PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

I. To prepare students to excel in computer applications to succeed in industry/ technical profession.
II. To provide students with solid foundation in mathematical and computing fundamentals and techniques required to solve related problems and also to pursue higher studies and research.
III. To train students with good computing breadth so as to comprehend, analyze, design and create computing solutions for the real life problems.
IV. To inculcate students in professional and ethical attitude, effective communication skills, multidisciplinary approach and an ability to relate computing issues to broader social context.
V. To provide students with an academic environment aware of excellence, leadership and continuous learning, on technology and trends needed for a successful career.

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,
1. Graduates will acquire knowledge of basic mathematics, computing fundamentals, programming concepts and other core computer subjects.
2. Graduates will have an ability to identify, formulate and implement computing solutions.
3. Graduates will have an ability to design and conduct experiments, analyze and interpret data.
4. Graduates will be able to design a system, component or process as per needs and specification.
5. Graduates will have the skill to work on multidisciplinary tasks and will be aware of the new and emerging disciplines.
6. Graduates will demonstrate skills to use modern tools, software and equipments to analyze problems.
7. Graduates will exhibit the knowledge of professional and ethical responsibilities.
8. Graduates will be able to communicate effectively in both verbal and written form.
9. Graduates will demonstrate effects of computing solutions on the society.
10. Graduates will have a confidence for self education and ability for continuous learning on trends and technologies.
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OBJECTIVES:
To introduce mathematical logic, combinatorial and counting techniques, Algebraic structures, Finite state system and grammar as Mathematical Foundation of computer Science so as to understand algorithms, computability and other theoretical aspects of Computer science.

UNIT I LOGIC 9+3

UNIT II COMBINATORICS 9+3
Permutations and Combinations - Mathematical Induction - Pigeonhole principle - Principle of Inclusion and Exclusion - Recurrence relations - Solution by generating functions and characteristics equations.

UNIT III ALGEBRAIC STRUCTURES 9+3
Groups - Cyclic group - Permutation group (Sn and Dn) - Substructures - Homomorphism - Cosets and Lagrange’s Theorem - Normal Subgroups - Rings and Fields (definition and examples).

UNIT IV LATTICES 9+3
Partial order relation – Posets - Hasse diagram - Lattices - Special Lattices - Boolean Algebra.

UNIT V FINITE STATE AUTOMATA AND GRAMMARS 9+3
Finite state automata - Deterministic and non-deterministic model - languages accepted by Finite State Automata - Regular expressions - Context-free grammars - Derivation trees.

OUTCOMES:
Upon completion of this course, the student will:
- Apply mathematical logic and develop analytical solutions for logical problems and they will be equipped with counting techniques to solve combinatorial problems.
- Comprehend the algebraic structure and formal languages with their applications to handle abstract generalizations and computability.

REFERENCES:
OBJECTIVES:
The student

- To understand the various problem solving techniques.
- To understand the usage of top down design technique in problem solving.
- To learn the syntax of C.
- To get exposed to the file processing techniques of C.
- To get familiarized with the pre-processor directives.

UNIT I  PROBLEM SOLVING

UNIT II  BASICS OF C PROGRAMMING

UNIT III  FUNCTIONS, ARRAYS AND STRINGS

UNIT IV  POINTERS AND AGGREGATE DATA TYPES

UNIT V  FILES AND PREPROCESSOR DIRECTIVES
Introduction to Files – Using Files in C – Read and Write Data with Files - Random Access Files – Types of Pre-processor Directives – #define - #include- Conditional Directives.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:

- Design and implement C programs for a given problem.
- Work with existing programs and modify it as per the requirements.
- Identify the errors in a C program.
- Identify the output of a C program without actually executing it.

REFERENCES:
OBJECTIVES:
The student
- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To understand the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To know the fundamental concepts of transaction processing - concurrency control techniques and recovery procedure.
- To have an introductory knowledge about the Storage and Query processing Techniques.

UNIT I RELATIONAL DATABASES

UNIT II DATABASE DESIGN

UNIT III DATA STORAGE AND QUERYING

UNIT IV TRANSACTION MANAGEMENT

UNIT V ADVANCED TOPICS

OUTCOMES:
Upon completion of this course, the student will:
- Design and create tables in relational database and query them.
- Know how transaction processing and concurrency control is done.
- Compare different types of databases.
REFERENCES:

CA7102 DATA STRUCTURES

OBJECTIVES: The student should be able to
- To gain comprehensive introduction of common data structures
- To master the linear and hierarchical data structures and its applications
- To learn about sorting techniques and disjoint set ADT

UNIT I LINEAR DATA STRUCTURES – LIST, STACK AND QUEUE 9

UNIT II HIERARCHICAL DATA STRUCTURES 9

UNIT III HASHING 9

UNIT IV PRIORITY QUEUES 9

UNIT V SORTING AND DISJOINT SET ADT 9

OUTCOMES:
Upon completion of this course, the student will:
- Describe, explain and use abstract data types including stacks, queues and lists
- Design and Implement Tree data structures and Sets
- Implement hashing techniques and heaps for applications
- Implement a variety of algorithms for sorting

TOTAL: 45 PERIODS
REFERENCES:

CA 7101 COMPUTER ORGANIZATION AND DESIGN  L  T  P  C
3  0  0  3

OBJECTIVES:
The student should be able to
- To understand the fundamentals of Boolean logic and functions.
- To have a thorough understanding of the basic structure and operation of a digital computer.
- To design and realize digital systems with basic gates and other components using combinational and sequential circuits.
- To discuss in detail about the operation of the arithmetic and logic unit.
- To study the instruction sets and operation of a processor.
- To study the different ways of communication with I/O devices and standard I/O Interfaces.
- To study the hierarchical memory system including cache memories and virtual memory

UNIT I DIGITAL FUNDAMENTALS

UNIT II COMBINATIONAL AND SEQUENTIAL CIRCUITS

UNIT III PROCESSOR FUNDAMENTALS

UNIT IV MEMORY

UNIT V DATA TRANSFER

TOTAL : 45 PERIODS
OUTCOMES:
- Master the binary and hexadecimal number systems including computer arithmetic.
- Design and implement digital systems with basic gates and other components using combinational and sequential circuits.
- Familiarize the Von Neumann architecture.
- Familiarize the functional units of the processor and addressing modes, instruction sets.
- Familiarize the memories and cache subsystem.

REFERENCES:

CA 7111 DATA STRUCTURES AND PROGRAMMING LABORATORY

OBJECTIVES:
The student should be able to
- To develop skills in design and implementation of data structures and their applications.
- To learn and implement linear, non linear and tree data structures.
- To learn Set ADT and Graph data structures and its applications.
- To study, implement and analyze the different sorting techniques.

EXPERIMENTS
1. Writing Simple C Programs.
2. Conditional and Iterative Structures.
3. Arrays, Functions and Strings.
4. Structures and Unions.
5. Pointers.
6. File Handling.
7. List ADT implementation with arrays and linked lists.
8. Stack ADT implementation with arrays and linked lists.
9. Queue ADT implementation with arrays and linked lists.
10. BST implementation.
11. AVL implementation.
13. Heap implementation – Priority Queues.
14. Sorting Algorithms – Insertion sort, Shell sort

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Work with basic data structures that are suitable for the problems to be solved efficiently.
- Design and implement linear, tree, and graph structures and its applications.
- Design various sorting techniques, its algorithm design and analysis.
CA 7112  DATABASE MANAGEMENT SYSTEMS LABORATORY

OBJECTIVES:
The student should be able to
- To understand the concepts of DBMS.
- To familiarize with SQL queries.
- To write stored procedures in DBMS.
- To learn front end tools to integrate with databases.

EXERCISES:
1. Data Definition - Manipulation of Tables and Views.
2. Database Querying – Simple queries - Nested queries - Sub queries and Joins.
3. Triggers.
4. Transaction Control.
5. Embedded SQL.
6. Database Connectivity with Front End Tools.
7. Front End Tools / Programming Languages.
10. Database Design and Implementation (Case Study).

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Design and Implement databases.
- Formulate complex queries using SQL.
- Design and Implement applications that have GUI and access databases for backend connectivity.

CA7201  COMPUTER COMMUNICATIONS AND NETWORKS

Learning Objectives:
- To explore various data communication techniques.
- To know Network Fundamentals and Protocols.
- To understand Network addressing and routing concepts.
- To understand the requirement of reliable and unreliable communication.
- To understand the functionality and concepts of various application layer protocols.

UNIT I  INTRODUCTION

UNIT II  NETWORK FUNDAMENTALS

UNIT III  NETWORK LAYER
UNIT IV  TRANSPORT LAYER
Transport layer Services – Multiplexing and Demultiplexing – Connectionless Transport – Principles of Reliable Data Transfer- Connection Oriented Transport – Flow Control – Congestion Control – Queuing disciplines – Congestion Avoidance.

UNIT V  APPLICATIONS

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

- Explain how communication works in data networks and the Internet
- Explain the role of protocols in data networks
- Describe the importance of addressing and naming schemes at various layers of data networks
- Describe the protocols and services provided by the application layer in the OSI model and describe how this layer operates in sample networks

REFERENCES :

CA 7204 OPERATING SYSTEM CONCEPTS

OBJECTIVES:
The student should be able to

- To Learn the Operating System basics.
- To Study the process management of Operating system.
- To Gain knowledge in storage management and I/O systems of Operating system.
- To Explore the case studies with various operating systems.

UNIT I  OPERATING SYSTEMS OVERVIEW

UNIT II  PROCESS MANAGEMENT

UNIT III  STORAGE MANAGEMENT

UNIT IV FILE AND I/O SYSTEMS  9

UNIT V CASE STUDY  8

OUTCOMES:
Upon completion of this course, the student will:

- Discuss on the basics of OS.
- Familiarize the In depth knowledge in process management, memory management and I/O management of various operating systems.

REFERENCES:
UNIT II REQUIREMENT ANALYSIS

UNIT III SOFTWARE TESTING

UNIT IV SOFTWARE TESTING

UNIT V SOFTWARE MAINTENANCE AND SOFTWARE METRICS

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Familiarize the basic concepts of Software design and implementation. Perform software testing on various applications.
- Apply various software metrics on software quality products.

REFERENCES:

CA 7202 DESIGN AND ANALYSIS OF ALGORITHMS

OBJECTIVES:
The student should be able to
- To understand the problem solving process and writing algorithms
- To use algorithm design paradigms for algorithm design
- To analyze the algorithms for time/space complexity

UNIT I ALGORITHM ANALYSIS

UNIT II HEAP SORT AND QUICK SORT
Heap Sort: Heaps – Maintaining the Heap Property – Building a Heap – Heap Sort Algorithm – Priority Queues – Quick Sort: Description – Performance – Randomized Version – Analysis
UNIT III  DESIGN AND ANALYSIS TECHNIQUES  9
Introduction to Dynamic Programming – Matrix Chain Multiplication – Longest Common
Subsequence – Greedy Algorithms – Activity Selection Problem – Huffman Codes

UNIT IV  GRAPH ALGORITHMS  9
Representation of Graphs – Representing Attributes – Breadth-First Search – Breadth-First Trees –
Depth-First Search – Topological Sort – Strongly Connected Components – Minimum Spanning
Trees: Growing a Minimum Spanning Trees – Algorithms of Kruskal and Prim – Single Source
Shortest Path – Bellman-Ford Algorithm – Single Source Shortest Path in Directed Acyclic Graphs –
Dijkstra’s Algorithm

UNIT V  NP PROBLEMS  9
Polynomial Time – Polynomial-time Verification – NP-completeness and Reducibility – NP-
Completeness Proofs – NP-complete Problems – Approximation Algorithms – Vertex Cover Problem

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
• Analyze the algorithms for time/space complexity
• Implement heap sort and quick sort
• Design algorithms using dynamic programming and Greedy approaches
• Design algorithms using graph structure to solve real-life problems
• Analyze problems in terms of polynomial time.

REFERENCES
3. Anany Levitin, “Introduction to Design and Analysis of Algorithms”, Third, Pearson Education,
   2012.

CA 7203  OBJECT ORIENTED PROGRAMMING PARADIGM  L  T  P  C
OBJECTIVES:
The student should be able to
• To understand the OO paradigm.
• To be aware of the OO design technique.
• To learn the syntax of C++.
• To be exposed to the file processing and exception handling techniques of C++.
• To be familiarized with the Standard Template Library.

UNIT I  INTRODUCTION  9
Introduction - Object-oriented Design - Object-oriented Features- –Types and Declaration –
Pointers – Arrays – Structures – Expressions and Statements – Functions – Namespaces and
Exceptions.

UNIT II  ABSTRACT DATA TYPES  9
Classes – Constructors – Destructors – Function Overloading – Operator Overloading –
Conversions.

UNIT III  INHERITANCE  9
Derived Class – Virtual Functions – Polymorphism - Abstract Base Class – Multiple Inheritance
UNIT IV  GENERIC PROGRAMMING  9
Templates – Generic Functions – Generic Classes – Standard Template Library – Containers –
Iterators Function Objects – Allocators.

UNIT V  I/O AND EXCEPTION HANDLING  9
Streams – Ostream – Istream – Files – Throwing Exceptions – Try Blocks – Handlers- OOP using
C++.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Design and implement C++ programs for any given problem. Understand an existing program and modify it as per the requirements.
- Identify the errors in a C++ program.
- Identify the output of a C++ program without actually executing it.
- Write generic programs using STL.

REFERENCES:

CA7211  OOP AND ALGORITHMS LABORATORY

OBJECTIVES:
The student should be able to
- To develop skills in object oriented programming.
- To learn and implement linear, non linear and tree data structures.
- To learn Set ADT and Graph data structures and its applications.
- To study, implement and analyze the different sorting techniques.

EXPERIMENTS
The following experiments should be practiced
1. Classes, Constructors, Destructors, Function overloading and Operator overloading.
2. Implementation of Derived classes, Abstract classes, Multiple inheritance, Static and Dynamic Polymorphism.
3. Implementation of IO Stream classes and Exception Handling.
4. Working with function template and class template.
5. Usage of standard template library and implementation of container and iterators.
7. Graph Implementation – Traversals
8. Shortest path using Dijkstra’s Algorithm
10. Matrix Chain Multiplication and LCS.
11. Activity Selection and Huffman Coding.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Develop programs in object oriented paradigm.
- Develop applications using various design techniques
- Design and implement various graph algorithms.

[Signature]
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[Position]
OBJECTIVES:
The student should be able to
- To know about various Process scheduling algorithms
- To realize the differences between OS and Distributed OS
- To learn Socket programming
- To study about Networking Tools

EXPERIMENTS
1. Client-server programming (Sockets)
2. Network analyzer - Tool
3. Traffic Analysis - Tool
4. Protocol Analysis - Tool
5. Study of Software Defined Networking tools
6. Implementation of Process scheduling algorithms (FCFS and SJF)
7. Implementation of Process scheduling algorithms (Round Robin and Priority)
8. Implementation of deadlock detection algorithm
9. Implementation of deadlock prevention and recovery process
10. Implementation of deadlock avoidance algorithm
11. Implementation of Page replacement algorithms
12. Implementation of Disk scheduling algorithms
13. Implementation of Distributed OS Resource Scheduling algorithms
14. Two-Phase Commit Protocol in Distributed OS.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- At the end of the course the student should be able to Implement process scheduling and deadlock detection, prevention algorithms
- Write programs for distributed process management.
- Write Socket programs with TCP/UDP Develop networking applications

OBJECTIVES:
The student should be able to
- To understand the architecture of embedded processor, microcontroller and peripheral devices.
- To appreciate the nuance of programming micro controllers in assembly language for embedded systems.
- To understand challenges in Real time operating systems.
- To learn programming the embedded systems in high level languages such as C.

UNIT I INTRODUCTION TO EMBEDDED SYSTEM
Introduction to Embedded system - Microprocessor V/s Micro-controller - 8051 Microcontroller
General architecture - Instruction set and Assembly programs - Embedded C programs.

UNIT II  MEMORY AND INTERFACE  9
Memory organization and interfacing - I/O devices and interfacing Counters and Timers - Serial data communication – Interrupts.

UNIT III  INTERFACING PERIPHERALS  9

UNIT IV  ADVANCED CONTROLLER AND PROCESSORS  9
Advanced Microcontrollers - PIC - ARM - ATOM processor - Architecture-Instruction set.

UNIT V  DESIGNING AND DEVELOPMENT OF APPLICATIONS  9
Design methodologies and tools - designing hardware and software components - system analysis and architecture design - system integration – debugging - case studies

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Have the ability to analyze architecture of embedded processors and microcontroller.
- Have the ability to use Assembly language to develop embedded software.
- Have the ability to use ANSI C to develop embedded software.
- Interface to peripherals, and have the knowledge of typical interfacing standards.
- Design and Develop the prototype of Embedded system (including interfacing to microcontroller, and control from software).

REFERENCES:

CA 7301  DATA WAREHOUSING AND MINING  

OBJECTIVES:
The student should be able to
- To Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence.
- To expose the students to the concepts of Data warehousing Architecture and Implementation.
- To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining.
- To identify Business applications and Trends of Data mining.
UNIT I  DATA WAREHOUSE

UNIT II  DATA MINING & DATA PREPROCESSING
Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation.

UNIT III  ASSOCIATION RULE MINING
Introduction - Data Mining Functionalities - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint – Based Association Mining.

UNIT IV  CLASSIFICATION & PREDICTION
Classification vs Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section

UNIT V  CLUSTERING

OUTCOMES:
Upon completion of this course, the student will:
- Evolve Multidimensional Intelligent model from typical system.
- Discover the knowledge imbibed in the high dimensional system.
- Evaluate various mining techniques on complex data objects.

REFERENCES:

CA 7303  OBJECT ORIENTED ANALYSIS AND DESIGN  L  T  P  C
3  0  0  3

OBJECTIVES:
The student should be able to
- Gives and understanding of OOAD basics, UML diagrams, system modeling, design based on requirements, converting design to code, and design patterns.

UNIT I  OOAD BASICS
UNIT II  REQUIREMENTS & MORE MODELING  

UNIT III  DESIGN AND PRINCIPLES OF DESIGN  

UNIT IV  MAPPING TO CODE  
Mapping designs to code – Test Driven development and refactoring – UML Tools and UML as blueprint

UNIT V  MORE PATTERNS  

OUTCOMES:
Upon completion of this course, the student will:
- Familiarize with the topics of object oriented System designs.
- Design Patterns using UML.
- Apply design patterns to various applications.

REFERENCES:

CA 7304  WEB PROGRAMMING  
L  T  P  C  3  0  0  3

OBJECTIVES:
The student should be able to
- To understand the basics of web forms and validation.
- To learn the concepts of XML related technologies.
- To learn the fundamentals of java.
- To understand the importance of server side programming and web development.

UNIT I  HTML AND JAVA SCRIPT  

TOTAL : 45 PERIODS
UNIT II XML TECHNOLOGIES

UNIT III JAVA BASICS

UNIT IV JAVA GUI AND DATABASE CONNECTIVITY

UNIT V SERVER SIDE SCRIPT

OUTCOMES:
Upon completion of this course, the student will:
- Design and implement web forms and client side validation. Work with XML authoring, Parsing, and related technologies.
- Develop object oriented programming using Java.
- Design and develop GUI based applications using Swing components.
- Design and develop servlet and JSP application with database connectivity.

REFERENCES:

CA 7313 WEB PROGRAMMING LABORATORY
OBJECTIVES:
The student should be able to
- To learn web page creation.
- To understand the real time requirements of web page such as validation, use of DOM, role of XML.
- To understand OOP concepts and basics of Java language.
- To learn and use client server architecture based applications.
- To explore server side functionalities of an application.

EXPERIMENTS:
2. Creation of XML file and validation using XML schema and generation of XML using tools.
3. Simple xml based applications using DOM, SAX and XSL.
4. Basic Java programming covering objects, inheritance, polymorphism, interfaces, packages and exception handling.
5. String handling programs and regular expression programs.
6. Creation of applet based GUI's. 7. Application involving applet based GUI, JDBC, Servlet, JSP/PHP, cookies and session tracking.

TOTAL : 45 PERIODS
OUTCOMES:
Upon completion of this course, the student will:
- Make Web site creation and validation.
- Work with XML based technologies.
- Develop simple console application using Java.
- Develop GUI application using Swing and Applet.
- Build web based applications using JDBC, Servlet / JSP.

CA 7311 CASE TOOLS LABORATORY

OBJECTIVES:
The student should be able to
- To understand the software engineering methodologies for project development.
- To gain knowledge about open source tools for Computer Aided Software Engineering.
- To develop an efficient software using case tools.

EXPERIMENTS:
1. Open source Tools: StarUML / UMLGraph / Topcased Prepare the following documents for each experiment and develop the software using software engineering methodology.
3. Software Requirement Analysis - Describe the individual Phases/modules of the project and Identify deliverables.
4. Data Modelling - Use work products – data dictionary - use case diagrams and activity diagrams - build and test class diagrams - sequence diagrams and add interface to class diagrams.
5. Software Development and Debugging – implement the design by coding

Sample Experiments:
Academic domain
1. Course Registration System
2. Student marks analysing system

Railway domain
1. Online ticket reservation system
2. Platform assignment system for the trains in a railway station

Medicine domain
1. Expert system to prescribe the medicines for the given symptoms
2. Remote computer monitoring Finance domain
3. ATM system
4. Stock maintenance Human Resource management
5. Quiz System
6. E-mail Client system.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Use open source CASE tools to develop software.
- Analyze and design software requirements in an efficient manner.
OBJECTIVES: The student should be able to
- Develop broad career plans, evaluate the employment market, identify the organizations to get good placement, match the job requirements and skill sets. Take part effectively in various selection procedures adopted by the recruiters.

EXPERIMENTS
- Practice on phonetics.
- Grammar and writing style.
- Natural language processing.
- Arithmetic skills.
- Communication skills.
- Use of software tools for presentation – Word, Excel, Power point.
- Database connectivity.
- Report writing.
- Project design and implementation.
- Presentation skills on projects.
- Group discussion.
- Interview preparation.

TOTAL : 30 PERIODS

OUTCOMES :
Upon completion of this course, the student should be able to :
- Develop effective communication skills (spoken and written).
- Develop effective presentation skills.
- Conduct effective business correspondence and prepare business reports which produce results.
- Become self-confident individuals by mastering inter-personal skills, team management skills, and leadership skills

CA 7401 ADVANCED JAVA PROGRAMMING
OBJECTIVES:
The student should be able to
- To understand the advanced concepts of java.
- To learn the concepts of web applications and MVC architecture.
- To learn the concept of distributed objects including web services.
- To understand the importance of advanced frameworks.

UNIT I JAVA BASICS

UNIT II JAVA NETWORK PROGRAMMING
UNIT III  WEB APPLICATION DEVELOPMENT  12

UNIT IV  SOFTWARE COMPONENTS  12
Distributed objects – RMI programming model – Parameters and return values in remote methods – Remote object activation - Web services and JAX-WS - Publishing and consuming SOAP based web services – REST-based web services – REST-based JSON web services.

UNIT V  ADVANCED FRAMEWORK  12

TOTAL : 60 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Work with Java I/O streams, networking and GUI based application development.
- Work with Web application development using Java Server Faces.
- Develop web services using REST/SOAP/JSON.
- Design and develop applications using advanced frameworks.

REFERENCES:

IF 7451  UNIX INTERNALS

OBJECTIVES:
The student should be able to
- To understand the design of the UNIX operating system.
- To become familiar with the various data structures used.
- To learn the various low-level algorithms used in UNIX.

UNIT I  OVERVIEW  9
General Overview of the System - History – System structure – User perspective –Operating system services – Assumptions about hardware - Introduction to the Kernel - Architecture of the UNIX operating system – Introduction to system concepts - The Buffer Cache - Buffer headers – Structure of the buffer pool – Scenarios for retrieval of a buffer– Reading and writing disk blocks – Advantages and disadvantages of the buffer cache.

UNIT II  FILE SUBSYSTEM  9
Internal representation of files - Inodes – Structure of a regular file – Directories –Conversion of a path name to an Inode – Super block – Inode assignment to a new file – Allocation of disk blocks.
 UNIT III  SYSTEM CALLS FOR THE FILE SYSTEM  

 UNIT IV  PROCESSES  

 UNIT V  MEMORY MANAGEMENT AND I/O  

OUTCOMES :  
Upon completion of the course, the students should be able to:  
- Design and implement any subsystem of an operating system.  
- Modify the existing data structures of Linux kernel.  
- Modify the existing subsystem of Linux kernel and rebuild it.  
- Design and implement new data structures and algorithms for the kernel of an operating system.  
- Critically analyze different data structures and algorithms used in the building of a kernel.

REFERENCES :  

CA7402  MOBILE COMPUTING  
OBJECTIVES:  
The student should be able to  
- To study the need and nature of mobile applications  
- To learn about the tools and platforms required for mobile application development  
- To understand the design issues in the development of mobile applications  
- To learn mobile application development  
- To become familiar with the popular cellular network and wireless data network

 UNIT I  INTRODUCTION  
UNIT II  TOOLS

UNIT III  APPLICATION DESIGN

UNIT IV  APPLICATION DEVELOPMENT

UNIT V  CELLULAR NETWORKS AND WIRELESS LANS

TOTAL : 45 PERIODS

OUTCOMES :
Upon completion of this course, the student will:
• To appreciate the need for rapid progress in mobile application development
• To use the various tools and developments for mobile application development
• To design and implement effective mobile applications in popular mobile development platform
• To deploy GSM network and IEEE 802.11 WLAN

REFERENCES :
8. Alasdair Allan, “iPhone Programming”, O'Reilly, 2010
OBJECTIVES:
The student should be able to
- To learn Java and Enterprise Java intensively.
- To understand many advanced technologies of Java such as Multithreading, Streaming, Networking, Generic collections, RMI.
- To learn and use MVC architecture for application development.
- To learn and use web services and advanced frameworks for web application development.

EXPERIMENTS
1. Design and Implement java programs that deals with the following:
   a. Classes and Objects and Interfaces.
   b. Exception Handling with user defined Exceptions.
   c. String Handling (String Class objects - String Manipulation functions).
   e. Implementation of Thread Synchronization using an application.
   f. Reading and Writing Objects using Serialization.
   g. Creation of User Interfaces using SWING.
   i. Usage of Recursion.
   j. Creation and Manipulation of generic objects.
   k. Reading websites using URL class.
   l. File Transfer using UDP.
   m. Chat Application using TCP.
2. Implementation of any Information System using JDBC.
3. Web Application development using Servlet and JSP.
4. Development of a Web application using JSF.
5. Database Connectivity using Java Bean.
7. Creation of REST based web services and its access using JSON.
8. Database access using Hibernate.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Become an intermediate or advanced developer of Java.
- Write programs on advanced technologies of Java such as Streaming, Networking, Multithreading and Generic collections.
- Develop chat and file transfer applications.
- Implement Server Side Programming and dynamic software components.
- Design and Develop GUI based components and Animations.
- Design and implementation of interactive web sites.
- Create distributed applications using RMI, JAX-WS, and REST based services.
- Create MVC applications using advanced frameworks.
CA7412  MOBILE APPLICATION DEVELOPMENT LABORATORY  L  T  P  C
0  0  4  2

OBJECTIVES:
The student should be able to
- To know about various platforms and tools available for developing mobile applications.
- To realize the differences between the development of conventional applications and mobile applications.
- To learn programming skills in J2ME and Android SDK.
- To study about micro browser based applications to access the Internet using Sun Java Toolkit.

EXPERIMENTS
The following experiments to be practiced
2. Form design for mobile applications.
3. Applications using controls.
4. Graphical and Multimedia applications.
5. Data retrieval applications.
7. Gaming applications. (Perform the experiments from 2 to 7 in J2ME and Android SDK framework)
8. Micro browser based applications using WAP, WML and WML scripts. (Perform experiments in 8 using Sun Java Wireless toolkit)

TOTAL : 45 PERIODS

OUTCOMES
Upon completion of this course, the student will:
- Be able to develop useful mobile applications for the current scenario in mobile computing and pervasive computing.

TOTAL : 45 PERIODS

CA7413  TECHNICAL SEMINAR AND REPORT WRITING  L  T  P  C
0  0  2  1

OBJECTIVES:
- To help students develop listening skills for academic and professional purposes.
- To help students acquire the ability to speak effectively in English in real-life situations.
- To inculcate reading habit and to develop effective reading skills.

SEMINAR ON:
- Literature survey methods and literature study methods for projects.
- Good programming practices.
- System software development.
- Application design.
- Operating system design.
- Compiler design.
- Network design.
- Soft computing.
- Implementation using languages and packages.
- Report and thesis writing.

TOTAL : 30 PERIODS
Upon completion of this course, the student will be able to:

- Gain confidence in facing the placement interview.
- Develop effective communication skills (spoken and written).
- Interact with each other and face a wide variety of issues, topics, and situations that they are likely to come across as entry level professionals.

CA7503 SOFTWARE TESTING

OBJECTIVES: The student should be able to

- To introduce the basics and necessity of Software testing.
- To introduce various testing techniques along with software production.
- To introduce the concepts of Software bugs and its impact.

UNIT I INTRODUCTION

UNIT II SOFTWARE TESTING METHODOLOGY

UNIT III SOFTWARE TESTING TECHNIQUES

UNIT IV AUTOMATED TESTING AND TEST TOOLS

UNIT V TEST DOCUMENTATION

TOTAL : 45 PERIODS

OUTCOMES :
Upon completion of this course, the student will:

- Perform automated testing using test tools.
- Document the testing procedures.

REFERENCES:
OBJECTIVES:
The student should be able to
- To understand the concept of cloud and utility computing and its various issues.
- To appreciate the emergence of cloud as the next generation computing paradigm.
- To be able to set up a private cloud.

UNIT I INTRODUCTION TO CLOUD COMPUTING

UNIT II DISTRIBUTED SYSTEMS

UNIT III VIRTUALIZATION

UNIT IV CLOUD SECURITY

UNIT V CASE STUDIES
Google App Engine – Google File System (GFS) – Big Table – Google’s NOSQL System– Chubby – Google’s Distributed Lock Service, Amazon AWS - Amazon EC2, Amazon Simple Storage Service (S3) – Eucalyptus – Open Stack.

OUTCOMES:
Upon completion of this course, the student will:
- Articulate the main concepts, key technologies, strengths and limitations of cloud computing.
- Identify the architecture, infrastructure and delivery models of cloud computing.
- Explain the core issues of cloud computing such as security, privacy and interoperability.

REFERENCES:

CA 7501 CRYPTOGRAPHY AND NETWORK SECURITY

OBJECTIVES:
The student should be able to
- To understand the mathematics behind Cryptography.
- To understand the standard algorithms used to provide confidentiality, integrity and authenticity.
- To get the knowledge of various security practices applied in the field of information technology

UNIT I FUNDAMENTALS AND MATHEMATICS OF CRYPTOGRAPHY

UNIT II ENCRYPTION TECHNIQUES

UNIT III HASH FUNCTIONS AND SIGNATURES

UNIT IV NETWORK SECURITY

UNIT V SYSTEM SECURITY

TOTAL : 45 PERIODS
OUTCOMES:
Upon completion of this course, the student will:

- Analyze the basic security algorithms required by any computing system.
- Predict the vulnerabilities across any computing system.
- Design a security solution for any computing system.

REFERENCES:

CA 7513 SOFTWARE TESTING LABORATORY

OBJECTIVES:
The student should be able to

- To study various testing tools.
- To implement various testing techniques.
- The following experiments should be practiced:

EXPERIMENTS
1. Study of software testing tools such as WinRunner, LoadRunner, Rational Rose Test Suite, QTP, Selenium
2. Implementation of testing techniques using tools:
   (1) Function testing
   (2) System testing
   (3) Acceptance testing
   (4) Usability testing
   (5) Agile testing
   (6) Configuration testing
   (7) Compatibility testing
   (8) Foreign language testing
   (9) Security testing
3. Mini-project: developing automated test case generation tool

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:

- Perform automated testing on applications using open source testing tools.
- Design and develop automated test case generation tools.
OBJECTIVES:
The student should be able to

- To understand the concept of Number Theory.
- To learn the cryptographic algorithms used to provide confidentiality, integrity and authenticity.
- To configure and study about wireless security.
- To develop web applications in the cloud.
- To learn the design and development process involved in creating a cloud based application.

EXPERIMENTS

Part I Cryptographic Algorithms (using Java)

1. Implementation of classical cryptographic algorithms.
2. Euclidean algorithm and Extended Euclidean algorithm.
3. Implementation of modular arithmetic.
4. Implementation of symmetric key cryptography using DES, AES, RC4 algorithms.
5. Implementation of Euler’s Theorem, Fermat Theorem and Chinese Remainder Theorem.
6. Implementation of algorithms for generating and checking prime numbers.
8. Implementation of Asymmetric key cryptography using RSA, ElGamal and Diffie-Hellman Key-exchange algorithms.

Part II Configuration and study exercise

12. VPN Configuration.
13. Firewall configuration for packet filtering and access control

Part III

Any 4 of the following experiments can be implemented:

1. Create a VM image which has a C compiler along with an operating system and do the following experiments
   a. Fibonacci Series
   b. File Operations
2. Install Virtual box with different flavours of linux or windows OS on top of windows7 or 8.
3. Install GAE and run a quick sort using python.
4. Install and run Eucalyptus Fast start.
5. Create two nodes in Eucalyptus and exchange data.
   Mini Project
6. Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm not present in CloudSim or Install Hadoop and manipulate a large dataset and run on Hadoop

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:

- Have a detailed overview of the design and development process involved in creating a cloud based application.
- Apply the security algorithms for web based and cloud based applications.
- Analyze and mitigate vulnerabilities across any computing system and hence be able to design a secure environment.
OBJECTIVES:
The student should be able to
- Construct workplace documents that demonstrate understanding of management communication contexts, genres, and contemporary business topics.
- Analyze and use quantitative data in professional documents.
- Recognize, explain, and use the formal elements of specific genres of organizational communication: white papers, recommendation and analytical reports, proposals, memorandums, web pages, wikis, blogs, business letters, and promotional document.

EXPERIMENTS
2. Use of Excel for graphs.
4. Report writing for an application project on any one of the following:
   - Student Information System.
   - Banking Operation.
   - Admission system.
   - Railway reservation system.
5. Header, Body computation and Footer generation for Reports.
6. Thesis writing:
   - Introduction on problems.
   - Literature survey – Existing work.
   - Architecture Design.
   - Algorithms and Implementation.
   - Presentation and results.
   - Writing Conclusion.
   - Display of Reference.

TOTAL : 30 PERIODS

OUTCOMES
Upon completion of this course, the student will:
- Explain the ethical, international, social, and professional constraints of audience, style, and content for writing situations.
- Demonstrate effective use of secondary research resources (such as electronic databases) as well as primary data gathering strategies.
- Identify different format features in print, multimedia, and HTML documents, and develop document design skills.
- Revise and effectively edit all assignments, including informal media (such as email messages to the instructor).

OBJECTIVES:
The student should be able to
- To understand the concepts of distributed system.
- To learn about distributed system resource management.
- To understand various fault tolerant techniques.
UNIT I COMMUNICATION IN DISTRIBUTED ENVIRONMENT 9

UNIT II DISTRIBUTED OPERATING SYSTEMS 12

UNIT III DISTRIBUTED RESOURCE MANAGEMENT 10

UNIT IV FAULT TOLERANCE AND CONSENSUS 7

UNIT V CASE STUDIES 7
Distributed Object-Based System – CORBA – Hadoop – Python Remote Objects - Distributed Ruby.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Develop fault tolerant distributed applications.
- Work Compare various distributed operating system characteristics.
- Apply efficient Resource allocation methodologies in distributed applications

REFERENCES:
3. Hadoop in Practice, Second Edition, Alex Holmes

CA 7014 HIGH SPEED NETWORKS L T P C 3 0 0 3

OBJECTIVES:
The student should be able to
- To provide an overview of high-speed networking technologies.
- To learn the enhanced set of functionalities for high-speed networking.
- To understand the underlying concept involved for high performance.

UNIT I HIGH SPEED LANS 9
UNIT II  IPV6

UNIT III  CONGESTION AND TRAFFIC MANAGEMENT

UNIT IV  INTEGRATED AND DIFFERENTIATED SERVICES

UNIT V  MPLS NETWORKS

TOTAL : 45 PERIODS

OUTCOMES :
Upon completion of this course, the student will:

• A good appreciation of the building blocks and operation of high speed networking technology including the hardware and software components.

REFERENCES :

CA 7025  TCP/IP DESIGN AND IMPLEMENTATION  L T P C
3 0 0 3

OBJECTIVES:
The student should be able to

• Understand the design of TCP/IP Protocol structure
• Understand the implementation of TCP and IP functionalities in the form of data structures
• Understand how TCP handles input and output with synchronization
• Understand the implementation of error processing strategies
• Understand the importance of timers and how it is managed in a TCP communication.

UNIT I  FUNDAMENTALS
Internetworking concepts - IP and datagram forwarding - TCP services - Interactive data flow - Timeout and retransmission - Bulk data flow - Persist timer – Keep-alive timer

UNIT II  ARP AND IP
Structure of TCP/IP in OS - Data structures for ARP - Cache design and management - IP software design and organization - Sending a datagram to IP
UNIT III  
**IP ROUTING IMPLEMENTATION**  
9  
Routing table - Routing algorithms - Fragmentation and reassembly - Error processing (ICMP) - Multicast Processing (IGMP)

UNIT IV  
**TCP I/O PROCESSING AND FSM**  
9  
Data structure and input processing - Transmission control blocks - Segment format - Comparison - Finite state machine implementation - Output processing - Mutual exclusion - Computing TCP data length

UNIT V  
**TCP TIMER AND FLOW CONTROL**  
9  
Timers - Events and messages - Timer process - Deleting and inserting timer event - Flow control and adaptive retransmission - Congestion avoidance and control - Urgent data processing and push function

OUTCOMES:  
Upon completion of this course, the student will:  
- Design a sample protocol stack.  
- Come up with more efficient data structures for the protocols.  
- Embed the protocol suite in a better and secure way in the OS.  
- Come up with the variants of TCP according to the applications.  
- Modify IP according to the applications.

REFERENCES:  

CA 7001  
**COMPUTER GRAPHICS AND ANIMATION**  
L T P C  
3 0 0 3

OBJECTIVES:  
The student should be able to  
- understand the foundation of graphics applications programming.  
- understand the fundamental concepts and theory of computer graphics.  
- understand the basics of application programming interface (API) implementation based on graphics pipeline approach and  
- become proficient at graphics programming using OpenGL.

UNIT I  
**INTRODUCTION**  
6  

UNIT II  
**GRAPHICS PRIMITIVES**  
6  

UNIT III  
**TRANSFORMATIONS**  
12  
Affine Transformations (2D & 3D): Translation, Rotation, Scaling, Reflection and Shearing; Hierarchical Modelling & viewing: The Camera Transformation – Perspective, orthographic and Stereographic views; Fractals.
UNIT IV ADVANCED RENDERING TECHNIQUE
Curves and Surfaces: Bezier, B-Splines and NURBS; Color models; Hidden Surface Removal Algorithms; Photorealistic rendering; Global Illumination: Ray tracing - Radiosity; Texture Synthesis – Bump Mapping, Environmental mapping; Advanced Lighting and Shading.

UNIT V ANIMATION
Overview of Animation Techniques – Key framing, Computer Animation; Motion capture and editing; forward/Inverse Kinematics; Deformation models; Facial animation; Rigid body animation - collision detection – Graphicsfile format – OpenGL animation procedures.

TOTAL : 45 PERIODS

OUTCOMES :
Upon completion of this course, the student will:

- Analyze the fundamentals of 2D and 3D computer graphics.
- Identify the structure of modern computer graphics systems.
- Explain the basic principles of implementing computer graphics primitives.
- Be able to construct interactive computer graphics programs using OpenGL.

REFERENCES

CA 7003 DATABASE TUNING

OBJECTIVES: The student should be able to

- To understand the basic principles of tuning.
- To learn about the performance criteria of choosing a DBMS.
- To understand and use suitable troubleshooting mechanisms for tuning databases.

UNIT I FUNDAMENTALS OF TUNING

UNIT II INDEX TUNING
Types of Queries – Data Structures – B tree – B + Tree - Hash Structures – Bit Map Indexes – Clustering Indexes – Non Clustering Indexes – Composite Indexes – Hot Tables – Comparison of Indexing and Hashing Techniques.
UNIT III  QUERY OPTIMIZATION  

UNIT IV  TROUBLESHOOTING  

UNIT V  CASE STUDIES  

OUTCOMES :  
Upon completion of this course, the student will:
- Gain knowledge on the significance of database tuning.
- Optimize queries for tuning databases.
- Develop tuning based E-Commerce applications.

REFERENCES :  

CA 7023  SOFTWARE QUALITY MANAGEMENT  
OBJECTIVES:  
The student should be able to
- To give a clear picture on quality management, documentation and control for software quality.
- To provide knowledge on standards, models and tools used for software quality management.
- To understand how to perform measurement and assessment of software quality.

UNIT I  BASICS OF SOFTWARE QUALITY  

UNIT II  CONTROLLING AND DOCUMENTING  

UNIT III  QUALITY STANDARDS  
UNIT IV QUALITY TOOLS

UNIT V QUALITY METRICS AND ASSESSMENT
Fundamentals of Measurement Theory - Software quality Metrics overview – Availability Metrics – Conducting In-Process quality assessment - Conducting software project Assessments.

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
• Prepare document, control and manage software quality with the aid of tools and standards.
• Practice the process of measurement and assessment to ensure Software Quality.

REFERENCES:

CA 7022 REAL TIME SYSTEMS

OBJECTIVES:
The student should be able to
• To learn the fundamentals of real time computing systems.
• To understand real time databases.
• To familiarize with real time reliability techniques.

UNIT I INTRODUCTION

UNIT II PROGRAMMING LANGUAGES AND TOOLS

UNIT III REAL TIME DATABASES
Real time Databases - Basic Definition - Real time Vs General Purpose Databases - Main Memory Databases - Transaction priorities - Transaction Aborts - Concurrency Control Issues - Disk Scheduling Algorithms - Two-Phase Approach to improve Predictability - Maintaining Serialization Consistency - Databases for Hard Real Time systems.
UNIT IV COMMUNICATION

UNIT V EVALUATION TECHNIQUES

OUTCOMES:
Upon completion of this course, the student will:
- Design and Implement real time applications.
- Apply real time communication techniques in networks.
- Evaluate reliability in real time applications.

REFERENCES:

CA 7009 FUNDAMENTAL OF DIGITAL IMAGE PROCESSING
OBJECTIVES:
The student should be able to
- To understand the basic concepts and algorithms of digital image processing.
- To familiarize the students with the image processing environments like MATLAB and its equivalent open source Image processing environments.
- To expose the students to a broad range of image processing techniques and issues and their applications, and to provide the students with practical experience using them.
- To appreciate the use of image processing in current technologies and to expose the students to real-world applications of image processing.

UNIT I FUNDAMENTALS OF IMAGE PROCESSING

UNIT II IMAGE ENHANCEMENT AND RESTORATION
UNIT III IMAGE SEGMENTATION AND IMAGE FEATURE ANALYSIS

UNIT IV MULTI RESOLUTION ANALYSIS AND MORPHOLOGICAL PROCESSING

UNIT V IMAGE PATTERN RECOGNITION AND CASE STUDIES

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Implement basic image processing algorithms using MATLAB tools.
- Design an application that incorporates different concepts of Image Processing.
- Apply and explore new techniques in the areas of image enhancement- restoration segmentation - compression-wavelet processing and image morphology.
- Critically analyze different approaches to implement mini projects.
- Explore the possibility of applying Image processing concepts in various domains.

REFERENCES:

CA 7026 USER INTERFACE DESIGN

OBJECTIVES: The student should be able to
- To know about the user.
- To learn the importance of best interface.
- To know about object oriented user interface (OOUI).
- To know about the merging of PC interface with Internet Web browser interfaces.

UNIT I FOUNDATIONS OF USER INTERFACE DESIGN
Designing quality software user interface – user experiences and expectations – software user interface – user interface models – psychology of humans and computer – golden rules of user interface design
UNIT II USER INTERFACE EVOLUTION
Computer standards and user interface guidelines – software usability testing – command lines and menus – graphical user interface.

UNIT III OBJECT-ORIENTED USER INTERFACE
Introduction – basic of OOUIs – core skills needed for OOUIs – user interface architecture behind OOUIs – OOUIs and the user’s model – User’s Memory load – Semantics of OOUIs – migrating from GUI to OOUIs.

UNIT IV USER INTERFACE DESIGN PROCESS
An iterative user interface design process – Design Team approach – User involved and learner – Centered design – Four-phase Interface design process – Iterative nature of interface design – Case Study – Gather and analyze user information – Design the user interface – Construct the user interface – Validate the user interface – Testing – evaluation

UNIT V ADVANCED USER INTERFACE TECHNIQUES AND TECHNOLOGIES
Interface Designer’s Tool kit – Uses of color – Audio and animation in the user interface - top ten usability – Problems with GUI and OOUIs – Help - advisors - wizards and multimedia – Social user interface and intelligent agents – The new worlds of PC – internet user interfaces.

OUTCOMES
Upon completion of this course, the student will:

- Design an efficient User interface with required information.
- Analyze user requirements thoroughly.
- Implement Object oriented approach in interface design

REFERENCES:

CA 7012 GRID COMPUTING

OBJECTIVES:
The student should be able to

- To understand Grid Architecture.
- To understand different types of grids.
- To know Grid standards.
- To acquire the knowledge of Grid computing in various areas.
UNIT I  INTRODUCTION  9

UNIT II  FRAMEWORK  9

UNIT III  DATA AND KNOWLEDGE GRID  9

UNIT IV  EDUCATIONAL GRID  9
Global infrastructure-e-Science perspective of Grid-Meta computing-grid and virtual observatory- High energy physics Grid-Biology and Grid-Medical images and Grid-Chemistry and Grid-Education and Enterprise with the Grid

UNIT V  APPLICATIONS  9

TOTAL : 45 PERIODS

OUTCOMES :
Upon completion of this course, the student will:
- Create Grid Middleware architecture.
- Explain the services offered by grid.
- To utilize grid for various applications.

REFERENCES

CA7018  INTERNET OF THINGS  L T P C  3 0 0 3

OBJECTIVES :
- To understand the fundamentals of Internet of Things.
- To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To apply the concept of Internet of Things in the real world scenario

UNIT I  FUNDAMENTALS of IoT  9
Introduction-Characteristics-Physical design - Protocols – Logical design – Enabling technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.
UNIT II IoT DESIGN METHODOLOGY 9
IoT systems management – IoT Design Methodology – Specifications Integration and Application Development.

UNIT III BUILDING IoT WITH RASPBERRY PI 9
Physical device – Raspberry Pi Interfaces – Programming – APIs / Packages – Web services -

UNIT IV BUILDING IoT WITH GALILEO/ARDUINO 9
Intel Galileo Gen2 with Arduino- Interfaces - Arduino IDE – Programming - APIs and Hacks

UNIT V CASE STUDIES and ADVANCED TOPICS 9
Various Real time applications of IoT- Connecting IoT to cloud – Cloud Storage for IoT – Data Analytics for IoT – Software & Management Tools for IoT
TOTAL : 45 PERIODS

OUTCOMES:
- Design a portable IoT using Arduino/ equivalent boards and relevant protocols.
- Develop web services to access/control IoT devices.
- Deploy an IoT application and connect to the cloud.
- Analyze applications of IoT in real time scenario

REFERENCES

CA 7028 XML AND WEB SERVICES

OBJECTIVES:
The student should be able to
- To learn the basics of XML technology.
- To understand the background of distributed information system.
- To analyze and design a web service based application.
- To learn the security features of web services and service composition

UNIT I XML FUNDAMENTALS 9

UNIT II DISTRIBUTED INFORMATION SYSTEM 9

UNIT III WEB SERVICES 9
UNIT IV  XML SECURITY  

UNIT V  SERVICE COMPOSITION  

OUTCOMES
Upon completion of this course, the student will:
- Create, validate, parse, and transform XML documents.
- Design a middleware solution based application.
- Develop web services using different technologies.
- Compose set of web services using BPEL.

REFERENCES:

CA 7011  GEOGRAPHICAL INFORMATION SYSTEMS  
OBJECTIVES:
The student should be able to
- To provide exposure to data models and data structure used in GIS and to introduce various Raster and Vector Analysis capabilities of GIS also expose the concept of quality and errors in GIS

UNIT I  BASICS  

UNIT II  DATA MODEL AND INPUT  

UNIT III  DATA ANALYSIS AND OUTPUT  
UNIT IV  SPATIAL MODELING  9

UNIT V  DATA QUALITY AND MISCELLANEOUS TOPICS  9

OUTCOMES:
Upon completion of this course, the student will:

- Apply the fundamental concepts and techniques related to the use of Geographic Information System.
- Apply this knowledge to a wide range of spatial/environmental problems.
- Describe GIS data models and spatial data collection.

REFERENCES:

TOTAL : 45 PERIODS

CA 7013  HEALTHCARE INFORMATION SYSTEMS  L T P C
3 0 0 3

OBJECTIVES: The student should be able to

- To gain knowledge about medical informatics and healthcare informatics.
- To understand the case study of computerized patient record.
- To study and use different tools for clinical information system.
- To apply the knowledge of Bio informatics for systems.

UNIT I  MEDICAL INFORMATICS  9

UNIT II  HEALTHCARE INFORMATICS  9
Strategic Planning - Selecting a Health Care Information System - Systems Integration and Maintenance - Systems Integration - Regulatory and Accreditation Issues - Contingency Planning and Disaster Recovery.

UNIT III  COMPUTERISED PATIENT RECORD  9
UNIT IV MEDICAL IMAGING

UNIT V BIO-INFORMATICS

OUTCOMES:
Upon completion of this course, the student will:
- To design and develop clinical and hospital management system on his own.
- To work with different medical imaging techniques.
- To apply the knowledge of bio informatics for biological databases.

REFERENCES:

CA 7006 E-LEARNING TECHNIQUES
OBJECTIVES:
The student should be able to
- To gain knowledge about modern technology for learning.
- To acquaint with the e-Learning Tools.
- To learn technologies involved in e-learning application development.
- To become aware of the current business potential of e-learning based business.

UNIT I INTRODUCTION
Developing e-learning-E-learning approaches-E-learning components-Synchronous and asynchronous e-learning-Quality of e-learning-Blended learning-Need to develop an e-learning course-The activities, The team, The technology-work flow to produce and deliver e-learning content

UNIT II DESIGNING AN E-LEARNING CONTENT/COURSE
Identifying and organizing course content-Needs analysis-Analysing the target audience-Identifying course content-Defining learning objectives-Defining the course sequence-Defining instructional, media, evaluation and delivery strategies-Defining instructional methods, Defining the delivery strategy, Defining the evaluation strategy

UNIT III CREATING INTERACTIVE CONTENT
Preparing content-Creating storyboards-Structure of an interactive e-lesson-Techniques for presenting content-Integrating media elements-Courseware development-Authoring tools-Types of authoring tools-Selecting an authoring tool
UNIT IV MANAGING AND EVALUATING LEARNING ACTIVITIES

Course delivery and evaluation - Components of an instructor led or facilitated course - Planning and documenting activities - Facilitating learners' activities - Using communication tools for e-learning - Learning platforms - Proprietary vs. open-source LMS

UNIT V MANAGEMENT AND IMPLEMENTATION OF E-LEARNING

Collaborative learning - Moodle and other open-source solutions - E-learning methods and delivery formats - Evaluating the impacts of e-learning

TOTAL : 45 PERIODS

OUTCOMES:

Upon completion of this course, the student will:

- Work with technologies involved in e-Learning Applications.
- Design and Develop e-Learning Application and working with e-Learning tools.

REFERENCES:


IF 7076 OPERATIONS RESEARCH

L 3  T 0  P 0  C 3

OBJECTIVES: The student should be able to

This course aims at providing the necessary basic concepts of a few deterministic optimization techniques, queuing theory, simulation and applies them to various engineering problems.

UNIT I QUEUEING MODELS

Markovian Queues - Steady state analysis of Single and Multi-server Models - Little’s Formula - Finite and Infinite capacity models - Machine Interference Model - Self-service Queue.

UNIT II LINEAR PROGRAMMING

Formulation - Graphical solution - Simplex method - Two-phase method - Transportation and Assignment Models.

UNIT III NON-LINEAR PROGRAMMING


UNIT IV DYNAMIC PROGRAMMING

Dynamic programming - Principle of optimality - Forward and backward recursion – Applications of dynamic programming - Problem of dimensionality.

UNIT V SIMULATION MODELLING

Monte Carlo Simulation - Types of Simulation - Elements of Discrete Event Simulation - Generation of Random Numbers - Applications to Queuing systems.

TOTAL : 45 PERIODS

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OUTCOMES:
Upon completion of this course, the student will:
- Have a clear perception of the power of mathematical programming tools and acquire skills to analyze queuing models.
- Demonstrate the application of the operations research techniques to problems drawn from industry, management and other engineering fields.

REFERENCES:

CA 7007 ENTERPRISE RESOURCE PLANNING

OBJECTIVES:
The student should be able to
To make the students aware of the enterprise resource planning using information technology.

UNIT I INTRODUCTION TO ERP

UNIT II ENTERPRISE SYSTEMS

UNIT III PROCESS IN ERP

UNIT IV INTEGRATION

UNIT V CASE STUDY

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Explain the traditional ecosystem and the use of technology in enterprises.
REFERENCES:

CA 7020 MULTIMEDIA L T P C
3 0 0 3

OBJECTIVES:
The student should be able to
- understand the foundation of Multimedia Elements.
- create a graphics presentation.
- understand the compression and communication techniques used in multimedia.
- understand the basic functionalities of multimedia tools and
- create an entire multimedia project

UNIT I INTRODUCTION
Multimedia; Multimedia Software Tools; Multimedia Authoring Tools; Graphics and Image Data Representation; Multimedia Architecture.

UNIT II IMAGE FORMATION

UNIT III MULTIMEDIA COMPRESSION TECHNIQUES
Basics of Information Theory; Lossless and Lossy Compression Algorithms – Image Compression Standards – Basic Audio and Video Compression Techniques – MPEG Audio and Video Coding.

UNIT IV MULTIMEDIA COMMUNICATION AND RETRIEVAL
Basics of Multimedia Networks; Multiplexing Technologies; Quality of Multimedia Data Transmission; Multimedia over IP; Media – on – Demand; Content based Retrieval; Relevance Feedback

UNIT V MULTIMEDIA TOOLS AND APPLICATION

TOTAL: 45 PERIODS

OUTCOMES
Upon completion of this course, the student will:
- Use current trends in multimedia.
- Identify the basic components of a multimedia project
- Analyze meaning and media: the evolution of information across a variety of media types
- Assess the relationship between Interactive design and learning theories.
- Be proficient in digital imaging, interactive production, audio production.
- Have the ability to produce work in a team-based.
REFERENCES:

CA 7016 INFORMATION MANAGEMENT SYSTEM

OBJECTIVES:
The student should be able to
- To aware the significant of information in the business scenario
- To familiarize method of restoring, retrieving and presenting the information.

UNIT I INTRODUCTION
Data, information, knowledge and wisdom; characteristics of information, quality of information, value of information in decision making in various levels of the organization - Role of information in Business scenario - functional and process approach in the organization; Source and supply of information and content to employees, shareholders and customers

UNIT II INFORMATION CAPTURING AND MIGRATION MECHANISMS
Data management and system integration - Content management - text, imaging, records, workflow, web content management; Distributed databases, OO databases - object life cycle modeling visual databases and knowledge based databases and business impacts, ETL on data warehouse, Meta data and indexing

UNIT III BUSINESS PROCESS MANAGEMENT
Practices of BPM, role of Information in BPM, Business Analysis - relationship between information and organization, Critical success factors, Enterprise analysis - framework and tools, Process design and modeling - process improvements, process modeling, business process reengineering, SOA, Six Sigma and continuous improvement, ERP

UNIT IV INFORMATION PRESENTATION
Enterprise wide search - DSS, EIS, ES, Fact and entity extraction - OLAP, Data mining algorithm - classification and clustering of information, information governance, BI

UNIT V INFORMATION IN BUSINESS SCENARIO AND BUSINESS TRENDS
Information in management application: Functional areas of management, roles and responsibilities of Information resource manager, E business models, Value of information in E-CRM - Social marketing – social and ethical issues in handling information management.

TOTAL: 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Gains knowledge on effective applications of information systems in business
REFERENCES:

CA 7019 M-COMMERCE

OBJECTIVES: The student should be able to
- To understand Mobile Business strategies.
- To understand Mobile marketing tools and techniques.
- To know about Mobile technologies.

UNIT I INTRODUCTION
Introduction – Mobile Marketing Campaign - Fortune 500 and Mobile Marketing - Consumers Engagement with Mobile Terminologies.

UNIT II MOBILE MARKETING

UNIT III MOBILE MARKETING TOOLS
Strategic thinking about Mobile Marketing Campaign - Mobile Marketing Tools – Setting up Mobile Website for Different Firms using SMS - MMS And Apps - To Drive Customers to Business and Other Ways to Attract Customers.

UNIT IV MOBILE APPLICATIONS
Location Based Marketing – LBS – NFC - Bluetooth and LBA - 2D Codes – Tablet - Other Mobile Applications - Business Firms Connecting To Customers Using Mobile – Case Study - Mobile Marketing For B2B Companies - Mobile E-Commerce to Drive Revenue.

UNIT V MOBILE APPLICATION DEVELOPMENT
Mobile Payments - Present and Future Mobile Technology - Mobile Application Development

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Analyze various mobile marketing strategies.
- Market Mobile based Applications.
- Apply various tools in mobile marketing.
REFERENCES:

OBJECTIVES:
The student should be able to
- To introduce the basics of software reliability.
- To illustrate how to perform planning, execution and testing for software reliability.
- To learn about various metrics and models of software reliability

UNIT I  INTRODUCTION TO RELIABILITY CONCEPTS  9

UNIT II  OPERATING PROFILES  10
Implementing Operational Profiles - Developing Operational Profiles - Using the Graphical Representation of the Operational Profile - Applying the Module Usage Table - Learning Operations and Run Concepts - Applying Operational Profiles.

UNIT III  EXECUTION AND TESTING  9

UNIT IV  FUNDAMENTALS OF MEASUREMENTS  8

UNIT V  METRICS AND MODELS  9

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Learn reliability concepts, metrics and models used to evaluate the software reliability.
- Work with planning, execution and testing of software for reliability.
REFERENCES:

MM 7072

VISUALISATION TECHNIQUES

OBJECTIVES: The student should be able to
- To understand the importance of data visualization.
- To know the different types of visualization techniques.
- To create various visualizations.

UNIT I INTRODUCTION

UNIT II FOUNDATIONS FOR DATA VISUALIZATION
Visualization stages – Experimental Semiotics based on Perception Gibson’s Affordance theory – A Model of Perceptual Processing – power of visual perception-Types of Data-visualization and data objects.

UNIT III COMPUTER VISUALIZATION
Non-Computer Visualization – Computer Visualization: Exploring Complex Information Spaces – Fisheye Views – Applications – Comprehensible Fisheye views – Fisheye views for 3D data – Interacting with visualization

UNIT IV MULTIDIMENSIONAL VISUALIZATION

UNIT V CASE STUDIES
Small interactive calendars – Selecting one from many – Web browsing through a key hole – Communication analysis – Archival analysis

TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Compare various visualization techniques.
- Design creative visualizations.
- Apply visualization over different types of data.
REFERENCES:

IF 7071 BIOINFORMATICS L T P C 3 0 0 3
OBJECTIVES:
- To learn bio-informatics algorithms

UNIT I

UNIT II

UNIT III

UNIT IV

UNIT V

TOTAL:45 PERIODS
OUTCOMES:  
Upon the completion of this course the student should be able  
• To design and implement bio-informatics algorithms

REFERENCES  

CA 7017  
INTELLIGENT DATA ANALYSIS  
L T P C  
3 0 0 3  

OBJECTIVES:  
The student should be able to  
• To understand data mining principles and techniques.  
• To expose the students to the concepts of Big Data.  
• To understand various data analysis tasks.

UNIT I  
INTRODUCTION TO BIG DATA  

UNIT II  
DATA PREPROCESSING & ASSOCIATION RULE MINING  
Need for Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation - Association Rule Mining - Mining Frequent Itemsets with and without Candidate Generation - Mining Various Kinds of Association Rules - Constraint-Based Association Mining.

UNIT III  
DATA ANALYSIS  

UNIT IV  
CLUSTERING  
UNIT V  CLASSIFICATION & PREDICTION
Classification vs Prediction – Data preparation for Classification and Prediction – Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back propagation – Support Vector Machines – Associative Classification – Other Classification Methods – Prediction – Accuracy and Error Measures – Evaluating the Accuracy of a Classifier or Predictor – Ensemble Methods – Model Section.

TOTAL : 45 PERIODS

OUTCOMES :
Upon completion of this course, the student will:
- Identify the need for Big data analytics for a domain.
- Apply Big data analytics for a given problem.
- Perform Classification and Clustering of data.
- Mine Big data by applying various mining techniques.
- Analyze data using various Modeling techniques.

REFERENCES :

CA 7008  FINANCIAL ACCOUNTING AND MANAGEMENT

OBJECTIVES:
The student should be able to
- To understand the operational nuances of a Finance and Account Manager
- To comprehend the technique of making decisions related to finance function.

UNIT I  FOUNDATIONS OF FINANCE
Financial management – An overview - Time value of money - Introduction to the concept of risk and return of a single asset and of a portfolio - Valuation of bonds and shares - Option valuation.

UNIT II  INVESTMENT DECISIONS
Capital Budgeting - Principles and techniques - Nature of capital budgeting - Identifying relevant cash flows - Evaluation Techniques – Payback - Accounting rate of return - Net Present Value - Internal Rate of Return - Profitability Index - Comparison of DCF techniques - Project selection under capital rationing - Inflation and capital budgeting - Concept and measurement of cost of capital - Specific cost and overall cost of capital.

UNIT III  FINANCING AND DIVIDEND DECISION
Financial and operating leverage - capital structure - Cost of capital and valuation - designing capital structure - Dividend policy - Aspects of dividend policy - practical consideration - forms of dividend policy - forms of dividends - share splits.
UNIT IV  WORKING CAPITAL MANAGEMENT

UNIT V  LONG TERM SOURCES OF FINANCE
Indian capital and stock market - New issues market Long term finance - Shares - Debentures and term loans - lease - Hire purchase - Venture capital financing - Private Equity.

OUTCOME:
Upon completion of this course, the student will:

- Possess the techniques of managing finance in an organization.

REFERENCES:

CA 7015  HUMAN RESOURCES MANAGEMENT

OBJECTIVES:
The student should be able to

- To provide knowledge about management issues related to staffing, training, performance, compensation, human factors consideration and compliance with human resource requirements.

UNIT I  PERSPECTIVES IN HUMAN RESOURCE MANAGEMENT

UNIT II  THE CONCEPT OF BEST FIT EMPLOYEE

UNIT III  TRAINING AND EXECUTIVE DEVELOPMENT
UNIT IV SUSTAINING EMPLOYEE INTEREST

UNIT V PERFORMANCE EVALUATION AND CONTROL PROCESS

TOTAL : 45 PERIODS

LEARNING OUTCOME:
Upon completion of this course, the student will:
• Gain knowledge and skills needed for success as a human resources professional.

REFERENCES:

CA 7002 CUSTOMER RELATIONSHIP MANAGEMENT

OBJECTIVES:
The student should be able to
• To understand the need and importance of maintaining a good customer relationship

UNIT I CUSTOMER RELATIONSHIP MANAGEMENT
Defined Technology – Strategy – CRM – CRM Success Factors – The Customer service/sales profile – The three levels of service/sales customer service/sales profile

UNIT II CUSTOMER SERVICE
Managing your customer service/sales profile – Content center – Brokerage managing initial – stand alone transaction managing for repeat business – Managing for customer advocacy – CRM strategy starting points - CRM strategy selection.

UNIT III MANAGING CUSTOMER DATA
Managing and sharing customer data – Returning to strategies – Data vs information – Managing customer information – Data vs ethics and legalities of data used tools for capturing customer information.

UNIT IV EFFECTIVE SLA’S
UNIT V MANAGING CRM

TOTAL : 45 PERIODS

OUTCOME:
Upon completion of this course, the student will:

- use the strategic customer acquisition and retention techniques in CRM

REFERENCES:

CA 7027 VIRTUALIZATION TECHNIQUES L T P C
3 0 0 3

OBJECTIVES:
The student should be able to

- To understand the concept of virtualization.
- To understand the various issues in virtualization.
- To familiarize the students with the types of virtualization.
- To compare and analyze various virtual machines products.

UNIT I OVERVIEW OF VIRTUALIZATION

UNIT II SERVER CONSOLIDATION

UNIT III NETWORK VIRTUALIZATION

UNIT IV VIRTUALIZING STORAGE
UNIT V  VIRTUAL MACHINES PRODUCTS  9

OUTCOMES :
Upon completion of this course, the student will:
- Create a virtual machine and to extend it to a virtual network.
- Discuss on various virtual machine products.
- Compile all types of virtualization techniques and utilize them in the design of virtual machines.

REFERENCES :

CA 7010  GAME PROGRAMMING  L T P C
3 0 0 3

OBJECTIVES:
The student should be able to
- To understand Game Designing and Development.
- To design the logic and develop Game Engine Model.
- To enable the students to create Interactive Games.

UNIT I  3D GRAPHICS FOR GAME PROGRAMMING  9

UNIT II  GAME DESIGN PRINCIPLES  9
Character development - Story Telling - Narration - Game Balancing - Core mechanics - Principles of level design - Genres of Games - Collision Detection - Game Logic - Game AI - Path Finding.

UNIT III  GAMING ENGINE DESIGN  9

UNIT IV  GAMING PLATFORMS AND FRAMEWORKS  9

UNIT V  GAME DEVELOPMENT  9
Developing 2D and 3D interactive games using OpenGL - DirectX – Isometric and Tile Based Games - Puzzle games - Single Player games - Multi Player games.

TOTAL : 45 PERIODS
OUTCOMES:
Upon completion of this course, the student will:
- Model and develop a new Gaming System.
- Develop interactive games with their knowledge gained out of various Gaming Platforms.

REFERENCES:

CA 7021 PROFESSIONAL PRACTICE AND ETHICS

OBJECTIVES:
The student should be able to
- To make the students aware of their responsibilities and duties as a computer professional.
- To acquaint and help the students to analyze the social implications of the rapid computerization.
- To gain knowledge about the ethical issues involved in computing, and improve Communication skills.

UNIT I INTRODUCTION

UNIT II PROFESSIONAL ETHICS AND RESPONSIBILITIES

UNIT III INTELLECTUAL PROPERTY RIGHTS

UNIT IV FRAMEWORKS

DIRECTORY
Centre For Academic Courses
Anna University, Chennai-600 028
UNIT V - COMPUTER ETHICS


TOTAL : 45 PERIODS

OUTCOMES:
Upon completion of this course, the student will:
- Make students aware of their responsibilities and duties as a computer professional.
- Acquaint and help students to analyze the social implications of the rapid computerization.
- Adopt the ethical issues involved in computing, and improve communication skills.

REFERENCES:

CA 7004 - DEVELOPMENT FRAMEWORKS AND VIRTUAL MACHINES

OBJECTIVES:
The student should be able to
- To learn the basics of JSP and XML.
- To understand the background of distributed information system.
- To analyze and design a web service based application.
- To understand the need of virtualization.
- To understand the concepts of virtualization and virtual machines.

UNIT I - JAVA SERVER PAGES

UNIT II - REMOTE METHOD INVOCATION
Remote Method Invocation - Java mail - EJB Architecture - Session Bean - stateless session bean - stateful session bean - Message Driven Bean - Transaction Management - Entity Bean - Java persistence API - Entity life cycle - entity relationship
UNIT III  HIBERNATE  
Hibernate - Architecture - HQL - Object relation mapping - Seam framework - Java EE Connector Architecture (JCA) - life cycle and workflow management - comparing JDBC with JCA - Java EE Design patterns - Java web service - role of SOAP and WSDL - JAX_WS - JAXB - SAAJ – JAXR

UNIT IV  STRUTS  
Struts - Architecture - Actions in struts - Interceptors - OGNL support - Integrating struts with Hibernate - Spring framework - architecture - Managing transaction - Security in J2EE - JAAS

UNIT V  VIRTUALIZATION TECHNOLOGIES  

TOTAL : 45 PERIODS

OUTCOMES :
Upon completion of this course, the student will:
- Develop web services using different technologies.
- Analyze the intricacies of server, storage, network, desktop and application virtualizations
- Design new models for virtualization.
- Design and develop cloud applications on virtual machine platforms.
- Familiarize the memories and cache subsystem.

REFERENCES :

IF7077  SERVICE ORIENTED ARCHITECTURE  
L  T  P  C  
3  0  0  3

OBJECTIVES:
- To learn SOA fundamentals
- To understand SOAD
- To study about service composition
- To explore RESTful services and SOA security

UNIT I  SOA FUNDAMENTALS  

UNIT II  SERVICE-ORIENTED ANALYSIS AND DESIGN  

UNIT III  SERVICE COMPOSITION  
Service Composition with REST - Fundamental Service Composition with REST - Advanced Service Composition with REST - Service Composition with REST Case Study - Design Patterns for SOA with REST - Service Versioning with REST - Uniform Contract Profiles.
UNIT IV  RESTFUL SERVICES AND THE RESOURCE - ORIENTED ARCHITECTURE  9

UNIT V  SOA TRANSACTION AND SECURITY  9
SOA and performance - SOA and security – Service Management - Model driven service deployment – Establishing SOA and SOA governance

TOTAL : 45 PERIODS

OUTCOMES:
At the end of the course, the student will be able
- To appreciate SOA fundamentals
- To implement SOAD
- To compose the web services
- To deploy RESTful services and SOA security

REFERENCES :
1. Nicolai M.Josuttis, SOA in design - The art of distributed system design, O'REILLY publication, 2007.
3. Leonard Richardson and Sam Ruby, RESTful Web Services, O'REILLY publication,2007.