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.

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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.

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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.

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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

Credit Based Grading System

Information Technology, V-Semester

IT-5001- Theory of Computation

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.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Information Technology, V-Semester

IT-5002 Principles of Programming Languages

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, concept of 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, application of 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. Cavlo Ghezzi & Mehdi Jazayeri " Programming Languages Concepts", Willey India
6 E Horowitz, "Programming Languages", 2nd Edition, Addison Wesley

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 a Recursive 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

list. (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 returns reverse 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.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Information Technology, V-Semester

IT- 5003 – Computer Networks

Unit I

Importance of computer networks, broadcast and point to point networks, Local area networks and Wide area networks , Introduction to ISO-OSI reference model, TCP/IP reference model , function of each layer, interfaces and services, Protocol data unit, connection oriented and connectionless services, service primitives, comparison of TCP/IP and ISO-OSI reference model, Novel Netware, Arpanet , X.25

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 Data link layer in the internet, Serial line IP and Pont to point protocol.

Unit III

MAC layer Protocols- , static and dynamic allocation , Pure and slotted ALOHA protocols, Carrier sense multiple access, Persistent and non persistent CSMA, IEEE standard 802.3 and Ethernet,802.3 cabling, IEEE 802.4, IEEE 802.5, FDDI Wireless LAN , Comparison of wired and wireless LAN, WIMAX

Unit IV

The Network layer- logical addressing, classful & classless addressing , address mapping, packet delivery & forwarding. unicast routing protocols, multicast routing protocols, Routing algorithm-Least Cost, Dijkstra's, Bellman-ford, congestion control algorithms, Internetworking devices, Introduction to Internet protocol IPv4.

Unit V

Transport layer-Transport services , Process to process delivery, UDP ,TCP ,congestion control, quality of service , Integrated services, Differentiated services, LAN-WAN Design and implementation-Configuring TCP/IP, using Ipconfig, ping command , study of structured LAN, study of internetworking devices and their configuration– switches, hubs, Bridges, routers and Gateways

References:-

1. “Local area networks”, Forouzan, TMH, 1st edition
2. “Computer Networks” - Tanenbaum ,PHI Learning.
3. “Computer Networks: Protocols, Standards and Interfaces” By Black, PHI learning
4. “Computer Communications & Networking Technologies”-Michael A. Gallo & William M. Hancock -Cengage pearsen publications

Suggested List of Experiment

1. Establishment and configuration of LAN.
2. Colour coding standard of CAT 5,6,7 and crimping of cable in RJ-45.
3. Study of WAN.
4. Case study of STOP AND WAIT Protocols.
5. Study of sliding window protocol.

6. study of IEEE 802.3 , 802.4 ,802.5.
7. Study of FDDI.
8. Study of basic networking commands like ping, ipconfig, etc
9. Case study of various Routing Strategies.
10. Case studies of various Network Topologies.
11. Establishing & studying the various parameters of a home LAN Network.
12. Study of IOS of routers.
13. Configuring routers, bridges and switches and gateways.

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Credit Based Grading System

Information Technology, V-Semester

IT- 5004 – Digital Communication

UNIT I

Digital signal, Quantization, Quantization error, Pulse code modulation, signal to noise ratio, Eye pattern, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM), limitations of DM and Adaptive Delta Modulation (ADM), comparison of various systems.

UNIT II

Digital modulations techniques, Generation, detection, equation and Bandwidth of amplitude shift keying (ASK) Binary Phase Shift keying (BPSK), Differential phase shift keying (DPSK), offset and non offset quadrature phase shift keying (QPSK), M-Ary PSK, Binary frequency Shift Keying (BFSK), M-Ary FSK Quadrature Amplitude modulation (QAM), MODEM,

UNIT III

Information theory and coding- Uncertainity, Unit of Information, entropy, Rate of information, Joint & Conditional entropy, Mutual information, channel capacity, Shannon's Theorem, Continuous channel, Capacity of a Gaussian channel: Shannon Hartley Theorem, Bandwidth S/N ratio trade off.

UNIT IV

Coding efficiency, Shanon,Fano and Huffman coding, Error control coding-Block codes, parity check codes, linear block codes, cyclic codes, Convolutional codes.

UNIT V

Data communication concepts – Data transmission – Parallel and serial transmission, synchronous, and Asynchronous transmission, Simplex,half duplex and fullduplex , unipolar and polar line codes, Nonreturn to zero codes, return to zero codes, bipolar line codes, bauds, modem, Line configurations-Point to point and point to multipoint configuration.

Reference Books:

1. Singh & Sapre, "Communication System", TMH
2. Taub & shilling, "Communication System", TMH
3. Simon Haykins, "Communication System", Willy
4. Hsu, "Analog and digital communication (Schaum)", TMH
5. B.P. Lathi, "Modern Digital and analog communication system",
6. Wayne Tomasi, "Electronic Communication system'.
7. Forouzan, "Data communication and networking", TMH 4th edition
8. Prakash C Gupta, "Data communication and Computer Networks",PHI Learning.
9. Analog & Digital Communication System; Discovery Press.
10. Frank R. Dungan, "Electronic Communication System", Thomson/Vikas.

List of Experiments

1. Study of PCM transmitter and receiver.
2. Study of ASK PSK and FSK transmitter and receiver.
3. Case Study of digital interface RS-232.
4. Case Study of Synchronous and asynchronous transmission.
5. Case Study of various multiplexing techniques.
6. Case Study of Parallel and serial transmission.
7. Study of NRZ and RZ Codes.

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Credit Based Grading System

Information Technology, V-Semester

Elective –I IT-5005(A): Microprocessor and Interfacing

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 Processor with 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.

Suggested Reading:

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”,Cengage Learning
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

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Information Technology, V-Semester

Elective –I IT 5005(B) Software Testing

Unit-1

Definition of Bugs, Faults and Failures, Testing and Debugging, Common Causes of Defects and Failures. Role of Software Testing and Quality, Purpose of Software Testing, Testing Technique: Top-down and Bottom-up Techniques, General Characteristics of Software Testing, Metrics and Testing , Quality Management System (QMS), Limitations of Software Testing.

Unit-2

Software Development Models, Waterfall Model, V-Model, W-Model, Prototyping Model, Spiral Model, Agile Methodology, Object-oriented Development Methodology, Testing Life Cycle , Test Levels, Software Verification Techniques, Software Validation Techniques, Verification and Validation in the Software Development Life Cycle.

Unit-3

Static Testing: Introduction, Types of Reviews, Review Process, Static Analysis, Static Analysis Tool, Dynamic Testing: Introduction, White Box Testing, Types of White Box Testing, Black Box Testing, Defect Management, Requirement Traceability Table (RTT), Interaction Testing, Retrospection, other type of testing.

Unit-4

Testing tools, Introduction, Automation Testing, Automation Testing Frameworks, Objectives and limitations of Framework, Components of Automation Framework, Automation Framework Design Challenge, Types of Frameworks, Data-driven Automation Framework, Keyword-driven Test Framework, Modularity-driven Automation Framework, Hybrid Automation Framework, Types of Automation Tools.

Unit-5:

Test management, Test Planning, Cost Benefit Analysis of Testing, Test Organisation, Test Strategies, Testing Activities, Monitoring and Control, Non-functional Testing or Specialised Testing, Introduction of object oriented testing.

References:

1. Sandeep Desai and Abhishek Srivastava “Software Testing: A Practical Approach”, PHI.
2. Dorothy Graham, E. V. Veenendaal, Isabel Evans and Rex Black “Foundations of Software Testing” Cengage Learning.
3. Milind G. Limaye “Software Testing: Principles, Techniques and Tools, Tata McGraw-Hill Education.

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Credit Based Grading System

Information Technology, V-Semester

Elective –I IT-5005 (C): Data Communication

Unit I

Data and signal-Analog and digital signals, Time and frequency domain, Composite signals, -Bandwidth, bit rate, bit length, Baseband and broadband transmission, Attenuation, distortion, noise,Nyquist bit rate ,Shannon capacity ,Throughout, delay ,Jitter, Bandwidth delay product.

Unit II

Data communication concepts – Data transmission – Parallel and serial transmission, synchronous, and Asynchronous transmission, Simplex,half duplex and fullduplex , unipolar and polar line codes, Non return to zero codes, return to zero codes, bipolar line codes, bauds , modem, Line configurations-Point to point and point to multipoint configuration.

Unit III

Telephone Network-Network topology, signaling- SS7,dial-up modems, modem standard, digital subscriber line – ADSL,SDSL,VDSL .Multiplexing,Frequency division multiplexing, time division multiplexing and wavelength division multiplexing, pulse code modulation, pleisochronous digital hierarchy(PDH), synchronous digital hierarchy (SDH) ,STM -1 frame, virtual container, mapping of data signals on STM- 1.

Unit IV

Switching techniques- Circuit , packet and hybrid switching, Types of error, single bit error, burst error, Error detection , Vertical redundancy check, Longitudinal redundancy check, cyclic redundancy check, error correction, Integrated services digital network, ISDN interface, ISDN devices, reference points ,ISDN services, ISDN Protocols

Unit V

Transmission media-Guided and unguided media, twisted pair ,Unshielded twisted pair and Shielded twisted pair, coaxial cable and fiber optic cable, radio waves, microwaves and infrared transmission RJ- 45,Network interface card, rack, cable standard-Category 5,6,and 7,cross connection, straight connection cable coding standards.

References:-

1. Data communication and networking, Forouzan, TMH 4 th edition.
2. Data communication and Computer Networks, Prakash C Gupta , PHI Learning.
3. Computer Networks, Tanenbaum , PHI Learning.
4. Communication Networks-Fundamental concepts and key Architectures, Leon-Garcia, Widjaja, TMH.
5. Computer Communications & Networking Technologies, Michael A. Gallo & William M. Hancock - Cengage pearsen publications.
6. Network for computer scientists & engineers, Youlu zheng & shakil akhtar , Oxford pub.

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Information Technology, V-Semester

Elective –I IT-5005 (D): Java Programming

UNIT-I

The Java Environment: Java Development Kit (JDK) ,Java virtual machine , Java programming environment (compiler, interpreter, appletviewer, 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, scope and lifetime; Access specifies; Constructors; Copy constructor; 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, Scroll bar; 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; The relationship 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; HTML Tags for applet

Introduction to Swing: swing library, Building applications using Swings

UNIT-III

Multithreading and Exception Handling: Overview of simple threads, Basic idea of multithreaded programming, Thread synchronization: Locks, synchronized methods, synchronized block, Thread scheduling, Producer-consumer relationship, Daemon thread, Basic idea of exception handling, stack based execution and exception propagation, Exception types:, Exception Handling: Try, Catch, Finally, Throw statement, Assertions

UNIT-IV

Input/Output : Exploring Java I/O., Directories, stream classes The Byte stream : Input stream, output stream, file input stream, file output stream, print stream, Random access file, the character streams, Buffered reader, buffered writer, print writer, serialization. **JDBC**: JDBC-ODBC bridge; The connectivity model; The driver manager; Navigating the result set object contents; java.sql Package; The JDBC exception classes; Connecting to Remote database.

UNIT-V

Java Networking: exploring java.net packageNetworking Basics: Socket, Client server, reserved sockets, proxy servers, Internet addressing, TCP sockets, UDP sockets. RMI: Client/Server architecture, RMI registry services; Steps of creating RMI Application and an example.

References:

1. Naughton & Schildt "The Complete Reference Java 2", Tata McGraw Hill.
2. Deitel "Java- How to Program:" Pearson Education, Asia.
3. Horstmann & Cornell "Core Java 2" (Vol I & II) , Sun Microsystems.
4. lvan Bayross "Java 2.0" : BPB publications.
5. Ivor Horton's "Beginning Java 2, JDK 5 Ed., Wiley India.
6. Java Programming for the absolute beginners By Russell, PHI Learning.

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Credit Based Grading System

Information Technology, V-Semester

IT-5006- Application Development Lab

Course Objectives

To design and implement projects /Applications like

- Design of Total Business Solution
- Online Examination System
- Multi User Chat System
- E-tutor system
- Online recruitment system
- College information tracking system
- Student information system etc.

Prerequisites:

Web page designing (HTML, CSS), scripting languages (JavaScript), programming languages (C, C++), knowledge of database (SQL/ORACLE) etc.

Front end tools that may be used:

HyperText Markup Language (HTML)
Cascading Style Sheets (CSS)
Extensible Markup Language (XML)
JavaScript
Hypertext Preprocessor (PHP)
Android etc.

Back end tools that may be used:

SQL/ MySQL/ Oracle/ Ms Access etc.

Course Outcomes:

After completion of this course students will be able to create a web based applications using HTML, PHP, CSS, Android and SQL.

References:

1. *Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5", 3rd Edition, O'Reilly Media.*
2. *Ivan Bayross, "HTML, JavaScript, DHTML and PHP", BPB Publication.*
3. *N.P. Gopalan, "Web Technology", PHI.*
4. *Web Technologies HTML, JavaScript, PHP, JAVA, JSP, ASP.NET, XML and AJAX, Black Book, Dreamtech Press.*
5. *David Schultz and Craig Cook, "Beginning HTML with CSS and XHTML" Apress.*
6. *Chuck Easttom, "Advanced JavaScript™ Third Edition" Wordware Publishing, Inc.*

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IT- 7001 – Cloud Computing

Unit-I

Introduction: Historical development ,Vision of Cloud Computing, Characteristics of cloud computing as per NIST , Cloud computing reference model ,Cloud computing environments, Cloud services requirements, Cloud and dynamic infrastructure, Cloud Adoption and rudiments .Overview of cloud applications: ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis ,Satellite Image Processing ,CRM and ERP ,Social networking .

Unit-II

Cloud Computing Architecture: Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance,
Cloud Solutions: Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management.
Cloud Offerings: Cloud Analytics, Testing Under Control, Virtual Desktop Infrastructure.

Unit –III

Cloud Management & Virtualization Technology: Resiliency, Provisioning, Asset management, Concepts of Map reduce , Cloud Governance, High Availability and Disaster Recovery. Virtualization: Fundamental concepts of compute ,storage, networking, desktop and application virtualization .Virtualization benefits, server virtualization, Block and file level storage virtualization Hypervisor management software, Infrastructure Requirements , Virtual LAN(VLAN) and Virtual SAN(VSAN) and their benefits .

Unit-IV

Cloud Security: Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Secutity Architecture.

Unit-V

Market Based Management of Clouds , Federated Clouds/Inter Cloud: Characterization & Definition ,Cloud Federation Stack , Third Party Cloud Services .
Case study : Google App Engine, Microsoft Azure , Hadoop , Amazon , Aneka

List of Experiments:

1. Installation and configuration of Hadoop/Euceliptus etc.
2. Service deployment & Usage over cloud.
3. Management of cloud resources.
4. Using existing cloud characteristics & Service models .
5. Cloud Security Management.
6. Performance evaluation of services over cloud .

Recommended Text:

1. Buyya, Selvi ," Mastering Cloud Computing ",TMH Pub
2. Kumar Saurabh, "Cloud Computing" , Wiley Pub
3. Krutz , Vines, "Cloud Security " , Wiley Pub
4. Velte, "Cloud Computing- A Practical Approach" ,TMH Pub
5. Sosinsky, " Cloud Computing" , Wiley Pub

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IT- 7002 – Object Oriented Analysis and Design

Unit I: Overview of Object Oriented concepts: Objects and classes, abstraction, generalization and inheritance, encapsulation, multiple inheritance, aggregation abstraction classes, polymorphism, link and association, Need for object oriented approach

Unit II: System design life cycle, object oriented S/W development process model, Object Oriented Analysis, Object Modeling Technique (OMT): object model, function model, relationship among models, object diagrams, state diagrams, data flow diagrams, analysis.

Unit III: Object oriented Design: Overview of object design, Combination the models, Designing algorithms, design optimization, Implementation of control, Adjustment, Design of association, object representation, physical packaging, documenting design decision, comparison of use-case driven approach.

Unit IV: Translation Object Oriented design into implementation, Programming style, Documentation, characterization of object oriented languages, Comparison of object oriented language like C++, JAVA, object programming.

Unit V: Unified Modeling Language (UML): Class diagram sequence diagram Use case diagram, Collaboration, diagram, state, chart diagram, Activity diagram, component diagram, deployment diagram, Object oriented Database: Relational Vs .object oriented database, the architecture of object oriented database, query language for Object Oriented database.

References:-

Satzinger, Jackson and Burd, "Object oriented Analysis and design with the Unified Process", CENGAGE Learning.

Michael Blaha and J. Rumbugh, "Object oriented Modeling and design with UML", Pearson Education

O'Docherty, "Object Oriented Analysis and Design Understanding, System Development with UML2.0", Wiley India.

List of Experiment:-

1 Ddraw Object, state, Data flow Diagram of ATM.
2 Draw Object, state, Data flow Diagram of Telephone Call.
3 Draw Object, state, Data flow Diagram of Library Information System.
4 Draw Object, state, Data flow Diagram of Airline reservation System.
5 Draw Object, state, Data flow Diagram of Calculator.
6 Draw Object, state, Data flow Diagram of College Management system.
7 Draw Object, state, Data flow Diagram of Payroll System.
8 Draw Object, state, Data flow Diagram of Railway Reservation system.
9 Draw Object, state, Data flow Diagram of Online Sales.
10 Draw Object, state, Data flow Diagram of Examination result display System of a University.

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IT- 7003 – Wireless & Mobile Computing

Unit I: Antenna , radiation pattern, antenna types, antenna gain, propagation modes, types of fading. Model for wireless digital communication, multiple access technique-SDMA, TDMA, FDMA, CDMA, DAMA, PRMA, MAC/CA, Cellular network organization, operations of cellular system, mobile radio propogation effects, , handoff, power control, sectorization, traffic engineering, Infinite sources, lost calls cleared, grade of service, poison arrival process

Unit II: GSM- Services, system architecture, radio interface, logical channels, protocols, localization and calling, handover, security, HSCSD, GPRS-architecture, Interfaces, Channels, mobility management DECT, TETRA, UMTS.

Unit III: IEEE 802.11: LAN-architecture, 802.11 a, b and g, protocol architecture, physical layer, MAC layer , MAC management, HIPERLAN-protocol architecture, physical layer, access control sub layer, MAC sub layer. Bluetooth-user scenarios- physical layer, MAC layer.

Unit IV: Mobile IP, DHCP, Ad hoc networks: Characteristics, performance issue, routing in mobile host. Wireless sensor network, Mobile transport layer: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, transaction oriented TCP. Introduction to WAP.

Unit V: Intruders, Intrusion detection, password management, viruses and related threads, worms, trojan horse defense, difference biometrics and authentication system, firewall design principle.

References:-

1 J. Schiller, “Mobile Communication”, Addision , Wiley
2 William Stalling, “Wireless Communication and Network”, Pearson Education
3 Upena Dalal,” Wireless Communication”, Oxford Higher Education
4 Dr. Kamilo Feher, “Wireless Digital communication”, PHI
5 William C.Y Lee, “Mobile Communication Design Fundamental” , John Wiley.

Suggested List of Practicals:

1. To implement mobile network using open source softwares like NS2 etc.
2. Implement Code Division Multiple Access (CDMA).
3. To write a programme to implement concept of frequency reuse when given size of geographical area and the set of available frequencies.
4. Study of OPNET tool for modeling and simulation of different cellular standards.
5. Study and Analysis of wired network.
6. Study and Analysis of wireless network.
7. Study and Analysis of Bluetooth.
8. Study of Mobile IP.
9. Write programs using WML (Wireless Markup Language)

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IT 7004(A) Elective –III Cyber Security & Forensics

Unit I- Cybercrimes and Attacks

Introduction, Classifications of Cybercrimes: E-Mail Spoofing, Spamming, Cyber defamation, Industrial Spying/Industrial Espionage, Hacking, Software Piracy, Password Sniffing, Credit Card Frauds, Cyberstalking, Botnets, Phishing, Pharming, Man-in-the-Middle attack, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Malware, Ransomware, Types of Identity Theft, Techniques of ID Theft, Cyber terrorism, Browser Attacks, Reverse Engineering, Cross site scripting

Unit II-Cyber Security Concepts

Introduction to Cyber Security, Cyber Security Goals, Cyber Security policy, Domain of Cyber Security Policy, Elements, Cyber Security Evolution, Implementing Hardware Based Security, Software Based Firewalls, Security Standards, Assessing Threat Levels, Forming an Incident Response Team, Reporting Cybercrime, Difference between cyber forensics and cyber security

Unit III-Cyber Forensics Fundamentals

Introduction to cyber forensics, needs of cyber forensic, cyber forensic and digital evidences, Internet Fraud, Storage Fundamentals, File System Concepts, challenges in cyber forensic, Data and Evidence Recovery- Deleted File Recovery, Data Recovery Tools, Data Recovery Procedures and Ethics, Preserve and safely handle original media, Document a "Chain of Custody", Complete time line analysis of computer files based on file creation, file modification and file access, Recover Internet Usage Data, Recover Swap Files/Temporary Files/Cache Files, Introduction to Encase Forensic Edition, Forensic Tool Kit (FTK) etc,

Unit IV- Cyber Forensics Investigation Introduction to Cyber Forensic Investigation, Investigation Tools, e-Discovery, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Encryption and Decryption methods, Search and Seizure of Computers, Recovering deleted evidences, Password Cracking.

Unit V- Cyber Laws

Introduction to IT laws & Cyber Crimes, Cyber Laws, IPR, Legal System of Information Technology, Social Engineering,

Reference Books

1. Nina Godbole and Sunit Belpure , Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
2. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph Weiss Cyber Security Policy Guidebook, John Wiley & Sons 2012.
3. Vivek sood, Cyber law simplified, Tata Mc GrawHill, Education (India).
4. Eoghan Casey, Handbook of digital forensic and investigation.
5. Clint P Garrison, Digital forensic for network, internet and cloud computing.
6. Panagiotis Kandlis, Digital crime and forensic science in cyberspace, information society S.A Greece IDEA Group Publishing.

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IT 7004(B) Elective –III E-Commerce & Governance

Unit I: Introduction to e-commerce: History of e-commerce, e-business models B2B, B2C, C2C, C2B, legal; environment of e-commerce, ethical issues, electronic data interchange, value chain and supply chain, advantages and disadvantages of e-commerce.

Unit II: Electronic Payment Systems: Credit cards, debit cards, smart cards, e-credit accounts, e-money, Marketing on the web, marketing strategies, advertising on the web, customer service and support, introduction to m-commerce, case study: e-commerce in passenger air transport.

Unit III: E-Government, theoretical background of e-governance, issues in e-governance applications, evolution of e-governance, its scope and content, benefits and reasons for the introduction of e-governance, e-governance models- broadcasting, critical flow, comparative analysis, mobilization and lobbying, interactive services / G2C2G.

Unit IV: E-readiness, e-government readiness, E- Framework, step & issues, application of data warehousing and data mining in e-government, Case studies: NICNET-role of nation wide networking in egovernance, e-seva.

Unit V: E-Government systems security: Challenges and approach to e-government security, security concern in e-commerce, security for server computers, communication channel security, security for client computers.

References:-

1 Gary P. Schneider, "E-commerce", Cengage Learning India.

2 C.S.R. Prabhu, "E-governence: concept and case study", PHI Learning Private Limited.

3 V. Rajaraman, "Essentials of E-Commerce Technology", PHI Learning Private Limited.

4 David Whiteley, "E-commerce study , technology and applications", TMH.

5 J. Satyanarayan, "E-government: The science of the possible", PHI Learning Private Limited.

6 P.T. Joseph, "E-Commerce An Indian Perspective", PHI Learning Private Limited.

7 Hanson and Kalyanam, "E-Commerce and Web Marketing", Cengage Learning India.

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IT 7004 (C) Elective –III Simulation and Modeling

Unit I: PHYSICAL MODELING: Concept of system and environment, continuous and discrete system, linear and nonlinear system, stochastic activities, static and dynamic models, principles used in modeling, Basic simulation modeling, Role of simulation in model evaluation and studies, Advantages and Disadvantages of simulation. Modeling of systems, Iconic, analog and Mathematical Modeling.

Unit II: COMPUTER BASED SYSTM SIMULATION: Technique of simulation, Monte Carlo method, experimental nature of simulation, numerical computation techniques, calumnious system models, analog and hybrid simulation, feedback systems, Buildings simulation models- Financial Model for an office Building, Sensitivity analysis for office building Model.

Unit III: SYSTEM DYNAMICS MODELING: Identification of problem situation, Exponential Growth Model and Decay Model, Logistic Curve, System Dynamic Diagrams, Simulation of System Dynamics-Waiting Times in Single Server Queuing System.

Unit IV: PROBABILITY CONCEPTS IN SIMULATION: Stochastic variables, discrete and continuous probability functions, Distributed Random numbers, generation of random numbers-Uniform and Non Uniform Random numbers, variance reduction techniques-Introduction, Common Random numbers-Rationale, Applicability and Synchronization.

Unit V: SIMULATION SOFTWARE: Introduction, Comparison of Simulation Package with Programming Languages, Classification of Simulation Software, Desirable Software features, General Purpose Simulation Package-ARENA, EXTEND, Study of SIMULA, DYNAMO,

References:-

1 Gorden G., “System simulation”, Printice Hall.

2 Averill M Law “ Simulation Modeling and Analysis”, TMH

3 Seila, Ceric and Tadikamalla “ Applied Simulation Modeling”, Cengage Learning.

4 Severance, ” System Modelling & Simulation : An Introduction”,John Wiley

5 Payer T., “Introduction to system simulation”, McGraw Hill.

6 Allan Carrie, "Simulation and Modeling" McGraw Hill.

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IT 7005 (A) Elective –IV Ad-hoc Networks

Unit I: Introduction :Introduction-Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, GSM, GPRS, PCS, WLAN and UMTS, Components of Packet Radios,
Routing in PRNETs, Route calculation, Pacing techniques, Ad Hoc Wireless Networks, Heterogeneity in Mobile Devices, Wireless Sensor Networks, Traffic Profiles, Types of Ad Hoc Mobile Communications, Types of Mobile Host Movements, Challenges Facing Ad Hoc Mobile Networks.

Unit II: Ad Hoc wireless MAC protocols- Introduction, Synchronous and asynchronous MAC protocols, Problem in Ad Hoc channel access, Receiver-initiated and sender-initiated MAC protocols, Existing Ad Hoc MAC protocols, Ad Hoc Routing Protocols- Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classifications of Routing Protocols: Table-Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), Cluster Switch Gateway Routing (CSGR), Source-Initiated On-Demand Approaches - Ad Hoc On-Demand Distance Vector Routing (AODV), Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA), Signal Stability Routing (SSR) Location- Aided Routing (LAR), Power-Aware Routing (PAR), Zone Routing Protocol (ZRP).

Unit III: Multicast routing In Ad Hoc Networks : Introduction, Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An Architecture Reference Model for Multicast Routing Protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh-Based Multicast Routing Protocols, Summary of Tree-and Mesh-Based Protocols - Energy-Efficient Multicasting, Multicasting with Quality of Service Guarantees, Application Dependent Multicast Routing, Comparisons of Multicast Routing Protocols.

Unit IV: Transport Layer, Security Protocols : Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks, Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

Unit V: QoS and Energy Management : Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classifications of QoS Solutions, MAC Layer Solutions, Network Layer
Solutions, QoS Frameworks for Ad Hoc Wireless Networks, Energy Management in Ad Hoc Wireless Networks – Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Energy Management Schemes, Battery Management Schemes, Transmission
Power Management Schemes, System Power Management Schemes.

References Books:-

1 C. Siva Ram Murthy and B.S. Manoj “Ad Hoc Wireless Networks: Architectures and Protocols”, Pearson Education.
2 C.K. Toh, “Ad Hoc Mobile Wireless Networks: Protocols and Systems”, Pearson Education.
3 George Aggelou, “Mobile Wireless Networks”, Tata McGraw- Hill.
4 Charles E. Perkins, Ad Hoc Networking, Pearson Education.

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IT 7005 (B)Elective –IV Artificial Intelligence

Unit I: Meaning and definition of artificial intelligence, Various types of 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 nonmonotonic 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 and natural languages 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.

Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal
Syllabus VII Semester
Bachelor of Engineering (Information Technology)
Credit based Grading System (CBGS) w.e.f July 2018

IT 7005 (C)Elective –IV Embedded System

Unit I: Introduction to Embedded System, Categories, Requirements, Applications, Challenges and Issues. Core of Embedded system, Memory, Sensors and Actuators, communication interface, Embedded firmware, system components.

Unit II: Fundamental issues of hardware software co-design, computational models in embedded designdata flow graph, control flow graph, state machine model, sequential programmed model, concurrent model, unified modeling language.

Unit III: Architecture of 8085 microcontroller, memory organization, registers, interrupts, addressing modes, instruction sets.

Unit IV: Embedded firmware design approaches- OS based, Super loop based. Embedded firmware development languages- Assembly language based, high level language based, mixed. Programming in embedded C.

Unit V: Types of Operating system, Task, process and threads, Multi processing and multi task, Task scheduling, Task communication, Task synchronization.

References:-

1 Shibu K V, “Introduction to Embedded System”, TMH.

2 David E Simon, “An Embedded Software Primer”, Pearson education Asia, 2001.

3 Steven F. Barett, Daniel J. Pack, “Embedded Systems” Pearson education, First Impression 2008.

4 Vahid Frank, Tony Givargis, “Embedded System Design”, John Wiley and Sons, Inc.

5 Dream Tech Software Team, “Programming for Embedded Systems” Wiley Publishing house Inc.

6 Sriram V Iyer, Pankaj Gupta, “Embedded Real time Systems Programming”, TMH.

7 Raj Kamal, “Embedded Systems”, TMH.