Bachelor of Engineering
In
Information Science & Engineering

SCHEME & SYLLABUS

III to VIII semesters

2017
<table>
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<th>Teaching Department</th>
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# Scheme of Teaching and Examination

**BE in Information Science & Engineering**

**Fourth Semester BE**

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## Scheme of Teaching and Examination
### BE in Information Science & Engineering
#### Fifth Semester BE

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### Scheme of Teaching and Examination
#### BE in Information Science & Engineering
##### Seventh Semester BE

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#### Eighth Semester BE

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-
IS310      DATA STRUCTURES & APPLICATIONS

Total Teaching hours: 50      No. of credits: 05

Course Outcomes:
After the completion of this course students should be able to
CO1: Explain the basic concepts of data structures.
CO2: Apply the concepts of linear and non-linear data structures to develop solutions for particular problem.
CO3: Develop algorithms for solving problems with the help of fundamental data structures

Introduction
10 Hours


Stacks and Queues
10 Hours


Linked Lists
10 Hours

Definition, Representation of linked lists in Memory, Memory allocation, Garbage Collection, Linked list operations: Traversing, Searching, Insertion, and Deletion. Doubly Linked lists, Circular linked lists, and header linked lists, Linked Stacks and Queues. Applications of Linked lists – Polynomials, Sparse matrix representation, Programming Examples.

Trees
10 Hours

Advanced Trees and Hashing

10 Hours


Text Books:


Reference Books:


IS320 COMPUTER ORGANIZATION & ARCHITECTURE

Total Teaching hours: 50  No. of credits: 05

Course Outcomes:
After the completion of this course students should be able to
CO1: Explain the basic concepts of Computer organization
CO2: Illustrate the concepts of memory and I/O management.
CO3: Analyze processor performance improvement using instruction level parallelism

Introduction 10 Hours
Basic structure of computers: Computer types, Functional units, Basic operational concepts, Bus structures, Performance, Historical perspective, Machine instructions & programs: Numbers, arithmetic operations & characters, Memory locations & addresses, Memory operations, Instructions & instruction sequencing; Addressing modes, Assembly language, Basic input/output operations, Stacks & queues, Subroutines, Additional instructions, Encoding of machine instructions.

Input/output Organization 10 Hours
Accessing I/O devices, Interrupts, Direct memory access, Buses; Interface circuits, Standard I/O devices.

Memory system 10 Hours
Basic concepts, Semiconductor RAM memories, Read-Only memories, Speed, size & cost, Cache memories, Performance considerations; Virtual memories, Secondary storage.

Arithmetic 10 Hours
Addition & subtraction of signed numbers, Design of fast adders; Multiplication of positive numbers, Signed-operand multiplication, Fast multiplication, Integer division, Floating point numbers and operations.

Pipelining 10 Hours
Basic concepts, Data Hazards, Instruction Hazards, Influence on Instruction sets, Data path & Control considerations, Superscalar Operation, UltraSPARC II example, Performance Considerations

Text Book:
Reference Books:

IS330  OBJECT ORIENTED PROGRAMMING WITH PYTHON

Total Teaching hours: 50  No. of credits: 05

Course Outcomes
On successful completion of the course, students should be able to:

CO1: Explain the features of object-oriented programming.
CO2: Apply File and Exception Handling concepts.
CO3: Analyse and apply Collections, Strings, and functions.

Object Oriented Programming  10 hrs
OOP Concepts, Class Definitions, Class Instantiation, Class and Instance Variables, Class Functions and Instance Methods, Constructors and Destructors, Inheritance

Exception and File Handling  10 hrs
Handling Exceptions, Raising Exceptions, Exception Propagation, User-Defined Exceptions, Reading From Text Files, Writing to Text Files, Reading from Binary Files, Writing to Binary Files, Seeking Within Files

Introduction to Python  10 hrs
Python, Python Basics (Data Types, Operations on Data Types, Data Type Conversions, Basic I/O, Basic Formatting) Python, Control Structures (Decisions, Loops)

Collections  10 hrs
Lists, Tuples, Sets, Dictionaries

Strings, Functions and Practical Python  10 hrs
Strings (Searching, Splitting, Joining)
Functions (Definition, Call, Positional Arguments, Default Arguments, Keyword Arguments, Variable Arguments, Returning From Functions, Lambda Expressions, Unpacking Argument Lists)
Practical Python (Stacks, Queues, Sequence Processing using map, filter and reduce, List Comprehensions, Matrices)

Text Book:

Reference Book:
IS340        DISCRETE MATHEMATICAL STRUCTURES

Total Teaching hours: 50

No. of credits: 05

Course Outcomes
On successful completion of the course, students should be able to:

CO1: Define and illustrate the basic concepts of discrete mathematical structures.
CO2: Apply logic, set theory, relations and functions.
CO3: Analyze and examine the concepts of Graph and Coding Theory.

Mathematical Logic

10 Hours


Counting, Relations and Digraphs

10 Hours


Functions and Order Relations and Structures

10 Hours

Functions – Functions for Computer Science, Permutations Functions, Growth of Functions. Order Relations - Partially ordered sets, External Elements of Partially Ordered Sets, Lattices, Functions on Boolean Algebras, Boolean Functions as Boolean Polynomials.

Graph Theory and Applications

10 Hours


Group Theory and Coding Theory

10 Hours

Binary Operations Revisited- Semi groups- Products and Quotients of Semi groups - Groups- Products and Quotients of Groups – Coding of Binary Information and Error Detection – Decoding and Error Correction.

Text Books:


\textbf{Reference Books:}

1. Discrete Mathematics and Its Applications, Kenneth Rosen, Mc Graw Hill, 6\textsuperscript{th} edition
IS410      DESIGN & ANALYSIS OF ALGORITHMS

Total Teaching Hours:  50                  No. of Credits:    05

Course Outcomes
On completion of this course, the students should be able to:

CO1: Explain the complexity of divide and conquer, greedy, dynamic programming and backtracking algorithms.
CO2: Identify and analyze appropriate algorithmic design technique for new problems.
CO3: Apply important algorithmic design paradigms and methods of analysis

Introduction                     10 Hrs

What is an Algorithm? Algorithm Specification, Analysis Framework, Performance Analysis: Space complexity, Time complexity, Asymptotic Notations: Big-Oh notation (O), Omega notation (Ω), Theta notation (Θ), and Little-oh notation (o), Mathematical analysis of Non-Recursive and recursive Algorithms with Examples
Important Problem Types: Sorting, Searching, String processing, Graph Problems, Combinatorial Problems, Fundamental Data Structures: Stacks, Queues, Graphs, Trees, Sets and Dictionaries.

Divide and Conquer               8 Hrs

General method, Binary search, Recurrence equation for divide and conquer, Finding the maximum and minimum, Merge sort, Quick sort, Strassen's matrix multiplication, Advantages and Disadvantages of divide and conquer, Decrease and Conquer Approach, Topological Sort

Greedy Method                   10 Hrs

General method, Coin Change Problem, Knapsack Problem, Job sequencing with deadlines, Minimum cost spanning trees: Prim's Algorithm, Kruskal's Algorithm, Single source shortest paths: Dijkstra's Algorithm, Optimal Tree problem: Huffman Trees and Codes, Transform and Conquer Approach: Heaps and Heap Sort

Dynamic Programming             10 Hrs


Backtracking                   12Hrs

Text Books:


Reference Books:

2. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)
IS420 OPERATING SYSTEMS

Total Teaching hours: 50 No. of credits: 05

Course Outcomes:

Students should be able to:

CO1: Explain the fundamental concepts in operating systems.
CO2: Apply the concepts to solve problems related to process, memory and files.
CO3: Demonstrate competence in recognizing and using operating system features.

Introduction 07 Hours

Concepts, OS objectives, OS functions, OS views, OS design issues, OS supports & services, Evolution of system structure.

Process management 16 Hours


Memory management 09 Hours

Key Characteristics, memory management functions, logical address & physical address, address translation, management schemes: contiguous memory allocation & non-contiguous memory allocation, virtual memory: paging, segmentation, cache memory design issues.

Device & file management 09 Hours

Device Characteristics, types, device controller, operations, buffering & types of buffering, clock, disk, management, disk arm scheduling policies, RAID, File system, server, management, design, organization, directory, sharing, blocking, management, allocation, file system reliability

Security & Protection 09 Hours

Overview, goals, security threats, attacks, design issues, protection structure, intruders, authentication, malicious programs, encryption: symmetric encryption, public key encryption.
Text Books:


Reference Books:

IS430        UNIX PROGRAMMING

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Define the concepts of Unix systems and Programming
CO2: Implement programs using files and process API's
CO3: Illustrate the use of File, process and IPC

Background and commands  10 hours


Shell Script  09 hours

Shell Scripts: read, Command Line Arguments, exit status, the Logical Operators, the if Conditional, using test and [ ] to evaluate expressions, the case, expr: while: Looping, for: Looping set and shift, trap: Interrupting. Development of simple shell scripts.

Unix File Systems  10 hours

UNIX file systems: file types, file systems, file attributes, Inodes in UNIX system. UNIX file APIs: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs

Process Control  12 hours


Daemon Processes and IPCs  09 hours

Daemon Processes: Daemon Characteristics, Coding Rules, Error Logging, Inter process Communication API's: Pipes, FIFOs, Message Queues, Semaphores

Text Books:

Reference Books:

3. Terrence Chan, Unix *System Programming Using C++*, Prentice Hall India, 1999
IS440    THEORY OF COMPUTATION

Total Teaching hours: 50    No. of credits: 05

Course Outcomes:

After completing this course, the students would be able to:
CO1: Explain the computational problems in terms of appropriate automaton.
CO2: Apply automation model to represent and solve computational problems.
CO3: Analyse list of problems to devise a system using specific models.

Finite Automata    10 Hours

Introduction- Basic Mathematical Notation and techniques- Finite State systems –
Basic Definitions- Finite Automaton – DFA & NDFA – Finite Automaton with €-moves – Regular Languages- Regular Expression – Equivalence of NFA and DFA –
Equivalence of NDFA’s with and without €-moves – Equivalence of finite Automaton and regular expressions –Minimization of DFA- - Pumping Lemma for
Regular sets – Problems based on Pumping Lemma.

Grammars    10 Hours

Grammar Introduction– Types of Grammar - Context Free Grammars and Languages– Derivations and Languages – Ambiguity- Relationship between
derivation and derivation trees – Simplification of CFG – Elimination of Useless
symbols - Unit productions - Null productions – Greiback Normal form – Chomsky
normal form – Problems related to CNF and GNF.

Pushdown Automata    10 Hours

Pushdown Automata- Definitions – Moves – Instantaneous descriptions –
Deterministic pushdown automata – Equivalence of Pushdown automata and CFL
- pumping lemma for CFL – problems based on pumping Lemma

Turing Machine    10 Hours

Turing Machines- Introduction – Formal definition of Turing machines –
Instantaneous descriptions- Turing Machine as Acceptors – Turing Machine as
Transducers Computable Languages and functions – Turing Machine
constructions – Modifications of Turing Machines

Computational Complexity    10 Hours

Undecidability- Basic definitions- Decidable and undecidable problems -
Properties of Recursive and Recursively enumerable languages – Introduction to
Computational Complexity: Definitions-Time and Space complexity of TMs –
complexity classes – introduction to NP-Hardness and NP-Completeness.
Text Book:


References Books:


IS510      LINEAR ALGEBRA

Total Teaching hours: 50               No. of credits: 05

Course Outcomes:

On successful completion of the course, students should be able to:
CO1: Define and interpret linear equations and write equations in matrix form.
CO2: Identify the basis for a given matrix, vector space and subspace.
CO3: Solve problems related to orthogonality and apply Eigen vectors to solve differential equations.

Introduction to vectors       10 hours

Vectors and linear combinations, lengths and dot products, vectors and linear equations. Idea of elimination.

Solving linear equations      10 hours

Elimination using matrices, rules for matrix operations, inverse matrices, LU factorization, transposes and permutations.

Vector spaces and subspaces   10 hours

Vector space, solving for Ax = 0, Rank and row reduced form, solution to Ax = B, independence basis and dimension, dimensions of the 4 subspaces.

Orthogonality and Determinants 10 hours

Orthogonality of the 4 subspaces, projections, least square approximations, orthogonal basis and gram-Schmidt, the properties of determinants, permutations of co-factors, Cramer's rule, inverse, and volumes.

Eigenvalues and Eigenvectors 10 hours

Introduction to Eigenvalues, Diagonalizing a matrix, applications to differential equations, symmetric matrices, positive define matrices, similar matrices, singular value decompositions, least square methods.

Text Book:


Reference Book:

IS520 DATABASE MANAGEMENT SYSTEMS

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain the concepts of relational database design.
CO2: Design and Implement queries using Structured Query Language (SQL).
CO3: Explore the concepts of Transactions in Database Systems.

Introduction 10 hours

Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; Data models, schemas and instances; Three-schema architecture and data independence; Centralized and client-server architectures. Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two.

Relational Model: Concepts, Constraints and Database Design 10 hours

Relational Model Concepts, Constraints and database schemas, Update operations, transactions, and dealing with constraint violations. Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form Properties of Relational Decompositions;

Algorithms for Relational Database Schema Design 10 hours

Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms. The role of information systems in organizations, the database design and implementation processing, automated design tools.

SQL 10 hours

SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures and SQL / PSM.
Transaction Management 10 hours

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; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related structures; The write-ahead log protocol; Checkpoint; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control.

Text Books:


Reference Books:

IS530  STATISTICAL METHODS IN INFORMATION PROCESSING

Total Teaching hours: 50  No. of credits: 05

Course Outcomes:

After the completion of this course students should be able to

CO1: Explain the different statistical measures and analysis types available.
CO2: Apply a selected method to solve an unknown problem.
CO3: Analyze results and make inferences.

Introduction to Statistics  10 Hrs

Introduction to uni-variate data, Measures of central tendency, Arithmetic mean, Median, Mode, Geometric Mean and Harmonic Mean, Measures of dispersion, Range, Quartile deviation, Mean deviation, Standard deviation and Co-efficient of variation, Skewness, Kurtosis and Moments, Problems.

Correlation and regression analysis  10 Hrs

Introduction to Correlation analysis, Types of correlation, Methods of studying correlation – Karl. Pearson’s coefficient of correlation Rank correlation method, Partial and Multiple Correlation, Introduction to Regression analysis – Regression lines, Properties of Regression coefficients, Angle between two regression lines, Problems.

Analysis of Time Series  10 Hrs


Analysis of variance  10 Hrs

Introduction to Small sample tests based on t and F distribution, Test for single mean, difference between means, Paired t-test, Test for equality of variances, ANOVA- one -way classification, Two-way classification., Non-Parametric Test: The Mann Whitney test, The Kruskal-Wallis single-factor analysis of variance by ranks, Procedure, Problems.
Statistical Quality Control 10 Hrs

Introduction - Process control, control charts for variables - Mean and Range chart (X Bar and R), control charts for variables - Mean and Standard deviation chart (X Bar and s), Introduction to Attributes Control charts, Control chart for the number of defectives (np-chart), Control chart for the fraction of defectives (p-chart), Control chart for the number of defects (c-chart).

Text Book:

Statistics for Technology- A course in Applied Statistics, C.Chatfield

Reference Books:

2. Elements of business Statistics, S.P.Gupta
4. Statistics – Theory and Practice, R.S.N.Pillai, & V.Bagavathi
5. Mathematical statistics with Application, John E. Freund's
6. Statistic – Problems and Solutions, V.K.Kapoor
Course Outcomes

On successful completion of the course, students should be able to:

CO1: Describe the basic concepts of data communication and transmission techniques.
CO2: Identify the different types of errors, data link protocols and spread spectrum techniques.
CO3: Illustrate the topologies, protocols for wireless communication.

Introduction to Data Communications

Data communications, data networking, and the internet – data communications and networking for today’s Enterprise, A communication model, Data communications, networks, The internet, An example configuration.

Data Transmissions – Concepts & Techniques


Digital Communication Techniques

Asynchronous and synchronous transmission, types of errors, error detection, error correction, line configuration. Data link control protocols- Flow control, Error control, High level data link control (HDLC). Multiplexing- frequency division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, asymmetric digital subscriber line, xDSL. Spread spectrum- the concept of spread spectrum, frequency hopping spread spectrum, direct sequence spread spectrum, code division multiple access.

Switching in Communication Networks

Local Area Networks  

Background, topologies and transmission media, LAN protocol architecture, bridges, layer 2 and layer 3 switches. High speed LANs- the emergence of high speed LAN, Ethernet, fire channel. Wireless LANs- overview, wireless LAN technology, IEEE 802.11 architecture and services, IEEE 802.11 medium access control, IEEE 802.11 physical layer, IEEE 802.11 security considerations.

Text Books:


Reference Books:

IS551       PROGRAMMING WITH JAVA

Total Teaching hours: 50               No. of credits: 05

Course Outcomes:

On successful completion of the course, students should be able to:
CO1: Illustrate core concepts of object-oriented programming using Java programming.
CO2: Demonstrate object-oriented design features such as encapsulation, polymorphism and Inheritance.
CO3: Apply common object-oriented design patterns and develop applications with event-driven graphical user interface.

Introduction to JAVA 10 hrs

Java and Java applications; Java Development Kit (JDK); Java is interpreted, Byte Code, JVM; Object-oriented programming; Simple Java programs. Data types and other tokens: Boolean variables, int, long, char, operators, arrays, white spaces, literals, assigning values; Creating and destroying objects; Access specifiers. Operators and Expressions: Arithmetic Operators, Bitwise operators, Relational operators, The Assignment Operator, The ? Operator; Operator Precedence; Logical expression; Type casting; Strings. Control Statements: Selection statements, iteration statements, Jump Statements. Classes: Classes in Java; Declaring a class; Class name; Super classes; Constructors; Creating instances of class; Inner classes. Inheritance: Simple, multiple, and multilevel inheritance; Overriding, overloading. Exception handling: Exception handling in Java.

The Applet Class 10 hrs

Two types of Applets; Applet basics; Applet Architecture; An Applet skeleton; Simple Applet display methods; Requesting repainting; Using the Status Window; The HTML APPLET tag; Passing parameters to Applets; getDocumentbase() and getCodebase(); ApletContext and showDocument(); The AudioClip Interface; The AppletStub Interface; Output to the Console. Multi Threaded Programming: What are threads? How to make the classes threadable; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, read-write problem, producer-consumer problems. Event Handling: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes.

Swings 10hrs

Swings: The origins of Swing; Two key Swing features; Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet; JLabel and ImageIcon; JTextField; The Swing Buttons; JTabbedPane; JScrollPane; JList; JComboBox; JTable. Overview of J2EE and J2SE. The
Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata; Data types; Exceptions.

**Servlets**

Background; The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking.

**Java Remote Method Invocation:**

Remote Method Invocation concept; Server side, Client side. **EJB**; Deployment Descriptors; Session Java Bean, Entity Java Bean; Message-Driven Bean; The JAR File.

**Text Books:**


**Reference Books:**

IS552 WEB PROGRAMMING

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain the various web programming concepts
CO2: Develop dynamic web pages using scripting languages
CO3: Design and develop client and server applications

FUNDAMENTALS OF WEB  10 Hours

XHTML – 1: Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; Security; The Web Programmers Toolbox. XHTML: Origins and evolution of HTML and XHTML; Basic syntax; Standard XHTML document structure; Basic text markup. XHTML – 2: Images; Hypertext Links; Lists; Tables; Forms; Frames; Syntactic differences between HTML and XHTML.

CASCADED STYLE SHEET and JAVASCRIPT  10 Hours

Introduction; Levels of style sheets; Style specification formats; Selector forms; Property value forms; Font properties; List properties; Color; Alignment of text; The Box model; Background images; The and tags; Conflict resolution. JAVASCRIPT: Overview of Javascript; Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation and modification; Arrays; Functions; Constructor; Pattern matching using regular expressions; Errors in scripts; Examples.

JAVASCRIPT AND HTML DOCUMENTS:  10 Hours

The Javascript execution environment; The Document Object Model; Element access in Javascript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The DOM 2 event model; The navigator object; DOM tree traversal and modification. Introduction to dynamic documents; Positioning elements; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor; Reacting to a mouse click; Slow movement of elements; Dragging and dropping elements.

PERL, CGI PROGRAMMING  10 Hours

Origins and uses of Perl; Scalars and their operations; Assignment statements and simple input and output; Control statements; Fundamentals of arrays; Hashes; References; Functions; Pattern matching; File input and output; Examples. CGI linkage; Query string format; CGI.pm module; a survey example; Cookies;
XML AND PHP

Introduction; Syntax; Document structure; Document Type definitions; Namespaces; XML schemas; Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets; XML processors; Web services. PHP: Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL.

Text Book:


Reference Books:

IS553    SYSTEM SIMULATION AND MODELING

Total Teaching hours: 50  No of credits: 05

Course Outcomes

After competition of the course students should be able to:
CO1: Explain the framework for discrete event simulation
CO2: Design input-output models for discrete event simulation
CO3: Demonstrate the simulation models for problem-solving

Introduction to system simulation 10Hrs

Introduction to system modeling and simulation: an overview of computer simulation, discrete event simulation, continuous simulation, Monte Carlo simulations, how to perform discrete event simulation, a framework for modeling the simulation, Examples with an illustration of DES, application of the framework for real-time applications.

Input-output modeling 10Hrs

Input modeling for DES: empirical input modeling, an overview of theoretical distribution, theoretical modeling of arrival process, theoretical modeling of process time, modeling the service time, modeling and analyzing single server system, execution rules, and specification of graph-based models, event graph modeling template, real-time examples of DES using graph-based models. Parameterize

Graph-based modeling 10Hrs

Event Graph Modeling and Simulation: Parameterized Event Graph Examples, Execution Rules and Specifications of the Parameterized Event Graph, Parameterized Event Graph Modeling of Tandem Lines, Parameterized Event Graph Modeling of Job Shops, Execution of Parameterized Event Graph Models Using SIGMA.

Activity-based modeling 10Hrs

Introduction to activity based modeling and simulation: def. and specification of activity cycle graph, activity cycle modeling template, activity-based modeling example, parameterized activity cycle diagram and its applications, execution of activity cycle diagram.

The framework of system simulation 10Hrs

Simulation of ACD using Arena: arena basics, ACD to arena conversion, ACD arena modeling examples. Output analysis and optimization: a framework for output analysis, qualitative output analysis, statistical output analysis, linear regression modeling for output analysis, response surface methodology for simulation. State-based modeling for simulation: finite state machine, timed
automata, state graph, system modeling with state graph, simulation of composite state graph models

Text Book:


Reference Books:

IS610 SOFTWARE ENGINEERING

Total Teaching hours: 50  No. of credits: 05

Course Outcomes (CO): At the end of the course student will be able to:

CO1: Explain software engineering process and translate a requirements specification into high level and low level architecture.

CO2: Develop application using software development techniques and understand software evolution.

CO3: Employ verification and validation techniques and estimate software cost.

Overview  10 hours

Introduction: FAQ’s about software engineering, Professional and ethical responsibility. Critical Systems, Software Processes: Critical Systems: A simple safety-critical system; System dependability; Availability and reliability. Software Processes: Models, Process iteration. Requirements: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; The software requirements document; Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management.

Software Design  10 hours

Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Control styles. Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design evolution.

Development  10 hours

Rapid Software Development: Agile methods; Extreme programming; Rapid application development. Software Evolution: Program evolution dynamics; Software maintenance; Evolution processes; Legacy system evolution.

Verification and Validation  10 hours

Verification and Validation: Planning; Software inspections; Automated static analysis; Verification and formal methods. Software testing: System testing; Component testing; Test case design; Test automation.

Management  10 hours

Managing People: Selecting staff; Motivating people; Managing people; The People Capability Maturity Model. Software Cost Estimation: Productivity; Estimation techniques; Algorithmic cost modeling, Project duration and staffing.
Text Book:


Reference Books:

IS620 COMPUTER NETWORKS

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain the concepts of Computer Networks
CO2: Identify the services provided by different layers and protocols associated with them.
CO3: Illustrate the working principles of protocols and its applications

Introduction to Computer Networks 10 hours


Application Layer Protocols 10 hours


Transport Layer Protocols 10 hours


Networking Layer & Routing Protocols 10 hours


Multimedia Networking Protocols 10 hours

Multimedia Networking Applications, Streaming Stored Audio and Video, Making the Best of the Best-Effort Service: An Internet Phone Example, RTP, Beyond Best-Effort, Scheduling and Policing Mechanisms.
Text Book:

1. *Computer Networking: A Top-Down Approach Featuring the Internet, 7/E*
   James F. Kurose, Pearson Education

Reference Books:

1. *Computer networks, 4e* Andrew s Tannenbaum, Prentice Hall
2. *Computer Networks  A Systems Approach, 4e*, Peterson Davis,
   Morgan Kaufmann series in networking
IS630    DATA MINING

Total Teaching hours: 50    No. of credits: 05

Course Outcomes:

On successful completion of the course, students should be able to:
CO1: Explain the basic concepts, principles and techniques of data mining
CO2: Apply the concepts of Supervised and Unsupervised learning techniques
CO3: Illustrate the recent trends and applications of data mining techniques.

Syllabus

Introduction to Data Mining    10 Hours

Overview on Data Mining, Motivating Challenges; The origins of data mining; Data Mining Tasks. Types of Data, Data Quality, Data Pre-processing; Measures of Similarity and Dissimilarity Data visualization techniques.

Classification    10 Hours

Preliminaries; General approach to solving a classification problem; Naïve Bayes Classifier, Decision tree induction; Rule-based classifier, Nearest-neighbour classifier, Bayesian classifier.

Cluster Analysis    10 Hours


Association Rule Mining    10 Hours

Problem Definition; Frequent Itemset generation; Rule Generation; Compact representation of frequent itemset, Alternative methods for generating frequent itemset. FP-Growth algorithm, Evaluation of association patterns; Effect of skewed support distribution; Sequential patterns.

Recent Trends & Applications of Data Mining    10 Hours

Multidimensional analysis and descriptive mining of complex data objects; spatial data mining; Multimedia data mining; Text mining; Mining the WWW. Outlier analysis. Data mining applications; Data mining system products and research prototypes; Additional themes on Data mining; Social impact of Data mining; Trends in Data mining.
Text Books:

2. *Data Mining: Concepts and Techniques*: Jiawei Han, Micheline Kamber and Jian Pei, Third Edition, Morgan Kaufmann Publisher, 2012.

Reference Book:

1. *Data Mining Techniques* - Arun K Pujari, Universities Press (India) Limited
IS640       MANAGEMENT INFORMATION SYSTEM

Total Teaching hours: 50 No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain the usage of Information Systems in management.
CO2: Apply ERP, CRM and Data warehouses techniques to solve problems.
CO3: Demonstrate the applications of Management Information System.

Foundation concepts 10 Hrs


Electronic & Enterprise business systems 10 Hrs

Electronic commerce & Decision support systems 10 Hrs
SECURITY AND ETHICAL CHALLENGES 10 Hrs


ENTERPRISE AND GLOBAL MANAGEMENT OF IT 10 Hrs

Managing IT: Business and IT, Managing IT, Business / IT planning, Managing the IS function, Failures of IT management. Managing global IT: The International Dimension, Global IT Management, Cultural, Political and Geo - Economic challenges, Global Business/ IT strategies, Global Business / IT applications, Global IT Platforms, Global data access issues, Global Systems development.

Text Book:


Reference Books:

IS 651       ADVANCED DATABASE SYSTEMS

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:

CO1: Explain data storage, indexing structures, security and physical design of database systems.

CO2: Apply the concepts of data mining and information retrieval techniques.

CO3: Illustrate the different data models to infer the outcome of models.

Data Storage, Indexing, Query Processing, and Physical Design       10 Hrs

Introduction, Secondary Storage Device, Buffering Blocks, Placing File Records on Disks, Operation on Files, Files of unordered Records (Heap Files), Files of Ordered Records (Sorted Files), Hashing Techniques, other Primary File Organizations etc

Indexing Structures for Files: Types of single-Level Ordered Indexes, Multilevel Indexes, Dynamic Multilevel Indexes Using B Trees and B+ Trees, Indexes on Multiple Keys, Other Types of Indexes.

Security, Advanced Modelling and Distribution       10 Hrs


Parallel Databases:       10 Hrs

Introduction; I/O Parallelism; Interquery parallelism; Intraquery parallelism; Interoperation parallelism; Design of parallel systems.

Distributed Databases: Homogeneous and heterogeneous databases; Distributed storage; Distributed transactions; Concurrency control in distributed databases; Availability; Distributed query processing; Heterogeneous distributed databases; Directory systems.

Data Mining & Information Retrieval:       10 Hrs

Decision-support systems; Data analysis and OLAP; Data Warehousing; Data mining; Overview of information retrieval; Basic Concepts; Boolean Model; Vector Model; Probabilistic Model; Retrieval Evaluation: Precision & Recall and Alternative Measures; Relevance ranking using terms; Relevance using hyperlinks; Synonyms, Homonyms, and Ontologies; Indexing of documents; Web search engines; Information retrieval and structured data; Directories.
Enhanced Data Models for Some Advanced Applications: 10 Hrs

Object oriented database, Active database and triggers, Temporal, Spatial, and Deductive Databases. **More Recent Applications:** Mobile databases; Multimedia databases; Geographical Information Systems; Genome data management.

**Text Book:**


**Reference Books:**

IS652    HUMAN COMPUTER INTERACTIONS

Total Teaching hours: 50                          No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain the fundamentals of human computer interaction and paradigms for interaction
CO2: Develop the design and evaluation methodologies for HCI
CO3: Explore the knowledge of HCI models and theories to real-world applications

Introduction                          10 Hours


Paradigms and HCI Software Process      10 Hours

Paradigms: Paradigms for interaction; Design process, Interaction design basics: The process of design, User focus, Design Focus: Cultural probes, Navigation design, Design Focus: Beware the big button trap, Modes, Screen design and layout, Alignment and layout matter, Checking screen colors, Iteration and prototyping
HCI in the software process: The software life cycle, Usability engineering, Iterative design and prototyping, Design Focus: Prototyping in practice, Design rationale

Rules & Evaluation Techniques          10 Hours

Designs 10 Hours

Universal design: Universal design principles, Multi-modal interaction, Designing websites for screen readers, choosing the right kind of speech, Apple Newton, Designing for diversity, Mathematics for the blind. User support: Requirements of user support, Approaches to user support, Adaptive help systems, Design Focus: It's good to talk help from real people, designing user support systems. Dialog notations and design: What is dialog?, Dialog design notations, Diagrammatic notations, Design Focus: Using STNs in prototyping, Design Focus: Digital watch documentation and analysis, Textual dialog notations, Dialog semantics, Dialog analysis and design.

Models & Theories 10 Hours


Text Book:


Reference Books:


IS653      SOFT COMPUTING

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:

CO1: Explain the fundamentals of Soft Computing Techniques
CO2: Design and evaluation methodologies of soft computing techniques
CO3: Explore the knowledge of soft computing techniques to real-world applications

Neural Networks  10 Hours


Fuzzy Logic  10 Hours


Artificial Intelligence  12 Hours


Genetic Algorithms:  10 Hours


Applications of Soft Computing  8 Hours

Optimization of TSP using GA approaches, GA based Internet Searching

**Text Books:**


**Reference Books:**

IS654      COMPUTER VISION

Total Teaching hours: 50        No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain the fundamentals of computer vision
CO2: Analyze different image representation models
CO3: Apply the knowledge of feature analysis in solving computer vision problems

Introduction to computer vision and image processing            10 Hrs

Image formations: image representation and image analysis task, why are
corner vision difficult, image digitization, digital image properties, color images,
cameras a perspective. Image it’s mathematical and physical background: linear
integral transform, image as a stochastic process, image formation physics

Data structure for image analysis            15 Hrs

Level of image representation, traditional image structures, hierarchical data
structures. Image pre-processing: pixel brightness transformation, geometric
transformation, local pre-processing, image restoration

Image segmentation            15 Hrs

Thresholding, edge-based segmentation, region-based segmentation, matching,
evaluation issues in segmentation, mean shift segmentation, active contour,
geometric deformable models, fuzzy connectivities, 3D based image
segmentation, graph cuts

Shape representation and description            10 Hrs

Region identification, contour-shape based representation and description, region
based shape representation, shape classes

Text Book:

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, Image Processing, Analysis, and

Reference Books:

2. Anup Basu, Xiaobo Li., “computer vision system, theory, and applications”,
   world scientific, 1993
IS710        DISTRIBUTED COMPUTING

Total Teaching hours: 50                                      No. of credits: 05

Course Outcomes (CO):

On successful completion of the course, students should be able to:
CO1: Explain the design issues and underlying principles of distributed systems
CO2: Apply process/processor scheduling algorithms in distributed and real time systems
CO3: Analyze the concepts of distributed file systems and shared memory in distributed systems

Introduction to distributed systems                              10 Hours

Distributed systems, goals, hardware/software concepts, design issues. Communications in distributed systems, layered protocols, ATM networks, Client-server models, RPC, group communications

Synchronization in distributed systems:                            10 Hours

Clock synchronization, mutual exclusion, election algorithms, atomic transaction, deadlocks in distributed systems.

Processes and Processors in distributed systems.                  10 Hours

Threads, system models, processor allocation, scheduling in distributed systems, fault tolerance, real time distributed system

Distributed file systems                                         10 Hours

Design, implementation, trends in distributed file system.

Distributed shared memory                                       10 Hours

Introduction, shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, object based distributed shared memory.

Text Book:


Reference Books:

1. Distributed Concepts & Systems, Pradeep K Sinha, PHI Editions
IS720  INFORMATION AND NETWORK SECURITY

Total Teaching hours: 50  No. of credits: 05

Course outcomes

On successful completion of the course, students should be able to:
CO1: Explain the concept of information and security.
CO2: Illustrate packet/traffic analysis concepts and protocol format, Analyze the working of Network Security Devices
CO3: Design Internet Security models from the packet flow aspect, Categorize web security requirements.

Introduction to Information Security and Technology 10 Hours

Planning for Security: Introduction; Information Security Policy, Standards, and Practices; The Information Security Blue Print; Contingency plan and a model for contingency plan Security Technology-1: Introduction; Physical design; Firewalls; Protecting Remote Connections

IDS and Cryptography 10 Hours


Introduction to Network Security, Authentication Applications 10 Hours


Electronic Mail Security and IP Security 10 Hours


Web Security 10 Hours

Web Security: Web security requirements; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET)

Text Books:

2. William Stallings: Network Security Essentials: Applications and
Standards, 3rd Edition, Pearson Education, 2007 (Chapters: 1, 4, 5, 6, 7, 8)

Reference Book:

IS730 INFORMATION RETRIEVAL

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:

CO1: Discuss various Information Retrieval (IR) models
CO2: Demonstrate data attributes, operations and design of indexing and searching algorithms.
CO3: Design User Interfaces and visualization techniques for searching the web

Introduction:


Retrieval Evaluation:

Introduction, Retrieval performance evaluation, Reference collections. **Query Languages:** Introduction, keyword-based querying, Pattern matching, Structural queries, Query protocols. **Query Operations:** Introduction, User relevance feedback, Automatic local analysis, Automatic global analysis.

Text and Multimedia Languages and Properties:


Indexing and Searching

Introduction; Inverted Files; Other indices for text; Boolean queries; Sequential searching; Pattern matching; Structural queries; Compression. **Parallel and Distributed IR:** Introduction, Parallel IR, Distributed IR.

User Interfaces and Visualization:

Introduction, Human-Computer interaction, The information access process, Starting points, Query specification, Context, Using relevance judgments, Interface support for the search process. **Searching the Web:** Introduction, Challenges, Characterizing the web, Search engines, Browsing, Metasearchers, Finding the needle in the haystack, Searching using hyperlinks.
Text Books:


Reference Books:

IS741       CLOUD COMPUTING

Total Teaching hours: 50          No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Illustrate the fundamentals and essentials of cloud computing.
CO2: Identify appropriate design choices for solving cloud computing problems
and manage the various aspects of cloud system.
CO3: Describe cloud virtualization technologies and Achieve complex solutions
driven by Service Oriented Architecture.

Introduction

10 Hours

Business and IT perspective, Cloud and virtualization, Cloud services requirements, cloud and dynamic infrastructure, cloud computing characteristics, cloud adoption.

Cloud models

Cloud characteristics, Measured Service, Cloud models, security in a public cloud, public verses private clouds, cloud infrastructure self service.

Cloud at a service

10 Hours

Gamut of cloud solutions, principal technologies, cloud strategy, cloud design and implementation using SOA, Conceptual cloud model, cloud service demand.

Cloud solutions

Cloud ecosystem, cloud business process management, cloud service management, cloud stack, computing on demand, cloud sourcing.

Cloud offerings

10 Hours

Cloud analytics, Testing under cloud, information security, virtual desktop infrastructure, Storage cloud.

Cloud management: Resiliency, Provisioning, Asset management, cloud governance, high availability and disaster recovery, charging models, usage reporting, billing and metering.

Cloud virtualization and SOA

10 Hours

Cloud virtualization technology: Virtualization defined, virtualization benefits, server virtualization, virtualization for x86 architecture, Hypervisor management software, Logical partitioning, VIO server, Virtual infrastructure requirements. Storage virtualization, storage area networks, network attached storage, cloud server virtualization, virtualized data center.

Cloud and SOA:

10 Hours

SOA journey to infrastructure, SOA and cloud, SOA defined, SOA defined, SOA
and IAAS, SOA based cloud infrastructure steps, SOA business and IT services.

**Text Book:**

1. *Cloud Computing* by Dr. Kumar Saurabh, Wiley India, 2011.

**Reference Books:**

1. Michael Miller, *Cloud Computing: Web based applications that change the way you work and collaborate online*, Que publishing, August 2009
IS742 CYBER SECURITY

Total Teaching hours: 50 No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Identify the different classifications of cybercrimes and offences.
CO2: Elaborate challenges in mobile devices and identify the different attacks.
CO3: Explain phishing in cybercrime and the Indian IT Act.

Introduction 10 Hours

Introduction to cybercrime, Cybercrime and information security, Who are Cybercriminals, Classification of Cybercrimes, Cybercrime: The Legal Perspectives, An Indian Perspective, Cybercrime and the Indian ITA 2000, A global perspective on cybercrimes, Cybercrime era: Survival mantra for the citizens.

Cyber offenses 10 Hours


Cyber crime: Mobile and Wireless devices 10 Hours

Introduction, Proliferation of mobile and wireless devices, Trends in mobility, Security challenges posed by mobile devices, Registry setting for mobile devices, Authentication service security, Attacks on mobile/ cell phones, Mobile devices: security implications for organizations, Organization measures for handling mobile, Organizational security policies and measures in mobile computing era, Laptops.

Tools and method used in Cybercrime 8 Hours

Introduction, Proxy servers and anonymizers, Phishing, Password cracking, Key loggers and spywares, Virus and worms, Trojan horses and backdoors, Steganography, DoS and DDoS attacks, SQL injection, Buffer overflow, Attacks on wireless networks.

Phishing and identity theft 12 Hours

Introduction, Phishing, Identity theft (id theft).

Cybercrimes and Cyber Security: The legal perspectives
Introduction, Cybercrime and the legal landscape around the world, Why do we need cyber laws: the Indian context, The Indian IT Act, Challenges to Indian law and cybercrime scenario in India, Consequences of not addressing the weakness in information technology act.
Text Book:


Reference Books:

IS743       INTERNET OF THINGS

Total Teaching hours: 50                                      No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain the appropriate APIs, models and enabling technologies required to
develop IoT applications.
CO2: Analyze the wireless and IPV6 technologies for IoT applications.
CO3: Develop and demonstrate IoT solutions for data Analysis using Apache
Hadoop MapReduce

Introduction 10 Hours

Introduction to Internet of Things: Introduction: Definition and Characteristics of
IoT, Physical Design of IoT: Things in IoT, IoT Protocols, Logical Design of IoT:
IoT Functional Blocks, IoT Communication Models, IoT Communication APIs, IoT
Analytics, Communication protocols, Communication Protocols, Embedded
Systems, IoT Levels and Deployment Templates Internet of Things Applications:
Introduction, Home Automation, Smart Metering/Advanced Metering
Infrastructure-Health/Body Area Networks, City Automation, Smart Cards,
Tracking, Surveillance system, Environment, Energy, Retail, Logistics, Agriculture,
Industry and Health care and Lifestyle

Design using Phyton 10 Hours

IoT Systems Logical Design using Python: Introduction, Installing Python, Data
types and Data structures, Control flow, Functions, Modules, Packages, File
handling, Classes, Python packages for IoT. IoT device, Exemplary Device:
Raspberry Pi, about the board, Linux on Raspberry Pi, Raspberry Pi Interfaces,
and Programming Raspberry Pi with Python

Layer Connectivity 10 Hours

Layer ½ Connectivity: Wireless Technologies for the IoT-WPAN Technologies for
IoT/M2M, Cellular and Mobile Network Technologies for IoT/M2M,Layer 3
Connectivity :IPv6 Technologies for the IoT: Overview and Motivations. Address
Capabilities, IPv6 Tunneling, IPsec in IPv6,Header Compression Schemes,
Quality of Service in IPv6, Migration Strategies to IPv6.

Data Analytics for IoT 10 Hours

Data Analytics for IoT – Introduction, Apache Hadoop, MapReduce Programming
Model, Hadoop MapReduce Job Execution, MapReduce Job Execution workflow,
Hadoop Cluster Setup, Starting and Stopping Hadoop Cluster Using Hadoop
MapReduce for Batch Data Analysis.
Applications of IoT  

10 Hours

Case Studies illustrating IoT Design-Introduction, Home Automation, Cities, Environment, Agriculture, Productivity Applications using different IoT devices, platform and software.

Text Books:


Reference Books:

IS744  ROBOTICS

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO-1: Explain the fundamentals of robotics and navigation.
CO-2: Implement the Kinematics concepts and apply the suitable image processing algorithms.
CO-3: Integrate image processing and Robotic control techniques

10 Hours


10 Hours


10 Hours


10 Hours


10 Hours

Image feature extraction: Region features: segmentation, thresholding, MSER, graph-based Line features: Hough transform Point features: Harris, SURF. Using multiple images: Fundamental & essential matrix, estimation & RANSAC
Homographies Dense stereo, rectification ICP and plane fitting, Examples: perspective undistortion, mosaicing, image retrieval. **Visual Servicing:** Position-based visual servoing (PBVS), Image feature motion due to camera motion, Controlling feature motion - image-based visual servoing (IBVS), estimating depth, Performance issues and failure modes, Servoing using line and ellipse features.

**Text Books:**


**Reference Book:**

IS751       MOBILE COMPUTING

Total Teaching hours: 50        No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain the working principles of mobile communication system
CO2: Analyze the concepts of mobility and location based services for improved advancements.
CO3: Illustrate the underlying technology behind mobile application languages.

Mobile Devices and Systems, Architectures         12 Hours


Wireless Medium Access Control and CDMA – based Communication         08 Hours


Mobile IP Network Layer, Mobile Transport Layer         10 Hours


Mobile Devices, Server and Management         10 Hours


Mobile Application languages – XML, Java, J2ME and JavaCard, Mobile Operating Systems         08 Hours


Text Book:

Reference Books:

IS752     C # PROGRAMMING & .NET

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:

CO1: Illustrate integrated development environment and recognize features of object-oriented designs.
CO2: Design and develop applications using C# core features.
CO3: Develop GUI based applications with distributed data-driven applications.

Introduction to Microsoft Visual C# Programming 10 hours


Arrays and Collections in Visual Studio 10 hours


Overloading, Delegates and Events 10 hours


WIN Forms 10 hours

WIN FORMS: Simple Widows Application, MDI Application, Working with new Windows controls

ADO.Net Features 10 hours

ADO.NET FEATURES: The ADO.NET Object Model, Connecting to Data, Understanding Connection Pooling, Using Provider Statistics, Retrieving Data, Introducing Command Classes, Working with Data Readers, Populating a DataTable, Filling Datasets Using a Data Adapter, Working with Data Tables, Working with Data Views.
Text Book:


Reference Books:

IS753  NATURAL LANGUAGE PROCESSING

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Design finite state transducers for Language Processing.
CO2: Build applications for NLP using machine learning algorithms.
CO3: Illustrate the various aspects of natural language generation.

Introduction  10 Hours

Introduction to NLP: Definition, Knowledge in speech and speech language processing, Word Classes: Review of Regular Expressions, Morphology: Inflectional, derivational, parsing and parsing with FST, Combining FST lexicon and rules, human morphological processing.

Phonology:  10 Hours

Speech sounds, phonetic transcription, phoneme and phonological rules, optimality theory, machine learning of phonological rules, phonological aspects of prosody and speech synthesis. Pronunciation, Spelling and N-grams: Spelling errors, detection and elimination using probabilistic models, pronunciation variation (lexical, allophonic, dialect), decision tree model, counting words in Corpora, simple N-grams, smoothing (Add One, Written-Bell, Good-Turing), N-grams for spelling and pronunciation.

POS Tagging:  10 Hours

Tag sets, concept of HMM tagger, rule based and stochastic POST, algorithm for HMM tagging, transformation based tagging, Sentence level construction & unification: Noun phrase, co-ordination, sub-categorization, concept of feature structure and unification. 3L

Lexical Semantics and Word Sense Disambiguation  10 Hours


Pragmatics:  10 Hours

Discourse: Reference resolution and phenomena, syntactic and semantic constraints on Co reference, pronoun resolution algorithm, text coherence, discourse structure. Dialogues: Turns and utterances, grounding, dialogue acts
and structures. Natural Language Generation: Introduction to language generation, architecture, discourse planning, text schemata, rhetorical relations.

Text Book:


Reference Books:


IS754       INTERNET PROGRAMMING

Total Teaching hours: 50            No. of credits: 05

On successful completion of the course, students should be able to:
CO1: Illustrate the concepts of static and dynamic web pages
CO2: Demonstrate interaction between client and server side applications
CO3: Design and develop web service based applications

An overview of Java:

Data Types – Variables and Arrays – Operators – Control Statements – Classes –
Objects – Methods – Inheritance - Packages – Abstract classes – Interfaces and
Inner classes – Exception handling - Introduction to Threads – Multithreading –
String handling – Streams and I/O – Applets.

Web 2.0:

Basics-RIA Rich Internet Applications - Collaborations tools - Understanding
websites and web servers: Understanding Internet – Difference between websites
and web server- Internet technologies Overview –Understanding the difference
between internet and intranet; HTML and CSS: HTML 5.0 , XHTML, CSS 3.

Client side and Server side Programming:

An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular
Expressions- Exception Handling-Validation-Built-in objects-Event Handling-
DHTML with JavaScript. Servlets: Java Servlet Architecture- Servlet Life Cycle-
Form GET and POST actions- Session Handling- Understanding Cookies-
Installing and Configuring Apache Tomcat Web Server DATABASE
CONNECTIVITY: JDBC perspectives, JDBC program example - JSP:
Understanding Java Server Pages-JSP Standard Tag Library(JSTL)-Creating
HTML forms by embedding JSP code.

PHP and XML:

An introduction to PHP: Using PHP- Variables- Program control- Built-in functions-
Connecting to Database – Using Cookies-Regular Expressions; XML: Basic XML-
Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers
and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

Introduction to AJAX and WEB Services:

Ajax Client Server Architecture-XML Http Request Object-Call Back Methods;
Web Services: Introduction- Java web services Basics – Creating, Publishing
,Testing and Describing a Web services (WSDL)-Consuming a web service,
Database Driven web service from an application –SOAP.
Text Books:


Reference Books:

IS811 STORAGE AREA NETWORK

Total Teaching hours: 50
No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Analyze storage needs on a variety of business and technological scales and select solutions to meet those needs
CO2: Assess the technical capabilities of a variety of storage technologies in light of business and technical needs to analyze, deploy and manage virtual machines..
CO3: Develop and implement migration strategies for growing business storage needs and network capabilities with description of a system backup and restoration

Introduction and Intelligent Disk Subsystems 10 Hours

Server Centric IT Architecture and its Limitations; Storage - Centric IT Architecture and its advantages; Case study: Replacing a server with Storage Networks; The Data Storage and Data Access problem; The Battle for size and access.

Intelligent Disk Subsystems: Architecture of Intelligent Disk Subsystems; Hard disks and Internal VO Channels, JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems; Availability of disk subsystems.

I/O Techniques: 10 Hours

The Physical I/O Path from the CPU to the Storage System, SCSI, The Fibre Channel Protocol Stack, Fibre Channel SAN, File System and NAS: Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.

Storage Virtualization: 10 Hours

Definition of Storage virtualization; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.

Application of Storage Networks: 10 Hours

Definition of the Term 'Storage Network', Storage Sharing, Availability of Data, Adaptability and Scalability of IT Systems

Network Backup: 10 Hours

General Conditions for Backup, Network Backup Services, Components of Backup Servers, Backup Clients, Performance Gains as a Result of Network Backup, Performance Bottlenecks of Network Backup, Limited Opportunities for
Increasing Performance, Next Generation Backup, Backup of File Systems, Backup of Databases

Text Book:


Reference Books:

IS812 INFORMATION STORAGE MANAGEMENT

Total Teaching hours: 50
No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Demonstrate components, methods and services of a data center.
CO2: Monitor storage infrastructure and management activities.
CO3: Evaluate storage architectures.

Introduction 10 Hrs

Introduction to information storage management, Evolution storage technology, Data Centre Infrastructure, Key challenges in managing information, Data Centre Environment: Application, Database Management System (DBMS) - Host : Connectivity, Storage, Disk Drive Components, Intelligent Storage System: Components of an Intelligent Storage System, Storage Provisioning, Types of Intelligent Storage Systems.

Storage Networking Technologies 10 Hrs


BUSINESS CONTINUITY and BACK UP RECOVERY 10 Hrs


STORAGE SECURITY and MANAGEMENT 10Hrs


Cloud Computing 10 Hrs

Text Books:

1. EMC Corporation, “Information Storage and Management”, 2nd edition
   Wiley India, ISBN13: 978-1118094839
2. Ulf Troppen Rainer Wolfgang Muller,”Storage Networks Explained”, India,

Reference Books:

1. Robert Spalding, Storage Networks: The Complete Reference, Osborne,
2. Farley,”Building Storage Networks”, Osborne, Tata McGraw Hill, 2009,
3. Meeta Gupta, Storage Area network Fundamentals, Pearson Education
   13: 978-0071626941
IS813       BIG DATA ANALYTICS

Total Teaching hours: 50      No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Explain big data analytics and methods to create innovative analytics systems for big data
CO2: Apply big data technologies and tools to analyze the data
CO3: Apply data mining methods to analyze and solve complex big data problems

Introduction

10 Hours

Overview of Big Data, History, Structuring Big Data, Types of Data, Elements of Big Data, Data analytics project life cycle, Problems & challenges in understanding Data Analytics, Web page categorization, computing the frequency of stock market change. Use of Big Data in Social Networking, Use of Big Data in preventing Fraudulent activities, Use of Big Data in Retail Industry.

Big Data Technology

10 Hours

Exploring Big Data Stack, Virtualization, Virtualization Approaches, Distributed and parallel computing for Big Data, The cloud and Big Data, Cloud Deployment Models, Cloud Delivery Models, Cloud providers in Big Data Market. Introducing Hadoop, Hadoop Ecosystem, Hadoop Distributed File Systems(HDFS), Features of HDFS : Hadoop YARN, MAP Reduce, Features of Map Reduce, Working of Map Reduce, Techniques to Optimize Map Reduce Jobs, Uses of Map Reduce, HBase, Features of HBase, Role of HBase in Big Data processing, Other tools of Hadoop (Hive, Pig and Pig Latin, Sqoop, ZooKeeper, Flume, OOZie).

Mining Data Streams

10 Hours


Frequent Itemsets

10 Hours


Recommendation Systems

10 Hours

A Model, Content Based Recommendations, Collaborative Filtering, Dimensionality Reduction Problem, The NetFlix Problem.
Text Books:


Reference Books:

IS821  FINANCIAL MANAGEMENT

Total Teaching hours: 50  No. of credits: 05

Course Outcomes:

After completion of the course, student will be able to:
CO1: Explain the functions of finance management
CO2: Apply the basic concepts which enable the financial decision making
CO3: Apply the concepts of financial management to contemporary financial events

Introduction to finance function  10 Hrs


Compounding and discounting principle  10 Hrs


Financing decision  10 Hrs

Sources of long term funds: Cost of capital – basic concepts. Cost of debenture capital, cost of preferential capital, cost of term loans, cost of equity capital (Dividend discounting and CAPM model). Cost of retained earnings. Determination of Weighted average cost of capital (WACC) and Marginal cost of capital. Investment decisions: Basis of project cash flow estimation; hurdle rates for projects and firm. Estimating cash flow for new project, Cash flows of replacement projects Investment evaluation techniques – Net present value, Internal rate of return, Modified internal rate of return, Profitability index, Payback period, discounted payback period, Accounting rate of return.

Capital budgeting under uncertainty  10 Hrs

Basic of constructing a decision tree. Simple problem on EMV and Decision making, Working capital management, Factors influencing working capital
requirements. Current asset policy and current asset finance policy. Determination of operating cycle and cash cycle. Estimation of working capital requirements of a firm. (Does not include Cash and Inventory Management)

**Capital Structure**

10 Hrs

Capital structure decisions – Overview of financing choices – The financing process; internal and external financing - Planning the capital structure: EBIT and EPS analysis. ROI & ROE analysis. Capital structure policy (No capital structure theories to be covered)

Dividend policy – Factors affecting the dividend policy - dividend policies - stable dividend, stable playout.

**Text Books:**

2. I.M. Pandey – Financial Management (Vikas), 9/e,

**Reference Books:**

2. Damodaran, Corporate Finance – John wiley & Co., 2/e, 2004
IS822 ENTREPRENEURSHIP DEVELOPMENT

Total Teaching Hours: 50
No. of Credits: 05

Course Outcomes:

After completion of the course, student will be able to:

CO1: Explain the principles of entrepreneurship development
CO2: Develop basic entrepreneurial skills
CO3: Identify and establish business effectively and efficiently

ENTREPRENEURSHIP 10Hours


MOTIVATION 10Hours

Major Motives Influencing an Entrepreneur – Achievement Motivation Training, Self Rating, Business Games, Thematic Apperception Test – Stress Management, Entrepreneurship Development Programs – Need, Objectives.

BUSINESS 10Hours


FINANCING AND ACCOUNTING 10Hours


SUPPORT TO ENTREPRENEURS 10Hours

Sickness in small Business – Concept, Magnitude, Causes and Consequences, Corrective Measures – Business Incubators – Government Policy for Small Scale

Text Books:


Reference Books:

IS823  HUMAN RESOURCE MANAGEMENT

Total Teaching hours: 50  No. of credits: 05

Course Outcomes

On successful completion of the course, students should be able to:
CO1: Identify the fundamentals of Human Resource Management
CO2: Apply the managerial skills for smooth running of the organization
CO3: Explore various dimensions of Human Resource Management, both as an academic discipline and as a professional practice.

Introduction to Managing Human Resource  8 Hours

Nature and scope, features, functions, objectives, policies, procedures and Programs, practices, Line and staff responsibility, Roles and Responsibilities of managers.

HR Planning & Acquisition  12 Hours


Training and Development  10 Hours


Compensation & Benefits Administration  10 Hours

Compensation Management: need for sound salary administration, factors affecting wages/ salary levels, job evaluation, wage salary survey, salary structure, salary fixation, incentives, bonus concepts, ESOPs, pay for performance, Benefits administration, employee welfare and working conditions- statutory and voluntary measures. Career Planning & Development: Career – Stages in career Planning and Career development – Process.
Employee Separations, Downsizing & Outplacement  

Employee separation, types, costs of employee separation, benefits of employee separation, managing early retirements, managing layoffs, outplacement goals and services. **HR Accounting, Records, Audit, Research and Information:** Human Resource accounting, HR Records, HR Audit—Objectives, Needs, Process. HR Information System

**Text Books:**

1. Essentials of Human Resource Management and Industrial Relations, Himalaya Publication - Subba Rao –3rd Revised ,
2. Internal Audit – Roy Chowdhary Subject Title Human Resource Management

**Reference Books:**

1. Human Resource Management, Principles & Practice – Aquinas, Vikas Publication,
2. Managing Human Resources - Wayne F Cascio, TATA McGRAW-HILL- 7th , , 10th Chapter
IS824 SOFTWARE PROJECT PLANNING AND MANAGEMENT

Total Teaching Hours: 50  No. of Credits : 05
Lab hours/week: 02

Course Outcomes:

After completing this course, the students would be able to:
CO 1: Select the resources required for a project to produce a work plan and resource schedule.
CO 2: Apply appropriate management procedures, estimation techniques and quality control procedures at different phases in software development.
CO 3: Analyse the impact of applying procedures and practices during and after the development of software.

Process Models: 10 Hours


Risk Management: 10 Hours


Estimation for software projects: 10 Hours


Quality concepts: 10 Hours


**Software Testing Strategies:** 10 Hours

**Text Book:**


**Reference Books:**