

**M.TECH. - FIRST SEMESTER**  
**CSC601- ADVANCED CONCEPTS IN OPERATING SYSTEM**

**Credits: 3**

**Objectives**

- To impart the characteristics of Operating System (OS) in Multiprocessor and Multicomputer.
- To impart the issues related to designing OS.
- To impart the latest trends in building Mobile OS.

**Unit-I Multiprocessor Operating Systems**

System Architectures: Structures of OS – OS design issues. Process synchronization: Process Scheduling and Allocation- memory management.

**Unit-II Distributed Operating Systems**

System Architectures: Design issues – Communication models – clock synchronization. Mutual exclusion: Election algorithms- Distributed Deadlock detection

**Unit-III Distributed scheduling and Distributed File Management**

Distributed scheduling - Distributed shared memory - Distributed File system – Multimedia file systems - File placement - Caching

**Unit-IV Database Operating Systems**

Requirements of Database OS – Transaction process model – Synchronization primitives - Concurrency control algorithms

**Unit-V Mobile Operating Systems**

ARM and Intel architectures - Power Management - Mobile OS Architectures - Underlying OS - Kernel structure and native level programming - Runtime issues- Approaches to power management

**Outcomes**

- Ability to understand advanced concepts in OS
- Ability to develop OS for distributed systems
- Ability to develop modules for mobile devices

**Evaluation Guidelines**

- 30% on Design, and 40% on Architecture, Structure, and Models, and 30% on Techniques.

**Text Book**

1. M Singhal and NG Shivaratri , “Advanced Concepts in Operating Systems”, Tata McGraw Hill Inc, 2011.

**Reference Books**

1. A S Tanenbaum, “Distributed Operating Systems”, Pearson Education Asia, 2009
2. Source Wikipedia, Mobile Operating Systems, General Books LLC, 2010.
3. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## **CSC603: ADVANCED NETWORK PRINCIPLES AND PROTOCOLS**

**Credits: 3**

### **Objectives**

- To impart the architecture of the Internet protocols as a layered model
- To impart the fundamentals of data transmission, encoding, multiplexing
- To impart the various components of wide area networks and local area networks work together

### **Unit-I Introduction and Data link Layer**

Introduction to Networks: Applications - Architecture - Topology – Switching. MAC Protocols: SLIP - PPP - ALOHA protocols - CSMA/CD - IEEE 802.3 - IEEE 802.4 – IEEE 802.5 - CSMA/CA - IEEE 802.11 - IEEE 802.16.

### **Unit-II Network Layer Issues and Protocols**

Network Layer: Issues - Routing - Congestion control. Internetworking: Issues – Address Learning Bridges - Spanning tree - Source routing – Bridges – Routers - Gateway.

### **Unit-III Advanced Network Layer Protocols**

Network Protocols: IPV4 – IPV6 - IP datagram - hop by hop routing – ARP – RARP - DHCP - Sub net Addressing - Address Masking – ICMP – RIP - RIPV2 – OSPF – DNS - LAN and WAN Multicast.

### **Unit-IV Transport Layer Issues and Protocols**

Transport Layer: Design issues - Connection Management - Transmission Control Protocol (TCP) - User Datagram Protocol (UDP) - Streaming Control Transmission Protocol (SCTP).

### **Unit-V Application Layer Issues and Protocols**

Application Layer Protocol: Telnet - TFTP - FTP - SMTP –Bootstrap Network Time Protocol-SNMP.

### **Outcomes**

- Ability to understand the different layers of TCP/IP protocol stack
- Ability to analyze the working principle of different protocols at different layers

### **Evaluation Guidelines**

- 20% on Synthesis, 40% on Analysis, and 40% on Conceptual understanding.

### **Text Books**

1. Andrew S. Tanenbaum and David J. Wetherall, “Computer Networks”, Fifth Edition, Pearson, 2011.
2. William Stallings, "Data and Computer Communications", Ninth Edition, Pearson, 2011.

### **Reference Book**

1. W Richard Stevens and G. Gabriani, "TCP/IP Illustrated - Volume I, The protocols", Pearson Education, 2009.

## **CSC605: ADVANCED DATA STRUCTURES AND ALGORITHMS**

**Credits: 3**

### **Objectives**

- To introduce and practice advanced algorithms and programming techniques necessary for developing sophisticated computer application programs.
- To impart various programming constructs such as divide-and-conquer, backtracking, and dynamic programming.
- To impart new techniques for solving specific problems more efficiently and for analyzing space and time requirements.

### **Unit-I Algorithmic Notations and Basic Data Structures**

Introduction to Algorithms: Review of order notation and growth of functions – recurrences - probability distributions – average case analysis of algorithms. Basic data structures: stacks - queues - linked lists and applications.

### **Unit-II Hashing and Binary Trees**

Hashing: Direct access tables and hash tables - hash functions and relates analysis. Trees: Binary Search trees and Operations - AVL Trees and balancing operations - Red Black Trees and operations.

### **Unit-III Graph Algorithms**

Graphs: BTrees – definition – properties - operations, data structures for disjoint sets. Graph algorithms : MST single source all pair shortest paths – BFS – DFS - topological sort - strongly connected components.

### **Unit-IV Advanced Graph Algorithms**

Graph algorithms: maximal independent sets - coloring vertex cover - introduction to perfect graphs.

### **Unit-V Algorithmic Paradigms**

Algorithmic paradigms: Greedy Strategy - Dynamic programming - Backtracking - Branch and Bound - Randomized algorithms.

### **Outcomes**

- Ability to understand techniques such as brute force, greedy, and divide and conquer.
- Ability to understand advanced Abstract Data Type (ADT) and data structures in solving real world problems.

### **Evaluation Guidelines**

- 40% on Problems, and 40% on Comparisons and Statements, and 20% on Definitions.

### **Text Books**

1. H. S. Wilf, “Algorithms and complexity”, Prentice hall, Second edition, 2003.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest,” Introduction to Algorithms”, Prentice hall, Third edition 2010.

### **References**

1. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## **CSP601: NETWORK PROGRAMMING LABORATORY**

**Credits: 2**

### **Objectives**

- To impart client and server applications using the "Sockets" API and the implementation of Data link layer protocol and TCP layer
- To impart computer communication network simulations.
- To impart modeling techniques using OPNET or NS-2 simulation software.

### **Experiments**

1. Exercises on Socket Programming using C or Java
2. Exercises using OPNET or NS-2 Network Simulator
  - a. Setting up of various network topologies
  - b. Implementation of various MAC protocols
  - c. Measurement of routing protocols
  - d. Analysis of TCP/IP protocol under various mechanisms
  - e. Setting up of network that carries various application protocols and analyzing the performances
3. Creation of XML documents and verification using DTDs and Schemas.
4. Transformation of XML documents to XHTML documents for presentation using XSL.
5. Development and deployment of Web Services using Dot Net and J2EE technologies.
6. Composition of Web services using BPEL.

### **Outcomes**

- Ability to understand the working principle of Socket programming
- Ability to work with the simulators such as OPNET or NS-2 toolkit

### **References**

1. UNIX Network Programming – Networking APIs: Sockets and XTI by W. Richard Stevens, Volume 1, Third edition, 2010, Prentice Hall.
2. Computer Networks: A Systems Approach – Network Simulation Experiments in OPNET by L. Peterson and S. Davie, Fourth edition, 2008, Elsevier.
3. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## **CSP603: ADVANCED PROGRAMMING LABORATORY**

**Credits: 2**

### **Objectives**

- To impart the features of object oriented programming.
- To impart various programming constructs.
- To impart the OS internals.

### **Experiments**

- Exercises using Linux tools – Grep, awk, tr
- Exercises using system calls
- Exercises in Python Exercises in C++/ Java

### **Outcomes**

- Ability to develop shell scripts for various applications.
- Ability to gain in-depth knowledge about OS internals.
- Ability to understand Object oriented concepts and developing software modules.

### **Reference Books**

1. Arnold Robbins, Nelson H. F. Beebe, Classic Shell Scripting, O'Reilly Media 2005
2. H. Schildt Java: The Complete Reference, Eighth Edition, McGraw-Hill Education (India) Pvt. Limited, 2011.
3. H. Schildt C++: The Complete Reference, Fourth Edition, McGraw-Hill Education (India) Pvt Limited, 2003.
4. Mark Lutz Learning Python, 3rd Edition, O'Reilly Media, 2007
5. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## **M.TECH. SECOND SEMESTER**

### **CSC602: MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE**

**Credits: 3**

#### **Objectives**

- To impart the fundamental concepts of logic, abstract algebra, and linear algebra.
- To impart probability and statistics, graph theory, etc.

#### **Unit-I Functional Logic**

Proposition Logic, Resolution Proof system, Predicate logic. Congruences, Fermat's theorem, Euler function, Chinese remainder theorem.

#### **Unit-II Algebra**

Groups, homomorphism theorems, cosets and normal subgroups, Lagrange's theorem, Ring. Field. Linear algebra: Vector Space, Basis, Matrices and Linear Transformations, Eigen values, Orthogonality.

#### **Unit-III Probability Distribution**

Counting, Probability, Discrete random variable, Continuous random variable, Moment generating function, Markov's inequality, Chebyshev's inequality, The geometric and binomial distributions, The tail of the binomial distribution.

#### **Unit-IV Graphs and Trees**

Graphs, Euler tours, planar graphs, Hamiltonian graphs, Euler's formula, applications of Kuratowski's theorem, graph colouring, chromatic polynomials, trees, weighted trees, the max-flow min-cut theorem.

#### **Unit-V NP-Complete Problems**

Turing Machines, Recursive and Recursively Enumerable languages. Cantor's Diagonalization theorem. Complexity classes - NP-Hard and NP-complete Problems - Cook's theorem NP completeness reductions. Approximation algorithms.

#### **Outcome**

- Ability to apply mathematical foundations in many areas of computer science like algorithms, computer networks, cryptography, etc.

#### **Evaluation guidelines**

- 50% on Problems, and 30% on Theorems, and 20% on Proofs.

#### **Text Books**

1. Donald F. Stanat and David F. McAllister, "Discrete mathematics in Computer Science" Pearson education 1977.
2. I.N. Herstein, Topics in Algebra. JOHN Wiley & SONS. 1990.

#### **Reference Book**

1. Linear Algebra 2nd Edition (Paperback) by Kenneth Hoffman, Ray Kunze, PHI Learning, 2009.

## CS604: ADVANCED DATABASE MANAGEMENT SYSTEM

Credits: 3

### Objectives

- To impart the basic concepts and terminology related to DBMS and Relational Database Design
- To impart advanced DBMS techniques to construct tables and write effective queries, forms, and reports
- To impart the concept of a database transaction and related database facilities, including concurrency control, journaling, backup and recovery, and data object locking and protocols.

### Unit-I Introduction

Formal review of relational database and FDs Implication – Closure - its Correctness

### Unit- II Basic Algorithms

3NF and BCNF - Decomposition and synthesis approaches - Review of SQL99 - Basics of query processing - external sorting - file scans

### Unit-III Advanced Concepts

Processing of joins - materialized vs. pipelined processing - query transformation rules - DB transactions - ACID properties - interleaved executions – schedules – serializability

### Unit-IV Lock based Protocols

Correctness of interleaved execution- Locking and management of lock - 2PL – deadlocks - multiple level granularity - CC on B+ trees - Optimistic CC

### Unit-V Log Based Recovery and Database System Architectures

T/O based techniques, Multiversion approaches, Comparison of CC methods, dynamic databases, Failure classification, recovery algorithm, XML and relational databases, Parallel databases , Emerging database applications ,Recent trends and developments

### Outcomes

- Ability to write complex queries including full outer joins, self-join, sub queries, and set theoretic queries.
- Ability to understand the file organization, Query Optimization, Transaction management, and database administration techniques

### Evaluation Guidelines

- 50% on Problems and Analysis, and 30% on Application, and 20% on Models and Architecture .

### Text Books

1. Silberschatz, H. Korth, S. Sudarshan, Database system concepts, Fifth Edition, McGraw Hill, 2008.
2. R. Elmasri and S. B. Navathe, "Fundamentals of Database Systems", Third Edition, Pearson Education, 2011

### Reference Book

1. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## **CSP602: ADVANCED DBMS LABORATORY**

**Credits: 2**

### **Objectives**

- To explore the features of a Database Management Systems
- To interface a database with front end tools
- To impart the internals of a database system

### **Experiments**

- Basic SQL
- Intermediate SQL
- Advanced SQL
- ER Modeling
- Database Design and Normalization
- Accessing Databases from Programs using JDBC
- Building Web Applications using PHP & MySQL
- Indexing and Query Processing
- Query Evaluation Plans
- Concurrency and Transactions
- Big Data Analytics using Hadoop

### **Outcomes**

- Ability to use databases for building web applications.
- Ability to gain knowledge on the internals of a database system.

### **References**

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", 6<sup>th</sup> edition, Tata McGraw Hill, 2011
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", 4<sup>th</sup> Edition, Pearson/Addision wesley, 2007.
3. Research Papers published in IEEE, ACM, Elsevier publishers, etc.



## **CSP604: INTERNSHIP**

**Credits: 2**

### **Objectives**

- To develop institute-industry interaction
- To know the industry practices
- To understand cutting edge technology in the chosen area

### **Methodology**

- To identify industries offering internship by Training and Placement Office
- To identify industries offering internship by students in consultation with the Internship Coordinator (Faculty) and Training and Placement Office
- To avail during summer vacation (not more than 3 months)
- To submit a report based on the work done during internship to the Internship Coordinator

### **Outcomes**

- Exposure to industry practices
- Strengthened institute-industry relationship
- Bridging academic knowledge with industry input

# **ELECTIVES FOR SEMESTER-I**

## **CSE601: PARALLEL COMPUTER ARCHITECTURE**

**Credits: 3**

### **Objectives**

- To impart the design of parallel computer systems including modern parallel architectures
- To impart the communication and computing possibilities of parallel system architecture and to predict the performance of parallel applications

### **Unit-I Fundamentals of Computer Design**

Trends in Technology – Dependability – Quantitative Principles of Computer Design. Pipeline Hazards – Pipelining Implementation issues.

### **Unit-II Instruction-Level Parallelism and Its Exploitation**

Instruction-Level Parallelism(ILP): Overcoming Data Hazards with Dynamic Scheduling – Hardware-Based Speculation – Exploiting ILP Using Dynamic and Static Scheduling – Limitations on ILP for Realizable Processors – Hardware versus Software Speculation

### **Unit-III Data-Level and Thread-Level Parallelism**

SIMD Instruction Set Extensions for Multimedia – Detecting and Enhancing Loop-Level Parallelism – Centralized and Distributed Shared-Memory Architectures - Directory Based Coherence – Models of Memory Consistency – Warehouse-Scale Computers.

### **Unit-IV Memory Hierarchy Design**

Cache Performance: Six Basic Cache Optimizations – Virtual Memory – Protection and Examples of Virtual Memory – Ten Advanced Optimizations of Cache Performance – Virtual Memory and Virtual Machines – The Design of Memory Hierarchies

### **Unit-V Storage Systems & Case Studies**

Advanced Topics in Disk Storage: Reliability Measures and Benchmarks – Case Studies / Lab Exercises: INTEL i3, i5, i7 processor cores, NVIDIA GPUs, AMD, ARM processor cores – Simulators – GEM5, CACTI, SIMICS, Multi2sim and INTEL Software development tools.

### **Outcomes**

- Ability to understand the representation of data, addressing modes, and instructions sets.
- Ability to understand parallelism both in terms of a single processor and multiple processors

### **Evaluation Guidelines**

- 30% - Techniques and Architecture Diagrams, 30% - Computing and Communication Skills, 40% - Definitions.

### **Text Books**

1. David.A.Patterson, John L.Hennessy, "Computer Architecture: A Quantitative approach", Elsevier, 5<sup>th</sup> Edition 2012.
2. K.Hwang, Naresh Jotwani, "Advanced Computer Architecture, Parallelism, Scalability, Programmability", Tata McGraw Hill, 2<sup>nd</sup> Edition 2010.

### **References**

1. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## CSE603: PRINCIPLES OF CRYPTOGRAPHY

Credits: 3

### Objectives

- To gain knowledge about the mathematics of the cryptographic algorithms
- To get an insight into the working of different existing cryptographic algorithms

### Unit-I Algebra

Group: cyclic group- cyclic subgroup – field - probability. Theorems: Fermat's theorem - Cauchy's theorem - Chinese Remainder Theorem - primality testing -Euclid's algorithm for integers - quadratic residues - Legendre symbol - Jacobi symbol.

### Unit-II Cryptography and cryptanalysis

Classical Cryptography - substitution cipher - Types of attack: Chosen Message Attack (CMA) – Chosen Plaintext Attack (CPA) – Chosen Cipher text Attack (CCA). Shannon perfect secrecy – One Time Passwords (OTP) - Pseudo random bit generators - stream ciphers and RC4.

### Unit-III Block ciphers

Modes of operation - DES and its variants – AES - Linear and differential cryptanalysis.

### Unit-IV Cryptosystems

One-way function - trapdoor one-way function - RSA cryptosystem - Diffie-Hellman key exchange – Hash functions.

### Unit-V Digital Signature and Certificates

Message authentication codes - Digital signature schemes – Elgamal Digital Signature – Schnorr Digital Signature – Digital Signature Standard – X.509 Certificate.

### Outcomes

- Ability to build a new unbreakable cryptosystem
- Ability to blend the cryptographic algorithms with the existing communication protocols
- Ability to analyze and apply cryptography for secure e-Commerce and secure transactions

### Evaluation guidelines

- 50% on Analysis and Evaluation, and 30% on Techniques and Methods, and 20% on Theorems and Terminologies.

### Text Book

1. Stinson. D. “Cryptography: Theory and Practice”, Third edition, Chapman & Hall/CRC, 2010.

### Reference Books

1. W.Stallings, “Cryptography and Network Security Principles and practice”, Fifth edition, Pearson Education Asia, 2012.

## **CSE605: COMPUTER GRAPHICS AND IMAGE PROCESSING**

**Credit: 3**

### **Objectives**

- To impart basic algorithms for computer graphics and image processing.
- To impart various filters, Point processing, and Arithmetic operations in image processing.

### **Unit-I Graphics System and Graphical User Interface**

Pixel, Resolution, Video display devices - Types – Graphical devices – Direct screen interaction – Logical input function –GKS. User dialogue – Interactive Picture construction techniques.

### **Unit-II Geometric Display Primitives and Attributes**

Geometric display primitives: Points, Lines and Polygons. Point display method – Line drawing: DDA 2D Transformations and Viewing, Transformations - types – matrix representation – Concatenation - Scaling, Rotation, Translation, Shearing, Mirroring. Homogeneous coordinates – Window to view port transformations. Windowing and Clipping: Point, Lines, and Polygons - boundary intersection methods.

### **Unit-III Digital Image Fundamentals**

Image Formation and types – Basic geometric transformations – Fourier Transforms – Walsh Transforms – Hadamard Transforms – Discrete Cosine – Hotelling Transforms.

### **Unit-IV Image Enhancement and Restoration**

Histogram Modification Techniques – Image Smoothing –Image Sharpening – Image Restoration – Degradation Model – Noise Models – Spatial Filtering –Frequency Domain Filtering.

### **Unit-V Image Segmentation and Recognition**

Detection of Discontinuities – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphology operations. Pattern classification -Clustering and Matching - Knowledge representation and use for scene analysis and image understanding (2D and 3D) - Object recognition and identification – Case study of various applications.

### **Outcomes**

- Ability to create software tools for Games and Animation
- Ability to understand Computer Graphics and Image Processing Techniques

### **Evaluation Guidelines**

- 50% on Applications, and 30% on Comparisons and Statements, and 20% on Definitions.

### **Text Book**

1. Donald Hearn & M. Pauline Baker, and Warren R. Carithers, “Computer Graphics”, Prentice-Hall of India, Fourth Edition, 2011.

### **Reference Book**

1. Newmann W.M. and Sproull R.F., “Principles of Interactive Computer Graphics”, Tata McGraw-Hill, Second Edition, 2008.

## CSE607: OPEN SOURCE PROGRAMMING

Credits: 3

### Objectives

- To impart Open Source Programming concepts
- To impart applications based on Open Source Softwares

### Unit-I Introduction

Introduction to open source programming languages: advantages and drawbacks - threats and vulnerabilities - Introduction to shell programming. Operating System – Linux.

### Unit-II PHP

PHP Language Basics, Functions - calling a function, variable function, and anonymous function, Strings - cleaning, encoding and escaping, and comparing strings, Arrays – storing data in arrays, extracting multiple values, traversing, and sorting arrays, Objects – creation, introspection, and serialization, Web Techniques – processing forms and maintaining state.

### Unit-III Web Database Applications

Three-tier architecture. Introduction to Object oriented programming with PHP 5. Database basics: MYSQL - querying web databases - writing to web databases - validation with Javascript - Form based authentication - protecting data on the web.

### Unit-IV PERL, TCL, AND PYTHON

PERL: Numbers and Strings, Control Statements, Lists and Arrays, Files, Pattern matching, Hashes, Functions. Introduction to TCL/TK. Introduction to Python.

### Unit-V Security in Web Applications

Recognizing web application security threats: Code Grinder - Building functional and secure web applications - Security problems with Javascript - vulnerable CGI scripts - Code Auditing and Reverse Engineering - types of security used in applications.

### Outcomes

- Ability to develop codes in open source web applications
- Ability to understand the risks associated with the open source Codes and CGI scripts

### Evaluation guidelines

- 80% on Programming Skills in Web Applications, 20% on Comparison on Different Languages.

### Text Book

1. Kevin Tatroe, Peter MacIntyre, Rasmus Lerdorf, “Programming PHP”, O’Reilly Media, 2012.

### Reference

1. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## CSE609: ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

Credits: 3

### Objectives

- To impart intelligent systems in e-learning, e-commerce, tele-medicine, automation, and bio-technology industries
- To impart an expert system using appropriate knowledge based software tools

### Unit-I Overview of Artificial Intelligence

Definition and Importance of Knowledge - Knowledge Based Systems - Representation of Knowledge - Knowledge Organization - Knowledge Manipulation, and Acquisition of Knowledge – Introduction to LISP – PROLOG – Syntax and Functions.

### Unit-II Dealing with Inconsistencies and Uncertainties

Introduction. Truth Maintenance Systems - Default Reasoning and the Closed World Assumption - Predicate Completion and Circumscription - Modal and Temporal Logics

### Unit-III Search and Control Strategies

Introduction - Preliminary Concepts - Examples of Search Problems - Uninformed or Blind Search - Informed Search - Searching And-Or Graphs. Matching Techniques: Introduction - Structures Used in Matching - Measures for Matching - Matching Like Patterns - Partial Matching

### Unit-IV Knowledge Representation

Syntax and Semantics for Propositional logic - Syntax and Semantics for FOPL - Properties of Well Formed Formula - Conversion to Clausal Form - Inference Rules, The Resolution Principle - No deductive Inference Methods - Representations Using Rules – Probabilistic Reasoning: Introduction - Bayesian Probabilistic Inference - Possible World Representations – Dumpster Shafer Theory

### Unit-V Knowledge Organization and Management

Introduction - Indexing and Retrieval Techniques - Integrating Knowledge in Memory - Memory Organization Systems. Expert Systems: Introduction - Rule Based System Architecture - Non-Production System Architecture - Dealing with uncertainty - Knowledge Acquisition and Validation - Knowledge System Building Tools.

### Evaluation guidelines

- 50% on Analysis, and 30% on Systems and Models, and 20% on Tools and Terminologies.

### Outcome

- Ability to design, build, and implement an expert system and to provide solutions to real world problems

### Text Book

1. Dan W. Patterson, “Introduction to Artificial Intelligence and Expert Systems, PHI Learning”, 2009.

### Reference Book

1. E. Rich & K. Knight, ” Artificial Intelligence”, TMH, New Delhi, 2005.

**Objectives**

- To impart the principles of Data warehousing and Data Mining.
- To impart the various Data preprocessing Methods.

**Unit-I Data Warehousing and Business Analysis**

Building a Data warehouse –Data Warehouse Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools – Query tools and Applications – Online Analytical Processing (OLAP) – Multidimensional Data Analysis.

**Unit-II Data Mining**

Data Mining Functionalities - Concept Hierarchy Generation- Architecture Of A Typical Data Mining Systems- Classification Of Data Mining Systems. Association Rule Mining: - Efficient and Scalable Frequent Item set Mining Methods – Mining Various Kinds of Association Rules – Association Mining to Correlation Analysis – Constraint-Based Association Mining.

**Unit-III Classification and Prediction**

Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Selection.

**Unit-IV Cluster Analysis**

Clustering Paradigms: Types of Data in Cluster Analysis. Clustering Techniques: A Categorization of Major Clustering Methods –Partitioning Methods – Hierarchical methods – Density-Based Methods – Grid-Based Methods – Model- Based Clustering Methods – Clustering High-Dimensional Data – Constraint-Based Cluster Analysis – Outlier Analysis.

**Unit –V Mining Object, Spatial, Multimedia, Text and Web Data**

Multidimensional Analysis and Descriptive Mining of Complex Data Objects .Spatial Data Mining Multimedia Data Mining. Text Mining. Mining the WWW.

**Outcome**

- Ability to understand Data Mining principles and techniques for real time applications.

**Evaluation Guidelines**

- 40% on Analysis, Evaluation and synthesis, and 30% on Application, and 30% on Knowledge and Comprehension.

**Text Book**

1. Jiawei Han, Micheline Kamber and Jian Pei “Data Mining Concepts and Techniques”, Third Edition, Elsevier, 2011.

**Reference Books**

1. Alex Berson and Stephen J. Smith “Data Warehousing, Data Mining & OLAP”, Tata McGraw Hill Edition, Tenth Reprint 2007.

**Objectives**

- To impart the basic Techniques in Computer Graphics and Image processing.
- To impart various filters, Point processing, and Arithmetic operations in Image processing.
- To impart various applications of Graphics and Image processing.

**Unit-I Graphics System and Graphical User Interface**

Graphic System: Pixel, Resolution, Video display devices - Types - Graphical devices - Direct screen interaction - Logical input function - Graphical Kernel System. User dialogue - Interactive Picture construction techniques.

**Unit-II Geometric Display Primitives and Attributes**

Geometric display primitives: Points, Lines and Polygons. Point display method - Line drawing: DDA 2D Transformations and Viewing - Types - matrix representation - Concatenation - Scaling - Rotation - Translation - Shearing – Mirroring - Window to view port transformations. Windowing and Clipping: Point - Lines and Polygons - boundary intersection methods.

**Unit-III Digital Image Fundamental**

Digital Image and Transforms: Image Formation and Types - Basic geometric transformations - Fourier Transforms - Walsh Transforms - Hadamard Transforms - Discrete Cosine - Hoteling Transforms.

**Unit-IV Image Enhancement and Restoration**

Image Restoration and Reconstruction: Histogram Modification Techniques - Image Smoothing - Image Sharpening - Image Restoration - Spatial Filtering - Frequency Domain Filtering. Models: Degradation Model - Noise Model.

**Unit-V Image Segmentation and Recognition**

Segmentation and Shape Recognition Techniques: Detection of Discontinuities - Edge Linking and Boundary Detection - Thresholding - Region Based Segmentation - Morphology operations. Pattern classification - Clustering and Matching - Object recognition and identification.

**Outcomes**

- Ability to create software tools for Games and Animation
- Ability to understand Computer Graphics and Image Processing Techniques

**Evaluation Guidelines**

- 30% on Applications, and 30% on Comparisons and Statements, and 40% on Conceptual Understanding.

**Text Books**

1. Donald Hearn & M. Pauline Baker, and Warren R. Carithers, “Computer Graphics”, Prentice-Hall of India, Fourth Edition, 2011.
2. Rafael C. Gonzalez, Richard E. Woods, “Digital Image Processing”, Pearson Education, Third Edition, 2011.

**Reference Books**

1. Newmann W.M. and Sproull R.F., "Principles of Interactive Computer Graphics", Tata McGraw-Hill, Second Edition, 2008.



## CSE615: DESIGN AND ANALYSIS OF PARALLEL ALGORITHMS

Credits: 3

### Objective

- To impart about parallel computing models, design and analyze parallel algorithms for PRAM machines and Interconnection networks.

### Unit-I Models of Computer

Structures and algorithms for array processors: SIMD Array Processors – Interconnection Networks - Parallel algorithms for Array processors. Multiprocessor architecture: multiprocessor control and algorithms - parallel algorithms for multiprocessors.

### Unit II Selection and Sorting

Selection: broadcast- all sums- parallel selection. Searching a random sequence - sorted sequence on PRAM models - Tree and Mesh.

### Unit III Merging

Merging: network for merging - merging on PRAM models. Sorting on a linear array: EREW , CREW and CRCW - SIMD models - MIMD Enumeration sort.

### Unit-IV Matrix Operations

Matrix operations: Transposition - Matrix by matrix multiplication - matrix by vector multiplication. Numerical problems: solving systems of linear equations - finding roots of non linear equations on PRAM models.

### Unit-V Graphs

Graphs: Connected components - dense graphs- sparse graphs - Directed graphs - Biconnected components - Ear decomposition. Minimum spanning tree: Sollin's algorithm.

### Outcome

- Ability to design and analyze parallel algorithms

### Evaluation guidelines

- 50% on Problems, and 30% on Comparisons, Issues, and Analysis, and 30% on Definition.

### Text Books

1. Kai Wang and Briggs, "Computer Architecture and Parallel Processing", McGraw Hill, 1985.
2. S. G. Akl, "Design and Analysis of Parallel Algorithms", Prentice Hall Inc., 1992.

### Reference Books

1. Joseph Jaja, "An Introduction to parallel Algorithms", Addison Wesley, 1992.

## CSE617: DIGITAL FORENSICS

Credits: 3

### Objectives

- To impart the basic digital forensics and techniques for conducting the forensic examination on different digital devices
- To impart how to examine digital evidences such as the data acquisition, identification analysis

### Unit –I Introduction

Computer forensics: Benefits of forensics - computer crimes - evidence and courts – policies and procedures - legal concerns and private issues.

### Unit- II Collecting Evidence

Understanding Computing Investigations – Procedure for corporate High-Tech investigations - understanding data recovery work station and software - conducting and investigations.

### Unit-III Data acquisition

Understanding storage formats and digital evidence: determining the best acquisition method - acquisition tools - validating data acquisitions - performing RAID data acquisitions - remote network acquisition tools - other forensics acquisitions tools.

### Unit-IV Incident Response

Processing crimes and incident scenes: securing a computer incident or crime - seizing digital evidence at scene - storing digital evidence - obtaining digital hash - reviewing case – E-mail as evidence: Tracing E-mail – E-mail Headers.

### Unit-V Network and Mobile Forensics

Network Forensics: Security Tools – Attacks – Response – Evidence and Investigation. Mobile Device Forensics: Cellular Network Components – Cell Phone Evidence – Cell Phone Forensic Tools. Evidence stored in Cloud – Solid State Drives.

### Outcomes

- Ability to analyze the contents of various storage devices
- Ability to handle evidence and analyze it for presentation in court of law

### Evaluation guidelines

- 50% on Investigation, and 30% on Evidence Collection and Tools, and 20% on Techniques.

### Text Books

1. The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics. Sammons, J. Syngress Publishing, 2012.
2. Warren G. Kruse II and Jay G. Heiser, “Computer Forensics: Incident Response Essentials”, Addison Wesley, March 2010.

### Reference

1. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

# **ELECTIVES FOR SEMESTER-II**

## **CSE602: DISTRIBUTED SYSTEMS**

**Credits: 3**

### **Objectives**

- To impart broad and up-to-date coverage of the principles and practice in the area of Distributed Systems.
- To understand the heterogeneous systems and their functionalities.

### **Unit-I Basic Concepts**

Distributed systems: Definition - Examples - Resource sharing and the Web Challenges -System models - Architecture and fundamental models. Networking: Interprocess communication - External data representation and marshalling - Client-server and Group communication.

### **Unit-II Distributed Objects and Process**

Distributed objects and remote invocation, Communication between distributed objects, Remote procedure call, Events and notifications . Distributed Operating System: Architecture - Protection - Processes and Threads - Communication and invocation.

### **Unit-III Operating System Issues**

Distributed file systems - Name services, Domain name system, Directory and discovery services, Peer to peer systems, Napster file sharing system, Peer to peer middleware routing overlays – Clocks, Events and process states. Clock Synchronization : Logical clocks - Global states. Distributed debugging. Distributed mutual exclusion: Elections. Multicast communication.

### **Unit-IV Distributed Transaction Processing**

Transactions : Nested transactions - Locks - Optimistic concurrency control - Timestamp ordering - Flat and nested distributed transactions - Atomic commit protocols - Concurrency control in distributed transactions -Distributed deadlocks - Transaction recovery . Overview of replication, Distributed shared memory and Web services.

### **Unit-V Distributed Algorithms**

Synchronous network model: Algorithms - leader election - maximal independent set. Asynchronous system model - Mutual exclusion: model - stronger conditions - lockout-free mutual exclusion algorithms - Asynchronous network model.

### **Outcomes**

- Ability to develop skill set in developing a distributed system.
- Ability to design and evaluate and protocols for various distributed systems.

### **Evaluation Guidelines**

- 30% on Problems and Analysis, and 30% on Application, and 40% on Conceptual Understanding.

### **Textbooks**

1. George Coulouris, Jean Dollimore, and Tim Kindberg, “Distributed Systems Concepts and Design”, 5<sup>th</sup> ed., Pearson Education, 2011.
2. Andrew S. Tanenbaum, Maarten van Steen, “Distributed Systems Principles and Paradigms”, 2<sup>nd</sup> ed., Pearson Education, 2006.
3. Nancy A. Lynch, “Distributed Algorithms”, Hardcourt Asia Pvt. Ltd., Morgan Kaufmann, 2000.

### **References**

1. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## CSE604: CLOUD COMPUTING

Credits: 3

### Objectives

- To impart an in-depth and comprehensive knowledge of the Cloud Computing
- To shed light on the Security issues in Cloud Computing

### Unit-I Introduction to Computing

History of Centralized and Distributed Computing - Overview of Distributed Computing, Cluster Computing - Grid computing. Technologies for Network based systems - System models for Distributed and cloud computing - Software environments for distributed systems and clouds.

### Unit-II Introduction to Cloud Computing

Cloud issues and challenges - Properties - Characteristics - Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical computational resources - Data-storage. Virtualization concepts - Types of Virtualization- Introduction to Various Hypervisors - High Availability (HA)/Disaster Recovery (DR) using Virtualization, Moving VMs .

### Unit-III Cloud Services

Service models - Infrastructure as a Service (IaaS) - Resource Virtualization: Server, Storage - Network - Case studies. Platform as a Service (PaaS) - Cloud platform & Management: Computation, Storage - Case studies. Software as a Service (SaaS) - Web services - Web 2.0 - Web OS - Case studies – Anything as a service (XaaS).

### Unit-IV Cloud Programming and Software Environments

Parallel and Distributed Programming paradigms – Programming on Amazon AWS and Microsoft Azure – Programming support of Google App Engine – Emerging Cloud software Environment.

### Unit-V Cloud Access

Authentication, authorization and accounting - Cloud Provenance and meta-data - Cloud Reliability and fault-tolerance - Cloud Security – privacy - policy and compliance - Cloud federation, interoperability and standards.

### Outcomes

- Ability to explain the core issues of cloud computing such as security, privacy, and interoperability.
- Ability to provide the appropriate cloud computing solutions and recommendations according to the applications used.

### Evaluation guidelines

- 50% on Analysis, and 30% on Paradigms, and 20% on Terms and Terminologies.

### Text Book

1. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, “Distributed and cloud computing from Parallel Processing to the Internet of Things”, Morgan Kaufmann, Elsevier 2012.

### Reference Books

1. Barrie Sosinsky, “ Cloud Computing Bible” John Wiley & Sons, 2010
2. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## CSE606: WIRELESS SENSOR NETWORKS

Credits: 3

### Objectives

- To impart the fundamentals of wireless sensor networks and its application to critical real time scenarios.
- To impart the various protocols at various layers and its differences with traditional protocols.

### Unit-I Introduction

Fundamentals of wireless communication technology - The electromagnetic spectrum radio propagation - characteristics of wireless channels - modulation techniques - multiple access techniques - wireless LANs – PANs – WANs – MANs - Wireless Internet.

### Unit-II Introduction to adhoc/sensor networks

Key definitions of adhoc/ sensor networks - unique constraints and challenges - advantages of ad-hoc/sensor network - driving applications - issues in adhoc wireless networks - issues in design of sensor network - sensor network architecture - data dissemination and gathering.

### Unit-III MAC Protocols

Issues in designing MAC protocols for adhoc wireless networks - Design Goals - Classification of MAC protocols - MAC protocols for sensor networks - location discovery – quality - other issues - S-MAC - IEEE 802.15.4.

### Unit- IV Routing Protocols

Issues in designing a routing protocol - Classification of routing protocols – Types: Table-driven - On-Demand – Hybrid – Flooding – Hierarchical - power aware routing protocols.

### Unit-V QoS and Energy Management

Issues and Challenges in providing QoS – Classifications – MAC - Network layer solutions - QoS frameworks - Need for energy management – Classification – Battery - Transmission power - System power management schemes.

### Outcomes

- Ability to build a WSN network.
- Ability to analyze the critical parameters in deploying a WSN
- Ability to understand various routing protocols at different layers

### Evaluation guidelines

- 50% on Analysis and Evaluation, and 30% on Techniques and Methods, and 20% on Theorems and Terminologies.

### Text Book

1. C. Siva Ram Murthy, and B. S. Manoj, "AdHoc Wireless networks", Prentice Hall Education, 2012.

### Reference Book

1. Feng Zhao and Leonides Guibas, "Wireless sensor networks", Elsevier publication, 2004.

## CSE608: ADVANCED DIGITAL DESIGN

Credits: 3

### Objectives

- To impart the basic building blocks, logic gates, adders, multipliers, shifters and other digital devices
- To impart logic minimization techniques, including Karnaugh Maps
- To impart techniques and tools for programmable logic design

### Unit – I Combinational Logic Models

Review of Combinational and Sequential logic design. Structural models of combinational logic: Propagation delay - Behavioral Modeling - Boolean equation based behavioral models of combinational logic – Cyclic behavioral model of flip-flop and latches. A comparison of styles for behavioral modeling. Design documentation with functions and tasks.

### Unit – II Synthesis of Combinational and Sequential logic

Introduction to synthesis – Synthesis of combinational logic – Synthesis of sequential logic with latches – Synthesis of three-state devices and bus interfaces – Synthesis of sequential logic with flip-flops - Registered logic – State encoding – Synthesis of gated clocks and clock enables – Resets – Synthesis of loops. Divide and Conquer: partitioning a design.

### Unit – III Controllers

Design and Synthesis of Datapath Controllers. Partitioned sequential machines – Design example: Binary counter. Design and synthesis of a RISC stored-program machine: Processor – ALU – Controller - Instruction Set - Design and Program Execution. UART: Operation – Transmitter - Receiver.

### Unit – IV Programmable Logic Devices (PLDs)

Devices: Storage devices – Programmable Logic Array (PLA) – Programmable Array - Logic (PAL) – Programmability of PLDs – Complex PLDs - Introduction to Altera and Xilinx FPGAs. Algorithms: Nested loop programs - Data flow graphs. Design Example of Pipelined: Adder - FIR Filter. Circular buffers – First in First Out (FIFO) - Synchronization across clock domains. Functional units: addition – subtraction - multiplication and division – Multiplication of signed binary numbers and fractions.

### Unit – V Synthesis

Postsynthesis Design Validation – Postsynthesis Timing Verification – Elimination of ASIC Timing Violations – False Paths – Dynamically Sensitized Paths – System Tasks for Timing Verification – Fault Simulation and Testing – Fault Simulation – Fault Simulation

**Outcomes**

- Ability to understand the use standard digital memory devices as components in complex subsystems
- Ability to design simple combinational logic circuits and logic controllers
- Ability to develop the necessary software for basic digital systems

**Evaluation guidelines**

- 50% on Problems, and 30% on Methods and Techniques, and 20% on Basics.

**Text Book**

1. Michael D. Ciletti, "Advanced Digital Design with the VERILOG HDL, 2<sup>nd</sup> Edition, Pearson Education, 2010.

**Reference Books**

1. Samir Palnitkar "Verilog HDL", 2<sup>nd</sup> Edition, Pearson Education, 2003.
2. Stephenbrown, "Fundamentals of Digital Logic with Verilog", McGraw-Hill-2007.
3. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## CSE610: REAL TIME SYSTEMS

Credits: 3

### Objectives

- To impart issues related to the design and analysis of systems with real-time constraints.
- To impart the various Uniprocessor and Multiprocessor scheduling mechanisms.
- To impart on various real time communication protocols.
- To study the difference between traditional and real time databases

### Unit-I Introduction to real time computing

Concepts; Example of real-time applications – Structure of a real time system – Characterization of real time systems and tasks - Hard and Soft timing constraints - Design Challenges - Performance metrics - Prediction of Execution Time : Source code analysis, Micro-architecture level analysis, Cache and pipeline issues- Programming Languages for Real-Time Systems

### Unit-II Real time Operating System

Threads and Tasks – Structure of Microkernel – Time services – Scheduling Mechanisms Communication and Synchronization – Event Notification and Software interrupt

### Unit-III Real time Scheduling

Task assignment and Scheduling - Task allocation algorithms - Single-processor and Multiprocessor task scheduling - Clock-driven and priority-based scheduling algorithms- Fault tolerant scheduling

### Unit-IV Real Time Communication

Network topologies and architecture issues – protocols – contention based, token based, polled bus, deadline based protocol, Fault tolerant routing. RTP and RTCP.

### Unit-V Real time Databases

Transaction priorities – Concurrency control issues – Disk scheduling algorithms – Two phase approach to improve predictability.

### Outcomes

- Ability to learn Real-time programming environments.
- Ability to develop real time systems.

### Evaluation guidelines

- 50% on Problems , and 30% on Algorithms, and 20% on Terms and Terminologies.

### Text Book

1. C.M. Krishna, Kang G. Shin – “Real Time Systems”, International Edition, Tata McGraw Hill Companies, Inc., New York, 2010.

### Reference Books

1. Philip A. Laplante and Seppo J. Ovaska, “Real-Time Systems Design and Analysis: Tools for the Practitioner” IV Edition IEEE Press, Wiley. 2011.
2. Research Papers published in IEEE, ACM, Elsevier publishers, etc.



## CSE612: MOBILE NETWORK SYSTEMS

Credits: 3

### Objectives

- To impart the fundamentals of Mobile communication systems.
- To impart the significance of different layers in mobile system.

### Unit-I Introduction

Introduction to wireless: mobile and cellular mobile systems - cellular mobile telephone systems. analog and digital cellular systems: frequency reuse - co-channel interference.

### Unit-II Medium Access Control (MAC)

MAC: SDMA – FDMA – TDMA – CDMA - Hand offs and dropped calls- initiation of handoff - power difference - mobile assisted cell-site and Intersystem handoff.

### Unit-III Communication Systems

Mobile Telecommunication standards: GSM – DECT – TETRA - IMT-2000 – CTEO - satellite systems – GEO - LEO and MEO - and broadcast systems –Digital audio and video broadcasting - IEEE 802.11 – HIPERLAN - Bluetooth - Wireless ATM - WATM services.

### Unit-IV Mobile Network Layer

Network support for mobile systems – Mobile IP- IP packet delivery- Agent discovery-tunneling and encapsulation, reverse tunneling, IPV6, DHCP.

### Unit-V Mobile Transport Layer

Mobile transport and application layer protocol - Review of traditional TCP, fast retransmit/fast recovery, transmission/timeout freezing, file systems, WWW, WAP.

### Outcome

- Ability to apply knowledge in application and protocol development.

### Evaluation guidelines

30% on Synthesis, and 30% on Application, and 40% on Conceptual Understanding.

### Text Book

1. Jochen Sciller, "Mobile Communications ", Pearson Education India, 2009.

### Reference Book

1. Theodore S. Rappaport, “Wireless Communications: Principles and Practice”, Pearson Education, 2010.
2. William C.Y Lee, "Mobile Cellular Telecommunications ", McGraw Hill International Editions, 1995.
3. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## CSE614: NETWORK SECURITY

Credits: 3

### Objectives

- To impart the network security, services, attacks, mechanisms, types of attacks on TCP/IP protocol suite.
- To impart network layer security protocols, Transport layer security protocols, Web security protocols.
- To impart the wireless network security threats.

### Unit –I Introduction Overview

Network Security, Security services, attacks, Security Issues in TCP/IP suite- Sniffing, spoofing, buffer overflow, ARP poisoning, ICMP Exploits, IP address spoofing, IP Fragment attack, routing exploits, UDP exploits, TCP exploits.

### Unit-II Authentication Algorithms and Protocols

Authentication: Requirements - Functions - Message Authentication Codes – Hashing: Functions - Security of Hash Functions and MACs - MD5 message Digest algorithm - Secure Hash Algorithm - RIPEMD - HMAC Digital Signatures, Authentication protocols: Kerberos - X.509.

### Unit-III Network Security and Web Security Protocols

Network Security: IP Security - AH and ESP - SSL/TLS - SSH. Web Security: HTTPS - DNS Security - Electronic Mail Security (PGP, S/MIME).

### Unit-IV Software Attacks and Security

Intruders - Viruses - Worms - Trojan horses - Distributed Denial-Of-Service (DDoS) - Honey nets and Honey pots. Security Systems: Firewalls – IDS.

### Unit-V Wireless Security

Issues and threats in Wireless networks. Wireless LAN Security: WEP - WPA.

### Outcomes

- Ability to assess an appropriate mechanism for protecting the network.
- Ability to design a security solution for a given system or application.

### Evaluation Guidelines

- 30% on Problems, and 30% on Comparisons and Statements, and 40% on Conceptual understanding.

### Text Books

1. W. Stallings, “Cryptography and Network Security: Principles and Practice”, 5/E, Prentice Hall, 2013.

### Reference Books

1. Atul Kahate, “Cryptography and Network Security”, Tata McGraw-Hill, 2003.
2. Research Papers published in IEEE, ACM, Elsevier publishers, etc.

## CSE616: MOBILE APPLICATION DEVELOPMENT

Credits: 3

### Objective

- To impart mobile application development using the Android platform.

### Unit-I Introduction

Introduction to mobile application development-trends - smart phones - ANDROID DEVELOPMENT SETUP – Eclipse, ADT, Android SDK, tools. Android application anatomy, emulator setup - Application framework basics: resources, layout, values, asset XML representation, generated R.Java file, Android manifest file - Creating a simple application.

### Unit-II Activities, Intent and UI Design

Introduction to activities-activities life-cycle - User Interface INTENT – intent object, intent filters – adding categories, linking activities, user interface design – Components -layouts, basics of screen design, registering listeners and different event Listeners - Creating application using multiple activities- views with different layouts.

### Unit-III Data Persistence

Shared preferences-File Handling-Managing data using SQLite database CONTENT PROVIDERS – user content provider, android provided content providers – Creating a simple applications using content provider and persisting data into database.

### Unit-IV Back Ground Running Process, Networking And Telephony Services

Services-Introduction to services–local service-remote service and binding the service-communication between service and activity-Multi-Threading-Handlers and AsyncTask-Android network programming- Telephony services - SMS and telephony applications

### Unit-V Advanced Applications

Location based services-Google maps services using Google API-Overview on Tweened animations, Property animations - android media-Google App engine - connecting Android apps-Cloud Storage-Android application development guidelines-publishing android applications

### Outcomes

- Ability to build Android programming Activities, Services, Broadcast Receivers and Content providers
- Ability to develop and publish Android applications in to Android Market

### Evaluation guidelines

- 50% on An Application, and 30% on Methods and Techniques, and 20% on Tool functions.

### Text Book

1. Wei-Meng Lee, “*Beginning Android 4 Application Development*” Wrox Publications, 2012.

### References

1. Paul Deital and Harvey Deital, ”Android How to Program” , Detial associates publishers, 2013.

## **CSE618: SERVICE ORIENTED ARCHITECTURE AND WEB SECURITY**

**Credits: 3**

### **Objectives**

- To provide an overview of Service Oriented Architecture and Web services and their importance.
- To introduce security solutions in XML and Web Services and to introduce security standards for Web Services.

### **Unit-I XML Technology**

XML: Introduction to XML and Web - Name Spaces – XML Document Structure - Structuring with Schemas and DTD - Modeling Databases in XML – XQuery.

### **Unit-II SOA Basics**

Service Oriented Architecture (SOA): Comparing SOA with Client-Server and Distributed architectures - Characteristics of SOA – Benefits of SOA -- Principles of Service orientation – Service layers - Business Process management.

### **Unit-III Web Services (WS)**

SOA and Web Services: Web Services Protocol Stack – Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI. Service-Level Interaction patterns: Enterprise Service Bus - .NET and J2EE Interoperability.

### **Unit-IV WS Technologies and Standards**

Web Services Technologies: JAX-RPC, JAX-WS. Web Service Standards: WS-RM, WS-Addressing, WS-Policy. Service Orchestration and Choreography: Composition Standards - BPEL –Service Oriented Analysis and Design.

### **Unit-V XML and WS Security**

XML Security Overview: Canonicalization – XML Security Framework – XML Encryption – XML Signature – XKMS Structure. Web Services Security: XACML - WS-Security.

### **Outcomes**

- Ability to understand the concepts of SOA and Web services, some of the prevailing standards and technologies of Web Services
- Ability to understand the approaches for providing security for XML documents as well as messages exchanged among Web Services

### **Evaluation guidelines**

- 50% on Learning Different Concepts in SOA, 30% on Different Techniques / Languages, 20% on Definitions and Block Diagrams.

### **Text Books**

1. Ron Schmelzer et al. “XML and Web Services”, Pearson Education, 2008.

### **Reference Books**

1. James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, “Java Web Services Architecture”, Elsevier, 2011.

## **CSC606/CSC607: SEMINAR AND TECHNICAL WRITING - I and II**

**Credits: 2**

### **Objectives**

- To develop soft skill
- To understand research papers and prepare presentation material
- To improve oral communication skills through presentation
- To prepare original technical write up on the presentation

### **Methodology**

- To choose the area of interest
- To identify current literatures
- To choose state of the art survey paper/research paper
- To consult and get confirmed with Seminar Coordinator
- To prepare the Powerpoint presentation on recent trends
- To present as per schedule drawn by Seminar Coordinator
- To prepare a technical write up and submit to Seminar Coordinator
- To attend Guest lecturers/Seminars and submit the report

### **Outcomes**

- Improvement in proficiency in English
- Improvement in presentation skill
- Improvement in analytical and reasoning ability
- Improvement in technical writing

### **References**

1. Research Papers published in IEEE, ACM, Elsevier publishers, etc.