Bansilal Ramnath Agarwal Charitable Trust’s

Vishwakarma Institute of Technology
(An Autonomous Institute affiliated to University of Pune)

Structure & Syllabus of

Master of Computer Application
(MCA)

Pattern ‘A14’

Effective from Academic Year 2014-15

Prepared by: - Board of Studies in Computer Engineering
Approved by: - Academic Board, Vishwakarma Institute of Technology, Pune

Signed by,

Chairman – BOS

Chairman – Academic Board
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<tr>
<td>CS72109</td>
<td>- Cloud Computing</td>
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<tr>
<td>CS72110</td>
<td>- Advanced Unix Programming</td>
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<td>- Mobile Application Development</td>
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<tr>
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<td>Application Development Technology Lab (Laboratory Course)</td>
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<td>- Network and Information Security Lab</td>
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<td>CS72309</td>
<td>- Cloud Computing Lab</td>
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<td>CS72310</td>
<td>- Advanced Unix Programming Lab</td>
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<td>- Mobile Application Development Lab</td>
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#### FF No. 653

**Course Structure**

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<th>Examination Scheme</th>
<th>Credits</th>
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<td>Lectures</td>
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#### Laboratory Courses

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<tr>
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<td>Practicals</td>
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#### Abbreviations Used

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<td>HA</td>
<td>Home Assignment</td>
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<td>ESE</td>
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<td>CA</td>
<td>Continuous Assessment</td>
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<td>*</td>
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TOTAL CREDITS: 21
CS51101:: DISCRETE STRUCTURES

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Elementary knowledge of Numbers, Sets, Basic Algebra.

Objectives:
The objective of this course module is to develop skills of Logic, Relation & functions, Group Theory and Graph Theory. This course has helped to pave the way for the present development and will prepare students for the present situation and the future by a modern approach.

Unit I  
Mathematical logic  
(9 Hrs)

- Propositions, Logical connectives, truth tables, implications and equivalence of logical statements, Disjunctive normal form and Conjunctive normal form, Valid arguments, Methods of proof. Theory of inference, predicate calculus, quantifiers free and bound variables.

Unit II  
Relations  
(9 Hrs)

- Relation defined as ordered n-tuple, Unary, binary, ternary, n-ary relations, Binary relations, Operations on relations, matrix representation and its properties.

Unit III  
Partial Order Relation  
(9 Hrs)

- Partial ordering relation, Poset. Hasse diagram, Chains and antichains. Lattice, maximal and minimal elements, upper bound, lower bound, Functions–definitions, domain, Range, One-one and Onto, Bijective function, Inverse function, Composition of function, Countable – Uncountable sets.

Unit IV  
Algebraic structures  
(9 Hrs)
Binary operation, Definitions of algebraic systems: Group, Abelian Group, Ring, Integral domain, Field. Order of a group, order of an element in a group, Composition table. Permutation group, Cyclic group, Subgroups: Cosets, right cosets, left cosets, Normal subgroups, quotient groups, Homomorphism, Isomorphism.

Unit V
Graph theory

Graph : Basic terminology, simple and weighted graph, adjacency and incidence, matrices, Degree of a vertex, Hand-shaking lemma, Directed Graph, underlying graph of directed graph, Walk, Path, Circuit. Trees: Definition – leaf, root, branch node, internal node, Rooted and binary trees, regular m-ary tree. Prefix codes, Binary search tree, Spanning trees, cut set, minimal spanning trees, Kruskal’s and Prim’s algorithms for minimal spanning tree.

Unit VI
Self Study


Text Books
2. “Graph Theory, Applications to Computer and Engineering Sciences”, N. Deo, Prentice Hall of India.

Reference Books
CS50101:: PROGRAMMING IN C

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To learn logic development.
- To become proficient in C programming language.
- To learn constructs of C language.
- To learn pointers and dynamic memory handling.
- To learn file handling with sequential, random and index sequential files.
- To create small application with the help of C files, structures

Unit I
Overview of C

Part A Brief History of C, Variables, Data Types, Operator & Expression, Character Set, C Token, Identifier & Keyword, Constant, Data Types in C, Data Declaration & Definition, Operator & Expression, Standard Input and Output, Selection Statement, if, Nested if – else, Conditional Expression, Switch statements, Iteration Statements, for loop, while loop, do-while loop, Jump Statements, Return statement., goto, break & continue, exit() function

Part B Precedence & Associatively of Operators, Nested loops, Difference between compiler and interpreter

Unit II
Functions & Pointers


Part B. Difference between macro and function, storage classes, structure of exe, Conditional, Compilation.
Unit III

Arrays & Strings

Part A. Single Dimension Arrays: Accessing array elements, Initializing an array, Character, pointers and Function, Pointers Array, Pointers to Pointers, Initialization of pointer Arrays, String Manipulation Functions, Library functions, String Manipulation functions using pointers, Multidimensional Arrays, Initializing the arrays, Memory, representation, Part B. function pointers, Array of pointers, pointer to array, string library functions using pointer

Unit IV

Structure, Union, Enumeration & typedef

Part A. Structures, Unions, Bit Fields, Enumeration, Typedef, Storage class, specifiers: Automatic, Extern, Static, Register Storage Class. Part B. Array of structures, pointer to structure, self referential structure (Linked list), difference between structure and union

Unit V

Files

Part A. External storage devices, files: definition and concepts, Command Line Arguments file organizations, Sequential File: creation, copy, merge, modify. Part B. Difference between text and binary files, Random file: Creation, modification, deletion records from file, Introduction to graphics, Hardware interface in C

Text Books


Reference Books


Additional Reading

CS50102:: INTERNET TECHNOLOGIES

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To increase the students knowledge of available web technologies.
- To become familiar with scripting languages.
- To learn and apply techniques that enhance a users web experience.

Unit I
HTML & Forms (9+2 Hrs)

Part A. Introduction To HTML, WWW, W3C, web publishing, Common HTML, Tags Physical & Logical, Some basic tags like <body>, changing background color of page, text color etc., Text formatting tags, <p> <br>,<hr> tags, Ordered & Unordered Lists Tags, Inserting image, Links: text, image links, image mapping, Tables, Frames, Form, Introduction with text box, buttons, radio buttons

Part B. Working with List box, checkbox, text area

Unit II
Cascaded Style Sheet (CSS) (9+2 Hrs)

Part A. Introduction to Style sheet, types of style sheets- Inline, External, Embedded CSS, text formatting properties, CSS Border, margin properties, Positioning, Use of classes in CSS, color properties, use of <div> & <span>, Intro & features of XML, writing XML elements, attributes etc. XML with CSS, XML DTD, Writing Simple sheets using XSLT

Part B. CSS background effects, padding properties, image properties

Unit III
Javascript (9+2 Hrs)

Part A. Intro to script, types, intro of JavaScript, JavaScript identifiers, operators, control & Looping structure, Intro of Array, Array with methods, Math, String, Date Objects with methods, User defined & Predefined functions, DOM objects, Event handling, Validations On Forms, Looping structure, Intro of Array, Array with metho

Part B. Window Navigator, History, Location.
Unit IV

PHP Language Core

Part A. Introduction to PHP and the Web Server Architecture Model, HTML Embedding Tags and Syntax, Simple PHP Script, Decision Making, Flow Control and Loops, Working with Arrays Strings and functions, Outputting Data, Include and Require Statements, Error Handling and Reporting Considerations, Processing HTML Form Input from the User, Creating a Dynamic HTML Form with PHP, Using GET, POST, SESSION and COOKIE variables, Introduction to Object-oriented PHP: Classes and Constructors

Part B. PHP and HTTP Environment Variables, Constants and Data Types, and Operators

Unit V

Database Operations with PHP and AJAX

Part A. Built-in Database Functions, Connecting to a MySQL, Selecting a Database, Building and Sending the Query to Database Engine, Retrieving, Updating and Inserting Data, Introduction to AJAX, AJAX with PHP, AJAX with database

Note: Apache Http Server is used at server side

Part B. Working of Arrays Strings and functions with database

Text Books


Reference Books

CS50103:: COMPUTER ORGANIZATION

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To understand the structure, function and characteristics of computer systems
- To understand the design of the various functional units of digital computers
- Study Microprocessor 8086 and Assembly Language Programming.

Unit 1: Structure of a Computer System (9+2 Hrs)


Part B: PCI Bus, SCSI Bus.

Unit 2: Processor Organization (CPU) (9+2 Hrs)

Part A: CPU Architecture, Register Organization, Instruction types, Types of operands, Instruction formats, addressing modes and address translation Instruction cycles, Instruction Pipelining. Introduction to 16 bit microprocessor 8086/8088: Internal architecture, Register Organization, Addressing Modes, Instruction format. Programmers model of 8086/8088 Instruction set. (Arithmetic, Data Transfer)

Part B: Programmers model of 8086/8088 Instruction set. (Logical, String & Branch)

Unit 3: Control Unit (9+2 Hrs)


Part B: Emulation. Applications of micro programming.

Unit 4: Memory Organization (9+2 Hrs)

Part A: Need, Hierarchical memory system, Characteristics, Size, Access time, Read Cycle time and address space. Main Memory Organization: ROM, RAM,
EPROM, EPROM, DRAM (example of 64kb memory using 8kb chips), SDRAM, DDR3, Cache memory Organization: Address mapping, Replacement Algorithms, Cache Coherence, MESI protocol. Virtual Memory: Segmentation, Paging, interleaved memories.

**Part B**: Secondary Storage: Magnetic Disk, Optical memory, CDROM, RAID

**Unit 5: Advanced Computer Organizations** (9+2 Hrs)


**Part B**: Input Devices, Output Devices

**Text Books**


**Reference Books**


**Additional Reading**

CS50104:: FOUNDATIONS OF MANAGEMENT

Credits: 03
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- Understand fundamental concepts and principles of management, including the basic roles, skills, and functions of management;
- Be knowledgeable of historical development, theoretical aspects and practice application of managerial process;
- Be familiar with interactions between the environment, technology, human resources, and organizations in order to achieve high performance;
- Be aware of the ethical dilemmas faced by managers and the social responsibilities of businesses.

Unit I
Management Concepts And Theory

Part A. What is Management? Is Management a science or an Art? Importance of Management, Challenges and Tasks of Management; Contributions of Taylor and Henry Fayol. Various approaches to Management; Functions of a Manager, introduction to Planning Process Nature of Plans; Types of Plans; Importance of Planning; McGregor’s Theory ‘X’ and ‘Y’

Part B. Steps in Planning. Why people fail in Planning; Limits of Planning; Establishing an Environment for Effective Planning; Creativity. Case studies based on planning

Unit II
Organizing

Part A. Introduction; Organizational Roles; Formal and informal Organization; Organizational Divisions: The Department; Factors Determining an Effective Span; Organizing a Process. Departmentalization, Basic Process in Organizing, Departmentalization by Simple Numbers; Departmentalization by Time; Departmentalization by Enterprise Function; Departmentalization by Territory, Departmentalization by Product

Part B. Customer Departmentalization: Market Oriented Departmentalization Process, Service Departments, Matrix Organization. Case studies based on organizing
Unit III  
Staffing and Motivation  
(9+2 Hrs)

Part A. Staffing: Recruitment; Selection; Sources of New Employees; Kinds of Tests; Purpose of Employment Interview; Education and Training; An Introduction; Methods of Training. Leadership-Definition and Concepts; Leadership Styles; The Managerial Grid; Leadership and Managing, Introduction to Motivation, Concept of Motivation and Motivators; The theory of ‘Hierarchy of Needs’; Hertzberg’s Theory on Motivation; The Porter and Lawler Model on Motivation; Special Motivational Techniques  
Part B. The Porter and Lawler Model on Motivation; Special Motivational Techniques.  
Case studies based on Staffing and Motivation

Unit IV  
Communication:  
(9+2 Hrs)

Part A. Communication, Purpose and Importance; The Communication Process; Need for Different Types of Communication in a Business Enterprise; Barriers and Breakdowns in Communication; Towards Effective Communication Controlling Methods: The Control Process; Control as a Feedback System; Common types of standards used in Control Process; Control Technique; The Budget; Return on Investment Contents of Unit  
Part B. Case studies based on Communication

Unit V  
Decision Making  
(9+2 Hrs)

Part A. Introduction and Definition; Aids to Decision Making; Theories of Decision Making; Decision Making; Under Certainty; Decision Making; Under Uncertainty. Key issues in Modern Management: MBO; Quality Circles- A Review; Total Quantity Management; Review and Concepts  
Part B. Case studies based on decision making

Text Books

2. “Essential of Management”, Koontz H & Weitrich H

Reference Books

2. “Management Today Principles And Practices”, Burton & Thakur
CS50201:: PROGRAMMING IN C (Tutorial)

Credits: 01  
Teaching Scheme: Tutorial 1 Hr/Week

Prerequisites: Nil

Objectives:
- To learn logic development.
- To become proficient in C programming language.
- To learn constructs of C language.
- To learn pointers and dynamic memory handling.
- To learn file handling with sequential, random and index sequential files.
- To create small application with the help of C files, structures

List of Contents

A TERM-WORK containing the record of the following:

Tutorial 1  Check for the perfect number, odd and even number.
Tutorial 2  Display the tables from 1 to 10 using nested loop
Tutorial 3  Write a function to print average of 3 numbers
Tutorial 4  Write a function to swap two numbers using call by value and call by reference
Tutorial 5  Write a function to find the maximum of 10 numbers
Tutorial 6  Use the Recursion function for printing reverse of line.
Tutorial 7  Write a program to print smallest and largest value of matrix.
Tutorial 8  Write a program to swap two arrays
Tutorial 9  Write a program to check whether entered string is palindrome or not
Tutorial 10 Implement library system using structure
Tutorial 11 Implement any sequential access file using command line arguments
Tutorial 12 Write program for creation of random file for storing library data

Text Books

Reference Books

Additional Reading
2. R. Hutchison, ‘Programming in C’
CS50301: PROGRAMMING IN C LAB

Credits: 02
Teaching Scheme: - Laboratory 4 Hrs/Week

Prerequisites: Nil

Objectives:
- To learn logic development.
- To become proficient in C programming language.
- To learn constructs of C language.
- To learn pointers and dynamic memory handling.
- To learn file handling with sequential, random and index sequential files.
- To create small application with the help of C files, structures.

List of Practical

1. Find Area, Perimeter of Square, Rectangle and Circle.
2. Find maximum of three numbers.
3. Check for the Prime and Armstrong Number.
4. Display the Floyd’s Triangle.
5. Find the Fibonacci Series and Factorial of Number, GCD of numbers.
6. Implement Inter conversion of Decimal, Binary & Hexadecimal no.
7. Implement the Function with call by values with and without return values and the implementation of function using call by reference.
8. Implement Pointer Arithmetic.
9. Use the Recursion function for finding sum of digits / reverse of digits / Fibonacci / Factorial etc.
10. Write a program for linear search, binary search.
11. Write a c program to merge the given two integer array elements in a third array. The new array should have the elements sorted in ascending order. Assume that the array to be merged are sorted in ascending order.
12. Implement the Addition and Multiplication of matrices.
14. Write a program to String manipulation functions e.g. string length, copy, concatenation, compare, reverse and palindrome with and without using library functions.
15. Implement Array of Structures to handle information such as Student result, Employee pay slip, Phone bill etc.
16. Implement File handling to perform Read / Write file, copy, merge file.
17. Develop a application for students result processing. Write program for creation of
sequential file.
18. Write program for creation of random file for storing library data

Mini Project Based on C:
The objective of this mini project is to gear up student for preparation of final project in Semester. Student will select individually project based on C. The students will be assessed based on demonstration.

Text Books

Reference Books
2. “C++ Primer ”, Stanley Lippman & Lafo,

Additional reading
1. “C++ Programming Language”, Bjarne Stroustrup
CS50302:: INTERNET TECHNOLOGIES LAB

Credits: 01
Teaching Scheme: - Laboratory  2 Hrs/Week

Prerequisites: Nil

Objectives:
- To increase the students knowledge of available Web technologies.
- To become familiar with scripting languages.
- To be able to designing interactive web pages.
- To become familiar with server side scripting.
- To learn and apply techniques that enhance a users web experience.

List of Practical

1. Create your home page using HTML. The page should contain images, tables, ordered and unordered lists, internal and external links and other text formatting elements.
2. Create a webpage to show the usage of frames in HTML.
3. Create a web page using the class and properties of CSS.
4. Create a web page with dynamic text effects. The text and image must change color, size and background on mouse events.
5. Create a user data validation form using JavaScript.
6. Write a user defined function in JavaScript to check if a string is palindrome or not. Do not use predefined function for the same.
7. Create an external DTD for a XML document storing data about students using appropriate elements, attributes and values.
8. Create a simple sheet using XSLT.
9. Implementation of passing variables through URL in PHP.
10. Implementation of user Authentication in PHP.(use session, cookies)
11. Implementation of database operation with PHP.
12. Implementation of sending email using PHP.

Mini Project Based on Web Programming:
The objective of this mini project is to provide introductory knowledge about web programming. Student will select individually commercial project based on web programming. The students will be assessed based on individual demonstration.

Text Books


Reference Books
CS50305:: SOFTSKILLS

Credits: 01

Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: Nil

Objectives:
- Enable students to comprehend the concept of communication
- To make the students aware of the importance, the role and the content of softskills through instruction, knowledge acquisition, demonstration and practice.
- To expose students to right attitudinal and behavioral aspects, and to build the same through activities.
- Teach students the four basic communication skills – Listening, Speaking, Reading and Writing
- Teaching students to the nuances of the four basic communication skills – Listening, Speaking, Reading and Writing.
- Learn The major concepts of technical communication (including audience analysis, ethics, collaboration, graphics, and design).
- Learn The major kinds of documents (memos, instructions, proposals, reports, and digital media)
- Learn oral presentations using a variety of research sources, including web communication environments to develop materials, gather responses, and engage in critical analyses.

List of Practical

1. Write a personal essay and or resume or statement of purpose which may include:
   - Who am I (family background, past achievements, past activities of significance)
   - Strength and weakness (how to tackle them) (SWOT analysis)
   - Personal Short-term Goals, long term goals and action plan to achieve them
   - Self assessment on soft-skills
2. Student will present to a group from the following ideas : Multimedia based oral presentation on any topic of choice (Business/Technical)
3. Student will present to a group from the following ideas : Public speaking exercise in the form of debate or elocution on any topic of Choice.
4. Student will undergo activities related to verbal/non-verbal skills from Appearing for mock personal interviews
5. Student will undergo activities related to verbal/non-verbal skills from following
   - Appearing for mock personal interviews
   - Participating in group discussion on current affairs/Social Issue/ethics and etiquettes
   - Participating in games, role-playing exercises to highlight nonverbal skills.
7. Student will submit one business document from the following
   - A representative official correspondence
   - Minutes of meeting
   - Work progress report
8. Students will participate in activities like:
   - Team games for team building
   - Situational games for role playing as leaders, members
9. Students will participate in activities like:
   - Organizing mock events
   - Conducting meetings

Text Books
1. “Asha Kaul”, Business Communication
2. “John Collin, “Perfect Presentation”, Video Arts MARSHAL

Reference Books
1. Jenny Rogers “ Effective Interviews”, Video Arts MARSHAL
2. Dr. R. L. Bhatia, “Managing time for competitive edge”.

Additional reading
1. M. Balasubramanyam, Business Communication
2. Raman Sharma, “ Technical Communications”, OXFORD
Title: Course Structure

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Abbreviations Used

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TOTAL CREDITS 21
CS51102:: MATHEMATICAL & STATISTICAL FOUNDATIONS

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Basic knowledge of sets and numbers.

Objectives:
The objective of this course is to explain to the students the importance of statistical methods for developing sound techniques for handling and analysis of numerical data and drawing valid inferences from it.

Unit I (9 Hrs)
Measures of central tendency
Frequency distributions, Graphical representation of a frequency distribution, Measures of central tendency: Arithmetic mean, Geometric mean, Harmonic mean and their properties. Mode, Median and their properties. Combined Mean. Partition values and graphical representation of partition values.

Unit II (9 Hrs)
Measures of Dispersion

Unit III (9 Hrs)
Correlation and regression
Bivariate distributions, Scatter diagram, Correlation, Karl Pearson’s coefficient of correlation and its properties, Rank correlation, Spearman’s rank correlation coefficient, Linear regression, lines of regression, coefficient of regression.

Unit IV (9 Hrs)
Probability
Introduction, Basic terminology: random experiment, sample space, event, mutually exclusive, exhaustive and independent events. Probability: classical definition and empirical definition. Conditional probability, Binomial probability, Bayes’ theorem.

Unit V (9 Hrs)
Random Variable and probability distributions

Definition of random variable, discrete and continuous random variables, Probability mass function, probability density function, Cumulative distribution function, Their properties and graph. Binomial and Poisson distributions. Uniform, Normal, Exponential distribution. (For all the above distributions using these definitions mean & variance should be obtained.) Special properties of the distribution (if any).

Unit VI 
Self Study
(10 Hrs)

Deciles, Percentiles, Measures of skewness (Karl Pearson’s and Bowley’s coefficient), Measure of skewness based on moments, Leptokurtic, mesokurtic, platykurtic distributions, Correlation coefficient for a bivariate Frequency distribution, Joint continuous Probability distribution: marginal & conditional distributions.

Text Books

Reference Books

Additional Reading:
CS50106:: DATA STRUCTURE

Credits: 03

Teaching Scheme: Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To introduce algorithmic analysis, fundamental data structures, problem solving paradigms
- To study the representation, implementation and application of basic data structures.
- To introduce algorithmic strategies and time complexity analysis of problems.
- Apply Data Structures and other techniques to Real life problems

Unit I
Introduction to Data Structure


Unit II
Linked List


Part B. Ordered Linked List: Singly, Doubly. 
Unit III  
(9+2 Hrs)

Tree

Part A. Tree Terminology, Binary Tree, Binary Tree Representation, and Binary Search Tree (BST): creation of binary search tree, finding height and counting leaf nodes of a binary search tree (with and without recursion), Finding mirror image of the binary search tree with and without recursion, Deletion of a node from a binary search tree, printing a tree level wise and depth wise. Threaded binary trees, Creation and traversal of in-order, pre-order and post-order threaded binary tree, Insertion and deletion of nodes in threaded binary tree.

Part B. pre-order and post-order threaded binary tree,

Unit IV  
(9+2 Hrs)

Tree applications and graph

Part A. Expression Tree. AVL tree, B tree, introduction to B tree, insertion in B tree, deletion.
Graph: Introduction, Graph Representation, Adjacency Matrix, Adjacency List, Graph Traversals, Depth First Search, Breadth First Search, topological sorting, Applications of Graph. Shortest path finding algorithm.

Part B. introduction to B+,B* tree, red-black tree.

Unit V  
(9+2 Hrs)

Sorting, searching and hashing


Part B. Sorting, Bubble, exchange, selection, insertion.

Text Books

Reference Books

CS50107: OPERATING SYSTEM

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Data Structures and Algorithms, Computer Organization.

Objectives:
- Identify the role of operating systems and explain the different structures of operating systems.
- Describe OS support for processes/threads, and virtual memory, I/O and file systems.
- Evaluate processes and/or threads synchronization mechanisms and explain deadlock conditions and ways to resolve them.
- Identify the different design and implementation concepts for Unix/Linux.
- Use Inter-Process Communication techniques under Unix/Linux.

Unit I
Introduction to OS and Shell Programming

Part A. Architecture, Goals & Structures of O.S., Hardware Abstraction layer, Basic functions, Interaction of OS and hardware architecture, Batch processing, multiprogramming, multitasking, time sharing, parallel, distributed & real-time OS, Shell and Command Programming

Part B. Difference between Linux and Windows OS

Unit II
Process Management


Part B. Dekker’s Algorithm, Peterson’s Algorithm

Unit III
CPU Scheduling & Deadlock

(9+2 Hrs)

(9+2 Hrs)

(9+2 Hrs)
Multiprocessor Scheduling: Granularity, Design Issues, Process Scheduling, Thread Scheduling, Real Time Scheduling: Characteristics, Real Time Scheduling, Deadlock: Principles of deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Deadlock Recovery
Part B. Multilevel queue scheduling, Multilevel feedback queue scheduling, Implementation of Banker’s algorithm

Unit IV
Memory Management

Part A. Memory management requirements, Fixed and Variable Partitioning, Allocation Strategies (First Fit, Best Fit, Worst Fit), Fragmentation, Swapping, Virtual Memory: Concepts, Segmentation, Paging, Address Translation, Demand paging, Page Replacement Policies (FIFO, LRU, Optimal, Other Strategies), Thrashing
Part B. Simulation of memory allocation algorithms

Unit V
I/O Devices & Files

Part B. Windows registry

Text Books

Reference Books
CS50108:: SOFTWARE ENGINEERING

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To learn the complete Software life cycle and understand its major activities such as software requirement analysis, design, testing, and implementation.
- An understanding of different software processes and how to choose between them.
- Understanding and Experience in Writing Requirements and Specifications.
- Introducing the various design approaches, models and metrics.
- Understanding and Experience in Designing and Rapid Prototyping.
- Presenting the various techniques of software cost estimation and risk assessment.
- To learn how to work in teams

Unit I  
SOFTWARE PROCESS MODELS  
( 9+2 Hrs)


Part B. Understanding of meaning of software, module, program, problem partitioning

Unit II  
REQUIREMENTS ENGINEERING  
( 9+2 Hrs)


Part B. Deploying Requirement Elicitation Techniques in context of real world problems
Unit III
DESIGN ENGINEERING

Part B. Case studies based on Design Engineering

Unit IV
TECHNICAL METRICS FOR SOFTWARE

Part A. Measurement Principles, Attributes for Effective Software Metrics, Function based metrics, Bang metric, Metrics for specification quality, High level design metrics, interface design metrics, source code metrics.
Part B. Case studies based on technical metrics

Unit V
RISK MANAGEMENT

Part B. Assessment and control of software risks

Text Books

Reference Books
CS50109:: MANAGEMENT ACCOUNTANCY

Credits: 03  \hspace{1cm} Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:

- To introduce students to accounting as the "language of business" and to the various financial accounting topics covered in the course with the understanding that some students may pursue more in-depth study in subsequent courses while others do not intend to continue their accounting education.
- To teach students to apply accounting theory, standards, principles and procedures to practical accounting problems in the elementary topical areas covered in the course.
- To teach students the fundamental rationale for the various financial accounting procedures introduced in the course.

Unit I
PRINCIPLES OF ACCOUNTING

Part A. Nature And Scope of Accounting, Double Entry System of Accounting, Introduction to Basic Books of Accounts of Sole Proprietary Concern, Closing of Books of Accounts And Preparation of Trial Balance
Part B. Numerical Problem solving based on (A) from text book prescribed

Unit II
FINAL ACCOUNTS

Part A. Trading, Profit And Loss Accounts And Balance Sheet of Sole, Proprietary Concern With Normal Closing Entries
Part B. Numerical Problem solving based on (A) from text book prescribed

Unit III
RATIO ANALYSIS

Part B. Numerical Problem solving based on (A) from text book prescribed

( 9+2 Hrs)
Unit IV
COSTING

Part A. Nature, Importance And Basic Principles, Budget And Budgetary Control: Nature And Scope, Importance Method Of Finalization, And Master Budget, Functional Budgets

Part B. Numerical Problem solving based on (A) from text book prescribed

Unit V
MARGINAL COSTING

Part A. Nature, Scope, Importance, Construction of Break Even Chart, Limitations And Uses Of Break Even Chart, Practical Applications of Marginal Costing

Part B. Numerical Problem solving based on part A from text book prescribed

Text Books
2. “Management Accounting”, Khan and Jain, Tata Mcgraw Hill

Reference Books
1. “Cost and Management Accounting”, Duncan Williamson PHI
CS50207: OPERATING SYSTEM (TUTORIAL)

Credits: 01  
Teaching Scheme: Tutorial 1 Hr/Week

Prerequisites: Data Structures and Algorithms, Computer Organization.

Objectives:
- To study the operations performed by Operating Systems as a resource manager.
- To learn the evolution of Operating Systems.

List of Contents

Implementation of a multiprogramming operating system:

A. Stage I
   CPU/ Machine Simulation
   Supervisor Call through interrupt

A. Stage II
   Paging
   Error Handling
   Interrupt Generation and Servicing
   Process Data Structure

B. Stage III
   Multiprogramming
   Interprocess Communication
   Virtual Memory
   IO handling spooling and buffering
Text Books

Reference Books
CS50306: DATA STRUCTURE LABORATORY

Credits: 02  Teaching Scheme: - Laboratory  4 Hrs/Week

Prerequisites: C Programming

Objectives:
- To introduce algorithmic analysis, fundamental data structures, problem solving paradigms
- To study the representation, implementation and application of basic data structures.
- To introduce algorithmic strategies and time complexity analysis of problems.
- Apply Data Structures and other techniques to Real life problems.

List of Practicals

1. Program for sparse matrix representation, transpose of sparse matrix, addition of two sparse matrix.
2. Program for polynomial addition, polynomial multiplication (static representation).
3. Program for singly linked list implementation. (insert, traverse, delete)
4. Program for ordered linked list implementation. (insert, traverse, del)
5. Program for reversing linked list implementation.
6. Program for merging two linked lists implementation
7. Program for doubly linked list implementation. (insert, traverse, delete).
8. Program for ordered doubly linked list implementation. (insert, traverse, delete)
9. Program for ordered circular linked list implementation. (insert, traverse, delete)
10. Program for ordered circular doubly linked list implementation. (insert, traverse, delete)
11. Program for stack implementation. (array, pointer implementation).
12. Program for multiple stack implementation.
13. Program for internal conversion for infix, postfix, prefix.
15. Program for matching parenthesis.
16. Program for queue implementation (array, pointer).
17. Program for circular queue implementation (array, pointer).
18. Program for reversing stack using queue.
19. Program for queue application. (priority queue)
20. Program for binary search tree implementation. (insert, level buy level traverse, delete,
    pre order, post order, inorder, copy, mirror, sum_of_nodes, count_leaf, display_leaf,
    count_nodes).
22. Program for depth first search in graph and breadth first search in graph.
23. Program for searching given element in list using linear search, binary search.
24. Program by creating separate functions for sorting list of elements using bubble sort, insertion sort, selection sort, merge sort, quick sort.
Mini Project Based on Data Structure:

The objective of this mini project is to gear up student for preparation of final project in Semester. Student will select individually commercial or Technical project based on Data Structures. The students will be assessed based on demonstration.

Text Books

Reference Books

Additional reading
CS50307:: OPERATING SYSTEM LABORATORY

Credits: 01  
Teaching Scheme: - Laboratory  2 Hrs/Week

Prerequisites: Data Structures and Algorithms, Computer Organization.

Objectives:
- To study the operations performed by Operating Systems as a resource manager.
- To learn the evolution of Operating Systems.

List of Practical

1. Solve the Readers-Writers problem using threads and semaphores.
2. Solve the Producers-Consumers problem using threads and semaphore.
3. Exercise on shell programming
4. Simulation of CPU scheduling algorithms.
5. Simulation of Banker’s Algorithm
6. Simulation of page replacement algorithm
7. Simulation of disk scheduling algorithms.

Text Books


Reference Books

CS50308:: SOFTWARE ENGINEERING LABORATORY

Credits: 01  Teaching Scheme: - Laboratory  2 Hrs/Week

Prerequisites: Nil

Objectives:
- To learn the complete Software life cycle and understand its major activities such as software requirement analysis, design, testing, and implementation.
- To learn different software processes for producing software products.
- An understanding of different software processes and how to choose between them.
- Understanding and Experience in Writing Requirements and Specifications.
- Introducing the various design approaches, models and metrics.
- Understanding and Experience in Designing and Rapid Prototyping.
- Understanding of Software Management including Planning/scheduling.
- Presenting the various techniques of software cost estimation and risk assessment.
- To learn how to work in teams.

List of Practical

1. To narrate Requirement Definition Document for the target system with following areas:
   - Problem Identification
   - Problem Statement
   - Proposed Solution
   - Benefits

2. To narrate System Requirements Specification Document for target system with reference to the IEEE 610.12.1990 std guidelines. The requirements collected need to fall into Functional, Nonfunctional, Pseudo and inverse requirements categories. The User and Stakeholder identification must be made.

3. To perform feasibility study and develop a project plan.

4. To develop analysis model of the target system by Context level DFD accompanied by Problem decomposition and Data Store indicators. It is expected that up to Level 3 DFD analysis must be included.

5. To develop design model of the target system by identifying the First cut program structure. The modules identified need to bear processing narrative.

Mini Project :
The objective of this mini project is to gear up student for preparation of final project in Semester. Student will select individually commercial or Technical project based software Engineering concepts. The students will be assessed based on demonstration.

Text Books

Reference Books
SEMESTER III
# Course Structure

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## Abbreviations Used

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<tr>
<th>Abbreviation</th>
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<tr>
<td>HA</td>
<td>Home Assignment</td>
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<td>Alternate Week Labotatory</td>
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TOTAL CREDITS 21
CS61102:: COMPUTER ORIENTED NUMERICAL METHODS

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Basic Algebra, Differential Equations.

Objectives:
By the end of this module students are expected to demonstrate the knowledge of

- Difference Operators. Interpolation for arguments proceeding at equal as well as unequal intervals.
- Fitting a function to the tabulated values by method of least squares.
- Numerical differentiation and integration.
- Numerical Solution of Differential Equations.

Unit I
Numerical Methods


Unit II
Interpolation

Part A. Difference operators: forward difference, backward difference, central difference, shift operators. Interpolation for arguments proceeding at equal intervals: Newton’s forward difference a interpolation formula, Gauss’s central difference formulae, Stirling’s Formula, Interpolation with unequal intervals, Lagrange interpolation formula.

Part B. Derivation of relations of forward difference, backward difference, shift operators. Dividend difference operator, Relation between divided differences and ordinary differences.
Unit III
Least Squares Approximations of Functions


**Part B.** Fitting of $y = ax^b + c$, $b$ non-integer. Taylor series representation, Chebyshev

Unit IV
**Numerical Differentiation and Integration**

**(9+2 Hrs)**


**Part B.** Gaussian Quadrature formulae.

Unit V
**Numerical Solution of Ordinary Differential Equations**

**(9+2 Hrs)**


**Part B.** Solution of boundary value problems by finite difference method.

**Text Books**


**Reference Books**


**Additional Reading**:

1. “Numerical Methods for Engineers”, Steven C. Chapra, Raymond P. Canale, Tata Mac-Grav Hill.
CS60101: DATABASE MANAGEMENT SYSTEM

Credits: 03  Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To understand fundamental concepts and principles of database management system, including the architecture, design and functionality.
- To become proficient in database design.
- Be familiar with data modeling concepts (E-R and Class diagrams) used in database development.
- Be able to create databases and pose complex SQL queries of relational databases.
- To solve case studies based on ER diagram, Normalization, SQL.
- Understand database performance issues

Unit I  (9+2 Hrs)
Database Basic concepts


Part B. ER Diagram Case Studies

Unit II  (9+2 Hrs)
Relational data model

Part A. Relational Model, Codd’s rules, Relational data model and relational algebra
Relational model concept, Relational model constraints, Relational Algebra – Relational database language, Data definition in SQL, Views and queries in SQL, Specifying constraints and indexes in SQL, Specifying constraints management systems Oracle

Part B. PL/SQL basic programs

Unit III  (9+2 Hrs)
RDBMS Design
Part A. Normalization: need of normalization, ER to Relational, Functional dependency, Inference Rules for Functional Dependencies, Closure of functional dependencies, Normal forms 1NF, 2NF, 3NF, 4NF, 5NF and Checking of lossless join, dependency preserving decomposition, A real world example of normalization.

Part B. Domain key normal form

Unit IV
Transaction:
Part A. Concept of transaction, ACID properties, serializibility, Prioritization, states of transaction, Concurrency control & recovery techniques, Locking techniques, Time stamp ordering, Granularity of data items, deadlock, Crash Recovery and Backup, Failure classifications, storage structure, Recovery & atomicity, Log base recovery, Recovery with concurrent transactions, Failure with loss of Non-Volatile Storage, Database backup & recovery, from catastrophic failure, Remote Backup System.
Part B. Multiversion scheme.

Unit V
Security and privacy
Part A. Security and privacy, database security issues, discretionary access control based on grant & revoking privilege, mandatory access control and role based access control for multilevel security. Encryption & public key infrastructures. Introduction to Query optimization. Selection size estimation.
Part B. Query optimization, Transformation of relational expressions. Storage and File Structure, Indexing and Hashing

Text Books:

Reference Books:

Additional Reading
CS60102::OBJECT ORIENTED DESIGN AND PROGRAMMING

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To experience the insights necessary to obtain maximum benefit from object technology
- To become familiar with the unified modeling language (UML 1.x or UML 2.0)
- To understand the practical connections between the theory of object-oriented design and the object-oriented programming languages.
- Learn Object Oriented Programming concepts.
- Learn c++ programming.

Unit I
Object Oriented concept


Part B. UML Diagram Case Studies.

Unit II
UML Diagram

Part A. Activity Diagram, Collaboration Diagram , Sequence Diagram, State chart diagram, Specification Class Diagram, Object Diagram, Deployment Diagram

Part B. UML Diagram Case Studies.

Unit III
Introduction to Object Oriented Programming

Part B. Static Data Members and static member Functions, Manipulating of String Using Operators, overloading operator using friend.

Unit IV
Inheritance and exception handling

(9+2 Hrs)


Part B. Multilevel Inheritance, Hybrid Inheritance., Nested Namespaces, Unnamed Namespaces, Namespace Aliases.

Unit V
Advance concepts

(9+2 Hrs)

Text Books:


Reference Books:

CS60103:: COMPUTER NETWORKS

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Data Communication.

Objectives:
- To understand some of the common data link layer protocols.
- To learn various routing algorithms.
- To understand various protocols used at different layers.

Unit I
Introduction


Part B. Mathematical derivation for frequency modulation

Unit II
Data Link Layer


Part B. SLIP, SONET, MPLS, Switched, fast and Gigabit Ethernet.

Unit III
Network Layer

Part B. Routing Algorithms: Broadcast routing, Multicast routing, Routing for mobile

Unit IV
Transport Layer

Part A. Services and service primitives, Elements of Transport protocol: Addressing, Connection establishment and release, flow control and buffering, Multiplexing, Crash recovery, UDP: Introduction, TCP: Introduction, Model, protocol, header, connection establishment and release, connection management, Transmission policy, congestion control, timer management, RPC, Introduction to wireless TCP and UDP.

Part B. Socket programming Windows.

Unit V
Application Layer


Text Books

Reference Books

Additional Reading
CS60109:: MANAGEMENT SUPPORT SYSTEMS

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- Understanding of types of information systems.
- Learn usage of information systems in business operations.
- Learning of how to formulate the business rationale for a business system.
- Understanding the key components of business network.
- Understanding alternatives for decision making.
- Understanding systems required for top management

Unit I  
System Concept

Part A. General Model, Types of systems, Subsystems, Organizational structure and functions, Systems approach to organization, exception, Feedback control, Law of requisite variety, Concept of Information, Quality and Value of information

Part B. Cases related to Feedback Control

Unit II  
Management Information Systems

Part A. Definitions, Integrated system, MIS Vs Data processing, Structure of MIS based on management activity and functions, Newell-Simon model, Limits on Human Information Processing, Characteristics of Human Information Processing performance

Part B. Information Systems for Functional Areas like information for finance, Marketing, Inventory control, Production function

Unit III  
Decision Support Systems And Modeling


Part B. Differences between MIS and DSS
Unit IV
Executive Information Systems And Expert Systems

Part B. Difference between DSS and EIS

Unit V
Personnel Administration Data Systems & Human Resource Management Information Systems

Part A. Types of Personnel Administration Data Systems; Personnel Status Reporting System; Employee Profile System; Personnel Data Retrieval System; Employment Control Reporting System; Employment Practice and Compliance Reporting System.
Part B. Personnel Action Data Systems; Placement Data Systems; Personnel Activity Reporting System; Fringe Benefit Administration System; Insurance Claims Processing Systems; Accident Reporting System
Text Books
1. Management Information System, Waman Javadekar
2. Management Information System, Gordan Devis, Margrethe H. Oison

Reference Books
1. “Information Systems for Modern Management”, Robert Murdick, Joel e. Ross
CS60202:: OBJECT ORIENTED DESIGN AND PROGRAMMING
(TUTORIAL)

Credits: 1  
Teaching Scheme: - Theory 1 Hrs/Week

Prerequisites: Nil

Objectives:
- To experience the insights necessary to obtain maximum benefit from object technology
- To become familiar with the unified modelling language (UML 1.x or UML 2.0)
- To understand the practical connections between the theory of object-oriented design and the object-oriented programming languages.
- Learn Object Oriented Programming concepts.
- Learn c++ programming.

List of assignment
A TERM-WORK containing the record of the following:

  Tutorial 1. UML Diagram case studies (Use Case Diagram)
  Tutorial 2. UML Diagram case studies (Object Diagram)
  Tutorial 3. UML Diagram case studies (Class Diagram)
  Tutorial 4. UML Diagram case studies (Activity Diagram)
  Tutorial 5. UML Diagram case studies (Sequence Diagram)
  Tutorial 6. UML Diagram case studies (State Chart Diagram)
  Tutorial 7. UML Diagram case studies (Component Diagram)
  Tutorial 8. UML Diagram case studies (Package Diagram)
  Tutorial 9. UML Diagram case studies (Deployment Diagram)

Text Books:

Reference Books:
CS60301::DATABASE MANAGEMENT SYSTEM LABORATORY

Credits: 01  \hspace{1cm} \textbf{Teaching Scheme:} - Laboratory 2 Hrs/Week

Prerequisites: NIL

Objectives:
- To learn oracle SQL, PL/SQL .
- To be familiar oracle technology.
- To solve case studies based SQL.

List of Practical

I. \hspace{1cm} \textbf{Introduction of SQL}

1. DDL, DML, DTL, Constraint definition examples
2. Commands to create table, Commands for table handling, Alter table , Drop table , Insert records, Commands for record handling, Update, Delete
3. Select with operators like arithmetic, comparison, logical Query Expression operators
4. Ordering the records with order by
5. Grouping the records ,Group functions: Avg, max, min, sum, count
6. Set operations : Union, Union all, intersect, minus
7. Join concept: Simple, equi, non equi, self, outer join
8. Sub queries.

II. \hspace{1cm} \textbf{PL/SQL}

10. Basic programs,Control structure,Condition – if, Interactive- loop, for, while.
11. Programs based on Database function , procedure and Triggers.
12. Programs based on Cursor.
13. Mini Project Based on SQL,PL/SQL

Text Books

Reference Books

1. “Understanding SQL”, Martin Gruber BPB publication, 2003
CS60302::OBJECT ORIENTED PROGRAMMING LABORATORY

Credits: 01

Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: NIL

Objectives:
- To experience the insights necessary to obtain maximum benefit from object oriented technology
- Implementation of Object Oriented Programming concepts

List Of Practical
1. Program for calculate area of square & other function to calculate area of circle overload these two function. Function parameter accept from user (Use function Overloading concepts).
2. Use Dynamic initializations of object concept Write a class cString having following
   - Data Abstraction
   - Length of string (int)
   - Base address of the string (char *)
   Procedural Abstraction
   - Default constructor, Parameterized constructor having char * parameter
   - Copy constructor
   - AcceptString()
   - DisplayString()
   - Destructor()
3. Operator overloading-I Write a class Complex containing members as m_real and m_imag. Overload binary +, binary -, unary -, ++ and – operators
4. Operator overloading-II Write a class cString and overload assignment ,insertion and extraction operators for it.
5. Design a C++ class set with suitable constructor and overload operator.
   - Operator + for union
   - Operator – for intersection
   - Operator < for difference
6. Design a C++ class string to overload < and > operator
7. Single Inheritance Derive class cWageEmployee from cEmployee
8. Multiple Inheritance Derive class cWageEmployee, cManager from cEmployee
9. Virtual base class concept Write a c++ program for display the result of the student as a class student accept roll no of the student, class test accept marks of the two subjects, in class sports accept student’s sports marks. All the information of the above classes display in the result class. Use virtual base class concept.
10. Pure virtual base class Write a c++ program for calculate area of circle & rectangle.
Create class shape & two other classes circle & rect. Use pure virtual class function concept

11. Create two derived classes called test-containing marks of two subjects & other derived class called result calculates result of the student. Use multilevel Inheritance.

12. Menu driven program in c++ for containing info. Of the person as choices (create update display & exit) create a class person-containing name, code of the person as an employee & other three classes as class A/c, class admin class master. Use hierarchical Inheritance

13. Program for unstructured Exception:
   - divide by zero
   - Array index out of bounds exception
   - Null pointer Exception
   - Using structured exception handlings catch these exceptions.

14. Template function & Namespace Write program for bubble sort using template and namespace.

15. Template class Write program for linked stack using template

16. RTTI Modify the class Stack to handle runtime anomalies like Overflow- Resulting out of trying to push an element when stack is full Underflow – Resulting out of trying to pop an element when stack is empty When exception is thrown the error no and appropriate error message should be displayed

Text Books

Reference Books
2. Stanley Lippman & Lajo,. “C++ Primer”

Additional Reading
1. Bjarne Stroustrup, “C++ Programming Language ”
CS60303: COMPUTER NETWORKS LABORATORY

Credits: 01  
Teaching Scheme: - Laboratory  2 Hrs/Week

Prerequisites: Data Communication.

Objectives:
- To learn and understand fundamentals of computer network.
- To learn and understand network architectures, protocols and applications

List of Practical

1. Study any protocol analyzer software (eg. Wireshark) to learn and use its important features, Study of network monitoring software like ETHREAL software. Assignment to examine TCP/IP and non-TCP/IP protocols (IPX/SPX) and capture them using protocol analyzer Software.
2. Study of existing LAN and understand the design and various components. Set up a small network of 3 to 4 computers and Hub/Switch as directed by the instructor. Use LAN Card, UTP Cables and Connectors. Install LAN Cards and Crimp the connectors.
3. Study and simulate OSI reference model.
4. Socket Programming using TCP
5. Socket Programming using UDP.
6. Implement CRC.
7. Implement Checksum.
8. PC-to-PC communication through RS-232 port (COM).
9. Implement Dijkstra’s Shortest path routing algorithm.
10. Implement sliding window protocol.

Mini Project Based on Computer Networks:
The objective of this mini project is to gear up student for preparation of final project in Semester. Student will select individually commercial or Technical project based on Computer Networks. The students will be assessed based on demonstration.

Text Books
Reference Books


Additional Reading

CS67401:: SEMINAR I

Credits: 01

Objectives: -
- To raise awareness about current technical topics.
- To gain new insights from examples of best practice.
- To learn and share knowledge about current technical topics in the field of computer.
- Present technical information clearly, concisely, and persuasively
- Inculcate research culture.
- Study and analyze one technical topic in detail.

Seminar is a course requirement wherein under the guidance of an internal guide a student is expected to do in depth study of Current Trends in Information Technology by doing literature survey, and understanding different aspects of the technology. It is mandatory to give a seminar presentation before a panel constituted for the purpose. The credits shall be awarded on the basis of the understanding of the concept and presentation by the student concerned.

Guidelines for Seminar

- Seminar topic strictly should be technical.
- Students have to refer research paper (publishing year : current or previous two years) preferably IEEE/ACM conference/journal paper and select the seminar topic. Students should discuss this topic with their respective guides.

Seminar Report Covers

- Certificate
- Index Page
- List of figures
- List of symbols and their meaning
- List of tables
- Titles/ Chapter Name : 14 pt (Bold)
- Subtitles / Paragraph Name : 12 pt (Bold)
- If any figure is copied from web page, write its URL in the text describing it
- Use equation editor for writing equations and uniformity of equations throughout report is assumed.
- Regular Text : 12 pt
- Font : Arial for titles and times new roman for regular text
Guidelines for Presentation

- Maximum: 20 Power point Slides
- Font: preferably times new roman for regular text
- Use more conceptual diagrams to explain a concept. Use more colors if needed.
- Do not paste paragraphs after paragraphs in the slides.
- Avoid copying figures if possible. If not then write an URL under the figure caption.
- Type equations using equation editor (Do not copy and paste)
- Write bibliography and references in last slide.
- Heading: 24 pt
- Subtitles (Text): 20 pt
- Only 6 points on each slide
- Time: 20 minutes for presentation and 05 min for question answer session.
SEMESTER IV
### Course Structure

#### Theory Courses

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<thead>
<tr>
<th>Code</th>
<th>Subject Name</th>
<th>Teaching Scheme (Hrs. / week)</th>
<th>Examination Scheme</th>
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<tr>
<td>CS61103</td>
<td>Quantitative Techniques</td>
<td>3</td>
<td>60</td>
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<td>CS60105</td>
<td>Design and Analysis of Algorithms</td>
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<td>CS60106</td>
<td>Java Programming</td>
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<td>CS60110</td>
<td>Software Project Management</td>
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<td>CS60111</td>
<td>Computer Graphics and Multimedia</td>
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#### Laboratory Courses

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<td>CS60306</td>
<td>Java Programming Lab</td>
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<td>CS60311</td>
<td>Computer Graphics and Multimedia Lab</td>
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#### Abbreviations Used

- **HA**: Home Assignment
- **TA**: Teacher Assessment
- **ISE**: In Sem. Examination
- **ESE**: End Sem. Examination
- **CA**: Continuous Assessment
- *****: Alternate Week Laboratory
- **^**: Detail Enclosed Separately

**TOTAL CREDITS**: 21
CS61103: Quantitative Techniques

Credits: 03

Prerequisites: Elementary knowledge of Numbers, Basic Algebra and Statistics.

Objectives:
The objective of this course module is to develop skills of Problem solving, quantitative Aptitude & Data Interpretation. This course has helped to pave the way for the present development and will prepare students for the present situation and the future by a modern approach.

Unit I
Numbers, Surds and Indices

Average, Problem on ages, simplification, problems on numbers, Surds and Indices, Decimal fraction, Square roots and Cube roots.

Unit II
Logarithms, Work, Time And Distance

Logarithms, Time and Work, Time and distance, Problems on trains, Boats and Streams, Pipes and Cisterns, Alligations and mixtures.

Unit III
Measures of Statical Data

Percentage, Profit and loss, Simple interest, Compound interest, Ratio and Proportion, Partnership, Chain Rule.

Unit IV
Area, Volume, Permutation and Combinations

Area, Volume and Surface Areas, Calender, Clocks, Permutations and Combinations, Probability, Hights and Distances.
Unit V
Data Interpretation

Tabulations: Tabulations of Imports and Exports of Data, Analysis of Tabulated Data,
Bar Graphs: Vertical or Horizontal Bars, Pie Charts: Pie Graphs, Central angle, Line
Graphs.

Unit VI
Self Study

Numbers, HCF and LCM of Numbers, Square root and Cube roots, True Discount,
Banker’s Discount, Odd man Out and Series, Stocks and Shares, Race and Games of Skill.

Text Books
1. “Quantitative Aptitude For Competitive Examinations”, Dr. R. S. Aggarwal, S. Chand.

Reference Books
CS60105::DESIGN AND ANALYSIS OF ALGORITHM

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To create programs based on different methods like greedy, divide and conquer, and branch and bound.
- To enhance the students' problem solving abilities.
- To provide a working knowledge of algorithm complexity and lower bounds of problems.
- To apply both top-down (divide-and-conquer) and bottom-up (dynamic programming) design.
- To apply the greedy approach in problem solving.

Unit I
INTRODUCTION TO DESIGN AND ANALYSIS OF ALGORITHM (9+2 Hrs)


Part B. Divide and conquer binary search, heap sort, quick sort and merge sort, finding the median.

Unit II
GREEDY METHOD (9+2 Hrs)


Part B. Huffman tree.

Unit III
DYNAMIC PROGRAMMING: (9+2 Hrs)

Part A. Dynamic Programming: General Strategy, The Principle of Optimality, Multistage graphs, OBST, 0/1 Knapsack, Traveling Salesperson Problem, Make change


Unit IV
BACKTRACKING

Part A. Backtracking: General Strategy, 8 Queen’s problem, Graph Coloring, Hamiltonian Cycles, 0/1 Knapsack, sum of subset.

Part B. Introduction to parallel algorithms, Parallel sorting

Unit V (9+2 Hrs)
BRANCH & BOUND, NP HARD & NP-COMPLETE PROBLEMS

Part A. Branch and Bound: General Strategy, 0/1 Knapsack, Traveling Salesperson Problem, recourse allocation problem.
   NP hard and NP-Complete Problems: Basic concepts, non-deterministics algorithms: sorting, NP-HARD and NP-COMPLETE classes, COOKS theorem.

Part B. Branch And Bound: Tile Problem, Maze Problem

Text Books

Reference Books
1. Bressard, “Fundamental of Algorithm.” PHI
2. Thomas H Cormen and Charles E.L Leiserson, “Introduction to Algorithm” PHI

Additional Reading
CS60106: JAVA PROGRAMMING

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Basic concepts of programming.

Objectives:
- Learn Core java and Advance java
- Student should learn application programs as well as web programming and network programming.

Unit I

INTRODUCTION TO CORE JAVA

Part A. Object Oriented concepts with respect to Java - Data abstraction, encapsulation, Class and Object, inheritance, polymorphism, Java Programming – Data types, variables, operators, control statements, Arrays. Programs based on class, methods, constructor, Inheritance, Interfaces, Packages

Part B. Difference between Java and C language, difference between Java and C++

Unit II

EXCEPTION HANDLING AND MULTITHREADING


Part B. String Handling

Unit III

JAVA APPLET, AWT AND SWING

Part B. Inner Classes, additional swing controls like JSlider, JToolBar, JSeparator, JSpinner, JProgressBar

Unit IV
NETWORKING WITH JAVA, JDBC AND RMI

Part A. Networking basics - Sockets, port, Proxy servers, Internet addressing, URL, java.net – networking classes and interfaces, Implementing TCP/IP based Server and Client, Datagrams – Datagram packet, Datagram server and client, URL connections, Java database connectivity, Types of JDBC drivers, Writing first JDBC applications, Types of statement objects( Statement, PreparedStatement and CallableStatement), Types of resultset, ResultSetMetadata, Inserting and updating records, JDBC and AWT, Connection pooling, RMI - Introduction & Architecture of RMI, Java.rmi classes and interfaces, Writing simple RMI application, Parameter passing in remote methods (marshalling and unmarshalling)

Part B. Application development in CORBA

Unit V
SERVLETS AND JSP

Part A. Servlets - Introduction, Servlet Vs CGI, Servlet API Overview, Writing and running Simple Servlet, Servlet Life cycle, Generic Servlet, HTTPServlet, ServletConfig, ServletContext, Writing Servlet to handle Get and Post methods, Reading user request Data, Writing thread safe servlet, Session tracking in servlets, Servlet and JDBC, JSP – Life cycle of JSP, Creating static content, Creating dynamic content, JSP scripting elements, JSP directives, Examples of JSP

Part B. JSP in XML
Text Books

Reference Books

Additional Reading
CS72116::SOFTWARE PROJECT MANAGEMENT

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Software Engineering

Objectives:
- To provide an introduction to the theory and practice of project management
  1. To provide an understanding of the project planning process
  2. To enable the students to use project planning tools and techniques
  3. To provide an understanding of project budgeting
  4. To appreciate risk analysis and management
  5. To define roles and work with cross functional teams
  6. To establish clear project objectives and milestones
  7. To create effective and deliverable project plans
  8. To deal with changes and deviations from the plan

Unit I (9+2 Hrs)
PROJECT MANAGEMENT

Part A. What are “projects”? Why project management? The project life cycle, Key stakeholders, Project management process groups, Project manager responsibilities, Understanding the role of senior management, Needs assessment, Project selection: Benefit/cost ratio, Present value and net present value, Building SMART objectives, Project charters, Project requirements document, Scope planning, The work breakdown structure

Part B. Network diagrams, Procurement planning, Communication and quality planning

Unit II (9+2 Hrs)
RISK MANAGEMENT

Part A. Definition and characteristics of “risk”, Elements and factors of risk, Types of risk, Components of risk management, Risk management planning, Risk identification, Analysis Fundamentals, Prioritizing Risk, Risk-based financial tools and techniques, Expected-value analysis, Decision trees, Planning For Risk, Risk documentation

Part B. Case Studies based on A.

Unit III (9+2 Hrs)
COST CONTROL AND SCHEDULING

Part B. Gantt and milestone charts, Establishing baselines, Understanding types of baselines, Managing Change Within The Project

Unit IV
PROGRESS MONITORING, PROJECT CONTROL AND REPORTING

Part A. What to monitor and why, Where and when to monitor, Project control through monitoring, Use of plans in project control, Reasons for reports: whom to report to and how to report. Types of report: exception, progress, management. Monitoring and control of project finances and quality. Assessment of implications and impact on the project of deviations and changes to project plan

Part B. Case study on Progress Monitoring, Control and Reporting

Unit V
PLANNING PROJECT QUALITY

Part A. Quality planning (QP) introduction, QP inputs and tools and techniques, Stakeholders and customers: Types, Importance of identification, Prioritization, Project quality requirements, Project quality Standards, Benchmarking, Quality function deployment (QFD), QP outputs, quality assurance, QA activities and the project quality management plan, Quality audits, Quality path vs. critical path, QA and change control, QA outputs, Quality control, QC inputs and tools and techniques, Plan-do-check-act (PDCA) cycle

Part B. Basic quality control toolkit: Check sheets, Histograms, Pareto charts, Flowcharts, Cause-and-effect diagrams, Interrelationship digraphs, Scatter diagrams, Run charts, Control charts, Design of experiments
Text Books

Reference Books
CS62106:: COMPUTER GRAPHICS AND MULTIMEDIA

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: C Programming

Objectives:
- To understand basic concepts of computer graphics and multimedia
- To understand algorithms to draw various graphics primitives
- To understand 2-D and 3-D transformations
- To learn basics of Open GL.
- To understand implementation of 3 D transformations and shading effects using Open GL.

Unit I  
Basic Concepts  
(9+2 Hrs)

Part A: Introduction to computer graphics, lines, line segments, vectors, pixels and frame buffers, DDA line drawing algorithm, Bresenham line and circle drawing algorithms, antialiasing, character generation: Stroke Principle, Starburst Principle, Bit map method, display of frame buffer, Graphics Primitives: Display devices, display file structure, algorithms and display file interpreter, Text and line styles.

Part B. Interactive devices, Data generating devices, primitive operations,

Unit II  
Polygons  
(9+2 Hrs)

Part A. Introduction, types of polygon, representation of polygon, entering Polygons, an inside test, polygon filling - Seed fill, scan line algorithm, filling with patterns. 2D Transformations: Introduction, matrices, Translation, Scaling, Rotation, Homogeneous coordinates for Translation, Rotation and scaling, Composite transformations- Rotation about arbitrary point, Reflection and Shear.

Part B. Inverse transformation.

Unit III  
Clipping and OpenGL  
(9+2 Hrs)
Part A. Windowing and Clipping: Introduction, viewing transforms, 2D clipping, Cohen-Sutherland outcode algorithm, Polygon Clipping, Sutherland-Hodgeman algorithm, Generalized clipping. Introduction to OpenGL. 3-D transformations: Introduction, 3-D geometry, primitives, transformations, Rotation about an arbitrary axis, Concept of parallel and perspective projections.

Part B. Mathematical problems on 3-D transformations, 3D in OpenGL

Unit IV

Hidden Surfaces and Lines


Part B. Mathematical problems on binary space partition.

Unit V

Curves and multimedia


Part B. Multimedia software tools – Adobe Flash
Text Books

Reference Books

Additional Reading
CS60206:: JAVA PROGRAMMING (TUTORIAL)

Credits: 01  
Teaching Scheme: Tutorial 1 Hr/Week

Prerequisites: Basic concepts of programming.

Objectives:
- Learn Core java and Advance java
- Student should learn application programs as well as web programming and network programming.

List of Contents

A TERM-WORK containing the record of the following:

1. Program for Armstrong numbers between 1 to 500.
2. Built reader-writer problem using thread synchronization.
3. Program to implement calculator in java.
4. Program to design the Notepad.
5. Program to implement library management system.
6. Program to develop real time chatting application.
7. Program to perform online objective examination.
8. Program to load and display image.

Text Books

Reference Books

Additional Reading:
CS60306:: JAVA PROGRAMMING LABORATORY

Credits: 02

Teaching Scheme: - Laboratory 4 Hrs/Week

Prerequisites: Basic concepts of programming.

Objectives:
- Learn Core java and advance java
- Student should learn application programs as well as web programming and network programming.

List of Practical

1. Print prime numbers in between 1 to 500.
2. Display area and volume of different shapes (Use class, object, constructor, overloading)
3. Display bank account information (Use interface and inheritance)
4. Display student mark sheet (Use package)
5. Write a program to illustrate following exceptions
   a) ArithmeticException b) ArrayIndexOutOfBoundsException
   c) NullPointerException d) IllegalAccessException
7. Read content of one file and write it into other file.
8. Create one form to read student information (Use applet, layout managers and all possible controls)
9. Write a program to illustrate card layout manager.
10. Write a program to create animation in java using multithreading.
11. Create chatting application using socket programming
12. Create RMI application to add, subtract, multiply and divide two numbers.
13. Create one form to add, update, modify, delete and display student records.
14. Create servlet to access student information from database from client side.
15. Create chatting application using UDP.
16. Write a program for online joining report of student using JSP and servlet.
Text Books

Reference Books

Additional Reading
CS60310:: DESIGN AND ANALYSIS OF ALGORITHMS LAB

Credits: 01
Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: Nil

Objectives:

- Fundamental understanding of the mathematics used to analyze, evaluate, and design algorithms
- Develop the ability to assess the advantages and disadvantages of different types of algorithms.
- Understand methods for designing time and space efficient algorithms.
- Increased ability to design and implement efficient solutions to problems.

List of Practicals

1. Quick Sort/ Merge Sort implementations using divide and conquer approach. Time complexity measure is to be obtained.
2. Minimal spanning Trees/ Job scheduling as an example of Greedy approach
3. Finding shortest path for multistage graph problem. (single source shortest path and all pairs shortest path.)
4. OBST/Flow Shop Scheduling as an example of dynamic programming.
5. 0/1 knapsack's problem using Dynamic Programming, Backtracking and Branch & Bound Strategies.
6. 8-Queen problem/ Graph coloring problem : general backtracking method and recursive back tracking method and their comparison for space and time complexity.
7. A complete LC branch and bound algorithm for job sequencing with dead lines problem. Use fixed tuple size formulation.
8. Algorithm implementation for `Traveling salesman' problem using -
   (a) Dynamic programming approach.
   (b) Branch & Bound approach.

Text Books

2. Bressard, “Fundamental of Algorithm.”, PHI

Reference Books

1. Thomas H Cormen and Charles E.L. Leiserson, “Introduction to Algorithm”, PHI
CS60311:: COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY

Credits: 01

Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: C Programming

Objectives:

- To understand basic concepts of computer graphics
- To understand algorithms to draw various graphics primitives
- To understand 2-D and 3-D transformations

List of Practical

1. Program to implement line and bar graph.
2. Program to implement DDA algorithm
3. Program to implement Bresenham midpoint Line drawing algorithm.
4. Program to implement midpoint and Bresenham circle drawing algorithm.
5. Program to display your name using bitmap method.
6. To create patterns using setfillstyle() in the graphics.
7. Line Pattern Generation
8. Program to implement algorithm for filling a polygon using scan-fill method.
9. To create a simple rectangle/triangle and apply 2D transformations like Scaling, Rotation and Translation.
10. Program to display OpenGL primitives like points, lines, quads etc
11. Program to implement 3-D transformations using OpenGL.
12. Program to implement Cohen_Sutherland line clipping algorithm.
13. Program to implement Bazier curve.
14. Developing an animation in Adobe Flash
15. Using OpenGL implement shading / animation effects
16. Mini Project Based on Computer Graphics :

Text Books


Reference Books


Additional reading

## Title: Course Structure

### FF No. 653

#### Course Structure

**Branch - CE (M.C.A) Dept.**  
**Year – TY**  
**Year of Engineering- TY**  
**Semester - V**  
**Academic Year - 2015-2016**  
**Pattern - A-14**

### Theory Courses

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**TOTAL**  

### Abbreviations Used

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**TOTAL CREDITS**  

21
CS7101:: OPERATION RESEARCH

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To understand a basic need for operation research.
- To study techniques & methodologies in operation research.
- To relate operation research with IT applications.

Unit I  
Linear Programming: Graphical and Simplex Method


Part B. Transportation problems using LPP concept

Unit II  
PERT/CPM


Part B. Scheduling of Activities Using a Gantt Chart using MS Projects / TORA

Unit III  
Sequencing ,Replacement Models & Queuing Theory
Part A. Terminology, Types of Sequencing Problems, Algorithm for Solving Sequencing Problems, Types of Replacement Model, Types of Maintenance Cost, Replacement of Items that deteriorate gradually, Replacement of Items that fail suddenly, Characteristics of Queuing Systems, Poisson and Exponential Distributions, Symbols and Notations, Single server Queuing Model, System of steady-state Equations, Queuing equations, Solving Queuing problems using computer.

Part B. Queuing models – 1. (M/M/1) : (GD/N/∞) and 2. (M/M/C) : (GD/N/∞)

Unit IV

Inventory Theory

Part A. Inventory Model Building, Single item deterministic Model, Inventory Control Models without shortages and Inventory Control Models with shortages.

Part B. Economic lot size with different rates of demand in different cycles, Economic lot size with finite rate of replenishment

Unit V

Game Theory


Part B. Linear Programming games using Simplex method

Text Books


Reference Books


Additional Reading

CS70101::DATA WAREHOUSING AND DATA MINING

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: DBMS

Objectives: -
- To understand the process of data mining and the key steps involved well enough to lead/manage a real-life data mining project
- Know the basics of data warehousing and how it facilitates data mining
- To understand fundamental issues in statistical data analysis that cut across all procedures, such as generalization to other data, basic tradeoffs, and validity of models.
- To deliver an overview of web data mining and other significant mining techniques

Unit I
Introduction
(9+2 Hrs)

Part A. Difference between operational database systems and data warehouses, Use of Data warehouse. A multidimensional data model, schema for multidimensional database: star, snowflake ,fact constellation. Data warehouse architecture, types of OLAP server, data warehouse implementation. Difference between OLTP and Data Warehouse, Data cube and OLAP, Concept hierarchies: total and partial, Set-grouping hierarchies, OLAP operations: drill-down, Roll-up and extreme Roll-up, slice-dice and pivot models of Data warehouse: Enterprise Warehouse, Data Mart, Virtual Warehouse.

Part B. Difference between OLAP and OLTP operations, star-net model,

Unit II
Introduction to Data mining
(9+2 Hrs)

Part A. Data mining primitives, Techniques:- Clustering, classification, association rules, linear and multiple regression, Feature selection, Mining text databases, multimedia databases, data pre processing: data summarization, data cleaning ,data reduction.

Part B. Text Mining, Mining Spatial ,Data Mining Application
Unit III  
Mining Frequent Pattern  
(9+2 Hrs)

Part A. Basic concept, market basket analysis, frequent pattern mining, frequent itemset mining methods, mining frequent itemset using candidate generation, mining frequent itemset without candidate generation methods, mining various kind of association rules.

Part B. Mining Frequent Itemset Using Vertical Data Format, Mining Closed Frequent Itemset

Unit IV  
Classification and Prediction  
(9+2 Hrs)


Part B. Support Vector Machines, other classification methods like genetic algorithm, rough set approach, fuzzy set approach.

Unit V  
Clustering  
(9+2 Hrs)

Part A. What is cluster analysis, types of cluster analysis, a categorization of major clustering method, partition, hierarchical, density based, grid based method, outlier analysis.

Part B. Constraints based cluster analysis, clustering high dimensional data.

Text Books

1. Jiawei Han and Micheline Kamber “Data mining: concepts and techniques”, the Morghan Kaufman, 2001.

Reference Books


Additional reading

4. Gagendra Sharma, “Data mining, Data warehousing and OLAP”, S.K. Kataria and sons,
CS70104:: SOFTWARE TESTING AND QUALITY ASSURANCE

Credits: 03  

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Software Engineering

Objectives:
- To understand Software Measurement Theory and Software Test Automation
- To practice Software Testing Techniques and Strategies
- Understand the fundamental concepts, approaches, and methodologies in software quality management and assurance.
- Understand the framework and general approach of several Quality System Standards and Total Quality Management (TQM).

Unit 1  
PRINCIPLES OF TESTING  
(9+2 Hrs)


Part B. Analysis of Flow Graphs, Complexity Measures and computations

Unit 2  
FUNCTIONAL TESTING  
(9+2 Hrs)


Unit 3  
(9+2 Hrs)
HIGHER ORDER TESTING


**Unit 4**

SOFTWARE QUALITY ASSURANCE


**Part B.** Software Benchmarks and Baselines, Key Factors for Software Assessment and Benchmark Studies, Identifying Software Best and Worst Practices

**Unit 5**

PLANNING PROJECT QUALITY

**Part A.** Quality planning (QP) introduction, QP inputs and tools and techniques, Stakeholders and customers : Types, Importance of identification, Prioritization, Project quality requirements, Project quality Standards, Benchmarking, Quality function deployment (QFD), QP outputs, quality assurance, QA activities and the project quality management plan, Quality audits, Quality path vs. critical path, QA and change control, QA outputs , Quality control , QC inputs and tools and techniques, Plan-do-check-act (PDCA) cycle

**Part B.** Basic quality control toolkit : Check sheets, Histograms, Pareto charts, Flowcharts, Cause-and-effect diagrams, Interrelationship digraphs, Scatter diagrams, Run charts , Control charts, Design of experiments

**Text Books**

Reference Books

Additional Reading
CS72107:: GEOGRAPHICAL INFORMATION SYSTEM

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To increase student awareness of GIS technology and provide opportunities to process, analyze and visualize spatial data and information.
- To understand the complexities of data manipulation, analysis, and mapping at different scales of space, time, and complexity.
- To study applications of GIS and Remote Sensing.

Unit I  
GIS and Maps  
(9+2 Hrs)


Part B. Selection of a GIS Application in Various Domains such as Weather Forecasting, Urban Planning, Agriculture, Defense, Network Applications.

Unit II  
Remote Sensing Fundamentals  
(9+2 Hrs)


Part B. Study of Satellites such as IRS, OCEANSAT-1, IKONOS etc.
Unit III  
**Image Processing**  
(9+2 Hrs)


**Part B.** Study of GIS Hardware and Software required specially for Image Processing.

Unit IV  
**Spatial Data Modeling and Management**  
(9+2 Hrs)


**Part B.** Design a Spatial Database for a Selected Application.

Unit V  
**Data Input, Quality and Analysis**  
(9+2 Hrs)


**Part B.** Identification of Data Inputs Outputs and Study of Required Analytical approach.

**Text Books**


**Reference Books**


**Additional Reading**


FF No. : 654 A
CS72105::ORGANIZATIONAL BEHAVIOR

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- To make the students understand the concepts & broad principles of contents of the course
- Develop conceptual framework of the course
- Sensitizes the students of the importance of course in real life environment

Unit I  
**Introduction to Organizational Behavior**  
(9+2 Hrs)


- **Part B.** Concept of personality: Development of personality – Attributes of personality, perception, values, and attitudes. Learning Behavior - Emotional Intelligence in organization. Johari window - Nature and dimensions of attitude – Developing the right attitude

Unit II  
**Organizational Change and Stress Management**  
(9+2 Hrs)

**Part A:** Types of changes: Dilemma of change, Pressure of change, Resistance to change Force field analysis, Change process, Overcoming the resistance to change,


Unit III

Motivation


Part B. Morale - Definition and relationship with productivity - Morale Indicators.

Unit IV

Group Dynamics and Team building


Part B. Group decision making Leadership theory, Quality Circle

Unit V

Organizational Culture:

Part A. Concept of Organizational Culture, Culture’s Functions, Creating an Ethical Organizational Culture, Creating a Positive Organizational Culture, What Is Spirituality? Spirituality and Organizational Culture, Why Spirituality Now? Characteristics of a Spiritual Organization, Achieving a Spiritual Organization,
Criticisms of Spirituality, How a Culture Begins, Creating and Sustaining Culture, Keeping a Culture Alive.

**Part B:** Concept of MBO technique and details, case studies.

**Text Books:**

**Reference Books:**

**Additional Reading :**
CS72106: ENTERPRISE RESOURCE PLANNING

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Nil

Objectives:
- Equip the students up-to-date with the modern concepts and applications of planning resources utilizing Enterprise Resource Planning (ERP) systems
- Develop student skills in applying methods and techniques of supply chain planning and operations scheduling.
- Understand the role of ERP systems and their impact on global business economies.

Unit I
Introduction

Part A. ERP-Overview, accommodating variety, integrated management information, integration, supply chain and resource management, integrated data model scope, Technology and benefits of ERP, ERP and modern enterprise.

Part B. case studies Manufacturing, automobile, banking, higher education, telecom, pharmaceuticals, government etc

Unit II
Business Engineering & Modeling in ERP

Part A. Overview, concept, significance and principles of business engineering, BRP, ERP and IT, Business Engineering with IT, ERP and Management concerns, Building of MIS, Business as a system, core processes in a manufacturing company, entities for data model in a manufacturing company, extended ERP.

Part B. case studies Manufacturing, automobile, banking, higher education, telecom, pharmaceuticals, government etc

Unit III
ERP Implementation

Part A. Overview, role of consultants vendors and users, customization, precautions, post implementation options, ERP Implementations methodology and guidelines for ERP implementation.

Part B. case studies Manufacturing, automobile, banking, higher education, telecom, pharmaceuticals, government etc
Unit IV  
**The ERP Domain**  
(9+2 Hrs)

Part A. Overview, MFC / PRO, IFS /Avlon as industrial and financial systems, Baan IV, SAP, SAP R/3 applications

Part B. case studies Manufacturing, automobile, banking, higher education, telecom, pharmaceuticals, government etc

Unit V  
**Marketing of ERP**  
(9+2 Hrs)

Part A. Overview, understanding markets, order winners and qualifiers, Role of ERP in gaining competitive advantage, ERP Marketing Strategy Process, Relationship marketing, developing marketing strategies and planning programmes and actions ERP buying and selling process cycles.

Part B. case studies Manufacturing, automobile, banking, higher education, telecom, pharmaceuticals, government etc

**Text Books**


**Reference Books**

CS72108:: BUSINESS INTELLIGENCE

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Database Management Systems.

Objectives:
- To understand the technology and processes associated with Business Intelligence framework.
- To demonstrate understanding of Data Warehouse implementation methodology and project life cycle.
- To understand how to identify the metrics, indicators and make recommendations to achieve the business goal for a business scenario.

Unit I

Introduction to Business Intelligence  
(9+2 Hrs)


Data Warehouse versus Data Marts, Data Warehouse Architecture. Introduction to SAS.

Part B. Illustrating the dependability and integration of ERP, SCM and E-commerce with BI.

Commercial BI vendors / and their comparison

Unit II

Introduction to Multi-Dimensional Data Modeling  
(9+2 Hrs)


OLAP operations

Part B. Techniques to handle changing dimensions, families of fact tables, fact less fact table.
Unit III  
**Data Cube Computation**  
(9+2 Hrs)

Part A. OLAP Query processing, Indexing techniques bitmap, join index and their comparison  
Efficient methods for Data cube computation: cube materialization, multiway array aggregation, BUC, Star cubing.  
Further development of data cube and OLAP technology  
Part B. Attribute oriented induction for data generalization and concept description.

Unit IV  
**Basics of Data Integration (Extraction Transformation Loading)**  
(9+2 Hrs)

Part A. Concepts of data integration need and advantages of using data integration, introduction to common data integration approaches, introduction to ETL using SSIS, Introduction to data quality, data profiling concepts and applications.

Part B. Data Cleaning, Reduction and Transformation operators. Commercial ETL tools.

Unit V  
**Basics of Enterprise Reporting**  
(9+2 Hrs)

Part A. Introduction to Enterprise Reporting, Concepts of Dashboards, Balanced Scorecards, introduction to SSRS Architecture, enterprise reporting using SSRS.

Explaining the technique for performance management by observing dashboards, assessing key performance indicators and using scorecard.

Part B. Types of Enterprise Reports, Components of Reporting System.

**Text Books**


**Reference Books**

CS72102:: NETWORK AND INFORMATION SECURITY

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Computer Networks.

Objectives:
- Understanding various vulnerabilities posing security threats to computer networks and information systems
- Understanding solutions proposed to ensure network and information security
- Understand the pros and cons of cryptographic techniques, their feasibility and security, social implications of network security

Unit I
Introduction

Part A. Types of attacks: DoS, IP spoofing, replay, DNS poisoning, Worms, viruses, Trojans, Phishing, Need of security, attributes of security, authentication, confidentiality, integrity and cryptography, Vulnerabilities in OSI model, layers, Bioinformatics security
Part B. Study of how to compute modular inverse of a number and matrix

Unit II
Secret Key Cryptography

Part A. Principles, elementary ciphers, DES, AES and key distribution
Part B. Implementation of S-DES and elementary ciphers

Unit III
Public Key Cryptography

Part A. Principles, RSA, DSA, key management, Kerberos, Diffie-Helleman key exchange, attacks and security analysis of each technique, message authentication and hash functions, Hash algorithms, digital signatures, X.509, Certification authorities in public key cryptography, Man-in-the-middle attack.
Part B. Implementation of RSA and Diffie-Helleman key exchange algorithm

Unit IV
Network Security Applications

Part A. Network layer security: IPSec for IPv4 and IPv6, Transport layer security: SSL and TLS, Application layer security: Security services, web security considerations, and S/MIME, PGP, PEM, https, IPS, Honey pots,
Part B. Wireless LAN security

Unit V
System Security and Web Security
(9+2 Hrs)
Part A. Intruders, Malicious Software, Firewall, web security
Part B. Cyber Laws

Text Books


Reference Books


Additional Reading

CS72115:: CLOUD COMPUTING

Credits: 03

Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Computer Networks

Course Objectives:
1. To learn the core concepts and principles of cloud computing as well as identify and explore some of the emerging research challenges in clouds.
2. To gain hands-on experience in using cloud computing infrastructure by designing, developing and deploying applications on cloud infrastructures.
3. To work on a large research project in cloud computing.

Unit 1: (9+2 Hrs)
Introduction to Cloud Computing

Part A. Introduction to Cloud Computing, Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS Cloud computing platforms: Infrastructure as service: Amazon EC2.Platform as Service: Google App Engine, Microsoft Azure,

Part B. Utility Computing, Elastic Computing

Unit 2: (9+2 Hrs)
Cloud Technologies

Part A. Introduction to Cloud Technologies, Study of Hypervisors Compare SOAP and REST

Webservices, AJAX and mashups-Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services Virtualization Technology: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization Multitenant software: Multi-entity support, Multi-schema approach, Multitenance using cloud data stores.

Part B. Data access control for enterprise applications.

Unit 3: (9+2 Hrs)
Data in the cloud

Part A. Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce,
Part B. Features and comparisons among GFS, HDFS etc, Map-Reduce model.

**Unit 4:**

(9+2 Hrs)

**Cloud Security**


Part B. Secure Execution Environments and Communications in cloud.

**Unit 5:**

(9+2 Hrs)

**Cloud Issues and Optimizations**


Part B. Monitoring in Cloud.

**Text Books**

1. *Cloud Computing for Dummies* by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)
3. *Cloud Security* by Ronald Krutz and Russell Dean Vines, Wiley-India

**Reference Books:**

1. *Google Apps* by Scott Granneman, Pearson
2. *Cloud Security & Privacy* by Tim Malhar, S.Kumaraswammy, S.Latif (SPD O’REILLY)
4. *Cloud Computing Bible* by Barrie Sosinsky, Wiley India
CS72109:: ADVANCED UNIX PROGRAMMING

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: C Programming and Operating System.

Objectives:
- Teaches the fundamentals of Unix Operating System.
- Prepare the students for Shell Programming, AWK Programming and rebuild the kernel.
- Hands-on experiences of IPC.
- Prepare the students for Unix Administration.

Unit 1: Introduction  
( 9+2 Hrs)


Shell Programming: Shell and Types of Shell, Features, Variables, Read Statement, Command Line Arguments, Operators, Control Structures: if, for, while, case, break, continue, Arrays, Functions, Writing Shell Scripts, Debugging.

Part B: AWK Programming.

Unit 2: Buffer Cache and File System  
( 9+2 Hrs)

Part A: Buffer Header, Structure of Buffer Pool, Buffer Retrieval, Reading and writing disks blocks, Advantages and disadvantages.

Internal representation of files: I-nodes, Structure of a regular file, Directories, Conversion of pathname to an i-node, Super block, I-node assignment to a new file, Location of disk block.

System calls for the file system: Open, Read, Write, File and record blocking, Lseek, Close, File creation, Creation of Special Files, Pipes, Mounting and Unmounting file systems.

Part B: Stat and fstat, Change directory, Change root, Change owner, Change mode, Link, Unlink.

Unit 3: Process Structure, Control and Scheduling  
( 9+2 Hrs)

Part A: Process states and transitions, Layout of system memory, Manipulation
of a process address space, Process creation, Signals, Process termination, Awaiting process termination, Invoking other programs, System boot and init process, Process scheduling, System calls for time.

Part B: User-id of a process, Clock

Unit 4: IPC and Memory Organization


Memory management: Swapping, Demand paging.


Unit 5: I/O subsystem and rebuilding of kernel

Part A: Driver interfaces, Disk driver, Terminal drivers, Streams.

Loadable kernel module: Types, Utility commands, Basic Program for rebuilding of the kernel.

Part B: UNIX System Administration.

Text Books


Reference Books

CS72110: MOBILE APPLICATION DEVELOPMENT

Credits: 03  
Teaching Scheme: - Theory 3 Hrs/Week

Prerequisites: Computer Networks, Java Programming.

Objectives:
- To understand network and transport protocols for wireless networks, including mobile IP and variants of TCP.
- Distributed systems platforms for mobile computing, including proxy based architectures and service discovery and interaction platforms.
- To understand characteristics of local and wide area technologies such as Bluetooth, 802.11 and GSM.
- To learn the file systems support for mobile computing.

Unit I (9+2 Hrs)  
Wireless Communication

Part A. Need and Applications of wireless communication, Wireless Data Technologies, Market for mobile communication, Mobile and wireless devices, Frequencies for radio transmission, signals, antennas, signal propagation, Multiplexing, Modulation, Specialized MAC, SDMA, FDMA, TDMA and CDMA
Part B. Spread spectrum and Cellular systems.

Unit II (9+2 Hrs)  
Mobile Network Layer and Mobile Transport Layer

Part A. Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and selective retransmission and recovery, Transaction oriented TCP.
Part B. Wireless LAN

Unit III (9+2 Hrs)  
J2ME Basics

Part A. Overview, small computing technology, J2ME architecture and Development Environment,
Part B. J2ME best practices and patterns

Unit IV (9+2 Hrs)  
J2ME User Interface

Part A. Commands, Items and Event Processing, High level display screens, Low level display screens
Part B. Application to create animation

Unit V
J2ME Data Management and J2ME Networking

Part A. Record Management System, J2ME database concepts, JDBC objects, Generic connection framework, web services
Part B. Personal Information manager

Text Books

Reference Books

Additional Reading
CS70301::DATA WAREHOUSING AND DATA MINING
LABORATORY

Credits: 01
Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: Database Management System

Objectives: -
• To understand the process of data mining and the key steps involved well enough to
  lead/manage a real-life data mining project
• Know the basics of data warehousing and how it facilitates data mining
• To understand fundamental issues in statistical data analysis that cut across all
  procedures, such as generalization to other data, basic tradeoffs, and validity of
  models.
• To deliver an overview of web data mining and other significant mining techniques

List of Practicals

1. ETL process understanding using ETL Tool.
2. The design of an ETL process.
3. Develop an application to implement defining subject area, design of fact dimension
   table, data mart.
4. Develop an application to construct a multidimensional data.
5. Develop an model to implement OLAP, roll up, drill down, slice and dice operation
6. Gain experience using Weka, a software package for machine learning, and R, a
   software package for statistics; Implementing Data cleansing method for a given
   problem.
7. Implementing data transformation for a given problem domain.
8. Generating association rules from a given large item set.
10. Build Na¨ıve Bayesian Models and rule based model.
11. Using clustering algorithm build a partitional model.
Text Books:
1. Jiawei Han and Micheline Kamber “Data mining: concepts and techniques”, the Morghan Kaufman, 2001.

Reference Books
CS70305:: SOFTWARE TESTING LABORATORY

Credits: 01

Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: Nil

Objectives:

- To understand the practices of requirements elicitation, capture and analysis
- To practice Software Testing Techniques and Strategies
- Understand the framework and general approach of several Quality System Standards and Total Quality Management (TQM).
- Acquire a working knowledge of quality assurance techniques such as inspections, testing and configuration management.

List of Practical

1. To narrate Requirement Definition Document for the target system with following three areas:
   - Problem Identification
   - Problem Definition
   - Problem Statement

2. To implement the System under construction and narrate Test Plan for the same. The Test plan consists of following issues
   - Purpose of the test
   - Location and schedule of the test
   - Test descriptions
   - Test procedures

1. To identify Test cases, Test Procedures, Test log, Test Oracle for the System under test. The Test case Scenarios should correspond to the relevant Use case Scenario.

4. A. To perform Unit testing especially indicating the traced Independent data paths, Control paths and Error handling paths. Prepare control flow graphs for the unit under test. Compute the Cyclomatic complexity of the unit. Record the Test criteria and Test conditions along with Test results.
   B. To perform Data Flow testing for the Program Segments by identifying the Definition-Use chain and type of data flow anomaly.

5. To perform Regression Testing / GUI Testing of the System under construction with Unit and Integration profiles.
Text Books


Reference Books

CS70332: APPLICATION DEVELOPMENT TECHNOLOGY
LABORATORY

Credits: 02  
Teaching Scheme: - Laboratory 4 Hrs/Week

Prerequisites: Object Oriented Concepts, Web Programming basics

Objectives:
- To learn development of web application, web services.
- To learn current way of application development.
- To learn application development with C# .net, ASP.NET, ADO.NET, AJAX.
- Develop database-driven web applications using a formal design method,

Overview of .NET
2. Understanding of Common Language Runtime (CLR), Just In Time (JIT) Compiler.
4. Understanding Internet Information Services 7.0 (IIS7)

Web Application and ASP.NET Controls
5. Design a web page using basic HTML controls.
6. Design a Registration page using standard ASP.NET controls (see list below).
7. Design a web page for an application using server and client side validation controls.
8. Design an application using File upload, Date picker and Calendar control.
9. Design an application using Master Page which provides template for other pages on a web site.
10. Design an application using themes and Skins.

ADO.NET and Data Access Controls
11. Design an application for storing data in a database using ADO.NET.
12. Design an application for storing data in a database and display it using different Bound List controls (see list below).
13. Design an application for storing the related data using ADO.NET and enhance it with add, delete, and update facilities.
14. Design an application for storing data in a database and display it using Crystal Reports.

ASP.NET Web Services and AJAX
15. Understanding AJAX concepts and then creating a calculator to demonstrate the difference between conventional and AJAX programs.
16. Create an application to demonstrate how a web page can fetch information from a database with AJAX.
17. Create an application to demonstrate how a web page can communicate with a web server while a user types characters in an input field using AJAX.
18. Understanding Web Service Architecture and designing an application using web service.

**Exception Handling and State Management**
19. Understanding the concept of Exception and Error handling and then designing an application using Exception and Error Handling concepts.
20. Understanding State Management using sessions and cookies, and designing an application using session and cookies state management concepts.

**ASP.NET Controls:** Label, Literal, Text Boxes, Buttons, Link Button, DropDown List, List Boxes, Check Boxes, Check Boxes List, Radio Buttons, Radio Buttons List, Image Server Control, Table Server Control, Calendar Server Control, AdRotator Server Control, Xml Server Control, Panel Server Control, Place Holder Server Control, BulletedList Server Control, Hidden field Server Control, File upload server control, multiple File upload server control, Multi view and View Server Control, Wizard Server Control, Image Map Server Control

**Bound List controls:** GridView, DetailsView, List View, Form View, Tree View

**Mini Project Based on ASP.NET:**
The objective of this mini project is to develop project using .net technology. It will gear up student for preparation of final project in Semester VI. Student will select individually Commercial or Technical project based on ASP.NET. The students will be assessed based on demonstration.

**Text Books**

**Reference Books**
CS72302::NETWORK AND INFORMATION SECURITY
LABORATORY

Credits: 01

Teaching Scheme: Laboratory 2 Hrs/Week

Prerequisites: Computer Network

Objectives:

- Able to analyze the packets.
- To understand the various attacks.
- To able to do encryption and decryption.

List of Practical

1. Implement Caesar Cipher & perform brute force attack on it.
2. Implementation of Playfair cipher.
3. Implement Vigenere Cipher
5. Implementation of RC4 algorithm.
6. Implementation of S-DES.
7. Implementation of S-AES
8. Implementation of RSA.
10. Implementation of ECC.
11. Implement Hash algorithm.
Mini Project:
The objective of this mini project is to develop application using any one of the cryptography algorithm which will enhance security of project.

Text Books

Reference Books

Additional Reading
CS72315::CLOUD COMPUTING LABORATORY

Credits: 01  
Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: Computer Network

Course Objectives:

- To learn the core concepts and principles of cloud computing as well as identify and explore some of the emerging research challenges in clouds.
- To gain hands-on experience in using cloud computing infrastructure by designing, developing and deploying applications on cloud infrastructures.
- To work on a large research project in cloud computing.

List of Practicals

1. Google App engine
2. Amazon cloud services
3. Windows cloud services
4. Map-reduce

Text Books

2. Enterprise Cloud Computing by Gautam Shroff, Cambridge
3. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India

Reference Books:

1. Cloud Security & Privacy by Tim Malhar, S.Kumaraswammy, S.Latif (SPD,O’REILLY)
3. Cloud Computing Bible by Barrie Sosinsky, Wiley India
5. Google Apps by Scott Granneman, Pearson
CS72309: ADVANCED UNIX LABORATORY

Credits: 01  
Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: C Programming, Operating System.

Objectives:
- To learn UNIX programming.
- To work in Linux platform.

List of Practical
1. Execution of basic and advanced Linux commands.
2. Shell Script
3. Program for IPC using pipes.
4. Program to illustrate message queue.
5. Illustrate process related system calls
6. Illustrate file related system calls
7. Program to implement sleeping barber problem using semaphore.
8. Program to illustrate shared memory segment.
9. Write a sample program for IPC using socket.

Mini Project using UNIX based on operating system concepts:

The objective of this mini project is to prepare student for system level programming. Student will select individually a project which will enhance system level design concepts. The students will be assessed based on demonstration.

Text Books

Reference Books

Additional Reading
CS72310:: MOBILE APPLICATION DEVELOPMENT LABORATORY

Credits: 01

Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: Computer Networks, Java Programming.

Objectives:

- To understand network and transport protocols for wireless networks, including mobile IP and variants of TCP.
- Distributed systems platforms for mobile computing, including proxy based architectures and service discovery and interaction platforms.
- To understand characteristics of local and wide area technologies such as Bluetooth, 802.11 and GSM.
- To learn the file systems support for mobile computing.

List of Practical

1. Write a simple program for displaying “Hello, World” on your mobile screen using J2ME Wireless Toolkit. Test output in different Emulators provided by J2ME Wireless Toolkit and Transfer it to the mobile.
2. Write a program for sending SMS to your friend by using your mobile phone. Use J2ME Wireless Toolkit to develop your application. Test it in the Emulator provided by Toolkit and Transfer it to your mobile.
3. Develop a simple calculator for your mobile by using J2ME Wireless Toolkit.
4. Write a simple program to take a snapshot by using the Camera in your mobile. Save the snapshot in the image or video format. Use Camera Media API provided J2ME. Test it in Emulator and Transfer it to your mobile.

Mini Project on mobile application using J2ME concepts:
The objective of this mini project is to prepare student for mobile application development. Student will select individually a project which will enhance their J2ME concepts. The students will be assessed based on demonstration.

Text Books

Reference Books


Additional Reading

CS70306:: ENTREPRENEURSHIP DEVELOPMENT LAB

Credits: 01

Teaching Scheme: - Laboratory 2 Hrs/Week

Prerequisites: Nil

Objectives:
- To provide the motivational inputs to students to become entrepreneurs
- To enable students to understand the importance of national wealth generation
- To teach students the legal formalities of starting a business with a few assignments
- To teach students to make efficient business cases identify opportunities and apply for loans to become independent business persons.
- To sensitizes the students with the importance of being self employed professionals on the planet instead of slavishly working under someone else.
- Major objective is to ensure that they become entrepreneurs and actually start a business and not just become bookworms of an entrepreneurship academic subject

List of Practical
1. Administration inputs to entrepreneurship – planning scheduling, time management
2. Preparation of Business cards
3. How to formulate a business and project plan
5. Market potential analysis of the business.
6. Tax and relativity of moral ethics in adverse business (corrupt) environments.
7. Study of Shop ACT.
Text Books

1. “Small and Medium Enterprise: Challenges and opportunities”, Dr J. S. Juneja,

Reference Books

2. Rabindra N Kanungo, Entrepreneurship & Innovation Models for Development

Additional Reading

1. Gopal & Ramamurthy; Project management Handbook, Macmilan Prassanna Chandra; Preparation, Appraisal, Budgeting and Implementation.
SEMESTER VI
## Course Structure

### Theory Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject Name</th>
<th>Teaching Scheme (Hrs./week)</th>
<th>Examination Scheme</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lectures       Tutorial</td>
<td>HA</td>
<td>TA</td>
</tr>
<tr>
<td>CS77405</td>
<td>Project</td>
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<tr>
<td>TOTAL</td>
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<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Abbreviations Used**

- **HA** Home Assignment
- **TA** Teacher Assessment
- **ISE** In Sem. Examination
- **ESE** End Sem. Examination
- **CA** Continuous Assessment
- **^** Alternate Week Laboratory
- **^** Detail Enclosed Separately

TOTAL CREDITS: 20
Objective
- Objective of this project is to give industry exposure to student for one complete semester.
- One of the important stipulations regarding project for MCA is that the candidate is to undertake a project in the area of Computer Science/ Computer Applications.
- The project work may be carried out by identifying research/ system oriented application problem/ web resources/ tools in any one of the business/ services computerized organizations/ information technology organizations.
- This project is intended to assess students’ acquaintance in technology.

GUIDELINES
- Project work will be carried out in the industrial/ Research organization individually.
- The faculty guiding the student shall be called the internal guide and the scientist / manager guiding the student (at site) shall be called as external guide.
- It is mandatory to submit the progress report every week to the internal guide. At the end of semester VI, the student has to submit a formal individual project report.
- Evaluation will be done by External examiner.

Project Documentation Format

Design Methodology/Paradigm : Object-Oriented

Index

Part-I
1. Certificate
2. Sponsorship Letter
3. Acknowledgement
4. Synopsis
5. Acronyms and numbered figure titles
6. Index

Part-II
1. System Requirements Specification
2. Use Case Diagrams along with Description
3. State Chart Diagram along with Description

Part-III
1. System-Subsystem Diagram along with Description
2. Software Architecture with Specifications
3. Description of Algorithms Derived (If Any)

Part-IV
1. Implementation Details
   Language
   Platform / Environment
   Design Transformation to Code along with I/O Screens
2. Testing
   Test Cases
   Test Conditions
   System Test Results

Part-V
1. Conclusions
2. Future Scope
3. References

Document Format:
1. Paper Size: A4
3. Font: Arial
   A) Font Size (Title): 12
   B) Font Size (Text): 10

Project Documentation Format

Design Methodology/Paradigm: Structured Analysis And Design

Index
Part-I
1. Certificate
2. Sponsorship Letter
3. Acknowledgement
4. Synopsis
5. Acronyms and numbered figure titles
6. Index

Part-II
1. System Requirements Specification
2. Use Case Diagrams along with Description
3. Sequence Diagrams along with Description
4. State Chart Diagram along with Description

Part-III
1. Class Diagram for the system along with Description
2. Software Architecture with Specifications
3. Description of Algorithms Derived (If Any)
Part-IV
   1. Implementation Details
      Language
      Platform / Environment
      Design Transformation to Code along with I/O Screens
   2. Testing
      Test Cases
      Test Conditions
      System Test Results

Part-V
   1. Conclusions
   2. Future Scope
   3. References

Document Format:
   1. Paper Size: A4
   3. Font: Arial
      A) Font Size (Title): 12
      B) Font Size (Text): 10

The above guidelines may be followed with periodic discussions with the guide.
CS77406::SEMINAR II

Credits: 02

Objectives:

- To raise awareness about current trends related to individual student’s project (CS77402) topic.
- To gain new insights from examples of best practice.
- To learn and share knowledge about current technical topics in the field computer.
- Present technical information clearly, concisely, and persuasively
- Inculcate research culture.
- Study and analyze one technical topic in detail.

Seminar is a course requirement wherein under the guidance of an internal guide a student is expected to do in-depth study of current trends related to individual student’s project (CS77402) topic by doing literature survey and understanding different aspects of the technology. It is mandatory to give a seminar presentation before a panel constituted for the purpose. The credits shall be awarded on the basis of the understanding of the concept and presentation by the student concerned.

Guidelines for Seminar

- Seminar topic strictly should be technical.
- Students have to refer research paper (publishing year: current or previous two years) preferably IEEE/ACM conference/journal paper and select the seminar topic. Students should discuss this topic with their respective guides.

Seminar Report Covers

- Certificate
- Index Page
- List of figures
- List of symbols and their meaning
- List of tables
- Titles/Chapter Name: 14 pt (Bold)
- Subtitles/Paragraph Name: 12 pt (Bold)
- If any figure is copied from web page, write its URL in the text describing it
- Use equation editor for writing equations and uniformity of equations throughout report is assumed.
- Regular Text: 12 pt
- Font: Arial for titles and times new roman for regular text
• Pages : 25-30
• Bibliography
• references
• Number of copies : 02 ( One for candidate and other for department)

Guidelines for Presentation
• Maximum : 20 Power point Slides
• Font : preferably times new roman for regular text
• Use more conceptual diagrams to explain a concept. Use more colors if needed.
• Do not paste paragraphs after paragraphs in the slides.
• Avoid copying figures if possible. If not then write an URL under the figure caption.
• Type equations using equation editor (Do not copy and paste )
• Write bibliography and references in last slide.
• Heading : 24 pt
• Subtitles(Text) : 20 pt
• Only 6 points on each slide
• Time : 20 minutes for presentation and 05 min for question answer session.