
| 3. Compare and contrast intruders, malicious software, and viruses.   | L4 |
| 4. Illustrate the need and significance of firewall and its types.  | L3 |
| 5. Identify the basic concepts of Network Management System, legal and ethical aspects of establishing a network. | L3 |

**UNIT I**

**Transport-Level Security**

Web Security Considerations, Secure Socket Layer and Transport Layer Security, Transport Layer Security, HTTPS, Secure Shell (SSH).

**UNIT II**

**Wireless Network Security:** IEEE 80.11 Wireless LAN Overview, IEEE 80.11i Wireless LAN Security, Wireless Application Protocol Overview, Wireless Transport Layer Security, WAP End-to-End Security.

**UNIT III**

**Intruders:** Introduction, Intrusion Detection, Password, the Base-Rate Fallacy Malicious Software Types of Malicious Software, Viruses, Virus Countermeasures, Worms, Distributed Denial of Service Attacks

**UNIT IV**

**Firewalls**

The Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewall Basing, Firewall Location and Configurations.

**UNIT V**

**Network Management Security**

Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3 Legal and Ethical Aspects Cybercrime and Computer Crime, Intellectual Property, Privacy, Ethical Issues.

**Text Book:**

1. Network Security Essentials by William Stallings, Fourth Edition-Pearson Education.

**Reference Books:**

1. Introduction to Data Mining, Tan, Steinbach and Kumar, Addison Wesley,206
2. Applied Cryptography by Bruce Schneir-John Willey & Sons.
3. Corporate Computer and Network Security by Raymond panko-Pearson Education.
4. Security in Computing by Charles P Pfleeger-O'Reilly Publications.



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**COMPUTER SCIENCE & ENGINEERING**

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**DESIGN PATTERNS (C56PE4E)**

**Course Objectives:**

Understand the idea behind Design Patterns in handling common problems faced during building an application.

**Course Outcomes:**

**Upon completion of course, the student will be able to:**

- |  |    |
|--|----|
| 1. Explain effectively solve design problems, and proficiently utilize design patterns in practical software development scenarios.                                      | L5 |
| 2. Design principles to address Document Editor challenges, demonstrate Proficiency in problem-solving.  | L6 |
| 3. Make Use of the adapter, bridge, composite, decorator, facade, flyweight, and proxy structural patterns in real-world situations.                                     | L3 |
| 4. Apply and implement various Behavioral Patterns (Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, and Observer) in practical applications. | L3 |
| 5. Utilize the Visitor, State, Strategy, and Template Method patterns; talk about the uses and advantages of different behavioral patterns.                              | L3 |

**UNIT I**

**Introduction:** What is a design pattern? design patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a DesignPattern.

**UNIT II**

**Designing a Document Editor:**

Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation.

**UNIT III**

**Creational Patterns:** Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

**UNIT IV**

**Structural Pattern:** Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy.

**UNIT V**

**Behavioral Patterns:** Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

**Text Book:**

1. Design Patterns, Erich Gamma, Pearson Education

**Reference Books:**

1. Pattern's in Java, Vol-I, Mark Grand, Wiley Dream Tech.
2. Patterns in Java, Vol-II, Mark Grand, Wiley Dream Tech.
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley Dream Tech.
4. Head First Design Patterns, Eric Freeman, O'reily publications.



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**B.Tech. VI Semester**

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

#### DEEP LEARNING (C56PE4F)

**Course Objective:**

Understand present the mathematical, statistical and computational challenges of building stable representations for high-dimensional data, such as images, text and data.

**Course Outcomes:**

**Upon completion of the course the student will be able to:**

- |  |    |
|--|----|
| 1. Apply knowledge of deep feed forward networks and regularization techniques for a given problem scenario.   | L3 |
| 2. Use various optimization strategies to train deep models for a given problem and illustrate convolution operations, variants of basic convolution function. | L3 |
| 3. Choose Recursive neural networks for a given sequence modeling task and explain deep learning applications.   | L3 |
| 4. Identify auto encoders for a given problem. Illustrate different types of representation learning.  | L3 |
| 5. List and explain the ways to structured probabilistic models for deep learning.   | L4 |

#### UNIT I

##### **Deep Feedforward Networks**

Challenges Motivating Deep Learning, Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms.

##### **Regularization for Deep Learning**

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under- Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training Tangent Distance, Tangent Prop, and Manifold Tangent Classifier.

#### UNIT II

##### **Optimization for Training Deep Models**

How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

##### **Convolutional Networks**

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuro scientific Basis for Convolutional Networks.

#### UNIT III

##### **Sequence Modeling: Recurrent and Recursive Nets**

Unfolding Computational Graphs, Recurrent Neural Networks and Bidirectional RNN, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, The Challenge of Long-Term Dependencies, Echo State Networks, Leaky Units and Other Strategies for Multiple Time Scales, The Long Short-Term Memory and Other Gated RNNs, Optimization for Long-Term Dependencies, Explicit Memory,

**Applications**

Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications

**UNIT IV****Autoencoders**

Undercomplete Autoencoders, Regularized Autoencoders, Representational Power, Layer Size and Depth, Stochastic Encoders and Decoders, Denoising Autoencoders, Learning Manifolds with Autoencoders, Contractive Autoencoders, Predictive Sparse Decomposition, Applications of Autoencoders.

**Representation Learning**

Greedy Layer-Wise Unsupervised Pretraining, Transfer Learning and Domain Adaptation, Semi-Supervised Disentangling of Causal Factors, Distributed Representation, Exponential Gains from Depth, Providing Clues to Discover Underlying Causes.

**UNIT V****Structured Probabilistic Models for Deep Learning**

The Challenge of Unstructured Modeling, Using Graphs to Describe Model Structure, Sampling from Graphical Models, Advantages of Structured Modeling, Learning about Dependencies, Inference and Approximate Inference, The Deep Learning Approach to Structured Probabilistic Models.

**Text Books:**

1. Deep Learning, Ian Good Fellow, Yoshua Bengio and Aaron Courville.

**Reference Books:**

1. Neural Networks and Learning Machines, Simon Haykin, Third Edition, Pearson.
2. Michael Nielsen, -Neural Networks and Deep Learning, Determination Press, 2015.  
<http://neuralnetworksanddeeplearning.com/>
3. CharuC.Aggarwal -Neural Networks and Deep learning, Springer International Publishing, 2018
4. Satish Kumar, -Neural Networks, A Classroom Approach, Tata McGraw -Hill, 2007.
5. Simon Haykin, —Neural Networks, A Comprehensive Foundation, 2nd Edition, Addison Wesley Longman, 2001.





## COMPUTER SCIENCE & ENGINEERING

**B.Tech.VI Semester**

**L/T/P C  
0/0/2 1**

### DATA WAREHOUSING AND DATA MINING LAB (C56PC5)

**Course Objective:**

Ability to understand the various kinds of tools, demonstrate the classification, clusters and etc. in large data sets.

**Course Outcomes:**

**Upon completion of Course the students will be able to:**

- |   |    |
|---|----|
| 1. Analyze data from files and other sources.                 | L4 |
| 2. Apply various data manipulation tasks on various datasets. | L3 |
| 3. Apply data mining techniques on real time data sets.       | L3 |

**TASK I:**

Build Data Warehouse and Explore WEKA

Build a Data Warehouse/Data Mart (using open source tools like Pentaho Data Integration tool, Pentaho Business Analytics; or other data warehouse tools like Microsoft-SSIS, Informatica, Business Objects etc.).

1. Identify source tables and populate sample data
2. Design multi-dimensional data models namely Star, snowflake and Fact constellation schemas for any enterprise (ex. Banking, Insurance, Finance, Healthcare, Manufacturing, Automobile, etc.).
3. Write ETL scripts and implement using data warehouse tools
4. Perform various OLAP operations such as slice, dice, roll up, drill up and pivot
5. Explore visualization features of the tool for analysis like identifying trends etc.

B. Explore WEKA Data Mining/Machine Learning Toolkit

1. Downloading and/or installation of WEKA data mining toolkit,
2. Understand the features of WEKA toolkit such as Explorer, Knowledge Flow interface, Experimenter, command-line interface.
3. Navigate the options available in the WEKA (ex. Select attributes panel, Preprocess panel, Classify panel, Cluster panel, Associate panel and Visualize panel) Study the arff file format
4. Explore the available data sets in WEKA.
5. Load a data set (ex. Weather dataset, Iris dataset, etc.)
6. Load each dataset and observe the following:
  - i. List the attribute names and their types
  - ii. Number of records in each dataset
  - iii. Identify the class attribute (if any)
  - iv. Plot Histogram
  - v. Determine the number of records for each class.
  - vi. Visualize the data in various dimensions

**TASK II:**

Perform data preprocessing tasks and Demonstrate performing association rule mining on data sets

1. Explore various options available in Weka for preprocessing data and apply (like Discretization Filters, Resample filter, etc.) on each dataset
2. Load each dataset into Weka and run Apriori algorithm with different support and confidence values. Study the rules generated.
3. Apply different discretization filters on numerical attributes and run the Apriori association rule algorithm. Study the rules generated. Derive interesting insights and observe the effect of

**TASK III:**

Demonstrate performing classification on data sets

1. Load each dataset into Weka and run ID3, J48 classification algorithm. Study the classifier output. Compute entropy values, Kappa a statistic.
2. Extract if-then rules from the decision tree generated by the classifier, Observe the confusion matrix and derive Accuracy, F-measure, TPrate, FPrate, Precision and Recall values. Apply a cross-validation strategy with various fold levels and compare the accuracy results.
3. Load each dataset into Weka and perform Naïve-Bayes classification and k-Nearest Neighbour classification. Interpret the results obtained.
4. Plot RoC Curves
5. Compare classification results of ID3, J48, Naïve-Bayes and k-NN classifiers for each dataset, and deduce which classifier is performing best and poor for each dataset and justify.

**TASK IV:**

Demonstrate performing clustering on data sets

1. Load each dataset into Weka and run a simple k-means clustering algorithm with different values of k (number of desired clusters). Study the clusters formed. Observe the sum of squared errors and centroids, and derive insights.
2. Explore other clustering techniques available in Weka.
3. Explore visualization features of Weka to visualize the clusters. Derive interesting insights and explanations.

**TASK V:**

Demonstrate performing Regression on datasets

1. Load each dataset into Weka and build a Linear Regression model. Study the clusters formed. Use the Training set option. Interpret the regression model and derive patterns and conclusions from the regression results.
2. Use options cross-validation and percentage split and repeat running the Linear Regression Model. Observe the results and derive meaningful results.
3. Explore a Simple linear regression technique that only looks at one variable.

**Resource Sites:**

1. <http://www.pentaho.com/>
2. <http://www.cs.waikato.ac.nz/ml/weka/>

**TASK VI:**

Credit Risk Assessment Description:

The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the bank's profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient. To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable textbook on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

**The German Credit Data:**

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. Credit dataset (original) Excel spreadsheet version of the German credit data. In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer!)

**A few notes on the German Dataset**

1. DM stands for Deutsche Mark, the unit of currency, worth about 90 cents Canadian (but looks and acts like a quarter).
2. owns\_telephone. German phone rates are much higher than in Canada so fewer people own telephones.
3. foreign\_worker. There are millions of these in Germany (many from Turkey). It is very hard to get German citizenship if you were not born of German parents. • There are 20 attributes used in judging a loan applicant. The goal is to classify the applicant into one of two categories, good or bad.

**Subtasks: (Turn in your answers to the following tasks)**

1. List all the categorical (or nominal) attributes and the real-valued attributes separately.
2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes.
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly? (This is also called testing on the training set) Why do you think you cannot get 100% training accuracy?
5. Is testing on the training set as you did above a good idea? Why or Why not?
6. One approach for solving the problem encountered in the previous question is using cross-validation? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease? Why?
7. Check to see if the data shows a bias against -foreign workers (attribute 20), or -personal- status (attribute 9). One way to do this (perhaps rather simple minded) is to remove these attributes from the dataset and see if the decision tree created in those cases is significantly different from the full dataset case which you have already done. To remove an attribute you can use the preprocess tab in Weka's GUI Explorer. Did removing these attributes have any significant effect? Discuss.
8. Another question might be, do you really need to input so many attributes to get good results? Maybe only a few would do. For example, you could try just having attributes 2, 3, 5, 7, 10, 17 (and 21, the class attribute (naturally)). Try out some combinations. (You had removed two attributes in problem 7. Remember to reload the arff data file to get all the attributes initially before you start selecting the ones you want.)
9. Sometimes, the cost of rejecting an applicant who actually has a good credit (case 1) might be higher than accepting an applicant who has bad credit (case 2). Instead of counting the misclassifications equally in both cases, give a higher cost to the first case (say cost 5) and lower cost to the second case. You can do this by using a cost matrix in Weka. Train your Decision Tree again and report the Decision Tree and cross-validation results. Are they significantly different from results obtained in problem 6 (using equal cost)?
10. Do you think it is a good idea to prefer simple decision trees instead of having long complex

decision trees? How does the complexity of a Decision Tree relate to the bias of the model?

11. You can make your Decision Trees simpler by pruning the nodes. One approach is to use Reduced Error Pruning - Explain this idea briefly. Try reduced error pruning for training your Decision Trees using cross-validation (you can do this in Weka) and report the Decision Tree you obtain? Also, report your accuracy using the pruned model. Does your accuracy increase?

12. (Extra Credit): How can you convert a Decision Trees into -if-then-else rules. Make up your own small Decision Tree consisting of 2-3 levels and convert it into a set of rules. There also exist different classifiers that output the model in the form of rules - one such classifier in Weka is rules. PART, train this model and report the set of rules obtained. Sometimes just one attribute can be good enough in making the decision, yes, just one Can you predict what attribute that might be in this dataset ? OneR classifier uses a single attribute to make decisions (it chooses the attribute based on minimum error). Report the rule obtained by training a one R classifier. Rank the performance of j48, PART and one R.

### Task Resources:

Mentor lecture on Decision Trees

Andrew Moore's Data Mining Tutorials (See tutorials on Decision Trees and Cross Validation)

Decision Trees (Source: Tan, MSU)

Tom Mitchell's book slides (See slides on Concept Learning and Decision Trees)

### Weka resources:

Introduction to Weka (html version) (download ppt version) Download Weka Weka Tutorial ARFF format

Using Weka from command line

### TASK VII:

#### Hospital Management System

Data Warehouse consists Dimension Table and Fact Table. REMEMBER The following Dimension The dimension object (Dimension):

\_ Name\_Attributes (Levels), with one primary key

\_ Hierarchies

One time dimension is must. About Levels and Hierarchies

Dimension objects (dimension) consist of a set of levels and a set of hierarchies defined over those levels. The levels represent levels of aggregation. Hierarchies describe parent-child relationships among a set of levels. For example, a typical calendar dimension could contain five levels. Two hierarchies can be defined on these levels:

H1: YearL > QuarterL > MonthL > WeekL > DayL H2: YearL > WeekL > DayL

The hierarchies are described from parent to child, so that Year is the parent of Quarter, Quarter the parent of Month, and so forth. About Unique Key Constraints When you create a definition for a hierarchy, Warehouse Builder creates an identifier key for each level of the hierarchy and a unique key constraint on the lowest level (Base Level) Design a Hospital Management system data warehouse (TARGET) consists of Dimensions Patient, Medicine, Supplier, Time. Where measures are \_NO UNITS', UNIT PRICE. Assume the Relational database (SOURCE) table schemas as follows

TIME (day, month, year),

PATIENT (patient\_name, Age, Address, etc.,)

MEDICINE (Medicine\_Brand\_name, Drug\_name, Supplier, no\_units, Uinit\_Price, etc.,) SUPPLIER:

(Supplier\_name, Medicine\_Brand\_name, Address, etc.,) If each Dimension has 6 levels, decide the levels and hierarchies, Assume the level names suitably. Design the Hospital Management system data warehouse using all schemas. Give the example 4-D cube with assumption names.



## COMPUTER SCIENCE & ENGINEERING

**B.Tech.VI Semester**

**L/T/P C**  
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### WEB TECHNOLOGIES LAB (C56PC6)

**Course Objective:**

Understand the program web applications using the following technologies HTML, Javascript, AJAX, PHP, Tomcat Server, Servlets, JSP.

**Course Outcomes:**

**Upon completion of the subject the student will be able to:**

- |  |    |
|--|----|
| 1. Develop and build interactive web pages using HTML and JavaScript and implement basic JavaScript functions for user interactions and data manipulation.   | L6 |
| 2. Develop and create XML documents and validate them against a given Document Type Definition (DTD) or XML Schema and Construct the structure of an XML document and represent it using a DOM tree and SAX. | L6 |
| 3. Develop a registration form in PHP that adds user information to the XML file and the data stored in the XML file.  | L3 |
| 4. Develop and Implement a database connection in a web application using a server-side scripting language (e.g., PHP, Java)   | L3 |
| 5. Analyze the structure and content of cookies stored in the browser.   | L4 |

**List of Experiments:**

1. Write an HTML page including JavaScript that takes a given set of integernumbers and shows them after sorting in descending order.
2. Write an HTML page including any required Java Script that takes a number from one text field in the range of 0 to 999 and shows it in another text field in words. If the number is out of range, it should show -out of rangell and if it is not a number, it should show -not a numberll message in the result box.
3. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, words and lines in the text entered using an alert message. Words are separated with white space and lines are separated with new line character.
4. Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next to the list. Add CSS to customize the properties of the font of the capital (color, bold and font size).
5. Create an XML document that contains 10 users information. Write a Java program, which takes User Id as input and returns the user details by taking the user information from the XML document using (a) DOM Parser and (b) SAX parser Implementthe following web applications using (a) PHP, (b) Servlets and (c)JSP:
6. A user validation web application, where the user submits the login name andpassword to the server. The name and password are checked against the data already available in Database and if the data matches, a successful login page isreturned. Otherwise a failure message is shown to the user.
7. Modify the 6<sup>th</sup> program to use an xml file instead of database.
8. Modify the 6<sup>th</sup> program to use AJAX to show the result on the same page below the submit button.

9. A simple calculator web application that takes two numbers and an operator (+, -, /, \* and %) from an HTML page and returns the result page with the operation performed on the operands.
10. Modify the above program such that it stores each query in a database and checks the database first for the result. If the query is already available in the DB, it returns the value that was previously computed (from DB) or it computes the result and returns it after storing the new query and result in DB.
11. A web application takes a name as input and on submit it shows a hello page where is taken from the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, it should show a logout page with Thank You message with the duration of usage (hint: Use session to store name and time).
12. A web application that takes name and age from an HTML page. If the age is less than it should send a page with -Hello , you are not authorized to visit this site message, where should be replaced with the entered name. Otherwise it should send -Welcome to this site message.
13. A web application for implementation: The user is first served a login page which takes user's name and password. After submitting the details the server checks these values against the data from a database and takes the following decisions. If name and password matches, serves a welcome page with user's full name. If name matches and password doesn't match, then serves -password mismatch message page. If name is not found in the database, serves a registration page, where user's full name is asked and on submitting the full name, it stores, the login name, password and full name in the database (hint: use session for storing the submitted login name and password)
14. A web application that lists all cookies stored in the browser on clicking -List Cookies message button. Add cookies if necessary.