

**OBJECTIVES:**

- To understand the protocol layering and physical level communication.
- To analyze the performance of a network.
- To understand the various components required to build different networks.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer.

**UNIT I INTRODUCTION AND PHYSICAL LAYER 9**

Networks — Network Types — Protocol Layering — TCP/IP Protocol suite — OSI Model — Physical Layer: Performance — Transmission media — Switching — Circuit-switched Networks — Packet Switching.

**UNIT II DATA-LINK LAYER & MEDIA ACCESS 9**

Introduction — Link-Layer Addressing — DLC Services — Data-Link Layer Protocols — HDLC — PPP — Media Access Control — Wired LANs: Ethernet — Wireless LANs — Introduction — IEEE 802.11, Bluetooth — Connecting Devices.

**UNIT III NETWORK LAYER 9**

Network Layer Services — Packet switching — Performance — IPv4 Addresses — Forwarding of IP Packets — Network Layer Protocols: IP, ICMP v4 — Unicast Routing Algorithms — Protocols — Multicasting Basics — IPv6 Addressing — IPv6 Protocol.

**UNIT IV TRANSPORT LAYER 9**

Introduction — Transport Layer Protocols — Services — Port Numbers — User Datagram Protocol — Transmission Control Protocol — SCTP.


**UNIT V APPLICATION LAYER 9**

WWW and HTTP — FTP — Email — Telnet — SSH — DNS — SNMP.

**TOTAL: 45 PERIODS****OUTCOMES:**

**On Completion of the course, the students should be able to:**

- Understand the basic layers and its functions in computer networks.
- Evaluate the performance of a network.
- Understand the basics of how data flows from one node to another.
- Analyze and design routing algorithms.
- Design protocols for various functions in the network.
- Understand the working of various application layer protocols

  
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**OBJECTIVES:**

- To understand the fundamentals of object modeling
- To understand and differentiate Unified Process from other approaches.
- To design with static UML diagrams.
- To design with the UML dynamic and implementation diagrams.
- To improve the software design with design patterns.
- To test the software against its requirements specification

**UNIT I UNIFIED PROCESS AND USE CASE DIAGRAMS 9**

Introduction to OOAD with OO Basics - Unified Process - UML diagrams - Use Case - Case study - the Next Gen POS system, Inception - Use case Modelling - Relating Use cases - include, extend and generalization - When to use Use-cases

**UNIT II STATIC UML DIAGRAMS 9**

Class Diagram - Elaboration - Domain Model - Finding conceptual classes and description classes - Associations - Attributes - Domain model refinement - Finding conceptual class Hierarchies - Aggregation and Composition - Relationship between sequenced diagrams and use cases - When to use Class Diagrams

**UNIT III DYNAMIC AND IMPLEMENTATION UML DIAGRAMS 9**

**Dynamic Diagrams** - UML interaction diagrams - System sequence diagram - Collaboration diagram - When to use Communication Diagrams - State machine diagram and Modelling - When to use State Diagrams - Activity diagram - When to use activity diagrams

**Implementation Diagrams** - UML package diagram - When to use package diagrams - Component and Deployment Diagrams - When to use Component and Deployment diagrams

**UNIT IV DESIGN PATTERNS 9**

**GRASP:** Designing objects with responsibilities - Creator - Information expert - Low Coupling - High Cohesion - Controller **Design Patterns** - **creational** - factory method - **structural** - Bridge - Adapter - **behavioural** - Strategy - observer - Applying GoF design patterns - Mapping design to code

**UNIT V TESTING 9**

Object Oriented Methodologies - Software Quality Assurance - Impact of Object Orientation

on Testing—Develop Test Cases and Test Plans

**TOTAL:45PERIODS**

**OUTCOMES:**

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


- Express software design with UML diagrams
- Design software applications using OO concepts.
- Identify various scenarios based on software requirements
- Transform UML based software design into pattern based design using design patterns
- Understand the various testing methodologies for OO software

**TEXTBOOKS:**

1. Craig Larman, —Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, Third Edition, Pearson Education, 2005.
2. Ali Bahrami-Object Oriented Systems Development -McGraw Hill International Edition-1999

**REFERENCES:**

1. Erich Gamma, and Richard Helm, Ralph Johnson, John Vlissides, —Design patterns: Elements of Reusable Object-Oriented Software, Addison-Wesley, 1995.
2. Martin Fowler, —UML Distilled: A Brief Guide to the Standard Object Modeling Language, Third Edition, Addison Wesley, 2003.

  
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**OBJECTIVES:**

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

**UNIT I INTRODUCTION 9**

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security - Security attacks, services and mechanisms - OSI security architecture - Classical encryption techniques: substitution techniques, transposition techniques, steganography - Foundations of modern cryptography: perfect security - information theory - product cryptosystem - cryptanalysis.

**UNIT II SYMMETRIC KEY CRYPTOGRAPHY 9**

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic - Euclid's algorithm - Congruence and matrices - Groups, Rings, Fields - Finite fields - SYMMETRIC KEY CIPHERS: DES - Block cipher Principle of DES - Strength of DES - Differential and linear cryptanalysis - Block cipher design principles - Block cipher mode of operation - Evaluation criteria for AES - Advanced Encryption Standard - RC4 - Key distribution.

**UNIT III PUBLIC KEY CRYPTOGRAPHY 9**

MATHEMATICS OF ASYMMETRIC KEY CRYPTOGRAPHY: Primes - Primality Testing - Factorization - Euler's totient function, Fermat's and Euler's Theorem - Chinese Remainder Theorem - Exponentiation and Algorithm - ASYMMETRIC KEY CIPHERS: RSA cryptosystem - Key distribution - Key management - Diffie Hellman key exchange - ElGamal cryptosystem - Elliptic curve arithmetic - Elliptic curve cryptography.

**UNIT IV MESSAGE AUTHENTICATION AND INTEGRITY 9**

Authentication requirement - Authentication function - MAC - Hash function - Security of hash function and MAC - SHA - Digital signature and authentication protocols - DSS - Entity Authentication: Biometrics, Passwords, Challenge Response protocols - Authentication applications - Kerberos, X.509

**UNIT V SECURITY PRACTICE AND SYSTEM SECURITY 9**

Electronic Mail security - PGP, S/MIME - IP security - Web Security -

SYSTEM SECURITY: Intruders–Malicious software–viruses–Firewalls.

TOTAL 45 PERIODS

**OUTCOMES:**

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

- Understand the fundamentals of network security, security architecture, threats and vulnerabilities
- Apply the different cryptographic operations of symmetric cryptographic algorithms
- Apply the different cryptographic operations of public key cryptography
- Apply the various Authentication schemes to simulated different applications.
- Understand various Security practices and System security standards

**TEXTBOOK:**

1. William Stallings, Cryptography and Network Security: Principles and Practice, PHI 3rd Edition, 2006.

**REFERENCES:**

1. C K Shyamala, N Harini and Dr. T R Padmanabhan: Cryptography and Network Security, Wiley India Pvt. Ltd
2. Behrouz A. Forouzan, Cryptography and Network Security, Tata McGraw Hill 2007.
3. Charlie Kaufman, Radia Perlman, and Mike Speciner, Network Security: PRIVATE Communication in a PUBLIC World, Prentice Hall, ISBN 0-13-046019-2

  
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**OBJECTIVES:**

- To understand the phases in a software project
- To understand fundamental concepts of requirements engineering and Analysis Modeling.
- To understand the various software design methodologies
- To learn various testing and maintenance measures

**UNIT I SOFTWARE PROCESS AND AGILE DEVELOPMENT 9**

Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models—Introduction to Agility-Agile process-Extreme programming-XP Process.

**UNIT II REQUIREMENTS ANALYSIS AND SPECIFICATION 9**

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document Requirement Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management-Classical analysis: Structured system Analysis, Petri Nets-Data Dictionary.

**UNIT III SOFTWARE DESIGN 9**

Design process — Design Concepts-Design Model— Design Heuristic — Architectural Design -Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design –Component level Design: Designing Class based components, traditional Components.


**UNIT IV TESTING AND MAINTENANCE 9**

Software testing fundamentals-Internal and external views of Testing-white box testing - basis path testing-control structure testing-black box testing- Regression Testing — Unit Testing — Integration Testing— Validation Testing— System Testing And Debugging—Software Implementation Techniques: Coding practices-Refactoring-Maintenance and Reengineering-BPR model-Reengineering process model-Reverse and Forward Engineering.

**UNIT V PROJECT MANAGEMENT 9**

Software Project Management: Estimation – LOC, FP Based Estimation, Make/Buy Decision COCOMO I & II Model – Project Scheduling – Scheduling, Earned Value Analysis Planning –Project Plan, Planning Process, RFP Risk Management – Identification, Projection - Risk Management-Risk Identification-RMMM Plan-CASE TOOLS

**TOTAL: 45 PERIODS****OUTCOMES:**

  
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**On Completion of the course, the students should be able to:**

- Identify the key activities in managing a software project.
- Compare different process models.
- Concepts of requirements engineering and Analysis Modeling.
- Apply systematic procedure for software design and deployment.
- Compare and contrast the various testing and maintenance.
- Manage project schedule, estimate project cost and effort required.

**TEXTBOOKS:**

1. Roger S. Pressman, —Software Engineering— A Practitioner's Approach I, Seventh Edition, McGraw-Hill International Edition, 2010.
2. Ian Sommerville, —Software Engineering I, 9th Edition, Pearson Education Asia, 2011.

**REFERENCES:**

1. Rajib Mall, —Fundamentals of Software Engineering I, Third Edition, PHI Learning Private Limited, 2009.
2. Pankaj Jalote, —Software Engineering, A Precise Approach I, Wiley India, 2010.
3. Kelkar S. A., —Software Engineering I, Prentice Hall of India Pvt Ltd, 2007.
4. Stephen R. Schach, —Software Engineering I, Tata McGraw-Hill Publishing Company Limited, 2007.
5. <http://nptel.ac.in/>.



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CS8691

ARTIFICIAL INTELLIGENCE

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**OBJECTIVES:**

- To understand the various characteristics of Intelligent agents
- To learn the different search strategies in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI.

**UNIT I INTRODUCTION**

9

Introduction—Definition—Future of Artificial Intelligence—Characteristics of Intelligent Agents—Typical Intelligent Agents—Problem Solving Approach to Typical AI Problems.

**UNIT II PROBLEM SOLVING METHODS**

9

Problem solving Methods - Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems- Searching with Partial Observations- Constraint Satisfaction Problems—Constraint Propagation-Backtracking Search-Game Playing- Optimal Decisions in Games—Alpha-Beta Pruning-Stochastic Games

**UNIT III KNOWLEDGE REPRESENTATION**

9

First Order Predicate Logic – Prolog Programming – Unification – Forward Chaining- Backward Chaining – Resolution – Knowledge Representation - Ontological Engineering- Categories and Objects – Events - Mental Events and Mental Objects - Reasoning Systems for Categories -Reasoning with Default Information

**UNIT IV SOFTWARE AGENTS**

9

Architecture for Intelligent Agents—Agent communication—Negotiation and Bargaining— Argumentation among Agents—Trust and Reputation in Multi-agents systems.

**UNIT V APPLICATIONS**

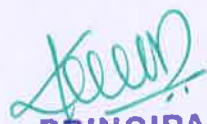
9

AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception—Planning—Moving

**TOTAL: 45 PERIODS**

**OUTCOMES:**

Up on completion of the course, the students will be able to:

  
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- Use appropriate search algorithms for any AI problem
- Represent a problem using first order and predicate logic
- Provide the apt agent strategy to solve a given problem
- Design software agents to solve a problem
- Design applications for NLP that use Artificial Intelligence.

**TEXTBOOKS:**

- 1 S.Russell and P.Norvig, "Artificial Intelligence: A Modern Approach", Prentice Hall, Third Edition, 2009.
- 2 I.Bratko, —Prolog: Programming for Artificial Intelligence, Fourth edition, Addison-Wesley Educational Publishers Inc., 2011.

**REFERENCES:**

1. M.Tim Jones, —Artificial Intelligence: A Systems Approach (Computer Science), Jones and Bartlett Publishers, Inc.; First Edition, 2008
2. Nils J.Nilsson, —The Quest for Artificial Intelligence, Cambridge University Press, 2009.
3. William F.Clocks in and Christopher S.Mellish, —Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003.
4. Gerhard Weiss, —Multi Agent Systems, Second Edition, MIT Press, 2013.
5. David L.Poole and Alan K.Mackworth, —Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.

  
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**OBJECTIVES:**

- To understand the concept of cloud computing.
- To appreciate the evolution of cloud from the existing technologies.
- To have knowledge on the various issues in cloud computing.
- To be familiar with the lead players in cloud.
- To appreciate the emergence of cloud as the next generation computing paradigm.

**UNIT I INTRODUCTION**

9

Introduction to Cloud Computing — Definition of Cloud — Evolution of Cloud Computing — Underlying Principles of Parallel and Distributed Computing — Cloud Characteristics — Elasticity in Cloud — On-demand Provisioning.

**UNIT II CLOUD ENABLING TECHNOLOGIES**

10

Service Oriented Architecture — REST and Systems of Systems — Web Services — Publish-Subscribe Model — Basics of Virtualization — Types of Virtualization — Implementation Levels of Virtualization — Virtualization Structures — Tools and Mechanisms — Virtualization of CPU — Memory — I/O Devices — Virtualization Support and Disaster Recovery.

**UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE**

8

Layered Cloud Architecture Design — NIST Cloud Computing Reference Architecture — Public, Private and Hybrid Clouds - IaaS — PaaS — SaaS — Architectural Design Challenges — Cloud Storage — Storage-as-a-Service — Advantages of Cloud Storage — Cloud Storage Providers — S3.

**UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD**

10


Inter Cloud Resource Management — Resource Provisioning and Resource Provisioning Methods — Global Exchange of Cloud Resources — Security Overview — Cloud Security Challenges — Software-as-a-Service Security — Security Governance — Virtual Machine Security — IAM — Security Standards.

**UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS**

8

Hadoop — MapReduce — Virtual Box — Google App Engine — Programming Environment for Google App Engine — Open Stack — Federation in the Cloud — Four Levels of Federation — Federated Services and Applications — Future of Federation.

TOTAL: 45 PERIODS

  
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## **OUTCOMES:**

**On Completion of the course, the students should be able to:**


- Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- Learn the key and enabling technologies that help in the development of cloud.
- Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models.
- Explain the core issues of cloud computing such as resource management and security.
- Be able to install and use current cloud technologies.
- Evaluate and choose the appropriate technologies, algorithms and approaches for implementation and use of cloud.

## **TEXTBOOKS:**

1. Kai Hwang, Geoffrey C. Fox, Jack G. Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2. Rittinghouse, John W., and James F. Ransome, — Cloud Computing: Implementation, Management and Security, CRC Press, 2017.

## **REFERENCES:**

1. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, — Mastering Cloud Computing, Tata Mcgraw Hill, 2013.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing- A Practical Approach", Tata Mcgraw Hill, 2009.
3. George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud : Transactional Systems for EC2 and Beyond (Theory in Practice)", O'Reilly, 2009.

  
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CS8601

MOBILE COMPUTING

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**OBJECTIVES:**

- To understand the basic concepts of mobile computing.
- To learn the basics of mobile telecommunications system.
- To be familiar with the network layer protocols and Ad-Hoc networks.
- To know the basis of transport and application layer protocols.
- To gain knowledge about different mobile platforms and application development.

**UNIT I INTRODUCTION 9**

Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies- Multiplexing – Spread spectrum -MAC Protocols –SDMA-TDMA-FDMA-CDMA

**UNIT II MOBILE TELECOMMUNICATIONS SYSTEM 9**

Introduction to Cellular Systems-GSM-Services & Architecture-Protocols- Connection Establishment-Frequency Allocation-Routing-Mobility Management-Security-GPRS-UMTS-Architecture-Handover-Security

**UNIT III MOBILE NETWORK LAYER 9**

Mobile IP-DHCP-AdHoc-Proactive protocol-DSDV, Reactive Routing Protocols-DSR, AODV, Hybrid routing-ZRP, Multicast Routing-ODMRP, Vehicular AdHoc networks (VANET)-MANET vs VANET-Security.

**UNIT IV MOBILE TRANSPORT AND APPLICATION LAYER 9**

Mobile TCP-WAP-Architecture-WDP-WTLS-WTP-WSP-WAE-WTA Architecture -WML

**UNIT V MOBILE PLATFORMS AND APPLICATIONS 9**

Mobile Device Operating Systems – Special Constraints & Requirements – Commercial Mobile Operating Systems – Software Development Kit: iOS, Android, BlackBerry, Windows Phone-MCommerce-Structure-Pros & Cons-Mobile Payment System-Security Issues

**TOTAL 45 PERIODS**

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## OUTCOMES:

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

- Explain the basics of mobile telecommunication systems
- Illustrate the generation of telecommunication systems in wireless networks
- Determine the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network
- Explain the functionality of Transport and Application layers
- Develop a mobile application using android/blackberry/ios/Windows SDK

## TEXTBOOKS:

1. Jochen Schiller, — Mobile Communications I, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, — Fundamentals of Mobile Computing I, PHI Learning Pvt. Ltd, New Delhi—2012

## REFERENCES

1. Dharma Prakash Agarwal, Qing and An Zeng, "Introduction to Wireless and Mobile systems", Thomson Asia Pvt Ltd, 2005.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, — Principles of Mobile Computing I, Springer, 2003.
3. William C. Y. Lee, — Mobile Cellular Telecommunications - Analog and Digital Systems I, Second Edition, Tata McGraw Hill Edition, 2006.
4. C.K. Toh, — Ad Hoc Mobile Wireless Networks I, First Edition, Pearson Education, 2002.
5. Android Developers: <http://developer.android.com/index.html>
6. Apple Developer: <https://developer.apple.com/>
7. Windows Phone DevCenter: <http://developer.windowsphone.com>
8. Black Berry Developer: <http://developer.blackberry.com>



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