BHARATHIAR UNIVERSITY, COIMBATORE – 641 046

M. Sc INFORMATION TECHNOLOGY (CBCS)
(Effective from the academic Year 2019 - 2020)

1. Eligibility for Admission to the Programme

Candidates for admission to the first year programme leading to the Degree of Master of Science in Information Technology (M.Sc IT) will be required to possess:

A Pass with 50% of marks in B.Sc. Computer Science / B.C.A. /B.Sc. Computer Technology / B.Sc. Information Technology.

In case of SC/ST candidates, a mere pass in any of the above Bachelor's degree will be sufficient.

2. Duration of the Programme

The programme shall be offered on a full-time basis. The programme will consist of three semesters of course work and laboratory work and the fourth semester consists of project work.

3. Regulations

The general Regulations of the Bharathiar University Choice Based Credit System Programme are applicable to this programme.

4. The Medium of Instruction and Examinations
The medium of instruction and Examinations shall be in English.

5. Submission of Record Notebooks for Practical Examinations & Project Viva-Voce.

Candidates taking the Practical Examinations should submit bonafide Record Note Books prescribed for the Examinations. Otherwise the candidates will not be permitted to take the Practical Examinations.

Candidates taking the Project Viva Examination should submit Project Report prescribed for the Examinations. Otherwise the candidates will not be permitted to take the Project Viva-voce Examination.

6. Online Courses.
Candidates have to complete one online course of minimum 3 month duration compulsorily to complete the M.Sc (IT) Programme.

M.Sc. Information Technology (University Department) 2019-2020
SCHEME OF EXAMINATIONS
(*Effective from the academic Year 2019-2020*) **(CBCS)**

Core/ Elective/ Supportive/ Project	Suggested Code	Sem	Title of the Paper	Duration	Credits	Marks
Core 1	19IT13A	I	Object Oriented Software Engineering	4	4	100
Core 2	19IT13B	I	Design and Analysis of Algorithms	4	4	100
Core 3	19IT13C	I	Advanced Java Programming	4	4	100
Core 4	19IT13D	I	Relational Database Management System	4	4	100
Core 5	19IT13P	I	Advanced Java Programming Lab	3	3	75
Core 6	19IT13Q	I	Relational Database Management System Lab	3	3	75
Elective - I	19IT1EX	I	Elective – I	4	4	100
Supportive-1	19IT1GSXX	I		2	2	50
Core 7	19IT23A	II	C# and .NET Programming	4	4	100
Core 8	19IT23B	II	Graphics and Multimedia Systems	4	4	100
Core 9	19IT23C	II	Information And Data Security	4	4	100
Core 10	19IT23D	II	Open Source Technology	4	4	100
Core 11	19IT23P	II	C# and .NET Programming Lab	3	3	75
Core 12	19IT23Q	II	Open Source Technology Lab	3	3	75
Elective - II	19IT2EX	II	Elective – II	4	4	100
Supportive-2	19IT2GSXX	II		2	2	50
Core 13	19IT33A	III	Embedded Systems	4	4	100
Core 14	19IT33B	III	Software Testing	4	4	100
Core 15	19IT33C	III	Grid and Cloud Computing	4	4	100
Core 16	19IT33D	III	Mobile Application Development	4	4	100
Core 17	19IT33P	III	Software Testing Lab	3	3	75
Core 18	19IT33Q	III	Mobile Application Development Lab	3	3	75
Elective - III	19IT3EX	III	Elective – III	4	4	100
Supportive-3	19IT3GSXX	III		2	2	50
Project	19ITPRO	IV	Project work and Viva-Voce		6	150
Total					90	2250

M.Sc Information Technology (University Department) 2019-2020
ELECTIVE PAPERS

19ITE01	Digital Image Processing	4	4	100
19ITE02	E- Commerce	4	4	100
19ITE03	Mobile Ad-Hoc Networks	4	4	100
19ITE04	Internet of Things	4	4	100

M.Sc Information Technology (University Department) 2019-2020

LIST OF SUPPORTIVE COURSES

Course Code	Title of the Course	Instruction Hours	Credits	Marks
19ITS01	Windows and Office Automation	2	2	50
19ITS02	Basics of Internet	2	2	50
19ITS03	Introduction to Information Technology	2	2	50

Programme Objective for M.Sc (IT) Programme.

Post Graduates of M.Sc(IT) Programme will be.,

PO1 : Programming Experts in JAVA, C#, HTML and Open Source Software.

PO2 : Developers of a Product / Process in the domains RDBMS, HCI, Networking and Security Tools.

PO3 : Solution Providers using appropriate IT Tools for the welfare of the society.

PO4:   Able to do Research in the Domain of DIP and Networking

Title of the Course : OBJECT ORIENTED SOFTWARE ENGINEERING

Course code : 19IT13A   **No of Credits : 04**

                                                       No of Teaching Hours: 48

Course Objectives:
- This course aims at introducing to the students about the product that is to be engineered and the process that provides a framework for the engineering technology.
- The course facilitates the students to analyse risk in software design and quality and to plan, design, develop and validate the software project.
- It also improves the knowledge of the students to do research in further developments.

UNIT I - Software Process and Life Cycle Models:
Software Development in Theory - Waterfall Life-Cycle Model - Rapid-Prototyping Life-Cycle Model - Open-Source Life-Cycle Model - Spiral Life-Cycle Model - Agile Processes - The Software Process - Improving the Software Process - Capability Maturity Models - Other Software Process Improvement Initiatives - Costs and Benefits of Software Process Improvement.

UNIT II - Planning and Estimation:
Planning and Estimating - Planning and the Software Process - Estimating Duration and Cost - Intermediate COCOMO - COCOMO II - Estimation Issues - Components of a Software Project Management Plan - Software Project Management Plan Framework - Planning Testing - Training Requirements - Documentation Standards - Testing the Software Project Management Plan.

UNIT III - Workflow of Software Life Cycle:
The Requirements Workflow - Overview of the Requirements Workflow - The Business Model - Initial Requirements - Metrics for the Requirements Workflow - Challenges of the Requirements Workflow - The Analysis Workflow - Extracting the Entity Classes - Challenges of the Analysis Workflow - The Design Workflow - Object-Oriented Design - Formal Techniques for Detailed Design - Metrics for Design - Challenges of the Design Workflow.

UNIT IV - Implementation workflow:
The Implementation Workflow - Choice of Programming Language - Good Programming Practice - Coding Standards - Test Case Selection - Black-Box Unit-Testing Techniques - Comparison of Unit-Testing Techniques - Integration Testing - Product Testing - Acceptance Testing - Metrics for the Implementation Workflow - Challenges of the Implementation Workflow.

UNIT V - Software Configuration Management:
Software Configuration Management - Software Configuration Items - The SCM Process - Identification of Objects in the Software Configuration - Version Control - Object pool representation of components, variants, and versions - Change Control - The change

control process - Access and synchronization control - Configuration Audit - Status Reporting - SCM Standards.

Reference Books:

- Stephan R. Schach, "Object oriented software engineering", Tata McGraw Hill, 2008.
- Roger Pressman, "Software Engineering", sixth edition, Tata McGraw Hill, 2014.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: Explain a process model for a software project Development.

CO2: Prepare the SRS, Design document, Project plan of a given software system

CO3: Apply Project Management and Requirement analysis, Principles to S/ W Project development.

CO4: Analyse the cost estimate and problem complexity using various Estimation techniques

           Course Prepared by: Mrs..W.ROSE VARUNA

           Course Verified by: Dr.M.SUNDARESAN

Title of the Course : DESIGN AND ANALYSIS OF ALGORITHMS

Course code : 19IT13B   **No of Credits : 04**

                                              No of Teaching Hours: 48

Course Objectives:
- This course will enable students to solve a given problem using an algorithm.
- Also, it enables to mathematically analyse the algorithms for its efficiency and effectiveness.
- It also improves the knowledge of the students to do research in further developments.

UNIT I - Algorithms:

Algorithms - Insertion sort - Analysing algorithms - Designing algorithms - Asymptotic notation - Standard notations and common functions - The maximum-sub array problem - Strassen's algorithm for matrix multiplication - The substitution method for solving recurrences - The recursion-tree method for solving recurrences - The master method for solving recurrences.

UNIT II - Probabilistic Analysis and Randomized Algorithms:

The hiring problem - Worst-case analysis - Probabilistic analysis - Randomized algorithms - Indicator random variables - Problems - Randomly permuting arrays - Probabilistic analysis and further uses of indicator random variables - The birthday paradox - An analysis using indicator random variables - Balls and bins - The on-line hiring problem - Problems.

UNIT III - Sorting Algorithms:

Heap sort – Heaps - Maintaining the heap property - Building a heap – Initialization – Maintenance - Termination - The heap sort algorithm - Priority queues – Quicksort - Description of quicksort - Performance of quicksort - A randomized version of quicksort - Analysis of quicksort - Sorting in Linear Time - Lower bounds for sorting - Counting sort - Radix sort - Bucket sort.

UNIT IV - Stacks and Queues:

Elementary Data Structures - Stacks and queues - Linked lists - Sentinels - Implementing pointers and objects - Representing rooted trees - Binary trees - Binary Search Trees - Binary search tree - Querying a binary search tree - Insertion and deletion - Randomly built binary search trees - Red-Black Trees - Properties of red-black trees – Rotations – Insertion – Deletion.

UNIT V - Dynamic programming

Matrix chain multiplication - Elements of dynamic programming - Longest common subsequence - Improving the code - Optimal binary search trees - Greedy Algorithms - An activity selection problem - Huffman codes - Improving the code - Prefix codes - Constructing a Huffman code - Correctness of Huffman's algorithm - Amortized Analysis - Aggregate analysis - The accounting method - The potential method - Dynamic tables.

Reference Books:

- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", MIT Press, Third Edition, 2009.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: Summarize the relevance of algorithms for computational Problems solving and real time applications.

CO2: Differentiate different algorithmic approaches, techniques and methods

CO3: Apply design and analysis techniques for a given algorithm.

CO4: Apply optimization techniques for improving the efficiency of algorithms.

Course Prepared by: Mrs.W.ROSE VARUNA

Course Verified by : Dr.M.SUNDARESAN

Title of the Course : ADVANCED JAVA PROGRAMMING   **No. of Credits: 4**

Course code. : 19IT13C   **No. of Teaching hours: 48**

Course Objectives:

- To establish a connectivity between Java database using JDBC/ODBC connection.
- To cover the advanced features of Java starting with the database connectivity using drivers and servlet programming.
- To understand the concept of Applets and the delegation event model.
- To introduce JDBC servlet packages along with JavaScript.
- To study about Java Server Pages and Entity Java Beans.

UNIT I

Basic Concept: Features, Characters of JAVA-Object-Oriented Programming: Encapsulation, Inheritance, Polymorphism, Overriding, Constants, Variables, Types, Swing - Swing and AWT components-Database programming with JDBC: JDBC/ODBC Bridge, Establishing a connection, SQL statements, Querying, Report, Java.sql packages, JDBC data sources, Connection pooling.

UNIT II

Distributed Applications and Networking: Client/Server communication - RMI, Advantages of RMI, RMI Architecture, RMI Applications, Parameters in RMI -JVM, Java Serialization, Java Networking, classes and interfaces, Networking: InetAddress, TCP/IP Client Sockets, URLConnection, HttpURLConnection, URL Class, Cookies, TCP/IP Server Sockets, Datagrams.

UNIT III

Applets and Events: Applets, HTML applet tags, Order of Applet initialization, Sizing graphics, Applet architecture, applet skeleton, passing parameters to applets.Events:Mouse Event Handling, the Delegation Event Model, Event class and event listener, Event Listener Interfaces, using the delegation event model.

UNIT IV

JDBC and Servlets: JDBC vs. ODBC, Types of JDBC Drivers, Basics JDBC - Features of Servlets, Servlet lifecycle service, Simple servlet program - Database Connectivity with JDBC using Servlet, servlet development options, JavaScript: JavaScript, dynamic page, operators, decision making, relational operators, cookies, sessions, URL rewriting, data storage.

UNIT V

JSP and EJB **:** Define JSP, Advantages of JSP, JSP tags, Servlet vs. JSP, JSP Syntax Basics, JSP Directories - EJB Benefits, Types of Enterprises Beans, Session Bean with types, Entity Bean, Entity Beans vs. Session Beans, Message Driven Beans, remote client, web server clients, contents of an enterprise bean, life cycle of EJB.

Reference Books:

- Java - The Complete Reference, Herbert Schildt, Tata McGraw-Hill, ninth edition, 2014.
- Advanced Java for Students, Dr. AshwinMetha and Sarika Shah, The X team, published by SPD Pvt. Ltd, 2012.
- Professional Java Server Programming, SubrahmanyanAllamaraju and Cedric Bues, Apress, SPD, 2005
- Java 2: Programmer's Reference, Herbert Schildt, Joseph O'Neil, 2000.
- Jamie Jaworski, "Java Unleashed", SAMStechmedia Publications 1999.

Course Outcomes:

On successful completion of the course, the students will be able to,

CO1: Describes about the basic object oriented concepts like encapsulation, polymorphism and various AWT concepts.

CO2: Explains about networking in advanced java using client/server communication and remote method invocation. Provides an overview about HTML tags and explain about java applets and event.

CO3: Handles different event in java using the delegation event model, event listener and class.

CO4: Evaluate the business logic of enterprise applications and explains how to simplify of large distributed applications.

Course prepared by: Dr. R. VADIVEL

Course Verified by: Dr. M. SUNDARESAN

Title of the Course   : **RELATIONAL DATABASE**   **No of Credits: 04**
                            MANAGEMENT SYSTEM
Course code   : **19IT13D**   **No of Teaching Hours : 42**

Course Objective :

- This course aims at facilitating the student to understand the various functionalities of DBMS software.
- It helps to perform many operations related to creating, manipulating and maintaining databases for Real-world applications
- It helps the students to understand the various designing concepts, storage methods, querying and managing databases.

Unit I - Introduction:

       Database-System Applications - Purpose of Database Systems - View of Data - Database Languages - Relational Databases - Database Design - Data Storage and Querying - Transaction Management - Database Architecture - Data Mining and Information Retrieval - Specialty Databases - Database Users and Administrators - History of Database Systems - Exercises.

Unit II -Transaction Management:

       Overview of Transaction Management- The ACID properties – Transactions and Schedules – Concurrent execution of Transactions – Lock based concurrency control – Performance of locking - Transaction support in SQL – Introduction to crash recovery – The log – Other recovery related structures – Check pointing – Recovering from a system crash – Media Recovery.

Unit III -Object based Databases and XML:

       Structured Data Types - Operations on Structured Data - Encapsulation and ADTs – Inheritance - Objects, OIDs, and Reference Types - Database Design for ORDBMS - ORDBMS Challenges – OODBMS - Comparing RDBMS, OODBMS, ORDBMS – XML – Structure – XML Schema – Querying and Transformation - The Application program interface – Storage of XML data- XML Application - Case Study in XML.

Unit IV -Parallel and Distributed Databases:

       Parallel Databases - I/O Parallelism – Inter query - Intra query Parallelism – Intra operation - Interoperation Parallelism - Query Optimization - Design - Parallelism on Multicore Processors - Distributed Databases - Homogeneous and Heterogeneous Databases - Data Storage - Transactions - Commit Protocols - Concurrency Control – Availability - Query Processing - Heterogeneous Databases - Cloud-Based Databases - Directory Systems.

Unit V -NoSQL:

       NoSQL Basics - Definition and Introduction - Sorted Ordered Column-Oriented Stores - Key/Value Stores - Document Databases - Graph Databases - Interfacing and Interacting with NoSQL - Language Bindings for NoSQL Data Stores – Storage Architecture - HBase Distributed Storage Architecture - NoSQL in Cloud - Google App Engine Data Store - Amazon SimpleDB – Case Study in MongoDB.

Reference Books:

- Silberschatz, Korth, Sudarshan, "Database system concepts", 6th Edition, Tata McGraw Hill (For UNITS I, IV), 2011.
- Ramakrishnan, Gehrke, "Database Management Systems", Tata McGraw Hill (For UNIT II, III), 2003.
- Shashank Tiwari, "Professional NoSQL" (For UNIT V), 2011.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: Explain the structure and model of the relational database system
CO2: Design multiple tables, and using group functions, sub queries
CO3: Design a database based on a data model considering the normalization to a
       Specified level
CO4: Estimate the storage size of the database and design appropriate storage techniques

Course Prepared by: Mrs.W.ROSE VARUNA

Course Verified by : Dr.M.SUNDARESAN

Title of the Course : ADVANCED JAVA PROGRAMMING LAB   No. of Credits: 3

Course code. : 19IT13P   No. of Teaching hours: 36

Course Objectives:

- Objective of this course is to provide the ability to design console based applications, GUI based and web based applications.

- Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications.

- Design and analyze programs using remote method invocations (RMI).

Syllabus : As per course code: 19IT13C, Title: Advanced Java Programming.

Course Outcomes:

On successful completion of the course, the students will be able to,

CO1: Identify classes, objects, members of a class and relationships among them needed for a specific problem.

CO2: Apply Java application programs using OOP principles and proper program structuring.

CO3: Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms.

CO4: Gain knowledge about basic Java language syntax and semantics to write Java programs and use concepts such as variables, conditional and iterative execution methods etc.

Course prepared by: Dr. R. VADIVEL

Course Verified by: Dr. M. SUNDARESAN

Title of the Course   : RELATIONAL DATABASE   No of Credits : 03
**   MANAGEMENT SYSTEM LAB**
Course code   : 19IT13Q   No of Teaching Hours : 36

Course Objectives:
- This course aims at giving adequate exposure to students on the Database design and E-R modelling.
- The course also facilitates students with hands on training on SQL, oracle and NoSQL (Mongo DB) within the RDBMS environment.
- It helps the students to implement the various designing concepts, storage methods, querying and managing databases.

Syllabus :
    As per "19IT13D - Relational database management system" core subject.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: Model Entity Relationship with E-R diagrams
CO2: Design database schema considering normalization and relationships within database
CO3: Write SQL queries to user specifications
CO4: Develop triggers, procedures, user defined functions and design accurate and
        PLSQL programs in Oracle, XML and NoSQL.

Course Prepared by: Mrs. W. ROSE VARUNA

Course Verified by   : Dr. M. SUNDARESAN

Title of the Course : C# AND.NET PROGRAMMING   **No. of Credits: 4**

Course code. : 19IT23A   **No. Teaching Hours: 48**

Course Objectives:

- To understand the basics of C# and .NET framework.
- To learn in detail about C# classes, structures and enumerations.
- To design a data structure using arrays and lists in C#.
- To know in detail about handling strings and file management to effectively create directories.
- To enable network connectivity between client and server and learn about .NET assemblies.

Unit I

Introduction to C#: Evolution of C#, characteristics of C#, applications of C#, C# differ from C++ and JAVA. Understanding .NET: .NET Strategy, origins of .NET Technology, .NET Framework, CLR, Framework Base Classes, user and program interface,VS.NET, .NET languages, benefits. Overview of C#: simple C# program, namespaces, adding comments, returning a value, aliases namespaces, passing string objects, command line arguments, interactive input, mathematical functions, multiple main methods, compile time errors, program structure, program coding style. Literals, variables and data types: literals,variables, data types, value and reference types, declaration of variables, initialization of variables, default values, constant values, scope of variables, boxing and unboxing.

Unit II

Operators and expressions: arithmetic, relational, logical, assignment, increment and decrement, conditional, bitwise, special operators, arithmetic expressions, evaluation of expressions, precedence of arithmetic expressions, type conversions, operator precedence and associativity, mathematical functions. Decision making and Branching: Decision making with IF statement, simple IF statement, the IF…ELSE statement, Nesting of IF….ELSE statement, ELSE….IF ladder, switch statement, '?:' operator. Decision making with looping: WHILE statement, DO statement, FOR statement, foreach statement, jump in loops.

Unit III

Methods in C#: declaring methods, main methods, invoking methods, nesting of methods, method parameters, pass by value, pass by reference, output parameters, variable argument lists, method overloading. Handling Arrays: one-dimensional array, creating an array, two-dimensional array, variable-size array, System.Array class, array list class. Manipulating Strings: creating strings, string methods, inserting strings, comparing strings, finding substrings, mutable strings, array of strings, regular expressions.

Unit IV

Structures and enumerations: structures, structs with methods, nested structs, difference between classes and structs - enumerations, enumerator initialization, enumerator base types, enumerator type conversion. Classes and Objects: basic principles of OOP, defining a class, adding variables, methods, member access modifiers, creating objects, accessing class members, constructors, overloaded constructors, static members, static constructors, private constructors, copy constructors, destructors, member initialization, THIS reference.

Inheritance and Polymorphism: classical inheritance, containment inheritance, defining a subclass, visibility control, defining subclass constructors, overriding methods, hiding methods, abstract classes and methods, sealed classes, sealed methods, polymorphism, extension methods.

Unit V

Interface –Multiple Inheritance: defining an interface, extending an interface, implementing interfaces, interfaces and inheritance, explicit interface implementation, abstract classes and interfaces. Operator overloading: overloadable operators, need for operator overloading, defining operator overloading, overloading unary and binary operators, overloading comparison operators. Delegates and Events: delegates, delegate declaration, delegate methods, delegate instantiation, delegate invocation, using delegates, multicast delegates, events. Managing console I/O operations: console class, console input, console output, formatted output, numeric formatting, standard numeric format, custom numeric format.

Reference Books:

- E. Balagurusamy, Programming in C#: A Primer, fourth edition, Tata McGraw-Hill, 2015.
- Ian Griffiths, Matthew Adams, and Jesse Liberty, "Programming C# 4.0", Sixth Edition, O'Reilly Media, 2010,
- Svetlin Nakov& Co, Fundamentals of computer programming with C#, The Bulgarian C# Programming Book, Sofia, 2013.
- Vystavel, Radek, "C# Programming for Absolute Beginners", Apress publications, 2017.
- E. Balagurusamy, "Programming in C#", Tata McGraw-Hill, 2002

Course Outcomes:

On successful completion of the course, the students will be able to

CO 1 : Be Familiar with C# and .NET
CO 2 : Design dynamic web pages
CO 3 : Get a job using C# and .NET skills
CO 4 : Became a freelance programmer

Course Prepared by: Dr. R. VADIVEL

Course verified by: Dr. M.SUNDARESAN

Title of the Course : GRAPHICS AND MULTIMEDIA SYSTEMS   No. of Credits: 4

Course code. : 19IT23B   **No. of Teaching hours: 48**

Course Objectives:

- To give a brief understanding of computer graphics and input output devices.
- To enable students to know about 2-D and 3-D geometrical transformations.
- To describe the ways in which multimedia information is captured, processed, and rendered.
- To introduce about various new multimedia image file formats such as TIFF and JFIF.
- To learn the step by step process of how to develop non-computer and computer based animation.

UNIT I

Introduction to Computer Graphics: Applications of computer Graphics, Operations of computer graphics, graphics software packages, requirements, graphical user interface. Graphical I/O devices: Raster video principles, random scan devices, graphics accelerators and graphics co-processors. Scan Conversion: methods, polynomial method, DDA algorithms, Bresenhams algorithms, midpoint methods.

UNIT II

2-D Geometrical Transformations: Basic transformations, homogeneous coordinate system, other transformations, combined transformations, inverse of combined transformations, 3-D Geometrical transformations: Basic 3-D transformations, 3-D translation, scaling, rotation, rotation about an arbitrary axis in space, other 3-D transformations, 3-D reflection, reflection about any arbitrary plane, 3-D shearing.

UNIT III

Introduction to Multimedia: Concepts of multimedia, types, multimedia data streams, hardware/software requirements, applications, multimedia authoring, digital audio, MIDI, image compression standards, video compression and encoding, hypertext and hyper media. Virtual Reality: Virtual reality basics, virtual reality markup language (VRML), building a VRML world.

UNIT IV

Graphics Image File Formats: Image file formats, raster formats, bitmap format, graphics interchange format, joint photographic experts group, tagged image file format, Microsoft image extensions, portable network graphics, BMP format, overview, bitmap compression, JPEG and JFIF, JPEG encoding steps, JFIF format, GIF format, GIF format, GIF extension blocks, TIFF file formats.

UNIT V

Animation and Flash: Overview, development of animation, non-computer and computer based animation, flash basics, flash work environment, drawing overview, using layers, creating text boxes for user input or dynamically updating text, creating animation, creating key frames, layers of animation, frame rates, steps for creating animation, publishing and exporting, publishing flash movies.

Reference Books:

- Malay K. Pakhira, "Computer Graphics, Multimedia and Animation", PHI learning, 2010.
- Jeffrey J. McConnell, "Computer Graphics: Theory Into Practice", Jones & Barlett Learning, 2006.
- Jeffcoate, Judith, "Multimedia in Practice", Prentice Hall, 2001.
- Tay Vaughan, Multimedia making it Work", McGraw Hill, 1994.
- Scott Jarol, Visual Basic Multimedia, Galgotia 1995.
- Vince, John, "Virtual Reality Systems", Pearsons Education, 1995.

Course Outcomes:

On successful completion of the course, the students will be able to,

CO1: Describe technical characteristics and performance of multimedia system and terminals.

CO2: Design creative approach in application of multimedia devices, equipment and systems.

CO3: Carry out experiments and measurements on the multimedia systems in laboratory conditions on real components and equipment.

CO4: Interpret and analyze measurement results obtained on the multimedia system and components.

Course prepared by: Dr. R. VADIVEL

Course Verified by: Dr. M. SUNDARESAN

Title of the Course : INFORMATION AND DATA SECURITY   No of Credits : 04

Course code : 19IT23C   No of Teaching Hours: 42

Course Objectives:
- This course focuses on the fundamentals of information security that are used in protecting both the information present in computer storage as well as information traveling over computer networks.
- Interest in information security has been spurred by the pervasive use of computer-based applications such as information systems, databases, and the Internet.
- Information security is enabled through securing data, computers, and networks. By the end of this course, student will be able to describe major information security issues and trends, and advise an individual seeking to protect data.

UNIT I - Conventional and modern encryption:
Overview - Security Attacks - Security Services - Classical Encryption Techniques - Symmetric Cipher Model - Substitution Techniques - Transposition Techniques - Rotor Machines – Steganography - Block Ciphers and the Data Encryption Standard - The Data Encryption Standard - Advanced Encryption Standard - AES Key Expansion - Multiple Encryption and Triple DES.

UNIT II - Public key encryption:
Basic Concepts in Number Theory - The Euclidean Algorithm - Greatest Common Divisor - Finding the Greatest Common Divisor - Fermat's and Euler's Theorems - Fermat's Theorem - Euler's Totient Function - Euler's Theorem - The RSA Algorithm - Description of the Algorithm - Computational Aspects - The Security of RSA - Elliptic Curve Cryptography - Diffie-Hellman Key Exchange.

UNIT III - Authentication and security practice:
Cryptographic Hash Functions - Applications of Cryptographic Hash Functions - Two Simple Hash Functions - Requirements and Security - Hash Functions Based on Cipher Block Chaining - Secure Hash Algorithm (SHA) - SHA-3 - Digital Signatures - Elgamal Digital Signature Scheme - Schnorr Digital Signature Scheme - NIST Digital Signature Algorithm - Elliptic Curve Digital Signature Algorithm - RSA-PSS Digital Signature Algorithm.

UNIT IV - Network security:
Extensible Authentication Protocol - Cloud Computing - Cloud Security Risks and Countermeasures - Data Protection in the Cloud - Cloud Security as a Service - Transport-Level Security - Web Security Considerations - Secure Sockets Layer - Transport Layer Security – HTTPS - Wireless Network Security - Wireless Security - Mobile Device Security - Electronic Mail Security - Pretty Good Privacy - S/MIME – Domain Keys Identified Mail.

UNIT V - Data security:
Securing Unstructured Data - Structured Data vs. Unstructured Data - At Rest, in Transit, and in Use - Approaches to Securing Unstructured Data – Databases - Applications - Networks – Computers - Storage (Local, Removable, or Networked) - Data Printed into the Physical World - Newer Approaches to Securing Unstructured Data - Data Loss Prevention (DLP) - Information Rights Management (IRM).

Reference Books:

- William Stallings, "Cryptography & Network Security", 6th Edition, Pearson Education, New Delhi 2013.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: Recognize the information security policies, standards and Procedures for completeness and alignment with generally accepted practices

CO2: Explain the functionalities of information security

CO3: Describe Authentication and Security practice

CO4: Analyse the root causes of cyber crime

Course Prepared by: Mrs.W.ROSE VARUNA

Course Verified by : Dr.M.SUNDARESAN

Title of the Course : OPEN SOURCE TECHNOLOGY   **No. of Credits : 4**

Course code.   : 19IT23D   **No. of Teaching Hours : 48**

Course Objectives :

- Students can understand open source software
- Students can familiar with open source software development
- Students are able to learn fundamentals of open source operating system
- Students are able to learn open source Desktop environment
- Develop their own open source software using these tools

Unit I - FOSS and Linux :

Open Source - Definition – Terms - Technology – Need - Free and Open Source Software Open Source Software Licenses.

Linux : Kernel -Architecture - Internal representation of files -Inodes –Structure of a regular file –Directories – shell - Basic commands - Desktop environment –KDE –GNOME - Development environment tools and systems

Unit II – Perl :

Overview of Perl – Variables – Statements - Scalar values - Operators - Control structures – regular expressions – Arrays – Hashes – List processing - Pattern Matching – File Handling

Unit III - PHP :

Basic Syntax of PHP – web environment - Common PHP Script - Elements -Using Variables - Constants – Data types - Operators - Statements – Flow Control functions – Dates and Times - Working With Arrays - Using Functions - String Manipulation and Regular Expression - File and Directory Handling - Working With Forms - OOP

Unit IV - Python :

Variables - Data types – Strings - Operators – Control Statements - Loops - Sequences : Lists – Tuples - Sets – Dictionaries – File Handling - Exception – Handling exception

Unit V - MySQL :

Data Types -Primary Keys and Auto Increment Fields – Queries -SQL programs - Create Database and Tables – ODBC - Connecting to MySQL with PHP - Creating, opening and Closing a Connection - Inserting data with PHP, Retrieving data with PHP.

Reference Books:

- James K L, "Linux : Learning the Essentials", PHI Learning Private Ltd., 2012
- Chris DiBona, Danese Cooper and Mark stone,"Open Sources 2.0 The Continuing Evolution", First Edition, O‟Reilly, 2005.

- Larry Wall, Tom Christiansen, Jon Orwart, "Programming PERL" , Third Edition, O"Reilly, 2010.
- Elliot White III, Jonathan D.Eisenhamer, "PHP 5 in practice" Pearson Education, 2007. Mark Lutz, " Programming Python 4E", O"Reilly, 2011.
- Paul Du Bois, O"Reilly Publishers," My SQL Cookbook", Second Edition,2010.

Course Outcomes :

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

CO 1 : Familiar with open source software tools
CO 2 : Can design their software package using open source software
CO 3 : Are able to get a job with their own open source software development skills.

Course Prepared by : Mr. T.RAMESH

Course verified by : Dr. M.SUNDARESAN

Title of the Course : **C# and .NET Programming Lab**   No. of Credits : 03

Course code.: **19IT23P**   No. of Teaching hours: 36

Course Objectives:

- This course presents the Introduction to .NET frame work, C# and its features.
- The course also facilitates the students to enable learn the fundamentals of .NET and C#
- It helps the students to Understood the .NET framework
- Learnt programming techniques in C#

Syllabus : As per course code: 19IT23A, Title: C# and .NET Programming core subject.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: Understand Data Encapsulation, inheritance, polymorphism, interfaces.
CO2:   access code written in any .NET compliant language and also to inherit the classes
        written in these languages.
CO3: Develop Console application, Windows application, and Web application using C#.
CO4: Knowledge of the structure and model of the programming language C #

Course Prepared by : Dr.R.VADIVEL

Course Verified by : Dr.M.SUNDARESAN

Title of the Course : OPEN SOURCE TECHNOLOGY LAB   No. of Credits : 3

Course code. : 19IT23Q   **No. of Teaching Hours : 36**

Course Objectives :

- Students can understand open source software concepts
- Students get exposure to Linux working environment
- Students can hands on training with open source software development
- Students can acquire knowledge about to develop their own open source software package
- Students are able to get a job using open source skills

Syllabus : Lab exercises related with the theory paper 19IT23D - OPEN SOURCE TECHNOLOGY

Course Outcomes :

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

CO 1 : Familiar with open source software environment
CO 2 : Can design and develop software product using open source software
CO 3 : Get a job with their own open source software development skills.
CO 4 : Contribute open source software development

Course Prepared by : Mr. T.RAMESH

Course verified by : Dr. M.SUNDARESAN

Title of the Course : EMBEDDED SYSTEMS   **No. of Credits: 4**

Course code. : 19IT33A   **No. of Teaching hours: 48**

Course Objectives:

- To understand the overview and applications of embedded systems along with its components.
- To enable the students to understand the embedded system based on various examples.
- To give brief analysis of Real Time Operating System concepts.
- To enable the students to learn the basic functions, principles and designing of 8051 microcontrollers.
- To provide a clear view of digital integrated circuits and embedded product life cycle.

UNIT I
Introduction to embedded systems: Applications embedded systems features, characteristics of embedded systems, model of an embedded system, microprocessor vs Microcontroller, history**. The embedded systems -The hardware's**: microcontroller unit (MCU), 8-bit MCU, memory of embedded systems, low power design, pull-up and pull-down registers.

UNIT II
Examples of Embedded Systems: Mobile Phones, Radio Frequency Identification (RFID), wireless sensor Networks (WISENET), robotics, biomedical applications, brain machine interface. **Buses and protocols:** definition, on-board buses for embedded systems, external buses automotive buses, wireless communication protocols.

UNIT III
Operating System Concepts: Embedded OS, NOS, Layers, History, Functions of OS, kernel, tasks/processes, scheduling algorithms, threads, interrupt handling, IPC, task synchronization, semaphores, priority inversion, device drivers. **Real-time OS:** real time tasks, real time systems, types, real time OS, real time scheduling algorithms, rate monolithic algorithm.

UNIT IV
The 8051 Microcontrollers: History of 8051, 8051 programmer's perspective assembly language programming, internal RAM, the 8051 stack, PSW, assembler directives, storing data in cache memory (ROM), the instruction set, port programming, subroutines(procedures).

UNIT V
Automated Design of Digital ICs: History of ICs, types of digital ICs, ASIC design, ASIC design. **Embedded product lifecycle management:** hardware software co design**,** modeling of systems, embedded product development life cycle management, life cycle models. **Embedded design:** A typical example, product design, the design process and testing.

Reference Books:

- Lyla B.Das, "Embedded Systems: An Integrated Approach', pearson , 2013.
- Rajkamal, 'Embedded system-Architecture, Programming, Design', TMH,2011.
- G.K.Kharate, Digital Electronics, Oxford University press, Sixth impression 2012.
- A.P.Godse, G.A.Godse, Microprocessor and Microcontroller, Technical Publication Pune, First Edition 2010.
- David E.Simon, An Embedded Software Primer, Pearson Education Asia, First Indian reprint 2000.

Course Outcomes:

On successful completion of the course, the students will be able to,

CO1:   Understand basic concepts in the embedded computing systems area.
CO2:   Determine the optimal composition and characteristics of an embedded system.
CO3:   Develop hardware-software complex with the use of the National Instruments products.
CO4:   An ability to design a system, component, or process to meet desired needs within realistic constraints.

Course prepared by: Dr. R. VADIVEL

Course Verified by: Dr. M. SUNDARESAN

Title of the Course : SOFTWARE TESTING   **No. of Credits: 4**

Course code.: 19IT33B   **No. of Teaching Hours: 48**

Course Objectives :

> **Students are able**
> - To study the basic concepts of Software testing
> - To understand the test case scenarios
> - To Learn different testing strategies
> - To study the various applications of testing and its challenges in commercial environments.
> - To became a software tester in the industry

UNIT I : INTRODUCTION

Testing as an Engineering Activity –Testing as a Process –Testing axioms –Basic definitions–Software Testing Principles –The Tester's Role in a Software Development Organization –Origins of Defects –Cost of defects –Defect Classes –The Defect Repository and Test Design –Defect Examples –Developer/Tester Support of Developing a Defect Repository –Defect Prevention strategies.

UNIT II : TEST CASE DESIGN

Test case Design Strategies –Black Box Approach - Random Testing –Requirements based testing –Boundary Value Analysis –Equivalence Class Partitioning –State-based testing – Cause-effect graphing –Compatibility testing –user documentation testing –domain testing – White Box Approach -Test Adequacy Criteria –static testing - structural testing –code functional testing –Coverage and Control Flow Graphs –Covering Code Logic –Paths –code complexity testing –Evaluating Test Adequacy Criteria.

UNIT III : LEVELS OF TESTING

Need for Levels of Testing –Unit Test Designing and Planning –Test Harness –Running and Recording Results –Integration Tests Designing and Planning –Scenario Testing –Defect Bash Elimination - System Testing –Acceptance Testing –Performance Testing –Regression Testing –Internationalization Testing –Ad-Hoc Testing –Alpha, Beta Testing –Testing OO Systems –Usability and Accessibility Testing –Configuration Testing –Compatibility Testing –Testing the Documentation –Website Testing.

UNIT IV : TEST MANAGEMENT

People and organizational issues in testing –Organization structures for testing teams –testing services –Test Planning –Test Plan Components –Test Plan Attachments –Locating Test Items –test management –test process –Reporting Test Results –The role of three groups in Test Planning and Policy Development –Introducing the test specialist –Skills needed by a test specialist –Building a Testing Group.

UNIT V : TEST AUTOMATION

Software test automation –skill needed for automation –scope of automation –design and architecture for automation –requirements for a test tool –challenges in automation –Test metrics and measurements –project, progress and productivity metrics.

Reference Books :

- Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2006.
- Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.
- Boris Beizer, Software testing techniques, Dreamtech Press, Second Edition – 2003.
- Paul Ammann, Jeff Offutt, "Introduction to Software Testing", Cambridge university press, 2008
- Myers and Glenford.J., The Art of Software Testing, John-Wiley & Sons, Second Edition, 2004
- Marnie.L. Hutcheson, Software Testing Fundamentals, Wiley-India, 2007.

Course Outcomes:

On successful completion of the course, student will be able to

CO1: Understand about the Types of errors and its consequences.

CO2: Apply various methods and tools of testing and maintenance of software's.

CO3: Create test strategies and plans, design test cases, prioritize and execute them.

Course Prepared by :Mr. T.RAMESH

Course Verified by : Dr.M.SUNDARESAN

Title of the Course   : GRID AND CLOUD COMPUTING   No of Credits : 04

Course code   : 19IT33C   No of Teaching Hours: 48

Course Objectives:
- Students will gain knowledge on Grid and Cloud computing fundamentals and Architecture by learning Grid and Cloud computing toolkits
- Grid and Cloud computing paradigm covers a range of distributed computing, hosting and access solutions, including service-based computing.
- The objective of the course is to provide comprehensive and in-depth knowledge of Grid and Cloud Computing concepts, technologies, architecture and researching state-of-the-art in Grid and Cloud Computing fundamental issues, technologies, applications and implementations.

UNIT I - Grid Computing Technology:
Introduction – High performance computing – Cluster Computing – Peer to Peer Computing – Internet Computing – Grid Computing – Grid Protocols – Globus Toolkit – Open Grid Services architecture – Types of Grids – Departmental Grids – Enterprise Grids – Extra prise Grids – Global Grids – Compute Grids – Data Grids – Utility Grids – Grid Networks – Grid Applications Characteristics – Application Integration

UNIT II – Grid Services Architecture merged with Web Services Architecture:
Service Oriented Architecture – Web Service Architecture – XML related Technologies and their Relevance to Web Services – XML Messages and Enveloping – SOAP - Processing Model – Features – SOAP Modules – Service Message Description Mechanisms – Relationship between Web Service and Grid Service – Web Service Interoperability and the Role of the WS-I Organization.

UNIT III - Evaluation of Cloud Computing:
Emergence of Cloud Computing – Trend of Cloud Computing – General Concept of Cloud Computing – Cloud Accelerant Factors – Technical Security Benefits of the Cloud – Email Communication – Working in a Virtual Office – Extra Processing Power – Cloud Computing Offerings – Barriers to Cloud Computing Adoption – Difference between Cloud, Cluster and Grid Computing.

UNIT IV – Cloud Service:
Software as a Service (SaaS) – Multitenant nature of SaaS Solutions – Open SaaS Solutions – Service Oriented Architecture – Platform as a Service (PaaS) – IT Evolution Leading to the Cloud – Benefits and Disadvantages of PaaS Solution – Infrastructure as a Service (IaaS) – Improving performance through Load Balancing – System and Storage Redundancy – Utilizing Cloud Based NAS Devices – Advantages of IaaS Solutions – Server Types Within an IaaS Solution

UNIT V - Cloud Security:
Cloud Security Issues – Kinds of Attacks – Problem Related to Attacks – Possible solutions for the attacks – Pillars of Cloud Computing Security – Confidentiality – Integrity – Authenticity – Self-managed Cloud Security Controls – Open Source Cloud Infrastructure

Security – New about Cloud Computing Security – Aspects relevant to Cloud Computing Security.

Reference Books:

- Ahmar Abbas, "Grid Computing: A Practical Guide to Technology and Applications, Firewall Media", 2013.
- Joshy Joseph, Craig Fellenstein, "Grid Computing", IBM Press, Pearson Education, 2013.
- Swarup K. Das, "Cloud Computing", Dominant Publishers & Distributors Pvt Ltd, 2015.
- Kris Jamsa, "Cloud Computing SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security, and More", Jones & Bartlett Learning, 2013.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1: Describe the key technologies, architecture, strengths, limitations and applications of Grid and Cloud computing
CO2:Explain the types and service models of grid and cloud.
CO3:Describe the core issues such as security, privacy, and interoperability in grid and cloud platform.
CO4:Apply suitable technologies, algorithms, and applications in grid and cloud computing driven systems

Course Prepared by: MRS..W.ROSE VARUNA

Course Verified by : DR.M.SUNDARESAN

Title of the Course : MOBILE APPLICATION DEVELOPMENT   **No. of credits : 4**

Course code. :19IT33D   **No. of Teaching Hours : 48**

Course objectives:
- To understand and learn the characteristics and development of mobile applications.
- To understand User Interface Design, Back end databases, other services for mobile applications.
- To get a job using mobile application development skills
- To get exposure to Android development environment To get exposure to IOS development environment

Unit I - Mobile Communication and Technology:
Mobile Communication - Mobile Computing - Mobile Computing Architecture
Mobile Communication and Technologies : GSM - CDMA - Bluetooth – ZigBee - IrDA - RFID – IEEE 802.11 – GPS - NFC

Unit II – LTE
3GPP - System Architecture Evolution – EUTRAN - Orthogonal Frequency-Division Multiplexing Access (OFDMA) – SCFDMA - Multiple Antenna Techniques – Delivery of voice and text message over LTE – MIMO - LTE advance

Unit III - User Interface Design and Files/Directories
User Interface Design : Fundamental - Views - Layouts – Drawable Resources - Resolution and Density Independence - Creating and Using Menus- Intents – Adapters - Internet Resources – Dialogs. Files and Directories: Files - Saving – retrieving – file Management - Databases – SQLite - Cursors and Content –Values – Working with SQlite

Unit IV – Networking, Location-Based Services and Multimedia Services
Networking and Emailing services - Maps – Geocoding – Location - Based Services – Alarm – service – Toast – Threads – using sensors – Graphics – Media Player – Camera – Video – Working with Bluetooth, NFC and WiFi – Handling Telephony and SMS – Email

Unit V : Tools :
Android: Development Tools – Architecture - Manifest - Application Life Cycle - Application Priority and Process States. IOS: iPhone Developer - Apple Developer Connection - Memory Management - Fundamental iPhone Design Patterns – Tables and Views.

Reference Books :
- Ashok K Talukder and Roopa R Yavagal, Mobile Computing, Tata McGraw Hill, 2005
- Reto Meier, "Professional Android 2 Application Development", Wrox Wiley, 2010.

- Pradeep Kothari, "Android Application Development" Dream tech Press, 2015
- Alasdair Allan, "iPhone Programming", O'Reilly, 2010.
- Christopher Cox, "An introduction to LTE – LTE, LTE-Advanced, SAE and 4G Mobile Communications", John Wiley & Sons, 2012.

Course Outcomes :

After Completion of the course, the students should be able to:

CO 1: Design and develop Mobile application using Android and IOS.
CO 2 : Knowledge about the Mobile application development
CO 3 : Able to get a job with their own skills.

Course Prepared by : Mr.T.RAMESH

Course Verified by : Dr.M.SUNDARESAN

Title of the Course : SOFTWARE TESTING LAB   **No. of Credits : 3**

Course code.: 19IT33P   **No. of Teaching Hours: 36**

Course Objectives :

- To get on hand experience on software testing
- To design and develop their own test case scenarios
- To design and develop their own testing strategies.
- To study and exposure to various commercial testing software
- To get a job in the field of software testing

Syllabus : Lab exercises based on the course code: 19IT33B, Title: Software Testing.

Course Outcomes :

On successful completion of the course, students will be able to

CO 1 : Write and test a program to login a specific web page

CO 2 : Understand the automation testing approach.

CO 3 : Conduct a test suite for any web sites.

Course Prepared by : Mr. T.Ramesh

Course Verified by : Dr.M.SUNDARESAN

Title of the Course : MOBILE APPLICATION DEVELOPMENT LAB   No. of Credits : 3

Course code. : 19IT33Q　　　　　　　　　　　**No. of Teaching Hours : 36**

Course Objectives:

- To understand and learn the software environment for mobile applications. To understand the concepts of 3G and 4G environment
- To understand User Interface Design, Back end databases, other services for mobile applications.
- To get a job using mobile application development skills To get the exposure to Android and IOS environment

Syllabus : Lab Exercises based the theory paper Mobile Application Development
Course code : (19IT33D)

Course Outcomes :

After Completion of the course, the students should be able to:

CO 1 : Design and develop Mobile application using Android and IOS with their own skills

CO 2 : Become a Mobile application developer

CO 3 : Able to get a job using this skills.

Course Prepared by : Mr.T.RAMESH

Course Verified by : Dr.M.SUNDARESAN

Title of the Course   : DIGITAL IMAGE PROCESSING   No. of Credits: 4

Course code.:19ITE01   No. of Teaching Hours: 48

Course Objectives   :

- To study basic image processing techniques for solving real problems.
- To study the image transform and Image enhancement techniques in image processing.
- To study the Image compression and Segmentation procedures.

UNIT I - Digital Image Fundamentals:
Digital Image, Applications of Digital Image Processing- Elements of Digital Image Processing- Digital Camera, Line Scan CCD Sensor – Display Element Perception – Luminance – Brightness, Contrast- Color Models – RGB, CMY, HSI.

UNIT II - Image Transform:
Fourier Transforms- Unitary Transform- Properties of Unitary Transform – 2D DFT – DCT- Discrete Wavelet Transform- Hotelling Transform – SVD Transform – Slant, Hadamard Transform, Haar Transforms.

UNIT III - Image Enhancement and Restoration:
Contrast Stretching – Intensity Level Slicing – Histogram Equalization – Spatial Averaging – Smoothing – Maximum, Minimum, Median filtering – Inverse Filtering – Wiener Filtering - Constrained Least Square Filtering - Geometric Mean Filter– Edge Detection – Degradation Model –Estimating the Degradation Function.

UNIT IV - Image Compression:
Huffman's Coding – Binary Codes – Predictive Coding – Bit Plane Coding - Arithmetic Coding - Run Length Coding- Transform Coding – JPEG and MPEG Coding.

UNIT V - Image Segmentation:
Point, Line and Edge Detection: Detection of Isolated Points – Line Detection – Edge Models – Basic Edge Detection – Thresholding: Basic Global thresholding – Multiple Thresholds – Variable Thresholding – Region based Segmentation: Region Growing – Region Splitting and Merging.

Reference Books:
- Gonzalez R.C and Woods R. E, "Digital image processing", Pearson/Prentice Hall, Fourth Edition, 2018.
- S.Jayaraman, S.Esakkirajan and T.Veerakumar, "Digital Image Processing", Tata McGraw Hill Education Private Limited, 2015
- Anil K Jain "Fundamentals of Digital image processing", Pearson, First Edition, 2015.
- S.Annadurai and R.Shanmugalakshmi, "Fundamentals of Digital Image Processing", Pearson Education, 2007.

Course Outcomes:

On successful completion of the course, student will be able to

CO1 : Understand about the fundamentals of Digital Image Processing. Describe
       about advanced concepts in image compression and segmentation.

CO2 : Apply, design and implement solutions for digital image processing problems. CO3 -
       Describe and apply the concepts of feature selection and extraction for digital
       image retrieval.

CO4 - Explore the concepts of Multi-resolution process and recognize the objects in
       an efficient manner.

Course Prepared by: Dr.M.SUNDARESAN

Course Verified by: Dr.M.SUNDARESAN

Title of the Course   : E-COMMERCE   **No. of Credits: 4**

Course code.: 19ITE02   **No. of Teaching Hours : 48**

Course Objectives:

- To understand the three major driving forces behind E-commerce – technology change, business development, and social issues to provide a coherent conceptual framework for understanding the field.
- To understand the e-business concepts and how it is different from e-commerce. To understand the e-business models and infrastructure.

UNIT I - Anatomy and Framework of E-commerce:
E-Commerce Framework- E-commerce and Media Convergence – The Anatomy of Ecommerce Applications – E-commerce Organization Applications – Market Forces Influencing the I-Way – Components of I-Way – Network Access Equipment.

UNIT II - E-commerce Applications and Models:
Architectural Framework for Electronic Commerce – World Wide Web (WWW) Architecture – Web Background: Hypertext Publishing – Technology behind the Web – Security and the web – Consumer-Oriented Applications – Mercantile Models from the Consumer's Perspective – Mercantile Models from the Merchant's Perspective.

UNIT III - Payment System and Privacy Issues:
E-business - Types of Electronic Payment Systems – Digital Token-Based Electronic Payment Systems – Smart Cards and Electronic Payment Systems – Credit Card-Based Electronic Payment Systems – Risk and Electronic Payment Systems – Designing Electronic Payment Systems – Electronic Data Interchange – EDI Applications in Business – EDI: Legal, Security and Privacy Issues –EDI and E-Commerce.

UNIT IV - Internal Electronic commerce Systems:
Internal Information Systems – Macro forces and Internal Commerce – Work-Flow Automation and Coordination – Customization and Internal Commerce – Supply Chain Management (SCM) – Dimensions of Internal Electronic Commerce Systems – Making a Business Case for a Document Library – Types of Digital Documents – Issues behind Document Infrastructure – Corporate Data Warehouses.

UNIT V - Marketing Process:
The New Age of Information-Based Marketing – Advertising on the Internet – Charting the On Line Marketing Process – Market Research – Search and Resource Discovery Paradigms – Information Search and Retrieval – E-commerce Catalogs or Directories – Information Filtering – Consumer-Data Interface: Emerging Tools.

Reference Books:

- Ravi Kalakota, Andrew B.Whinston, "Frontiers of Electronic Commerce" Pearson Education Asia, 1996, Twelfth Impression.
- Jeffery F. Rayport, Bernard J.Jaworski , "E-commerce", Tata McGraw Hill Publication, 2003.
- Bharat Bhasker, "Electronic Commerce Framework, Technologies and Applications", Tata McGraw Hill Publication, 2013.

Course Outcomes:

On successful completion of the course, student will be able to

CO1 : Demonstrate an understanding of the foundations and importance of E-Commerce.

CO2 : Demonstrate an understanding of retailing in E-commerce by Analyzing branding and pricing strategies, Using and determining the effectiveness of market research Assessing the effects of disintermediation. CO3 - Analyze the impact of E-commerce on business models and strategy.

CO4 - Describe the Internet trading relationships including Business to Consumer, Business- to- Business, Intra-organizational.

Course Prepared by: Dr.M.SUNDARESAN

Course Verified by: Dr.M.SUNDARESAN

Title of the Course .: **MOBILE AD-HOC NETWORKS**   **No. of Credits: 4**

Course code. : **19ITE03**   **No. of Teaching hours: 48**

Course Objectives:

- This course covers all aspects of ad hoc and sensor networking, from design through performance issues to application requirements.

- This course starts with the design issues and challenges that are associated with implementations of ad hoc and sensor network applications.

- This course makes students understand the techniques and strategies for localizing sensor nodes in a network by means of exact and relative positioning techniques.

UNIT I - Introduction:
Ad-Hoc Networks- Services and applications – Characteristics – Wireless Sensor Networks – Sensor Application of Body Area Network and Health Care Monitoring - WLANs – WLAN Services –Physical Media For WLANs- Types of Mobile Host Movements-Challenges Facing Ad-Hoc Mobile Networks.

UNIT II - Routing in MANETs:
Types of Ad-Hoc Routing Protocols- Proactive Routing Protocols: DSDV –OLSR- WRP, Reactive Routing Protocols: AODV–DSR - TORA- LAR –PAR, Hybrid Routing Protocols: ZRP-FSR-LANMAR –Cluster Based Routing Protocols.

UNIT III - QoS and Energy Management:
Define Qos- Objective of Qos Based Routing -List out the QoS Applications- on Demand QoS Routing Protocol- A Cross Layer QoS of Service Model- Power Management-Advances in Device Power Management – Advances in Protocol Power Management – Power Conservation by Mobile Applications.

UNIT IV - Architecture and Model:
Ad-Hoc Service Location Architectures-Bluetooth Architectures- Bluetooth Network Configuration-Bluetooth Applications -The WAP Protocol Architecture – WAP Service Model – WAP Programming Model- WWW programming Model.

UNIT V - Security and NS-2 Tools:
MANET Performance Metrics, NS2 Simulation parameters- NS2 OTCL –Multicast Routing Mobile Ad-Hoc Networks- Unicast Route Discovery in AODV- Multicast Route Discovery in AODV -Classifications of MAC Protocols – Security in Ad-Hoc Networks.

Reference Books:
- William Stallings, "Wireless Communications & Networks", Pearson Education, 2005.
- C.Siva Ram Murthy, B.S. Manoj, "Ad-Hoc Wireless Networks – Architectures and Protocols", 2nd Edition, Pearson Education, 2011.
- Fei Hu , Xiaojun Cao, " Wireless Sensor Networks Principles and Practice " CRC Press, 2010.

- C.K Toh,"Ad-Hoc Mobile Wireless Networks" Protocols and Systems, Pearson Edition, 2011.
- Carlos de Morais Cordeiro, Dharma Rakish Agrawal, "Ad-Hoc & Sensor Networks", Cambridge Uni.Press,India Pvt.Ltd ,2010.
- L.Gavrilovska, R.Prasad, "Ad-Hoc Networking Towards Seamless Communications", Springer, 2006.
- Charles E.Perkins , "Ad-Hoc Networking",Pearson Edition , 2011.
- George Aggelou," Mobile Ad-Hoc Networks", Tata McGraw –Hill Edition, 2009.

Course Outcomes:

On successful completion of the course students will able to,

CO1: Describe the principles of mobile ad hoc networks and what distinguishes them from infrastructure-based networks. Understand the issue of broadcast storms and flooding, and how some techniques attempt to reduce them.

CO2: Describe the limitations of wireless sensor networks, especially energy constraints, and the devised solutions. Understand the components of a wireless sensor nodes and the role of each component in the wireless sensor network.

CO3: Understand the differences between routing in MANETs and routing in WSNs, and the general techniques used.

CO4: Work on a project that addresses an issue applicable to MANETs or WSNs and propose a solution for it.

Course prepared by: Dr. R. VADIVEL

Course Verified by: Dr. M. SUNDARESAN

Title of the Subject : INTERNET OF THINGS   **No. of Credits : 4**

Course code : 19ITE04   **No. of Teaching Hours : 48**

Course Objectives :

- Students can understand Internet of Things
- Students can familiar with open source Sensor and Actuator devices
- Students are able to learn Communication protocols used in IoT
- Students are able to learn Privacy and Security needed for IoT
- Students can contribute their own design and development of IoT devices

UNIT I – IOT: Sensing and Actuator Devices :

Internet of Things : Definition– Scope—Structure – Characteristics – Generation –Integrated IoT Sensors : Description - Characteristics – Polytronics Systems - Swarm – Printed Electronics –Linear and angular displacement - Speed and flow rate sensors - Force sensors - capacitive pressure sensor- Temperature sensors - Industrial sensors

UNIT II – IOT : Input/Output Devices :

INPUT DEVICES : Keyboard basics - Keyboard scanning algorithm - LCD modules - clock and Timer - Interrupts - service routines - Interrupt-driven pulse width modulation. Triangle waves - analog and digital values - Auto port detection - Capturing analog information - service routine - analog to digital data acquisition.; OUTPUT DEVICES : Bridge – relay drives - DC/ Stepper Motor control – optical devices.

UNIT III – IOT : Architecture :

IOT- Architecture and Reference model - M2M - IoT Technology Fundamentals- Functional View, Information View, Deployment view - Operational View, Other Relevant architectural views. Real-World Design Constraints- Technical Design constraints - Data representation and visualization, Interaction and remote control.

UNIT IV – IOT : Network Protocols

PHY/MAC Layer : 3GPP MTC, IEEE 802.11, IEEE 802.15, WirelessHART, Z-Wave, Bluetooth Low Energy, Zigbee Smart Energy, DASH7 ; Network Layer : IPv4, IPv6, 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP ; Transport Layer: TCP, MPTCP, UDP, DCCP, SCTP - TLS, DTLS ; Session Layer : HTTP, CoAP, XMPP, AMQP, MQTT ; Service Layer : oneM2M, ETSI M2M, OMA, BBF

UNIT V - IOT : Privacy and Security

Cryptographic controls - IOT messaging and communication protocols – IOT Node Authentication - Identity lifecycle – authentication credentials – IoT IAM infrastructure – Authorization with Publish / Subscribe schemes – access control ; Lightweight and robust 6LoWPAN, 6TiSCH,ND, DHCP, ICMP, RPL, CORPL, CARP   ; Transport Layer: TCP,

MPTCP, UDP, DCCP, SCTP - TLS, DTLS ; Session Layer : HTTP, CoAP, XMPP, AMQP, MQTT ; Service Layer : oneM2M, ETSI M2M, OMA, BBF

UNIT V - IOT : Privacy and Security

Cryptographic controls - IOT messaging and communication protocols – IOT Node Authentication - Identity lifecycle – authentication credentials – IoT IAM infrastructure – Authorization with Publish / Subscribe schemes – access control ; Lightweight and robust schemes for Privacy protection – Trust and Trust models for IOT – self-organizing Things - Preventing unauthorized access.

REFERENCE BOOKS :

- Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **"**From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence**",** 1st Edition, Academic Press, 2014.
- Peter Waher**, "**Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
- Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
- Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118-47347-4, Willy Publications
- Vijay Madisetti and ArshdeepBahga, **"**Internet of Things (A Hands-on-Approach)**",** 1st Edition, VPT, 2014.

Course Outcomes :

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

CO1 : Understand the concept of IOT

CO2 : Can design and develop their own IOT devices

CO3 : Can contribute to design and develop new protocols for networking and privacy control

Course Prepared by : Mr. T.RAMESH

Course verified by : Dr. M.SUNDARESAN

Title of the Course : WINDOWS AND OFFICE AUTOMATION   No. of Credits: 2

Course code. : 19ITS01   **No. of Teaching hours: 24**

Course Objectives:

- To introduce about windows10 environment, browse internet and manage files.

- To learn about the basics of Windows 2016 and Office word 2016.

- To know about Excel 2016 to maintain business and financial accounts.

- To enable students to practice with PowerPoint 2016 and create presentations.

- To provide a clear view of office outlook and organize the contents.

UNIT I –The windows 10 environment
Getting started, personalizing folders and files, working with applications, notifications, browsing, manage peripheral devices, network.

UNIT II - Office 2016 Package
User interface, change office, application options, create files, open and move files, view, edit files, save and close. **Word 2016:**Modify the text, collaborate documents, merge data with documents and labels.

UNIT III - Excel 2016
Data calculations, naming data, Excel tables, formulas, worksheet data, manipulate worksheet data, valid sets of values.

UNIT IV - PowerPoint 2016
Slides, Add and remove slides, Divide, Rearrange, Apply themes, slide backgrounds, simple graphics, Insert, move, and resize pictures, pictures, shapes, sound, Animate text and pictures.

UNIT V - Outlook 2016
Email messages, attach files, display messages, participant information, respond to messages, conversations, folders.

Reference Books:

- Windows 10 Step by Step, Joan Lambert Steve Lambert, 2015.
- Microsoft Office 2016 Step by Step, Joan Lambert Curtis Frye, 2015.

Course Outcomes:

On the successful completion of the course students will be able to,

CO1: Describe the usage of computers, its operating systems and why computers are Essential components in business and society.

CO2: Utilize the Internet Web resources and evaluate on-line e-business system.

CO3: Solve common business problems using appropriate Information Technology applications and systems.

CO4: Identify categories of programs, system software and applications. Organize and work with files and folders.

Course prepared by: Dr. R. VADIVEL

Course Verified by: Dr. M. SUNDARESAN

Title of the Course : BASICS OF INTERNET   **No of Credits : 02**

Course code: 19ITS02   **No of Teaching Hours: 24**

Course Objectives:

- This course aims at facilitating the student to understand the basic internet programming concepts
- It gives guidance for Browsing World Wide Web and the Internet Applications
- It gives hands on practices by applying the concepts for implementing internet applications.

UNIT I - Introduction to the Internet

Introduction - What Is a Computer – Supercomputers - Computer Programs - Computer Programmers - Computer Organization - Input unit - Output unit - Memory unit - Memory or Primary memory - Central processing unit (CPU) - Multiprocessors - Secondary storage unit - Machine Languages - Machine dependent - Assembly Languages - Assemblers - High-Level Languages.

UNIT II - World Wide Web

History of the Internet and World Wide Web – ARPANET – Internet - Electronic mail - Internet Protocol – Bandwidth - Hypertext Markup Language - World Wide Web Consortium (W3C) - Web 2.0 - Web 1.0 - Personal, Distributed and Client/Server Computing - Workstations - Hardware Trends - Key Software Trend: Object Technology - Software Technologies.

UNIT III - Web Browser Basics

Web Browser Basics: Internet Explorer and Firefox - Introduction to the Internet Explorer 7 and Firefox 2 Web Browsers - Connecting to the Internet – Network Interface card (NIC) - local area network (LAN) - Digital Subscriber Line (DSL) - Internet Service Provider (ISP) - Internet Explorer 7 and Firefox 2 Features - URL (Uniform Resource Locator) - Customizing Browser Settings.

UNIT IV - Searching the Internet

Searching the Internet - Search engines - Options in Firefox 2 - Databases – Meta search engines - Searching the Internet with Internet Explorer 7 - Keeping Track of Your Favorite Sites - Bookmarks - File Transfer Protocol (FTP) – Restricted access - Uploading - Online Help - Internet Explorer 7 Help dialog - Firefox 2 Help dialog - Contents and Index - Other Web Browsers – Opera – Safari.

UNIT V- Web 2.0

Web 2.0 – Introduction - Web 1.0 - What Is Web 2.0? - Architecture of participation – Search - Search engines - Search engine results page (SERP) - Google Search – Yahoo – MSN – Ask - Vertical Search - Location-Based Search - Creating Customized Search Engines - Attention economy – Tagging - Social Networking - Social Media - Social Bookmarking - Software Development.

Reference :

- Internet & World Wide Web HOW TO PROGRAM, 5e, P. J. Deitel and H. M. Deitel, 2012.

Course Outcomes:

On the successful completion of the course, students will be able to

CO1:   Apply a structured approach to identifying needs, interests, and functionality of a website

CO2:   Browse websites that meet specified needs and interests

CO3: Well-versed in Search Engines like Google Search, Yahoo, MSN and Ask.

CO4: Well-versed in Social Networks and Social media.

Course Prepared by: Mrs..W.ROSE VARUNA

Course Verified by : Dr.M.SUNDARESAN

Title of the Course : INTRODUCTION TO INFORMATION TECHNOLOGY

Course code. : 19ITS03   **No. of Credits : 2**

No. of Teaching Hours : 24

Course Objectives :

- Non-Computer Students are Able to understand the Fundamentals of Computer Science

- Students are able to understand the basics of RDBMS

- Students are able to understand the basics of Networking

- To assist the Students those who are appearing for the Government Examinations like Bank, LIC , Railways

  Stepping Stone to the job seekers

Unit I – Computer Basics :
Basic Computer Terminology - History Of Computers - Number System – ASCII - ISCII - UNICODE;

Unit II - Microprocessor : Basic Concepts - Clock Speed – Types;
Memory Concepts : Units − Primary Memory - Secondary Memory **-** - Components Of Computer Systems - ALU – Input /Output Devices – Ports/ Connectors

Unit II - Software And Operating System :
Software Concepts : Types Of Software : System Software - Utility Software - Application Software; System Software **-** Operating System – Complier - Interpreter And Assembler
Operating System : Need - Functions - Concept Of Booting - Operating System Basics

Unit III – Introduction to RDBMS :
Introduction To RDBMS – File Organization – Normal Form – DDL And DML – Schema - Indexing – Sorting - View

Unit V – Introduction to Computer Networks :
Computer Network Basics – Protocol – Topology - Networking Devices Virus, Hacking
Internet/Intranet/Extranet – WWW – Web Server – Browser – Search Engine – Home Page

Reference Book :

- Sushila Madhan, Information Technology, Taxmann.2015
- Introduction to Information Technology, ITL limited, Pearson education, 2015 Richord Fox, Information Technology, Chapman and Hall, 2015
- S.K. Das, Fundamentals Of Computer Science, Platinum Publishers,

Course Outcomes :

      After completion of the course, the students should be able to:

      CO 1 : Understand the computer fundamentals

      CO 2 : Prepare for government exam easily

      CO 3 : Helpful for further studies in computer science

Course Prepared By : Mr. T.RAMESH

Course Verified By : Dr. M.SUNDARESAN