Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Branch- Common to All Discipline

ES301	**Energy & Environmental Engineering**	**3L-1T-0P**	**4 Credits**

The objective of this Course is to provide *an introduction to energy systems and renewable energy resources, with a scientific examination of the energy field and an emphasis on alternative energy sources and their technology and application.*

Module 1: Introduction to Energy Science:

Introduction to energy systems and resources; Introduction to Energy, sustainability & the environment; Overview of energy systems, sources, transformations, efficiency, and storage; Fossil fuels (coal, oil, oil-bearing shale and sands, coal gasification) - past, present & future, Remedies & alternatives for fossil fuels - biomass, wind, solar, nuclear, wave, tidal and hydrogen; Sustainability and environmental trade-offs of different energy systems; possibilities for energy storage or regeneration (Ex. Pumped storage hydro power projects, superconductor-based energy storages, high efficiency batteries)

***Module2*: Ecosystems**

- Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of the following ecosystem (a.)Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

***Module 3*: Biodiversity and its conservation**

- Introduction – Definition: genetic, species and ecosystem diversity; Bio-geographical classification of India; Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values; Biodiversity at global, National and local levels; India as a mega-diversity nation; Hot-sports of biodiversity; Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Endangered and endemic species of India; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

***Module 4:* Environmental Pollution**

- Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards; Solid waste Management: Causes, effects and control measures of urban and industrial wastes; Role of an individual in prevention of pollution; Pollution case studies; Disaster management: floods, earthquake, cyclone and landslides.

Module 5: **Social Issues and the Environment**

- From Unsustainable to Sustainable development; Urban problems related to energy; Water conservation, rain water harvesting, watershed management; Resettlement and rehabilitation of people; its problems and concerns. Case Studies
  Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies Wasteland reclamation; Consumerism and waste products; Environment Protection Act; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; Issues involved in enforcement of environmental legislation; Public awareness.

Module 6: Field work

- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

REFERENCE

1. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc.
2. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB).
3. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai,
4. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
5. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards', Vol I and II, Enviro Media (R)
6. Boyle, Godfrey, Bob Everett, and Janet Ramage (Eds.) (2004), Energy Systems and Sustainability: Power for a Sustainable Future. Oxford University Press.
7. Schaeffer, John (2007), Real Goods Solar Living Sourcebook: The Complete Guide to Renewable Energy Technologies and Sustainable Living, Gaiam

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, III-Semester

IT302 Discrete Structure

Course objectives

The main objectives of this course are:

1. To introduce students with sets, relations, functions, graph, and probability.
2. To enable students to perform set operation and solve logical reasoning and verify the correctness of logical statement.
3. To apply the properties of relations and find partially ordered set and lattices.

Unit I-Set Theory, Relation, Function, Theorem Proving Techniques : Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, Equivalence relation, Partial ordering relation, Job Scheduling problem
Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions, pigeonhole principle. Theorem proving Techniques: Mathematical induction, Proof by contradiction.

Unit II- Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard
results.

Unit III- Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Normal Forms, Universal and existential quantifiers. Introduction to finite state machine Finite state machines as models of physical system equivalence machines, Finite state machines as language recognizers

Unit IV- Graph Theory: Introduction and basic terminology of graphs, Planer graphs, Multigraphs and weighted graphs, Isomorphic graphs, Paths, Cycles and connectivity, Shortest path in weighted graph, Introduction to Eulerian paths and circuits, Hamiltonian paths and circuits, Graph coloring, chromatic number, Isomorphism and Homomorphism of graphs.

Unit V- Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices. Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms , Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions , Generating functions , Solution by method of generating functions.

Course Outcomes

On completion of the course;

1. Students will be able to understand the notion of mathematical thinking, and algorithmic thinking and be able to apply them in problem solving such as formal specification, verification, and basic concepts of set theory.
2. Students understand the basic principle of Boolean algebra, logic and set theory.
3. Be able to construct simple mathematical proof and possess the ability to verify them.

Reference Books:

1. C.L.Liu" Elements of Discrere Mathematics" TMH.
2. Lipschutz, "Discrete mathematics (Schaum)",TMH.
3. U.S Gupta " Discrete Mathematical Structures" Pearson.
4. S. Santha," Discrete Mathematics with Combinatorics and graph theory", Cengage Learning.
5. Dr.Sukhendu. Dey " Graph Theory With Applications" Shroff Publishers

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, III-Semester

IT303 Data Structure

Course objectives

The main objectives of this course are:

1. To introduce the concepts of linear, non-linear data structures , the operations performed on them and the applications of various data structures.
2. To introduce various algorithms of searching and sorting.
3. To understand the basic concepts of stacks, queues, linked lists, trees and graphs
4. To enable students to write algorithms for solving various problems using data structures.

Unit 1: Introduction Data, data type, data object. Types of data structure – primitive &n non-primitive , linear & non-linear. Operations on data structures – traversing, searching , inserting , deleting. Complexity analysis – worst case, best case, average case. Time – space trade off , algorithm efficiency, asymptotic notations – big oh , omega , theta.

Unit 2: Arrays & Structure Introduction , declaration of arrays , operations on arrays – inserting , deleting , merging of two arrays , 1 dimensional & 2 dimensional arrays, row & column major representation , address calculation in array , storing values in arrays , evaluation of polynomial – addition & representation. Searching & sorting – Introduction , sequential search, binary search , Fibonacci search , indexed sequential search, hashed search. Types of sorting with general concepts – bubble , heap , insertion , selection , quick , heap , shell , bucket , radix and merge sort.

Unit 3: Stacks & Queues Basic concept of stacks & queues, array representation of stacks, operation on stacks – push , pop , create , getTop , empty , linked representation of stack , multiple stack. Application of stack – Conversion: infix , prefix , postfix and evaluation of arithmetic expression. Linked representation of queue, operations on queue – insertion & deletion. Types of queue with functions – circular , deque , priority queue. Applications of queues – job scheduling , Josephus problem.

Unit 4: Linked List Introduction – basic terminology , memory allocation & deallocation for linked list. Linked list variants – head pointer , head node , types linked list – linear & circular linked list. Doubly linked list , creation of doubly list, deletion of node from doubly linked list, insertion of a node from doubly linked list, traversal of doubly linked list. Circular linked list – singly circular linked list , circular linked list with header node , doubly circular linked list. Applications of linked list – polynomial representation & garbage collection.

Unit 5: Trees Basic terminology – general tree , representation of general tree, types of trees, binary tree- realization and properties , traversal in binary trees – inorder , preorder , postorder , applications of trees. Graph- Basic Terminologies and representations, Graph search and traversal algorithms.

Course Outcomes

On completion of the course:

1. For a given search problem (linear search and binary search) student will be able to implement it.
2. For a given problem of stacks, queues and link lists, students will be able to implement it and analyze the same to determine the time and computation complexity
3. Students will be able to write an algorithm for selection sort, insertion sort, quick sort, merge sort, heap sort, bubble sort and compare their performance
4. Students will be able to implement tree, graph search and traversal algorithms

References :

1.Varsha H. Patil "Data Structure Using C++" Oxford.
2. Rajesh K. Shukla "Data Structures Using C & C++" Wiley India.
3. Reema Thareja " Data Structure Using C " Oxford.
4. D. S Malik "Data Structure Using C++ " Second Edition Cengage.
5. Kushwaha and Mishra "Data Structure: A programming Approach with C", PHI Learning.
6. A. K Sharma "Data Structure Using C" Pearson.
7. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures", Computer Science Press

List of Experiments

1. Write a program to search an element in the array using Linear and Binary Search.
2. Write a program to perform the following operation in Matrix:
    1. Addition 2. Subtraction 3. Multiplication 4. Transpose
3. Write a program to perform the following operation on strings using string functions:
    1. Addition 2. Copying 3. Reverse 4. Length of String
4. Write program for implementing the following sorting methods to arrange a list of integers in ascending order:
    a) Quick sort b) Selection sort c) Insertion sort d) Merge sort
5. Write a program that uses stack operations to convert a given infix expression into its postfix equivalent.
6. Write a program to merge two sorted array into one sorted array.
7. Write a program to implement stack using array and linked list.
8. Write a program to implement queue and circular queue using array.
9. Write a program to insert an element in the beginning and end of singly linked list.
10. Write a program to insert an element at any position in singly and doubly linked list.
11. Insert and delete a node at any position in doubly linked list.
12. Write a program of Tower of Hanoi.
13. Write a program that uses functions to perform the following:
    a) Create a binary search tree of integers.
    b) Traverse the above Binary search tree non recursively in in order.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, III-Semester

IT304 Object Oriented Programming & Methodology

Course Objectives

1. The objective of this course is to understand the advantage of object oriented programming over procedure oriented programming.
2. To help students to understand the key features of Object Oriented Programming and Methodology like objects, methods, instance, message passing, encapsulation, polymorphism, data hiding, abstract data and inheritance.
3. To develop understanding of pointers and memory management.
4. To be able to develop understanding of file input/output and templates

Unit I- Introduction: Object oriented programming, Introduction, Application, characteristics, difference between object oriented and procedure programming, Comparison of C and C++, Cout, Cin, Data Type, Type Conversion, Control Statement, Loops, Arrays and string arrays fundamentals, Function, Returning values from functions, Reference arguments, Overloaded function, Inline function, Default arguments, Returning by reference.

Unit II- Object and Classes: Implementation of class and object in C++, access modifiers, object as data
type, constructor, destructor, Object as function arguments, default copy constructor, parameterized constructor, returning object from function, Structures and classes, Classes objects and memory, static class data, Arrays of object, Arrays as class Member Data, The standard C++ String class, Run time and Compile time polymorphism.

Unit III- Operator overloading and Inheritance: Overloading unary operators, Overloading binary operators, data conversion, pitfalls of operators overloading, Concept of inheritance, Derived class and base class, access modifiers, types of inheritance, Derived class constructors, member function, public and private inheritance.

Unit IV- Pointer and Virtual Function: Addresses and pointers, the address-of operator & pointer and arrays, Pointer and Function pointer, Memory management: New and Delete, pointers to objects, debugging pointers, Virtual Function, friend function, Static function, friend class, Assignment and copy initialization, this pointer, dynamic type information.

Unit V-Streams and Files: Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, printer output, Function templates, Class templates Exceptions, Containers, exception handling.

Course Outcomes

On the completion of this course students will be able to:

1. Recognize attributes and methods for given objects.
2. Define data types and also deal with operations applied for data structures.
3. Implement algorithms and complex problems.

Reference Books:

1. E. Balaguruswami, "Object Oriented Programming in C++", TMH.
2. Robert Lafore, "Object Oriented Programming in C++", Pearson.
3. M.T. Somashekare, D.S. Guru, " Object-Oriented Programming with C++", PHI.
4. Herbert Shildt, "The Complete Reference C++", Tata McGraw Hill publication.

List of Experiments:

1. Write a program to find out the largest number using function.
2. Write a program to find the area of circle, rectangle and triangle using function overloading.
3. Write a program to implement complex numbers using operator overloading and type conversion.
4. Write a program using class and object to print bio-data of the students.
5. Write a program which defines a class with constructor and destructor which will count number of object created and destroyed.
6. Write a program to implement single and multiple inheritances taking student as the sample base class.
7. Write a program to add two private data members using friend function.
8. Write a program using dynamic memory allocation to perform 2x2 matrix addition and subtraction.
9. Write a program to create a stack using virtual function.
10. Write a program that store five student records in a file.
11. Write a program to get IP address of the system.
12. Write a program to shutdown the system on windows operating system.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, III-Semester

IT305 Digital Circuits and Systems

Course Objectives

1 Understand working of logic gates.
2 To design and implement combinational and sequential logic circuits
3 Understand the process of analog to digital and digital to analog conversion
4 To understand various logic families

Unit I- Number systems and logic gates: Decimal, Binary, Octal, Hexadecimal number systems and radix conversion. Codes- BCD, excess 3, gray, ASCII. Boolean algebra- Theorems and properties, Boolean functions, canonical and standard forms, De Morgans theorem, digital logic gates, Karnaugh maps.

Unit II- Combinational circuits: Introduction to combinational circuits, multilevel NAND, NOR implementation. Designing binary Adders and Subtractors. Decoder, Encoder, Multiplexer, Demultiplexer circuits.

Unit III- Sequential circuits: Introduction to Sequential circuits, flip-flops, RS, D, T, JK, M/S JK-flipflops, truth tables, excitation tables and characteristic equations, clocked and edge triggered flipflops, Registers- Definition, serial, parallel, shift left/right registers, Johnson counter, asynchronous and synchronous counters.

Unit IV- Digital logic families: Bipolar and unipolar logic families, Digital IC specifications, RTL, DTL, All types of TTL circuits, ECL, IIL, PMOS, NMOS & CMOS Logic.

Unit V- Clocks and timing circuits: Bistable, Monostable & Astable multivibrator, Schmitt trigger circuit, Introduction of Analog to Digital & Digital to Analog converters, Display devices, 7 and 16 segment LED display, LCD.

Course Outcomes

On the completion of this course

1 Students will be able to perform number base conversions, use Boolean logic to create digital circuits.
2. Student can understand use of encoders, decoders, multiplexers and demultiplexers in communication systems.
3 By learning design of combinational and sequential circuits student can understand its use in digital systems such as computers, communication systems and other modern technologies.
4 Study of ADC and DAC along with display devices will enable students to understand signal conversion and its display and their applications in digital devices.

Reference Books:

1. M. Morris Mono, “Digital logic design”, Pearson Education Pvt. Ltd.
2. A Anand Kumar, “Fundamentals of digital circuits“, PHI Learning Pvt Ltd.
3. A K Maini, “Digital Electronics Principles and Integrated Circuits, Wiley India Pvt Ltd.
4. R P Jain, “Modern Digital Electronics”, Tata McGraw-Hill publishing company Ltd.
5. D P Kothari and J S Dhillon, "Digital Circuits and Design", Pearson Education Pvt. Ltd.

List of Experiments:

1. Study and verify the operation of AND, OR, NOT, NOR and NAND logic gates.
2. Design all basic logic gates using NOR universal gate.
3. Design all basic logic gates using NAND universal gate.
4. Verification of Demorgan’s theorem.
5. Construction and verification of half adder andfull adder circuits.
6. Construction and verification of half subtractor and full subtractor circuits.
7. Design of Binary to Grey & Grey to Binary code Converters .
8. Design of BCD to excess-3 code converter.
9. Design and verification of Multiplexer circuit
10. Design and verification of De-multiplexer circuit.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, III-Semester

IT306 (Java Programming Lab)

Course Objectives:

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java and be familiar of the important concepts like class, inheritance and multithreading, AWT and JDBC.
3. Students will able to use the Java SDK environment to create, debug and run simple Java programs.

Unit I-Overview of Java, Installation, First Simple Program, Compilation process , Java Keywords , Identifiers , Literals, Comments, Data Types, Variables, Dynamic initialization, type conversion and casting, Operators, Control Statements.

Unit II-Declaring Objects, Introducing Methods, Constructors, this Keyword, Garbage Collection, finalize Method, Overloading Methods, Overloading Constructors, Using Objects as Parameters, Inheritance, Creating a Multilevel Hierarchy, Packages and Interfaces, Exception Handling, Multithreaded

Unit III-The Applet Class: Applet Basics, The Applet Class, Applet Architecture, Applet Initialization and Termination , Simple Applet Display Methods, Simple Banner Applet, Using the Status Window, The HTML APPLET Tag, Passing Parameters to Applets, Improving the Banner Applet.

Unit IV-Introducing the AWT: Working with Windows, Graphics, and Text, AWT Classes, Window Fundamentals, Component, Container, Panel, Frame, Working with Frame Windows, Handling Events in a Frame Window, AWT Controls, Layout Managers, and Menus, Adding and Removing Controls, Grid Layout, Border Layout, introduction to swing and servlet.

Unit V-Event Handling, Two Event Handling Mechanisms, The Delegation Event Model, Events, Event Sources, Event Listeners, Event Classes, The Mouse Event Class and others, JDBC: JDBCODBC bridge, the connectivity model, the driver manager, navigating the result set object contents, the JDBC exceptional classes, connecting to remote database.

Course Outcomes:

On the completion of this course students will be able to understand:

1. The concepts of Java programming
2. The basic terminology used in computer programming and write, compile and debug programs in JAVA language.
3. The different data types, decision structures, loops, functions to design Java programs.
4. Develop program using the java collection API as well as the java standard class library.
5. Develop Java applets

Reference Books:

1. E. Balagurusamy, “Programming with java A Primer”, McGrawHill.
2. Sharanam Shah, “ Core Java 8 for Beginners”, Shroff Publisher.
3. Naughton & Schildt, “The Complete Reference Java 2”, Tata McGraw Hill.
4. Horstmann & Cornell, “Core Java 2” (Vol I & II), Pearson.

List of Experiments:

1. Write a program that accepts two numbers from the user and print their sum.
2. Write a program to calculate addition of two number using prototyping of methods.
3. Program to demonstrate function overloading for calculation of average.
4. Program to demonstrating overloaded constructor for calculating box volume.
5. Program to show the detail of students using concept of inheritance.
6. Program to demonstrate package concept.
7. Program to demonstrate implementation of an interface which contains two methods declaration square and cube.
8. Program to demonstrate exception handling in case of division by zero error.
9. Program to demonstrate multithreading.
10. Program to demonstrate JDBC concept using create a GUI based application for student information.
11. Program to display “Hello World” in web browser using applet.
12. Program to add user controls to applets.
13. Write a program to create an application using concept of swing.
14. Program to demonstrate student registration functionality using servlets with session management.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

IT501 - Operating System

Course Objectives

- Learn concepts of operating systems
- Learn the mechanisms of OS to handle processes
- Study of various mechanisms involved in memory management techniques
- Gaining knowledge of deadlocks prevention and detection techniques
- Analyzing disk management functions and techniques

Unit I

Introduction to Operating Systems, Evaluation of OS, Types of operating Systems, system protection, Operating system services, Operating System structure, System Calls and System Boots, Operating System design and implementation, Spooling and Buffering.

Unit II

Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling. Process concept, operations on processes, threads, inter process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization,

Unit III

Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling. Concepts of memory management, logical and physical address space, swapping, Fixed and Dynamic Partitions, Best-Fit, First-Fit and Worst Fit Allocation, paging, segmentation, and paging combined with segmentation.

Unit IV

Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation, Role of Operating System in Security, Security Breaches, System Protection, and Password Managment.

Unit V

Disk scheduling, file concepts, File manager, File organization, access methods, allocation methods, free space managements, directory systems, file protection, file organization & access mechanism, file sharing implement issue, File Management in Linux, introduction to distributed systems.

References:

1. Silberschatz ,"Operating system", Willey Pub

2. Tanenbaum “ Modern Operating System” PHI Learning.
3. Dhamdhere, ”System Programming and Operating System”,TMH.
4. Stuart,”Operating System Principles, Design &Applications”,Cengage Learning
5. Operating System : Principle and Design by Pabitra Pal Choudhury, PHI Learning

Suggested List of Experiments

1. Program to implement FCFS CPU scheduling algorithm.
2. Program to implement SJF CPU scheduling algorithm.
3. Program to implement Priority CPU Scheduling algorithm.
4. Program to implement Round Robin CPU scheduling algorithm.
5. Program to implement classical inter process communication problem(producer consumer).
6. Program to implement classical inter process communication problem(Reader Writers).
7. Program to implement classical inter process communication problem(Dining Philosophers).
8. Program to implement FIFO page replacement algorithm.
9. Program to implement LRU page replacement algorithm

Course Outcomes

Upon successful completion of this course the students will:

- Gain knowledge of history of operating systems
- Understand designissuesassociatedwithoperatingsystems
- Gain knowledge ofvariousprocessmanagementconceptsincludingscheduling,synchronization,deadlocks
- Understand conceptsofmemorymanagementincludingvirtualmemory
- Understand issuesrelatedtofilesysteminterfaceandimplementation,diskmanagement
- Befamiliarwithprotectionandsecuritymechanisms
- BefamiliarwithvarioustypesofoperatingsystemsincludingUnix

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

IT502 - Computer Networks

Course Objectives

- To provide students with an overview of the concepts and fundamentals of computer networks
- To familiarize with the basic taxonomy and terminology of computer networking area.
- Describe how computer networks are organized with the concept of layered approach
- To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite

Unit I

Importance of computer networks, broadcast and point to point networks, Local area networks and Wide area networks , ISO-OSI reference model, TCP/IP model , interfaces and services, Protocol data unit, connection oriented and connectionless services, service primitives, Binding Protocol Address- ARP & RARP, packet format, Encapsulation.

Unit II

Data-Link layer: - Data link layer design issues, framing , flow & error control , physical addressing, Stop & Wait protocol ,Go back N ARQ ,selective repeat ARQ ,piggybacking and pipelining ,HDLC LAN Protocol stack-Logical link control and Media Access Control sublayer, IEEE 802.2 LLC Frame format; MAC layer Protocols- static and dynamic allocation, Pure and slotted ALOHA, Carrier sense multiple access, Persistent and non persistent CSMA, IEEE standard 802.3, 802.4, 802.5, FDDI,

Unit III

The Network layer- logical addressing, classful & classless addressing, packet delivery & forwarding. unicast routing protocols , multicast routing protocols, Routing algorithm- Least Cost, Dijkstra's, Bellman-ford, Introduction to Internet protocol, IPv4 header, IPv4 Datagrams, Encapsulation, Fragmentation and Reassembly, IP routing, Subnet addressing, Subnet mask, Super netting- special case of IP addresses, Ipv6-Motivation, frame format and addressing. ICMP: Introduction, ICMP Header, ICMP message types.

Unit IV

Transport layer- TCP: Introduction ,Transport services , Process to process delivery, TCP ,congestion control algorithms, quality of service, headers, connection establishment and termination, timeout of connection establishment, maximum segment size, port no. and socket addresses, TCP timers, UDP: Introduction, UDP header, UDP checksum, UDP operations, encapsulation & decapsulation, queuing, SCTP-Services, transmission sequence number, stream identifier, stream sequence number, packet format.

Unit V

Application layer - BOOTP:-operation, packet format, DHCP:-Address allocation, configuration & packet Format, DNS: Distribution of name spaces, DNS in the internet, FTP:-Connection, Communication, command processing, TFTP, E-Mail: SMTP, POP, IMAP, SNMP. study of internetworking devices and their configuration– switches, hubs, Bridges, routers and Gateways.

References

1. ."Computer Networks" - Tanenbaum ,PHI Learning
2. "Data Communication & Networks " , Fourouzan TMH
3. "TCP/IP-Protocol suite", Forouzan, TMH 3rd edition
4. "Computer Networks and Internets", D.E.Comer, Pearson
5. "TCP/IP Illustrated" W. Richard Stevens, Volume I, Addison Wesley,
6. "Internetworking with TCP/IP Vol. I, II & III", Comer , PHI Learning.

Course Outcomes

Upon successful completion of this course the students will:

- Have agood understanding of the OSI Reference Model and its Layers
- Identify core networking and infrastructure components and the roles they serve; and given requirements and constraints, design an IT infrastructure including devices, topologies, protocols, systems software, management and security;
- Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
- Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

Departmental Elective IT- 503 (A) Theory of Computation

Course Objectives

- Student learns some fundamental concepts in automata theory and designing of Finite Automata, conversion NFA to DFA. Application of Finite Automata in computer science and real world.
- Obtain minimized DFA and Application of regular expression and conversion from RE to Finite Automata and Finite Automata to Regular Expression and Proving language are not regular.
- Designing of CFG's , Construction of parse trees, finding and removing ambiguity in grammars, simplification of CFG, Conversion of grammar to Chomsky Normal Form ,Greibach normal form.
- Designing problems on Pushdown Automata and conversion of grammar to PDA, PDA to Grammar.
- Designing Turing machines, understanding the working of various types of Turing machines and study P and NP type problem.

UNIT I

Introduction of the theory of computation, Finite state automata – description of finite automata, properties of transition functions, Transition graph, designing finite automata, FSM, DFA, NFA, 2-way finite automata, equivalence of NFA and DFA, Mealy and Moore machines.

UNIT II

Regular grammars, regular expressions, regular sets, closure properties of regular grammars, Arden's theorem, Myhill-Nerode theorem, pumping lemma for regular languages, Application of pumping lemma, applications of finite automata, minimization of FSA.

UNIT III

Introduction of Context-Free Grammar - derivation trees, ambiguity, simplification of CFGs, normal forms of CFGs- Chomsky Normal Form and Greibach Normal forms, pumping lemma for CFLs, decision algorithms for CFGs, designing CFGs, Closure properties of CFL's.

UNIT IV

Introduction of PDA, formal definition, closure property of PDA, examples of PDA, Deterministic Pushdown Automata, NPDA, conversion PDA to CFG, conversion CFG to PDA.

UNIT V

Turing machines - basics and formal definition, language acceptability by TM, examples of TM, variants of TMs – multitape TM, NDTM, Universal Turing Machine, offline TMs, equivalence of single tape and multitape TMs. Recursive and recursively enumerable languages, decidable and undecidable problems – examples,

halting problem, reducibility. Introduction of P, NP, NP complete, NP hard problems and Examples of these problems.

Reference Books:

1. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.
2. John E Hopcroft, Jeffrey D. Ullman and Rajeev Motwani, "Introduction to Automata Theory, Languages and Computation", Pearson Education.
3. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning.
4. Peter Linz, "Introduction to Automata Theory and Formal Languages", Narosa Publishing.
5. John C Martin, "Introduction to languages and the theory of computation", TATA McGraw Hill.

Course Outcomes

At the completion of the course, students will be able to...

- Convertbetween finite automata, regular grammars, and regular expression representations of regular languages
- Apply the pumping lemma for regular languages to determine if a language is regular
- Convertbetweengrammars and push-down automata for context-free languages
- Determine if a language is regular or context-free
- Demonstrate that a grammar is ambiguous
- Translate a context-free grammar from one form to another
- Produce simple programs for a Turing Machine
- Explain the concept of undecidability
- List examples of undecidable problems

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

Departmental Elective IT- 503 (B) Microprocessor and Interfacing

Course Objectives:

- To introduce basic concepts of microprocessor
- Tointroduceserialandparallelbusstandards.
- To introduce programming in assembly language.
- To introduce basic concepts of interfacing memory and peripheral devices to a microprocessor.

UNIT –I:
Evolution of microprocessor, single chip micro computers, Micro processor Application, Microprocessor and its architecture, addressing modes, instruction, Instruction sets, Arithmetic and Logic Instruction, Program control instruction, Introduction –8086 family, procedure and macros, connection , Timing and Troubleshooting interrupt, 80286, 80836 and 80486 micro processor system concept.

UNIT –II:
Microprocessor Cycle, AIU, Timing and control Unit, Register data, Address bus, Pin Configuration, Intel 8086 instruction, Opcode and operands, limitation word size. Programming the microprocessor Assembly language, The Pentium and Pentium Pro Micro Processorwith features, Pentium II, Pentium III and Pentium –IV Microprocessor with software changes. Instruction set for Intel 8086, Introduction Intimation and data formats, Addressing modes, Status flags, Symbols and abbreviations, programming of microprocessors, Assembly language, high level language, areas of application of various languages, Stacks, Sub routines system, software, commands in assembly language, software Development, Debugging program, Modular programming, Structured programming, Top-down, Bottom-up design , MACRO microprogramming.

UNIT-III:
Assembly language programming with Examples like Addition of 8/16-bit Binary number, subtraction of 8/16 bit binary number, Address partitioning, addressing mode, type of addressing mode, memory and I/o interfacing, Data transfer schemes, Interfacing device and I/o devices I/o ports, Basic I/o Interfacing MDS, Micro controllers, I/o processor and co-processors ,Microcomputer Development system, Single chip micro computers, intel 8748 intel 8051, inter 8096, intel 8049intel 2920/2921, I/o processor UPI-425,UPI-41,42, Co-processor, math processor math co-processor –8087, 80287, 80387DX 803875x

UNIT –IV:
Bus Interface I/o port Addressing, decoding 8279, Programmable key board/display interface, 8254 Internal Timer, 16550 programmable communication interface A/D, 8259A Programmable Interrupt Controller, 8237 DMA Controller, Shared bus operation, disk Memory system Video display. ISA Bus, Extended ISA (EISA) and VESA Local Buses, Peripheral Component Inter Connect (Pc I) Bus, Parallel Printer interface (LPT) Universal serial Bus (USB) Accelerated graphics port (AGP),Programmable Communication interfere 8251 VSART CRT Controller 8275, 6854, Floppy disk Controller 8272, I/o processor 8089.

UNIT –V:

Memory Unit, RAM,SRAM, DRAM,ROM, PROM EPROM, EEPROM Nonvolatile RAM semiconductor Technology for memory, Shift register, Magnetic Memory, Tap, disc, main memory and secondary memory cache memory, program memory and Data Memory, Real and virtual memory Buses, memory Addressing capacity of CPU, processing speed of computer

Reference Books:

1. Douglas V Hall, "Microprocessors and interfacing –Programming & Hardware" TMH
2. Barry B. Brey, "The intel Microprocessor –8086", Pearson Education
3. Kenneth J.Ayala,"The 8086 Microproccessor: Programming & Interfacing The PC",CengageLearning
4. Krishna Kant,"Microprocessors and Microcontrollers", PHI Learning
5. A.K.Ray KM Bhurchandi, "Advanced Microprocessor and peripherals" McGraw Hill
6. R.S. Gaonkar ,"Microprocessors and interfacing", TMH

Course Outcomes:

At the completion of the course, students will be able to...

- Explainthemicroprocessor'sandMicrocontroller'sinternalarchitecture
- Applyknowledgeanddemonstrateprogrammingproficiencyusingthevariousaddressingmodesanddatatransferinstructionsofthetargetmicroprocessorandmicrocontroller.
- Compareacceptedstandardsandguidelinestoselectappropriate Microprocessor(8085&8086)andMicrocontrollertomeetspecifiedperformancerequirements.
- Analyzeassemblylanguageprograms
- DesignelectricalcircuitrytotheMicroprocessorI/Oportsinordertointerfacetheprocessortoexternaldevices.
- Evaluateassemblylanguageprograms

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

Departmental Elective IT- 503 (C) Principles of Programming Languages

Course Objectives

- Tointroduce the majorprogramming paradigms, and the principles and techniques involved in design and implementation of modern programming languages.
- To introduce notations to describe syntax and semantics of programming languages.
- To analyze and explain behavior of simple programs using concepts such as binding, scope, control structures, subprograms and parameter passing mechanisms.
- To introduce the concepts of concurrency control and exception handling

UNIT-I
Language Evaluation Criteria, influences on Language design, Language categories, Programming Paradigms – Imperative, Object Oriented, functional Programming, Logic Programming. Programming Language Implementation –Compilation and Virtual Machines, programming environments

UNIT-II
Data types: Introduction, primitive, character, user defined, array, associative, record, union, pointer and reference types, design and implementation uses related to these types. Names, Variable, conceptof binding, type checking, strong typing, type compatibility, named constants, variable initialization, Sequence control with Expressions, Conditional Statements, Loops, Exception handling.

UNIT-III
Subprograms and Blocks: Fundamentals of sub-programs, Scope and lifetime of variable, static and dynamic scope, Design issues of subprograms and operations, local referencing environments, parameter passing methods, overloaded sub-programs, generic sub-programs, design issues for functions overloaded operators, co routines.

UNIT-IV
Abstract Data types: Abstractions and encapsulation, introductions to data abstraction, Static and Stack-Based Storage management. heap based storage management. Garbage Collection. Object oriented programming in small talk, C++, Java, C#, PHP, Perl . Concurrency: Subprogram level concurrency, semaphores, monitors, massage passing, Java threads, C# threads

UNIT–V
Exception handling, Exceptions, exception Propagation, Exception handler in C++ and Java. Logic Programming Language : Introduction and overview of logic programming, basic elements of prolog, applicationof logic programming. Functional Programming Languages: Introduction, fundamentals. Introduction to 4GL.

Reference Books:
1. Sebesta,"Concept of programming Language", Pearson Edu.
2. Louden, "Programming Languages: Principles & Practices", Cengage Learning
3. Tucker, " Programming Languages: Principles and paradigms", Tata McGraw –Hill

4. Terrance W Pratt, "Programming Languages: Design and Implementation", Pearson Edu.
5. CavloGhezzi& Mehdi Jazayeri" Programming Languages Concepts", Willey India
6 EHorowitz, "Programming Languages", 2nd Edition, Addison Wesley

Suggested List of Experiments:

1. Define a LISP function to compute sum of squares.
2. Define a LISP function to compute difference of squares.(if x > y return x2 -y2, otherwise y2 -x2).
3. Define aRecursive LISP function to solve Ackermann's Function.
4. Define a Recursive LISP function to compute factorial of a given number.
5. Define a Recursive LISP function which takes one argument as a list and returns last element of the ist. (Do not use last predicate).
6. Define a Recursive LISP function which takes one argument as a list and returns a list except last element of the list. (Do not use but last predicate).
7. Define a Recursive LISP function which takes one argument as a list and returnsreverse of the list. (Do not use reverse predicate).
8. Define a Recursive LISP function which takes two arguments first, an atom, second, a list, returns a list after.

Course Outcomes:

At the completion of the course, students will...

- Have the background for choosing appropriate programminglanguages for certain classes of programming problems
- Be able to program in an imperative (or procedural),an object-oriented, a functional, and a logical programminglanguage
- Understand the significance of an implementation of aprogramming language in a compiler or interpreter
- Have the ability to learn new programming languages
- Have the capacity to express programming concepts andchoose among alternative ways to express things
- Be able to design a new programming language
- Make good use of debuggers and related tools

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

Open Elective IT- 504 (A) Artificial Intelligence

Course Objectives

- To present an overview of artificial intelligence (AI) principles and approaches
- Develop a basic understanding of the building blocks of AI

Unit I:

Meaning and definition of artificial intelligence, Production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.

Unit II:

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and non-monotonic reasoning.

Unit III:

Probabilistic reasoning, Baye's theorem, semantic networks, scripts, schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning.

Unit IV:

Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding, natural language processing.

Unit V:

Introduction to learning, Various techniques used in learning, Introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

References:-

1 Rich E and Knight K, “Artificial Intelligence”, TMH, New Delhi.

2 Nelsson N.J., “Principles of Artificial Intelligence”, Springer Verlag, Berlin.

Course Outcomes:
Upon successful completion of this course the students will:

- Be familiar with terminology used in this area

- Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.
- Know how to build simple knowledge-based systems
- Have ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

Open Elective IT- 504 (B) E Commerce & Governance

Course Objectives

- Discuss fundamentals of e-commerce, types and applications.
- Evaluate the role of the major types of information systems in a business environment and their relationship to each other
- Assess the impact of the Internet and Internet technology on business electronic commerce and electronic business
- Identify the major e management challenges for building and using information systems and learn how to find appropriate solutions to those challenges.
- Learn strategies for e-commerce, e government, Wireless Application Protocol, WAP technology and electronic payment system.

Unit I: Introduction

Definition of Electronic Commerce, Brief history of Ecommerce, e, E-Commerce: technology and prospects, incentives for engaging in electronic commerce, needs of E-Commerce, advantages and disadvantages, , Inter Organizational E-Commerce Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework ,Impact of E-commerce on business, E-Commerce Models.

Unit II: Network Infrastructure for E- Commerce

Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY). Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device. Emerging Client Server Security Threats, firewalls & Network Security.

Unit III: E-Marketplaces, e Procurement and e Payment Systems

Define e-Marketplace and Describe their Functions, Explain e-Marketplace types and their features, Describe the various types of auctions and list their characteristics, Discuss the benefits, limitations and impacts of auctions, E-Commerce in the wireless environment, Competition in the DE and impact on industry, Integration and e-Business suits, ERP, eSCM, CRM, e-Procurement definition, processes, methods and benefits , e-Payment, Discuss the categories and users of smart cards, Describe payment methods in B2B EC

Unit IV: Electronic Payment System

Electronic Payments Overview of Electronics payments, Overview, The SET protocol, Payment Gateway, Digital Token based Electronics payment System, magnetic strip card, E-Checks, Smart Cards, Credit Card, Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking.

Unit V: e-Government

Definition of e-Governments, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, Implementation, E-Government Services, Challenges and Opportunities, E-Government Benefits, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

Reference Books

1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.
2. Pete Lohsin , John Vacca "Electronic Commerce", New Age International
3. Goel, Ritendra "E-commerce", New Age International
4. Laudon, "E-Commerce: Business, Technology, Society", Pearson Education
5. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH
6. Turban, "Electronic Commerce 2004: A Managerial Perspective", Pearson Education
7. Denieal Amor, " The E-Business Revolution", Addision Wesley
8. Diwan, Sharma, "E-Commerce" Excel
9. J. Satyanarayan, "E-government: The science of the possible", PHI Learning Private Limited
10. C.S.R. Prabhu, "E-governence: concept and case study", PHI Learning Private Limited

Course Outcomes

Upon successful completion of this course the student will be able to:

- understand the e-business concepts.
- understand the e-business models and infrastructure.
- learn how e-business concepts are applied to different fields, such as: education, banking, tourism and so on.
- willcome up with online business ideas and will be motivated to apply what they learned.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

Open Elective IT- 504 (C) Java Programming

Course Objective:

- To learn the basic concepts and techniques which form the object oriented programming paradigm
- To identify Java language components and how they work together in applications.
- To design and program stand-alone Java applications.
- To learn how to use exception handling in Java applications.
- To learn Java Event Handling

UNIT-I

The Java Environment: Java Development Kit (JDK) , Java virtual machine, Java programming environment(compiler, interpreter, applet viewer, debugger), Java Applications Programming Interface(API),Basic idea of application and applet. Java as an object oriented language: objects, classes, encapsulation, inheritance and software reuse, polymorphism, abstract classes and abstract methods,: defining an interface, implementing & applying interfaces, variables in interfaces, extending interfaces, Packages,scopeandlifetime;Accessspecifies;Constructors;Copyconstructor;this pointer; finalize() method; arrays; Memory allocation and garbage collection

UNIT- II

AWT: Containers and components, AWT classes, window fundamentals: Component, Container, Panel, Window, Frame, Canvas, AWT Controls, Layout Managers and Menus: adding and removing control, Labels, Button, Check Box, Radio Button, Choice, menu, Text area, Scroll list, Scrollbar; Frame; Layout managers-flow layout, Grid layout, Border layout, Card layout. Java Event Handling Model: Java's event delegation model –Ignoring the event, Self-contained events, Delegating events; The event class hierarchy; There lationship between interface, methods called, parameters and event source; Adapter classes; Event classes action Event, Adjustment Event, Container Event, Focus Event, Item Event, Eye Event, Mouse Event, Text Event,Window Event. Applets: Applet security restrictions; the class hierarchy for applets; Life cycle of applet; HTMLTags for applet Introduction to Swing: swing library, Building application susing Swings

UNIT-III

Multithreading and Exception Handling: Overview of simple threads, Basic idea of multi threaded programming, Thread synchronization: Locks, synchronized methods, synchronized block,Thread scheduling,Producer-consumerrelationship,Daemon thread,Basicidea ofexception handling,stack basedexecutionandexceptionpropagation,Exception types: Exception Handling:Try,Catch,Finally,Throw statement,Assertions

UNIT-IV

Input/Output:ExploringJavaI/O.,Directories,streamclassesTheBytestream:Inputstream,outputstream,file input stream, file output stream, print stream, Randomaccess file, the character streams, Buffered reader, buffered writer, print writer, serialization. JDBC: JDBC-ODBCbridge; The connectivity model; The driver manager; Navigating there sult set object contents; java.sql Package; The JDBCexception classes; Connecting to Remote database.

UNIT-V

Java Networking: exploring java. Net package Networking Basics: Socket, Client server, reservedsockets,servers,Internetaddressing,TCPsockets,UDPsockets. RMI: Client/Server architecture, RMI registry services; Step sofcreating RMI Application and an example

References:

1. Naughton&Schildt"TheCompleteReferenceJava
2. TataMcGraw Hill.2.Deitel "Java-How toProgram:"PearsonEducation,Asia.
3. Horstmann&Cornell "CoreJava2" (Vol I&II) ,SunMicrosystems.
4. LvanBayross"Java2.0":BPBpublications.
5. Ivor Horton's"BeginningJava2,JDK5Ed.,WileyIndia.
6. JavaProgrammingfor theabsolutebeginnersByRussell,PHILearning

Course Outcomes

Upon successful completion of this course the student will:

- Have the knowledge of the structure and model of the Java programming language
- use the Java programming language for various programming tasks
- develop software in the Java programming language
- evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements
- propose the use of certain technologies by implementing them in the Java programming language to solve the given problem

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, V-Semester

Departmental Lab IT-505 Advanced Java Lab

Course Objective:

• To learn Designing and developing Web applications
•Designing Enterprise based applications by encapsulating an application's business logic.
•Designing applications using pre-built frameworks.

Unit I

Java Database Connectivity(JDBC): JDBC Product, Types of Drivers, Two-Tier Client/Server Model, Three-Tier Client/Server Model, Basic Steps of JDBC, Creating and Executing SQL Statement, The Result Set Object, Working with Database MetaData Interface

Unit II

Java Servlets:Servlet Interaction & Advanced Servlets, Life cycle of Servlet, Java Servlet Development Kit, Javax.servletpackage, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http Package, Handling HTTP.

Unit III

JavaServer Pages(JSP): JSP Technologies, Understanding the Client-Server Model, Understanding Web server software, Configuring the JSP Server, Handling JSP Errors, JSP Translation Time Errors, JSP Request Time Errors, Creating a JSP Error Page

Remote Method Invocation (RMI): RMI Architecture, Designing RMI application, Executing RMI application

Unit IV

Enterprise Java Beans (EJB): Types of EnterpriseJava beans, Session Bean & Entity Bean, Features of Session Bean, Life-cycle of Stateful Session Bean, Features of Entity Bean, Life-cycle of Entity Bean, Container-managed Transactions & Bean-managed Transactions, Implementing a container-managed Entity Bean

Unit V

Struts: Introduction to the Apache Struts, MVC Architecture, Struts Architecture, How Struts Works? Introduction to the Struts Controller, Introduction to the Struts Action Class, Using Struts ActionFrom Class, Using Struts HTML Tags, Introduction to Struts Validator Framework, Client Side Address Validation in Struts, Custom Validators Example, Developing Application with Struts Tiles

References

1.Java the Complete Reference, ninth edition by Herbert Schild, Publisher: McGraw Hills
2.Head First EJB 3.0 by Kathy Sierra, Bert Bates, Publisher: O'Reilly Media 3.Head First Servlets and JSP by Bryan Basham, Kathy Sierra & Bert Bates, Publisher: O'Reilly Media
4.Just Hibernate, A Lightweight Introduction to the Hibernate Framework by Madhusudhan Konda, Publisher: O'Reilly Media

5.Programming Jakarta Struts, 2nd Edition by Chuck Cavaness, Publisher: O'Reilly Medi

Course Outcomes:

Upon successful completion of this course students will be able to-

- learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
- create dynamic web pages, using Servlets and JSP.
- make a resusable software component, using Java Bean.
- invoke the remote methods in an application using Remote Method Invocation (RMI)
- understand the multi-tier architecture of web-based enterprise applications using Enterprise JavaBeans (EJB).
- developStateful, Stateless and Entity Beans.
- use Struts frameworks, which gives the opportunity to reuse the codes for quick development.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII- semester

IT 701 Soft Computing

Course Objective:
The objective of this course is to familiarize the students with different soft computing tools to use them to be able to solve complex problems

Unit I Introduction to Neural Network: Concept, biological neural network, comparison of ANN with biological NN, evolution of artificial neural network, Basic models, Types of learning, Linear separability, XOR problem, McCulloch-Pitts neuron model, Hebb rule.

Unit II Supervised Learning: Perceptron learning, Single layer/multilayer, Adaline, Madaline, Back propagation network, RBFN, Application of Neural network in forecasting, data compression and image compression.

Unit III Unsupervised learning: Introduction, Fixed weight competitive nets, Kohonen SOM, Counter Propagation networks, (Theory, Architecture, Flow Chart, Training Algorithm and applications). Introduction to Convolutional neural networks (CNN) and Recurrent neural networks (RNN).

Unit IV Fuzzy Set: Introduction, Basic Definition and Terminology, Properties and Set-theoretic Operations, , Fuzzy Relations , Membership Functions and their assignment, Fuzzy rules and fuzzy Reasoning, Fuzzy if-then Rules, Fuzzy Inference Systems. Application of Fuzzy logic in solving engineering problems.

Unit V Genetic Algorithm: Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation, convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problems like TSP (Travelling salesman problem), Network design routing. Introduction to Ant Colony optimization (ACO) and Particle swarm optimization (PSO).

References-

1. S.N. Shivnandam, “Principle of soft computing”, Wiley.
2. S. Rajshekaran and G.A.V. Pai, “Neural Network , Fuzzy logic And Genetic Algorithm”, PHI.
3. Jack M. Zurada, “Introduction to Artificial Neural Network System” JAico Publication.
4. Simon Haykins, “Neural Network- A Comprehensive Foudation”
5. Timothy J.Ross, “Fuzzy logic with Engineering Applications”, McGraw-Hills 1.

Suggested List of Experiments-

1. Form a perceptron net for basic logic gates with binary input and output.
2. Using Adaline net, generate XOR function with bipolar inputs and targets.
3. Calculation of new weights for a Back propagation network, given the values of input pattern, output pattern, target output, learning rate and activation function.
4. Design fuzzy inference system for a given problem.
5. Maximize the function $y = 3x^2 + 2$ for some given values of x using Genetic algorithm.
6. Implement Travelling salesman problem using Genetic Algorithm.
7. Optimisation of problem like Job shop scheduling using Genetic algorithm

Course Outcomes:

After the completion of this course, the students will be able to:

1. Understand concept of ANN and explain the XOR problem
2. Use supervised neural networks to classify given inputs
3. Understand unsupervised neural networks for clustering data .
4. Build Fuzzy inference system using concepts of fuzzy logic.
5. Obtain an optimized solution to a given problem using genetic algorithm.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Departmental Elective IT 702(A) Data Science

Course Objective:
The objective of this course is to familiarize students with the roles of a data scientist and enable them to analyze data to derive meaningful information from it.

Unit I Data Science and Big Data Overview: Types of data, Sources of data, Data collection, Data storage and management, Big Data Overview, Characterization of Big data, Drivers of Big Data, Challenges, Big Data Use Cases, Defining Big Data Analytics and examples of its use cases, Data Analytics Lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicate Results, Operationalize.

Unit II Advanced Analytical Theory and Methods: Clustering, K-means, Additional Clustering Algorithms, Association Rules, Apriori Algorithm, Applications of Association Rules, Regression, Linear Regression, Logistic Regression, Classification, Decision Trees, Naive Bayes, Additional Classification Methods, Text Analysis, Text Analysis Steps, Determining Sentiments.

Unit III Advanced Analytics-Technology and Tools: Analytics for Unstructured Data Use Cases, MapReduce, Apache Hadoop,Traditional database vs Hadoop, Hadoop Core Components, HDFS, Design of HDFS, HDFS Components, HDFS Architecture, Hadoop 2.0 Architecture, Hadoop-2.0 Resource Management, YARN.

Unit IV The Hadoop Ecosystem: Introduction to Hive, Hbase, HiveUse Cases: Facebook, Healthcare; Hive Architecture, Hive Components. Integrating Data Sources, Dealing with Real-Time Data Streams and Complex Event Processing, Overview of Pig, Difference between Hive and Pig, Use Cases of Pig, Pig program structure, Pig Components, Pig Execution, Pig data models, Overview of Mahout, Mahout working.

Unit V Introduction to R, Basic Data Analytics Methods Using R, Communicating and Operationalizing an Analytics Project, Creating the Final Deliverables, Data Visualization Basics.

References:

1. EMC Education Services, “Data Science and Big Data Analytics”, Wiley, 2015.
2. Judith Hurwitz, Alan Nugent, Fern Halper, and Marcia Kaufman, “Big Data for Dummies”,Wiley & Sons, 2013.
3. VigneshPrajapati, “Big Data Analytics with R and Hadoop” ,Packt Publishing, 2013.
4. David Dietrich, Barry Heller, and Beibei Yang“Data Science and Big Data Analytics:Discovering, Analyzing, Visualizing and Presenting Data”, John Wiley & Sons, Inc.

Course Outcomes:
After the completion of this course, the students will be able to:

1. Demonstrate proficiency with statistical analysis of data.

2. Build and assess data-based models.
3. Execute statistical analyses with professional statistical software.
4. Demonstrate skill in data management.
5. Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Departmental Elective IT 702(B) Cloud Computing

Course Objective:
The objective of this course is to provide students with the comprehensive and in-depth knowledge of Cloud Computing concepts, technologies, architecture and applications.

UNIT I
Introduction of Grid and Cloud computing, characteristics, components, business and IT perspective, cloud services requirements, cloud models, Security in public model, public verses private clouds, Cloud computing platforms: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing.

UNIT II
Cloud services- SAAS, PAAS, IAAS, cloud design and implementation using SOA, conceptual cloud model, cloud stack, computing on demand, Information life cycle management, cloud analytics, information security, virtual desktop infrastructure, storage cloud.

UNIT III
Virtualization technology: Definition, benefits, sensor virtualization, HVM, study of hypervisor, logical partitioning- LPAR, Storage virtualization, SAN, NAS, cloud server virtualization, virtualized data center.

UNIT IV
Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud, Cloud computing security architecture: Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro- architectures; Identity Management and Access control-Identity management, Access control, Autonomic Security, Cloud computing security challenges: Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

UNIT V
SOA and cloud, SOA and IAAS, cloud infrastructure benchmarks, OLAP, business intelligence, e-Business, ISV, Cloud performance monitoring commands, issues in cloud computing. QOS issues in cloud, mobile cloud computing, Inter cloud issues, Sky computing, Cloud Computing Platform, Xen Cloud Platform, Eucalyptus, OpenNebula, Nimbus, TPlatform, Apache Virtual Computing Lab (VCL), Anomaly Elastic Computing Platform.

References:
1. Dr.Kumar Saurabh, “Cloud Computing”, Wiley India.
2. Ronald Krutz and Russell Dean Vines, “Cloud Security”, Wiley-India.
3. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, “Computing for Dummies”, Wiley India Edition.
4. Anthony T.Velte Toby J.Velte, “Cloud Computing – A Practical Approach”, TMH.
5. Barrie Sosinsky, ‘Cloud Computing Bible”, Wiley India.

Course Outcomes:
After the completion of this course, the students will be able to:

1. Explain the core concepts of the cloud computing paradigm
2. Demonstrate knowledge of virtualization
3. Explain the core issues of cloud computing such as security, privacy, and interoperability.
4. Choose the appropriate technologies, algorithms, and approaches for the related issues.
5. Identify problems, and explain, analyze, and evaluate various cloud computing solutions.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Departmental Elective IT 702(C) SIMULATION & MODELING

Course Objective:
The objective of this course is to introduce students to basic simulation methods and tools for modeling and simulation of continuous, discrete and combined systems. The objective is to impart knowledge of simulation principles. The ability to create simulation models of various types.

Unit I
Modeling & Simulation Concepts Modeling & Simulation Concepts: System Concepts, What is a Model? Type of Models, Modeling & Simulation, Continuous vs. Discrete System Simulation, Numerical Integration vs. Continuous Simulation, Analog vs. Digital Simulation, Simulation vs. Monte- Carlo Simulation, Nature of Computer Modeling and Simulation, When to Use Simulation? Limitations of Simulation

Unit II
Probability Concepts in Simulation Stochastic variables, Random numbers: Pseudo-random generators, Testing of Pseudo-random number generators, Generation of non-uniformly distributed random numbers, discrete and continuous random variables, and density and distributive functions. Study of few distributions such as Poisson, Normal, Uniform

Unit III
Simulation of Continuous Systems Introduction, Differential equations, Pure Pursuit Problem, Simulation of Chemical Reaction, Autopilot Simulation and Simulation of other Continuous systems

Unit IV
Simulation of Discrete Systems Arrival patterns and service times, Simulation of Queuing System - Elementary idea about networks of Queuing with particular emphasis to computer system environment

Unit V
Verification & Validation Design of simulation experiments and validation of simulation experiments comparing model data units and real system data
Simulation Language A brief introduction to important discrete and continuous languages such as GPSS (Study & use of the language). Use of data base & AI techniques in the area of modeling and simulation

References:

1. Deo, Narsing “System Simulation with Digital Computers”
2. Gorden G, “System Simulation”, Prentice Hall
3. Shridhar Bhai Trivedi, Kishore “Probability & Statistics with reliability Queuing, Computer Science Applications”
4. Payer, T.A., “Introduction to System Simulation”, McGraw Hill
5. Reitman, J, “Computer Simulation Application”, Wiley
6. Barnes B, “Modeling and Performance Measurement of Computer System
7. Spriet, WIA. “Computer Aided Modeling and Simulation (Academic Press).

Course Outcomes:
After the completion of this course, the students will be able to:

1. Define, describe and apply basic concepts related to modeling, identification and simulation
2. Classify various simulation models and give practical examples for each category.
3. Demonstrate the ability to apply knowledge of probability and statistics for *simulation & modeling*,
4. Generate and test random numbers and apply them to develop simulation models.
5. Construct a model for a given set of data and motivate its validity.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Departmental Elective IT 702(D) Augmented and Virtual Reality

Course Objective:
The objective of this course is to provide students a general introduction of Virtual and Augmented Environments followed by an analysis of features, requirement and issues in real-life applications.

Unit I Introduction to Virtual Reality- Virtual Reality and Virtual Environment: Introduction, Applications of Virtual Reality, Computer graphics, Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality, Historical development of VR, Scientific Landmark 3D Computer Graphics: Introduction, The Virtual world space, positioning the virtual observer, the perspective projection, human vision, stereo perspective projection, 3D clipping, Colour theory, Simple 3D modeling, Illumination models, Reflection models, Shading algorithms, Radiosity, Hidden Surface Removal, Realism-Stereographic image.

Unit II Geometric Modeling- Geometric Modeling: Introduction, From 2D to 3D, 3D space curves, 3D boundary representation Geometrical Transformations: Introduction, Frames of reference, Modeling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.

Unit III Virtual Environment -Animating the Virtual Environment: Introduction, The dynamics of numbers, Linear and Nonlinear interpolation, the animation of objects, linear and non-linear translation, shape & object in betweening, free from deformation, particle system. Physical Simulation: Introduction, Objects falling in a gravitational field, Rotating wheels, Elastic collisions, projectiles, simple pendulum, springs, Flight dynamics of an aircraft.

Unit IV VR Hardware and Software- Human factors: Introduction, the eye, the ear, the somatic senses. VR Hardware: Introduction, sensor hardware, Head-coupled displays, Acoustic hardware, Integrated VR systems. VR Software: Introduction, Modeling virtual world, Physical simulation, VR toolkits, Introduction to VRML

Unit V Augmented and Mixed Reality- Taxonomy, Technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, wireless displays in educational augmented reality applications, mobile projection interfaces, marker-less tracking for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

References:

1. John Vince, “Virtual Reality Systems “, Pearson Education Asia, 2007.
2. Anand R., “Augmented and Virtual Reality”, Khanna Publishing House, Delhi.
3. Adams, “Visualizations of Virtual Reality”, Tata McGraw Hill, 2000.
4. Grigore C. Burdea, Philippe Coiffet , “Virtual Reality Technology”, Wiley Inter Science, 2 nd Edition, 2006.
5. William R. Sherman, Alan B. Craig, “Understanding Virtual Reality: Interface, Application and Design”, Morgan Kaufmann, 2008.
6. Alan B Craig, William R Sherman and Jeffrey D Will, Developing Virtual Reality Applications: Foundations of Effective Design, Morgan Kaufmann, 2009.

7. Gerard Jounghyun Kim, Designing Virtual Systems: The Structured Approach, 2005.
8. Alan B. Craig, Understanding Augmented Reality, Concepts and Applications, Morgan Kaufmann, 2013.

Course Outcomes:

After the completion of this course, the students will be able to:

1. Demonstrate knowledge of virtual reality and its applications
2. To describe the importance of viewing and projections.
3. Understand geometric modeling and Virtual environment.
4. Explain about virtual reality hardware and software
5. Develop Virtual Reality applications.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Open Elective IT 703 (A) Cyber Laws and Forensics

Course Objective:
The objective of this course is to emphasize the importance of cyber laws and digital forensics, and to prepare students to conduct a digital investigation in an organized and systematic way.

UNIT-I Introduction to cybercrime, definition, cyber crime and information security, classification of cybercrimes, cybercrime: the legal perspectives, an Indian perspective, cybercrime and the Indian ITA 2000, a global perspective on cybercrime, Cyber offences: How criminals plan them, Tools and methods used in cyber crime, Need of cyber law, The Indian IT act, challenges to Indian law and cybercrime scenario in India, digital signature and Indian IT act, Amendments in the Indian IT act, cybercrime and punishment

UNIT-II Law and framework for information security, law for intellectual property rights(IPR), patent law, copy right law, Indian copyright act, privacy issue and law in Hong Kong, Japan, and Australia, data protection act in Europe, health insurance portability and accountability act of 1996(HIPAA), Gramm-leach-Bliley act of 1999(GLAB),Sarbanes-Oxley(SOX), legal issue in data mining, building security into software/system development life cycle.

UNIT III Digital forensics Science, The need for computer forensics, Understanding computer forensics, computer forensics versus other related disciplines, A brief History of computer Forensics, Cyber forensics and digital evidence, Digital forensics lifecycle, chain of custody concept, Network forensics, Approaching a computer forensics investigation, setting up a computer forensics laboratory, Forensics and social networking sites, computer forensics from compliance perspective, challenges in computer forensics, forensics auditing, antiforensics

UNIT IV Current Computer Forensics Tools, Evaluating Computer Forensics Tool Needs, Types of Computer Forensics Tools, Tasks Performed by Computer Forensics Tools, Tool Comparisons, Other Considerations for Tools, Computer Forensics Software Tools, Command-Line Forensics Tools, UNIX/Linux Forensics Tools, Other GUI Forensics Tools, Computer Forensics Hardware Tools, Forensic Workstations

UNIT V Forensics of hand held devices, Investigating Network Intrusions and Cyber Crime, Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks ,Router Forensics. Cyber forensics tools and case studies.

References:
1) The Indian Cyber law with Cyber glossary, Suresh T. Vishwanathan, New Delhi, Bhart Law House, 2000.
2) Law of Cyber Crimes and Information Technology Law, S.V. JogaRao, 2007.
3) Cory Altheide, Harlan Carvey, Digital Forensics with Open Source Tools, Syngress imprint of Elsevier.
4) Bill Nelson, Amelia Phillips, Christopher Steuart, “Guide to Computer Forensics and Investigations”, Fourth Edition, Course Technology.
5. Angus M. Marshall, “Digital forensics: Digital evidence in criminal investigation”, John – Wiley and Sons, 2008.

6. Nina Godbole and Sunit Belapure– Cyber Security, Wiley India Publication.
7. Nina Godbole, Information system security, Wiley India Publication.
8. Information Warfare: Corporate attack and defense in digital world, William

Course Outcomes:

After the completion of this course, the students will be able to:

1. Become aware of various cyber crimes and cyber laws
2. Underline the need of digital forensic and role of digital evidences
3. Understand different types of digital evidences that can be presented to support investigations
4. List the methods to generate legal evidence and supporting investigation reports
5. Use various digital forensic tools

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Open Elective IT 703 (B) Internet of Things

Course Objective:
The objective of this course is to provide an understanding of the technologies and the standards relating to the Internet of Things and to develop skills on IoT technical planning.

Unit I IoT definition, Characteristics, IoT conceptual and architectural framework, Physical and logical design of IoT, IoT enablers, Modern day IoT applications, M2M communications, IoT vs M2M, IoT vs WoT, IoT reference architecture, IoT Network configurations, IoT LAN, IoT WAN, IoT Node, IoT Gateway, IoT Proxy, IPv4 vs IPV6

Unit II Sensor, Basic components and challenges of a sensor node, Sensor features, Sensor resolution; Sensor classes: Analog, Digital, Scalar, Vector Sensors; Sensor Types, bias, drift, Hysteresis error, quantization error; Actuator; Actuator types: Hydraulic, Pneumatic, electrical, thermal/magnetic, mechanical actuators, soft actuators

Unit III Basics of IoT Networking, IoT Components, Functional components of IoT, IoT service oriented architecture, IoT challenges, 6LowPAN, IEEE 802.15.4, ZigBee and its types, RFID Features, RFID working principle and applications, NFC (Near Field communication), Bluetooth, Wireless Sensor Networks and its Applications

Unit IV MQTT, MQTT methods and components, MQTT communication, topics and applications, SMQTT, CoAP, CoAP message types, CoAP Request-Response model, XMPP, AMQP features and components, AMQP frame types

Unit V IoT Platforms, Arduino, Raspberry Pi Board, Other IoT Platforms; Data Analytics for IoT, Cloud for IoT, Cloud storage models & communication APIs, IoT case studies

References:
1. Vijay Madisetti, Arshdeep Bahga, “Ïnternet of Things, A Hands on Approach”, University Press
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, “Introduction to Internet of Things: A practical Approach”, ETI Labs
3. Pethuru Raj and Anupama C. Raman, “The Internet of Things: Enabling Technologies, Platforms, and Use Cases”, CRC Press
4. Jeeva Jose, “Internet of Things”, Khanna Publishing House, Delhi
5. Adrian McEwen, “Designing the Internet of Things”, Wiley
6. Raj Kamal, “Internet of Things: Architecture and Design”, McGraw Hill
7. Cuno Pfister, “Getting Started with the Internet of Things”, O Reilly Media

Course Outcomes:
After the completion of this course, the students will be able to:
1. Understand Internet of Things and its hardware and software components

2. Interface I/O devices, sensors & communication modules
3. Analyze data from various sources in real-time and take necessary actions in an intelligent fashion
4. Remotely monitor data and control devices
5. Develop real life IoT based projects

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Open Elective IT 703 (C) Social Networks

Course Objective:
The objective of this course is to focus on the importance of social network analysis and to enhance skills of students for analyzing social media and networking data.

UNIT I Introduction Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

UNIT II Modelling, Aggregating and Knowledge Representation Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

UNIT III Extraction and Mining Communities in Web Social Networks Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - MultiRelational characterization of dynamic social network communities.

UNIT IV Predicting Human Behaviour and Privacy Issues Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT V Visualization and Applications of Social Networks Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

References:

1. Ajith Abraham, Aboul Ella Hassanien, Václav Snášel, ―Computational Social Network Analysis: Trends, Tools and Research Advances‖, Springer, 2012
2. Borko Furht, ―Handbook of Social Network Technologies and Applications‖, Springer, 1st edition, 2011
3. Charu C. Aggarwal, ―Social Network Data Analytics‖, Springer; 2014
4. Giles, Mark Smith, John Yen, ―Advances in Social Network Mining and Analysis‖, Springer, 2010.

5. Guandong Xu , Yanchun Zhang and Lin Li, ―Web Mining and Social Networking – Techniques and applications‖, Springer, 1st edition, 2012
6. Peter Mika, ―Social Networks and the Semantic Web, Springer, 1st edition, 2007.
7. Przemyslaw Kazienko, Nitesh Chawla,‖Applications of Social Media and Social Network Analysis‖, Springer,2015
8. Maksim Tsvetovat and Alexander Kouznetsov , "Social Network Analysis for Startups", O'Reilly Media, 2011.
9. Charles Kadushin, "Understanding Social Networks", Oxford University Press, 2012
10. Social Network Analysis: Theory and Applications

Course Outcomes:

After the completion of this course, the students will be able to:

1. Understand the importance of social media and networks
2. Have skills for analyzing social media and networking data
3. Visualize social networks
4. Create real-life case studies using social media data
5. Plan and execute a small-scale network analysis project.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII-Semester

Open Elective IT 703 (D) Digital Image Processing

Course Objective:
The objective of this course is to describe and explain basic principles of digital image processing.

Unit I Introduction and Digital Image Fundamentals: The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.

Unit II Image Enhancement in the Spatial Domain: Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods.

Unit III Image Enhancement in the Frequency Domain: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering.
Image Restoration A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invariant Degradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.

Unit IV Image Compression: Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards. **Image Segmentation** Detection of Discontinuities, Edge linking and boundary detection, Threshold, Region Oriented Segmentation, Motion based segmentation.

Unit V Representation and Description: Representation, Boundary Descriptors, Regional Descriptors, Use of Principal Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. **Object Recognition** Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.

References:
1. R.C Gonzalez & Richard E Wood, “Digital Image Processing”, Addison Wesley Publishing
2. Anil K Jain, “Fundamentals of Digital image processing”. PHI.
3. Sonka, Hlavac, Boyle, “Digital image processing and computer vision”, Cengage learning, India Edition.
4. B Chanda, D. Dutta Majumder, “Digital image Processing and Analysis”, PHI.

Course Outcomes:
After the completion of this course, the students will be able to:
1. Explain basic concepts of image processing.
2. Have knowledge of techniques employed for the enhancement of images
3. Categorize image compression techniques
4. Interpret image segmentation and representation techniques.
5. Develop any image processing application

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII- semester

IT 704 Cloud Computing Lab

Course Objective:

The objective of this course is to make students understand *Cloud computing* concepts and the installation of different cloud simulation tools/ cloud setup tools.

Suggested List of Practicals:

1. Study of cloud computing concepts
2. Using Eucalyptus or Open Nebula or equivalent to set up the cloud
3. Find procedure to run the virtual machine of different configuration.
4. Check how many virtual machines can be utilized at particular time.
5. Install a C compiler in the virtual machine and execute a sample program.
6. Show the virtual machine migration based on the certain condition from one node to the other.
7. To develop web applications in cloud
8. To learn the design and development process involved in creating a cloud based application
9. To learn to implement and use parallel programming using Hadoop
10. Install Virtualbox/VMware Workstation with different flavours of linux or windows OS on top of windows 7 or 8.
11. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
12. Install Google App Engine. Create hello world app and other simple web applications using python/java.
13. Use GAE launcher to launch the web applications.
14. Simulate a cloud scenario using CloudSim.
15. Implementation of various scheduling mechanisms using open source cloud simulator.
16. Find a procedure to transfer the files from one virtual machine to another virtual machine.
17. Find a procedure to launch virtual machine using trystack (Online Openstack Demo Version)
18. Install Hadoop single node cluster and run simple applications like wordcount

Course Outcomes:

On completion of this course, the students will be able to:

1. Configure various virtualization tools such as Virtual Box, VMware workstation.
2. Design and deploy a web application in a PaaS environment.
3. Learn how to simulate a cloud environment to implement new schedulers.
4. Install and use a generic cloud environment that can be used as a private cloud.
5. Manipulate large data sets in a parallel environment.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Information Technology, VII- semester

IT 705 IoT Lab

Course Objective:
The objective of this course is to to create a competitive industry required IoT skill in students.

Suggested List of Practicals
1. Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2. To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3. To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4. To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5. To interface motor using relay with Arduino/Raspberry Pi and write a program to turn ON motor when push button is pressed.
6. To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
7. To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
8. To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
9. Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
10. Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
11. To install MySQL database on Raspberry Pi and perform basic SQL queries.
12. Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
13. Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.
14. Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
15. Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

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

1. Have understanding of Arduino/Raspberry Pi
2. Apply the skills learned by designing, building, and testing a microcontroller-based embedded system
3. Publishing/Subscribing to connect, collect data, monitor and manage assets
4. Remotely monitor data and control devices
5. Perform experiments and mini projects on IoT