

# Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

**Branch- Common to All Discipline**

**New Scheme Based On AICTE Flexible Curricula**

<b>BT401</b>	<b>Mathematics-III</b>	<b>3L-1T-0P</b>	<b>4 Credits</b>
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**OBJECTIVES:** The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems appearing in different sections of science and engineering. More precisely, the objectives are:

- To introduce effective mathematical tools for the Numerical Solutions algebraic and transcendental equations.
- To enable young technocrats to acquire mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation and Fourier Transform which are used in various branches of engineering.
- To acquaint the student with mathematical tools available in Statistics needed in various field of science and engineering.

**Module 1: Numerical Methods – 1: (8 hours):** Solution of polynomial and transcendental equations – Bisection method, Newton-Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

**Module 2: Numerical Methods – 2: (6 hours):** Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss-Seidal, and Relaxation method.,

**Module 3: Numerical Methods – 3: (10 hours):** Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. Milne's and Adam's predictor-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

**Module 4: Transform Calculus: (8 hours):** Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

**Module 5: Concept of Probability: (8 hours):** Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

## **Textbooks/References:**

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics

**Course Objectives**

The objective of course is to understand the basic structure and operation of computer system. Students will be able to know the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division. To study the different ways of communicating with I/O devices and standard I/O interfaces, hierarchical memory system including cache memories and virtual memory, concept of pipeline.

**Unit-I** Computer architecture and organization, computer generations, von Neumann model, CPU organization, CPU organization, Register organization, Various CPU register, Register Transfer, Bus and Memory Transfers, Arithmetic, Logic and Shift micro-operations, Arithmetic logic shift unit.

**Unit-II** The arithmetic and logic unit, Fixed-Point representation: integer representation, sign-magnitude, 1's and 2's complement and range, Integer arithmetic: negation, addition and subtraction, multiplication, division, Floating-Point representation, Floating-Point arithmetic, Hardwired micro-programmed control unit, Control memory, Micro-program sequence.

**Unit-III** Central Processing Unit (CPU), Stack Organization, Memory Stack, Reverse Polish Notation. Instruction Formats, Zero, One, Two, Three- Address Instructions, RISC Instructions and CISC Characteristics, Addressing Modes, Modes of Transfer, Priority Interrupt, Daisy Chaining, DMA, Input-Output Processor (IOP).

**Unit-IV** Computer memory system, Memory hierarchy, main memory: RAM, ROM chip, auxiliary and associative memory, Cache memory: associative mapping, direct mapping, set-associative mapping, write policy, cache performance, Virtual memory: address space, memory space, address mapping, paging and segmentation, TLB, page fault, effective access time, replacement algorithm.

**Unit-V** Parallel Processing, Pipelining General Consideration, Arithmetic Pipeline, and Instruction Pipeline, Vector Operations, Matrix Multiplication, and Memory Interleaving, Multiprocessors, Characteristics of Multiprocessors.

**Course Outcomes**

At the end of the course student will be able to :

1. Understand basic structure of computer system, arithmetic operations,
2. Understand the arithmetic operations, Study of hardwired and micro-programmed control units.
3. Develop the concepts of memory management, interleaving and mapping.
4. Analyze the arithmetic and instructional pipelines.

**Reference Books:-**

1. M. Morris Mano, "Computer System Architecture", Pearson.
2. Dr. M. Usha, T.S. Srikanth, "Computer System Architecture and Organization", Wiley India.
3. William Stallings, "Computer Organization and Architecture", Pearson.
4. V. Rajaraman, T. Radhakrishnan, "Computer Organization and Architecture", PHI.

**Course Objectives**

Data structure includes analyzing various algorithms along with time and space complexities. It also helps students to design new algorithms through mathematical analysis and programming.

**Unit-I** Algorithms, Designing algorithms, analyzing algorithms, asymptotic notations, heap and heap sort. Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication.

**Unit-II** Study of Greedy strategy, examples of greedy method like optimal merge patterns, Huffman coding, minimum spanning trees, knapsack problem, job sequencing with deadlines, single source shortest path algorithm, etc.

**Unit-III** Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm, etc.

**Unit-IV** Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle, Graph coloring problem etc. Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, introduction to parallel algorithms.

**Unit-V** Binary search trees, height balanced trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs (In order, preorder, postorder, DFS, BFS), NP-completeness.

**Course Outcomes:**

At the end of the course student will be able to :

- 1 Implement sorting and searching algorithm
- 2 Experiment with techniques for obtaining maximum output with minimum efforts
- 3 Make use of dynamic programming for finding
- 4 Solve 8 queen's problem and others of the kind for application in real world scenarios .
- 5 Distinguish between NP hard and NP complete problems and develop their solutions

**Reference Books:-**

1. Cormen Thomas, Leiserson CE, Rivest RL; Introduction to Algorithms; PHI.
2. Horowitz & Sahani; Analysis & Design of Algorithm
3. Dasgupta; algorithms; TMH
4. Ullmann; Analysis & Design of Algorithm;
5. Michael T Goodrich, Roberto Tamassia, Algorithm Design, Wiley India

### **List of Experiments( expandable):**

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for optimal merge patterns.
6. Write a program for Huffman coding.
7. Write a program for minimum spanning trees using Kruskal's algorithm.
8. Write a program for minimum spanning trees using Prim's algorithm.
9. Write a program for single sources shortest path algorithm.
10. Write a program for Floye-Warshal algorithm.
11. Write a program for traveling salesman problem.
12. Write a program for Hamiltonian cycle problem.

**Course Objectives**

The study of communication systems starts with the concept of analog communication. In this course time and frequency representation of information is given. The objective of this course is to be familiar with the basic building blocks of communication systems such as modulator and demodulator. Different types of analog modulation techniques are given in this course.

**Unit-I** Signals and Systems: Block diagram of a communication system, signal-definition, types of signals continuous, discrete, deterministic, non-deterministic, periodic, non-periodic, energy, power, analog and digital signals. Electromagnetic Spectra, Standard signals- DC, sinusoidal, unit step, ramp, signum, rectangular pulse, impulse(delta) signal. System definition, classification of systems, linear, nonlinear, time variant, time invariant, causal, non causal, stable and unstable systems. Fourier transforms: Time domain and frequency domain representation of signal, Fourier Transform and its properties, conditions for existence, Transform of Gate, unit step, constant, impulse, sine and cosine wave. Shifting property of delta function, convolution, time and frequency convolution theorems.

**Unit-II** Amplitude modulation: Modulation, need of modulation, types of modulation techniques, amplitude modulation (DSB-FC), modulation index, frequency spectrum of AM wave, linear and over modulation, power relation in AM, transmission efficiency, modulation by a complex signal, bandwidth of AM, AM modulators, square law and switching modulator, advantages and disadvantages of AM. Demodulation of AM: Suppressed carrier amplitude modulation systems, DSB-SC, SSB-SC, VSB-SC systems, comparison of various amplitude modulation systems. Demodulation of AM, square law and envelope detector, synchronous detection of AM, Low and high power AM transmitters, AM receivers, TRF and superheterodyne receivers, sensitivity, selectivity and fidelity of receivers.

**Unit-III** Angle modulation: Introduction and types of angle modulation, frequency modulation, frequency deviation, modulation index, deviation ratio, bandwidth requirement of FM wave, types of FM. Phase modulation, difference between FM and PM, Direct and indirect method of FM generation, FM demodulators- slope detector, Foster seeley discriminator, ratio detector. Introduction to pulse modulation systems.

**Unit-IV** Sampling of signal, sampling theorem for low pass and Band pass signal, Pulse amplitude modulation (PAM), Time division, multiplexing (TDM). Channel Bandwidth for PAM-TDM signal Type of sampling instantaneous, Natural and flat top, Aperture effect, Introduction to pulse position and pulse duration modulations, Digital signal, Quantization, Quantization error, Pulse code modulation, signal to noise ratio, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM) and Adaptive Delta Modulation (ADM), comparison of various systems.

**Unit-V** 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).

Course Outcomes:

At the end of the course student will be able to :

1. Differentiate Analog and Digital Signal and types of signals.
2. Understand the communication of information over the communication channel.
3. Understand how information signal of low frequency can be transmitted with the help of modulation techniques over a long distance.
4. Differentiate different modulation techniques such as AM, SSB, DSB and FM.
5. Explain using block diagrams, modulation and demodulation techniques for digital signal and determine bandwidth requirement.

**Reference Books:**

1. Singh & Sapre, “Communication Systems”, TMH.
2. Taub Schilling, “Principles of Communication Systems”, TMH.
3. W. Tomasi “Electronic Communications Systems”, Pearson Education Pvt. Ltd.
4. Taub & shilling, “Communication Systems”, TMH.
5. Abhay Gandhi, “Analog and Digital Communication”, CENGAGE Learning.

**List of Experiments:**

1. AM Modulation and Demodulation (Envelope Detector)
2. Frequency modulation using reactance modulator.
3. Frequency modulation using varactor modulator.
4. Pulse Amplitude Modulation and Demodulation
5. Pre-emphasis and De-emphasis
6. Analog Multiplexing.
7. Amplitude Modulation using Pspice
8. Receiver characteristics (selectivity, sensitivity, fidelity).
9. Operation of foster-seeley loop detector.
10. Operation of ratio detector.

**New Scheme Based On AICTE Flexible Curricula**

**Information Technology, IV-Semester**

**IT405 - Data Base Management System**

**Course Objectives:**

The main objectives of the course are

1. To understand fundamental knowledge of file system, database concepts and use of relational database.
2. To study of different data model and conceptual design using ER diagram.
3. Students can use SQL operations to manipulate the database and learn how to design and create a good database using functional dependencies and normalization.
4. The course provides an overview of transaction management, concurrency control, distributed database and Big Data.

Basic Concepts: Introduction to DBMS, File system vs DBMS, Advantages of database systems, Database System architecture, Data models, Schemas and instances, Data independence, Functions of DBA and designer, Entities and attributes, Entity types, Key attributes, Relationships, Defining the E-R diagram of database.

Relational Model: Structure of relational databases, Domains, Relations, Relational algebra – fundamental operators and syntax, relational algebra queries, Entity-Relationship model :Basic concepts, Design process, constraints, Keys, Design issues, E-R diagrams, weak entity sets, extended E-R features –generalization, specialization and aggregation

SQL: Data definition in SQL, update statements and views in SQL: Data storage and definitions, Data retrieval queries and update statements, Query Processing & Query Optimization: Overview, measures of query cost, selection operation, sorting, join, evaluation of expressions, transformation of relational expressions, estimating statistics of expression results, evaluation plans. Case Study of ORACLE and DB2.

Relational Database design: Functional Dependency –definition, trivial and non-trivial FD, closure of FD set, closure of attributes, irreducible set of FD, Normalization –1NF, 2NF, 3NF, Decomposition using FD-dependency preservation, lossless join, BCNF, Multi-valued dependency, 4NF, Join dependency and 5NF

Introduction of transaction, transaction processing and recovery, Concurrency control: Lock management, specialized locking techniques, concurrency control without locking, Protection and Security Introduction to: Distributed databases, Basic concepts of object oriented data base system.

**Course Outcomes:**

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

1. Compare file system and DBMS and explain how DBMS is better than traditional File Processing Systems.
2. Analyze the physical and logical database designs, database modeling, relational, hierarchical, and network models



3. Analyze and renovate an information model into a relational database schema and to use a DDL, DML and DCL utilities to implement the schema using a DBMS.
4. Formulate data retrieval queries in SQL and Relational Algebra.
5. Demonstrate an understanding of functional dependencies, normalization theory and apply such knowledge to the design of a database.
6. Demonstrate and explain terms like Transaction Processing, Concurrency Control, distributed database and big data.

**Reference Books:**

1. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill.
2. Elmasri, Navathe, "Fundamentals of Database Systems", Pearson.
3. Ivan Bayross, "SQL, PL/SQL the Programming Language of Oracle", BPB publications.
4. S. Sharma, J. Agrawal, S. Agrawal, "Advanced Database Management System", Dreamtech Press.
5. Leon & Leon, "Fundamental of Data Base Management System", TMH

**List of Experiments:**

1. To perform various SQL Commands of DDL, DML, DCL.
2. Write SQL Commands such as Insertion, deletion and updation for any schema.
3. To execute Nested Queries, Join Queries, order-by, having clause and string operation.
4. To perform set operators like Union, Intersect, Minus on a set of tables.
5. To execute various commands for GROUP functions (avg, count, max, min, Sum).
6. Write a PL/SQL block for transaction application using Triggers.
7. Write a DBMS program to prepare report for an application using function.
8. Designing of various Input screens/Forms.
9. Create reports using database connectivity of Front end with back end.
10. Create database Design with normalization and implementing in any application.

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**Information Technology, IV-Semester**

**IT406 - Introduction to MATLAB/SciLab/Web Design**

**Course Objective:**

To familiarize students with open source academic software like Scilab or licensed software like Matlab to carryout experiments in various fields in due course like computer graphics and multimedia, soft-computing, image processing, data mining etc.

Experimental works in web design will enable students to design web pages and develop web based projects.

**Introduction to MATLAB/SciLab**

Installing MATLAB/SciLab Under windows/linux, Basics of MATLAB programming, Data Types, Creating variables, comments, multiline comments, Array operations in MATLAB/Scilab, Loops and execution control statements, inbuilt mathematical functions, Working with files: Scripts and Functions, Plotting and program output, overview of various toolboxes, introduction to Matlab simulink.

**Introduction to Web Design**

Introduction, Elements, Tags, Attributes, Paragraph, Headings, Line Breaks, Horizontal Rule, Lists, Formatting, Color Codes, Font, Text Links, Email, Images, Image Link, Forms, Table, Frames, Comments, Music Codes, Video Codes, Div, DHTML: Cascading Style Sheet Introduction, Types of CSS, Selectors (Tags), Class and Id with the Selectors, CSS Background & Color, CSS Text, CSS Font, CSS Border, CSS Padding.

**Reference Books:**

1. Fausett L.V. (2007) Applied Numerical Analysis Using MATLAB, 2nd Ed., Pearson Education
2. Chapra S.C. and Canale R.P. (2006) Numerical Methods for Engineers, 5th Ed., McGraw Hill
3. N.P. Gopalan, "Web Technology", PHI.
4. Ivan Bayross, "HTML, JavaScript, DHTML and PHP", BPB Publication.

**Suggested List of Experiments/ program (Expandable):**

1. Write your first Matlab/Scilab program.
2. Extract an individual element of an array
3. Write Matlab/Scilab program to illustrate loops and control statements.
4. Create a simple plot.
5. Name the title, axes title of the plot.
6. Create a webpage with HTML describing your department on following points: Use paragraph and list tags. Apply various colors to suitably distinguish key words. Also apply font styling like italics, underline and two other fonts to words you find appropriate. Also use header tags.
7. Create a web page using HTML for following: Create a table to show your class timetable. Use tables to provide layout to your HTML page describing your university infrastructure.

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**Information Technology, IV-Semester**

**IT407- Dot Net**

**Course Objective:**

Gain a comprehensive understanding of the philosophy and architecture of C-Sharp programming. Configure and deploy a Microsoft ASP.NET Web application. Learn how to implement web applications using web forms, including programs that interact with databases. Gain a strong knowledge in all Dot Net Web application concepts

Introduction .NET framework, features of .Net framework, architecture and component of .Net, elements of .Net.

Basic Features Of C# Fundamentals, Classes and Objects, Inheritance and Polymorphism, Operator Overloading, Structures. Advanced Features Of C# Interfaces, Arrays, Indexers and Collections; Strings and Regular Expressions, Handling Exceptions, Delegates and Events.

Installing ASP.NET framework, overview of the ASP .net framework, overview of CLR, class library, overview of ASP.net control, understanding HTML controls, study of standard controls, validations controls, rich controls. Windows Forms: All about windows form, MDI form, creating windows applications, adding controls to forms, handling Events, and using various Tolls

Understanding and handling controls events, ADO.NET- Component object model, ODBC, OLEDB, and SQL connected mode, disconnected mode, dataset, data-reader Data base controls: Overview of data access data control, using grid view controls, using details view and frame view controls, ado .net data readers, SQL data source control, object data source control, site map data source.

**XML:**

Introducing XML, Structure, and syntax of XML, document type definition (DTD), XML Schema, Document object model, Presenting and Handling XML. xml data source, using navigation controls, introduction of web parts, using java script, Web Services

**Reference Books:**

1. C# for Programmers by Harvey Deitel, Paul Deitel, Pearson Education
2. Balagurusamy; Programming in C#; TMH
3. Web Commerce Technology Handbook by Daniel Minoli, Emma Minoli , TMH
4. Web Programming by Chris Bates, Wiley
5. XML Bible by Elliotte Rusty Harold ,
6. ASP .Net Complete Reference by McDonald, TMH.
7. ADO .Net Complete Reference by Odey, TMH

**List of Experiments/ program (Expandable):**

1. Working with call backs and delegates in C#
2. Code access security with C#.
3. Creating a COM+ component with C#.
4. Creating a Windows Service with C#
5. Interacting with a Windows Service with C#
6. Using Reflection in C#
7. Sending Mail and SMTP Mail and C#
8. Perform String Manipulation with the String Builder and String Classes and C#:
9. Using the System .Net Web Client to Retrieve or Upload Data with C#
10. Reading and Writing XML Documents with the XML Text-Reader/-Writer Class and C#
11. Working with Page using ASP .Net.
12. Working with Forms using ASP .Net
13. Data Sources access through ADO.Net,
14. Working with Data readers , Transactions
15. Creating Web Application.

**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

**New Scheme Based On AICTE Flexible Curricula**

**Information Technology, IV-Semester**

**BT408- 90 hrs Internship based on using various software's –Internship -II**

To be completed anytime during fourth semester. Its evaluation/credit to be added in fifth semester.

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

## New Scheme Based On AICTE Flexible Curricula

### Information Technology, IV-Semester

#### BT409 Cyber Security

##### Unit I

**Introduction-** Introduction of Cyber Crime, Categorizing Cybercrime, Cybercrime Theory, Criminology perception of cyber criminals: hackers, computer intrusions and Attacks, Privacy, surveillance and protection, hiding crimes in cyberspace, cryptography, hacking vs cracking, privacy and security at risk in the global information society.

##### Unit II

**Application Security-** Data Security, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats -Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail Viruses, Macro Viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce- Electronic Payment System, e- Cash, Credit/Debit Cards.

##### Unit III

###### Cryptography concepts and Techniques

Plain text , cipher text, types – substitution ,transposition ,encryption, decryption , symmetric and asymmetric key cryptography algorithms, steganography .

##### Unit IV

**Security Policies-** Development of Policies, WWW Policies, Email Security Policies, Policy Review Process-Corporate Policies-Sample Security Policies, Publishing and Notification Requirement of the Policies.

##### Unit V

**Information Security Standards-**ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

**Case Study** – Corporate Security , Cyber cases

##### References:

- Nina Godbole “ Cyber Security: Wiley.
- Michael E. Whitman and Herbert J Mattord "Principle of Information Security" Cengage
- William Stallings “Cryptography and Network Security” PEARSON
- Charles P. Pfleeger, Shari Lawrence Pfleeger, “Analysing Computer Security”, Pearson Education India.
- Vinod V. Sople, “Managing Intellectual Property” PHI Learning Private Limited
- IT Act 2000 Details [www.mit.gov.in](http://www.mit.gov.in)
- Atul Khate, “Cryptography and Network Security” ,TMH
- V.K.Pachghare, “Cryptography and information Security”, PHI Learning Private Limited, Delhi India.
- CHANDER, HARISH, ” Cyber Laws And It Protection ” , PHI Learning Private Limited ,Delhi

# **RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

Credit Based Grading System

## **Information Technology, VI-Semester**

### **IT-6001 Internet Technology and Network Management**

#### **Unit-I**

Binding Protocol Address: ARP & RARP, packet format, Encapsulation, Internet protocol: Introduction, Ipv4 header, Ipv4 Datagram, Encapsulation, Fragmentation and Reassembly, IP routing, Subnet addressing, Subnet mask, Supernetting- special case of IP addresses Ipv6- Motivation, frame format and addressing, comparison of Ipv4 and Ipv6.

#### **Unit-II**

ICMP: Introduction, ICMP Header, ICMP message types, ICMP timestamp request and reply, trace route, ping program. Intra & inter domain routing-distance vector routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP, Unicast Routing protocols, IGMP-IGMP message, operation, encapsulation.

#### **Unit-III**

TCP: Introduction, services, headers, connection establishment and termination, timeout of connection establishment, maximum segment size- half, close, state transition diagram, 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-IV**

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: Management components, SMI, MIB.

#### **Unit-V**

Network management applications:-Configuration management, Fault Management, Performance management, Security management, Accounting management, Report Management, policy based management.

#### **References:-**

1. B. A Forouzan, TCP/IP-Protocol suite, TMH.
2. D.E.Comer, Computer Networks and Internets, Pearson.
3. Mani Subramaniam , Network management- principles & practice, Pearson education.
4. W. Richard Stevens, TCP/IP Illustrated Volume I, Addison Wesley.
5. Comer, Internetworking with TCP/IP: Vol. I, II & III, PHI Learning.

# **RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

Credit Based Grading System

## **Information Technology, VI-Semester**

### **IT-6002 Software Engineering**

#### **Unit I**

Introduction, Software- problem and prospects Software development process: System Development Life Cycle, Waterfall Model, Spiral Model and other models, Unified process-Agile development-Agile Process- Extreme Programming- Other agile Process models.

#### **Unit II**

Measures, Metrics and Indicators, Metrics in the Process and Project Domains, Software Measurement, Metrics of Software Quality, S/W reliability, Software estimation techniques, LOC and FP estimation. Empirical models like COCOMO, project tracking and scheduling, reverse engineering.

#### **Unit III**

Software requirements and specification: feasibility study, Informal/formal specifications, pre/post conditions, algebraic specification and requirement analysis models, Specification design tools. Software design and implementation: Software design objectives and techniques, User interface design, Modularity, Functional decomposition, DFD, Data Dictionary, Object-oriented design, Design patterns implementation strategies like top- down, bottom-up.

#### **Unit IV**

Coding standard and guidelines, programming style, code sharing, code review, rapid prototyping, specialization, construction, class extensions, intelligent software agents, reuse performance improvement, debugging. Software Testing Strategies: Verification and Validation, Strategic Issues, test plan, white box, black-box testing, unit and integration testing, system testing test case design and acceptance testing, maintenance activities.

#### **Unit V**

Software Maintenance: Software Supportability, Reengineering, Business Process Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering, project scheduling and tracking plan, project management plan, SQA and quality planning, SCM activities and plan, CMM, Software project management standards, Introduction to component based software engineering.

#### **References:**

1. P,S. Pressman, Software Engineering. A Practitioner's Approach, TMH.
2. Rajib Mall, Fundamental of Software Engineering, PHI.
3. Hans Van Vliet, Software Engineering, Wiley India Edition.
4. James S. Peters, Software Engineering, Wiley India Edition.
5. Pankaj Jalote, Software Engineering: A Precise Approach, Wiley India.
6. Kelkar, Software Project Management, PHI Learning



## **List of Experiments:**

### **Sample Problems:**

- a. Library Management System
- b. Automated banking system
- c. Airline reservation system
- d. Employee management application
- e. Hospital management Application

### **Suggested Lab work for above given problems:**

1. Develop requirements specification for sample problems (The requirements specification should include both functional and non-functional requirements).
2. Develop DFD Model (Level 0, Level 1 DFD and data dictionary) of the sample problems (Use of a CASE tool required).
3. Design Class diagram for sample problems.

**Information Technology, VI-Semester**

**IT-6003 Computer Graphics and Multimedia**

**Unit I**

Introduction to Raster scan displays, Storage tube displays, refreshing, flickering, interlacing, colour monitors, display processors resolution, working principle of dot matrix, inkjet laser printers, working principles of keyboard, mouse scanner, digitizing camera, track ball, tablets and joysticks, graphical input techniques, positioning techniques, rubber band techniques, dragging etc.

**Unit II**

Scan conversion techniques, image representation, line drawing, simple DDA, Bresenham's Algorithm, Circle drawing, general method, symmetric DDA, Bresenham's Algorithm, curves, parametric function, Bezier Method, B-spline Method.

**Unit III**

2D & 3D Co-ordinate system, Translation, Rotation, Scaling, Reflection Inverse transformation, Composite transformation, world coordinate system, screen coordinate system, parallel and perspective projection, Representation of 3D object on 2D screen, Point Clipping, Line Clipping Algorithms, Polygon Clipping algorithms, Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading ray tracing, color models like RGB, YIQ, CMY, HSV.

**Unit IV**

Introduction to multimedia components applications, Multimedia System Architecture, Evolving technologies for Multimedia, Defining objects for Multimedia systems, Multimedia Data interface standards, Multimedia Databases, Multimedia Hardware, SCSI, IDE, MCI, Multimedia Tools, presentation tools, Authoring tools.

**Unit V**

Compression & Decompression, Multimedia Data & File Format standards, TIFF, MIDI, JPEG, DIB, MPEG, RTF, Multimedia I/O technologies, Digital voice and audio, Video image and animation, Full motion video, Storage and retrieval technologies.

**References:-**

1. Donald Hearn and M.Pauline Baker, Computer Graphics C Version, Pearson Education, 2003.
2. Prabat K Andleigh and Kiran Thakrar, Multimedia Systems and Design, PHI Learning,
3. Tay Vaughan, Multimedia making it work, Tata McGraw Hill edition.
4. Amarendra N Sinha & Arun D Udai, Computer Graphics, McGraw Hill publication.
5. Mukherjee, Fundamental of Computer Graphics and Multimedia, PHI Learning.

## List of Experiments:

1. Write a program to implement DDA line drawing algorithm
2. Write a program to implement Bresenham's line drawing algorithm.
3. Write a program to implement Bresenham's circle drawing algorithm.
4. Write a program to draw an ellipse using Bresenham's algorithm.
5. Write a program to perform various transformations on line, square & rectangle.
6. Write a program to implement Cohen Sutherland line clipping algorithm.
7. Write a program to implement Liang-Bersky line clipping algorithm.
8. Write a program to implement Cohen-Sutheland polygon clipping algorithm to clip a polygon with a Pattern.
9. Write a program to convert a color given in RGB space to its equivalent CMY color space.
10. Study of various Multimedia file formats: -RTF, MIDI, GIF, JPEG, MPEG, TIFF etc.
11. Write a program to implement JPEG compression scheme for still images.
12. Write a program to perform Packbits compression & decompression.
13. Write a short program to create a TIFF file using bitmap segments and text files as the TIFF File components.
14. Write a program to convert a BMP file into either JPEG or GIF file.
15. Study of various Multimedia Authoring Tools.

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VI-Semester

### IT-6004 Compiler Design

**UNIT-I:** Introduction to Compiler, analysis of source program, phases and passes, Bootstrapping, lexical analyzers, data structures in compilation – LEX: lexical analyzer generator, Input buffering, Specification and Recognition of tokens, YACC, The syntactic specification of programming languages: Context free grammars, derivation and parse trees, capabilities of CFG.

**UNIT-II:** Syntax Analysis: working of Parser, Top down parsing, Bottom-up parsing, Operator precedence parsing, predictive parsers, LR parsers (SLR, Canonical LR, LALR), constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator.

**UNIT-III:** Syntax Directed Translation: Definitions, Inherited Attributes, L-attributed definitions, S-attributed definitions, Dependency graph, Construction of syntax trees, Top down translation, postfix notation, bottom up evaluation.

**UNIT-IV:** Intermediate Code Generation: Three address code, quadruple & triples, translation of assignment statements, Boolean expression and control structures, Backpatching, Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management.

**UNIT-V:** Code Optimization and Generation: organization of code optimizer, basic blocks and flow graphs, DAG representation of basic blocks, loops in flow graph, peephole optimization, Basic of block optimization.

#### Reference Books:

1. A. V. Aho, R. Sethi & J. D. Ullman, Compilers: Principles, Techniques and Tools, Pearson Ed.
2. Alfred V. Aho, Jeffrey D. Ullman, Principles of Compiler Design, Narosa Publishing House.
2. Ronald Mak, Writing Compilers and Interpreters, Wiley India Edition.
3. Louden, Compiler Construction, Cengage learning.

#### List of Experiments:

1. Study of LEX tool and its installation in LINUX.
2. Write a program to identify string using lex tool.
3. Write a program to find keyword and identifiers using lex tool.
4. Write a program to count all character using lex tool.
5. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines.
6. Write a program to calculate First and Follow of a Grammar.
7. Write a program to construct LL(1) parser for given language.
8. Write a program to construct an operator precedence parser for a given language.
9. Write a program to construct a recursive descent parser for an expression.

10. Study of YACC tool and installation in Linux operating system.
11. Write a program for implementing a calculator for computing the given expression using semantic rules of the YACC tool.
12. Write a program for implementing Shift Reduce parsing and LR parsing.
13. Write a program for generating various intermediate code forms i) Three address code ii) Polish notation.

**Elective –II IT-6005(1): Digital Signal and Processing**

**Unit I**

**Discrete-Time Signals and Systems**

Discrete-time signals, discrete-time systems, analysis of (DTLTI) discrete-time linear time-invariant systems, discrete time systems described by difference equation, solution of difference equation, implementation of discrete-time systems, stability and causality, frequency domain representation of discrete time signals and systems.

**Unit II**

**The z-Transform**

The direct z-transform, properties of the z-transform, rational z-transforms, inversion of the z transform, analysis of linear time-invariant systems in the z- domain, block diagrams and signal flow graph representation of digital network, matrix representation.

**Unit III**

**Frequency Analysis of Discrete Time Signals**

Response of LT1 systems to arbitrary inputs (Convolution sum), circular convolution, Discrete Fourier transform (DFT), properties of DFT, two dimensional DFT.

**Unit IV**

**Efficient Computation of the DFT**

FFT algorithms, Radix 2 FFT, Decimation in time algorithm, Decimation in frequency algorithm, Decomposition for 'N' composite number.

**Unit V**

**Digital filters Design Techniques**

Design of IIR and FIR digital filters, Impulse invariant and bilinear transformation, windowing techniques-rectangular and other windows, examples of FIR filters, design using windowing.

**References:**

1. Proakis, Digital Signal Processing, Pearson Education.
2. Oppenheim and Schaffer, Digital Signal Processing, PHI Learning.
3. Johnny R. Johnson, Introduction to Digital Signal Processing, PHI Learning.
4. Rabiner and Gold, Theory and Application of Digital Signal Processing, PHI Learning.
5. S. Salivahanan, Digital Signal Processing, TMH.

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VI-Semester

### Elective –II IT-6005(2): Distributed System

**Unit I:** Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. System Models: Architectural models, Fundamental Models Theoretical Foundation for Distributed System : Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms.

**Unit II:** Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem.

**Unit III:** Distributed Objects and Remote Invocation: Communication between distributed objects, Remote procedure call, Events and notifications, Java RMI case study. Security: Overview of security techniques, Distributed File Systems: File service architecture, Sun Network File System, The Andrew File System.

**Unit IV:** Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault-tolerant services, Transactions with replicated data.

**Unit V:** Distributed Algorithms: Destination based routing, APP (assignment problem in parallel), Deadlock free Packet switching, Introduction to Wave & traversal algorithms, Election algorithm. CORBA Case Study: CORBA, CORBA services.

#### **References:-**

1. P K Sinha, Distributed operating systems: Concepts and design, PHI Learning.
2. Sunita Mahajan & Shah, Distributed Computing, Oxford Press.
3. Tanenbaum and steen, Distributed systems: Principles and paradigms, PHI Learning.
4. Singhal & Shivaratri, Advanced Concept in Operating Systems, McGraw Hill.
5. Coulouris, Dollimore, Kindberg, Distributed System: Concepts and Design, Pearson Ed.
6. Gerald Tel, Distributed Algorithms, Cambridge University Press.

# **RAJIV GANDHI PROUDYOGIKI VISHWA VIDYALAYA, BHOPAL**

Credit Based Grading System

## **Information Technology, VI-Semester**

### **Elective –II IT-6005(3): Web Technology**

#### **UNIT I**

History of the internet, internetworking concepts, architecture, and protocol: switch, router, protocols for internetworking, internet address and domains. Introduction to World Wide Web (WWW), working of web browser and web server, Web server and its deployment, N-tier architecture, services of web server, Common gateway interface (CGI), Uniform Resource Locator (URL), format of the URL, Hyper Text Transfer Protocol (HTTP), feature of HTTP protocol HTTP request-response model, Hyper Text Transfer Protocol Secure (HTTPS).

#### **UNIT II**

Introduction to Hyper Text Markup Language (HTML), HTML elements, XHTML syntax and Semantics, eXtensible Markup Language (XML), element, attributes, entity declarations, DTD files and basics of Cascading Style Sheet (CSS). Document object Model (DOM) history and levels, Document tree, DOM event handling.

#### **UNIT III**

Introduction to Java Script, Basic concepts, variables and data types, functions, conditional statements, Loops, Operators, Arrays, Standard Objects and form processing in Java.

#### **UNIT IV**

Evaluation of web applications, type of web documents, feature of web pages, multitier web applications, introduction to Apache web server, Security in application: authentication, authorization, auditing, security issues, security on the web, proxy server, Firewall. Middleware Concepts, CORBA, Java Remote Method Invocation (RMI), Message Oriented Middleware (MOM), EJB, Microsoft's Distributed Component Object Model (DCOM) Web Servers HTTP request types System Architecture Server side Scripting. Web server and its deployment, Web client, services of web server, mail server proxy server, multimedia server.

#### **UNIT V**

Introduction to servlet, Overview Architecture Handling HTTP Request, Get and post request, redirecting request multi-tier applications, Introduction to JSP, basic JSP, Java Bean class and JSP. Setting up an Open Data Base Connectivity (ODBC) data source.

#### **References:-**

1. J. C. Jackson, Web Technologies: A computer science perspective, Pearson Education.
2. A. S. Godbole & A. Kahate, Web Technologies: TCP/IP Architecture, and Java Programming, TMH.
3. Paul S. Wang Sanda, S Katila, An Introduction to Web Design, Programming, CENGAGE Learning.
4. N.P.Gopalan, J.Akilandeswari, Web Technology: A developer's Perspective, PHI Learning.



**Information Technology, VI-Semester**

**Elective –II IT-6005 (4): IPR (Intellectual Property Rights)**

**Course Objective**

Acquaint the students with the basic concepts of Intellectual Property Rights; and sensitize the students with the emerging issues in IPR and the rationale for the protection of IPR.

**UNIT I Introduction**

Introduction and Justifications of IPR, Nature of IP, Major forms of IP- *Copyright, Patent, Trade Marks Designs, Geographic indication, layout design of Semi conductors, Plant varieties, Concept & Meaning of Intellectual Property.*

Major international documents relating to the protection of IP - *Berne Convention, Paris Convention, TRIPS.* The World Intellectual Property Organization (WIPO).

**UNIT II Copyright**

Meaning and historical development of copyright , Subject matter , Ownership of copyright, Term of copyright, Rights of owner, Economic Rights, Moral Rights. Assignment and licence of rights, Infringement of copyright, Exceptions of infringement, Remedies, *Civil, Criminal, Administrative*, Registration Procedure.

**UNIT III Patents**

Meaning and historical development, . Criteria for obtaining patents, Non patentable inventions, Procedure for registration, Term of patent, Rights of patentee, Compulsory licence, Revocation, Infringement of patents, Exceptions to infringement, Remedies, Patent office and Appellate Board.

**UNIT IV – Trade Marks, Designs & GI**

**Trade Marks:** Functions of marks, Procedure for registration, Rights of holder, Assignment and licensing of marks, Infringement, Trade Marks Registry and Appellate Board.

**Designs:** Meaning and evolution of design protection, Registration, Term of protection, Rights of holder, unregistered designs.

**Geographical Indication:** Meaning and evolution of GI, Difference between GI and Trade Marks, Registration, Rights, Authorised user.

## **UNIT V Contemporary Issues & Enforcement of IPR**

IPR & sustainable development, The Impact of Internet on IPR. IPR Issues in biotechnology, E-Commerce and IPR issues, Licensing and enforcing IPR, Case studies in IPR

### **Course Outcome:**

1. Students will be able to understand Primary forms of IPR
2. Students will be able to assess and critique some basic theoretical justification for major forms of IP Protection
3. Students will be able to compare and contrast the different forms of IPR in terms of key differences and similarities.
4. Students will be able to understand the registration procedures related to IPR.
5. Students will be exposed to contemporary issues and enforcement policies in IPR.

### **References:**

1. P. Narayanan, *Intellectual Property Law*, Eastern Law House
2. . Neeraj Pandey and Khushdeep[ Dharni, *Intellectual Property Rights*, PHI, 2014
3. N.S Gopalakrishnan and T.G. Agitha, *Principles of Intellectual Property*, Eastern Book Co. Lucknow, 2009.
4. Anand Padmanabhan, *Enforcement of Intellectual Property*, Lexis Nexis Butterworths, Nagpur, 2012.
5. *Managing Intellectual Property The Strategic Imperative*, Vinod V. Sople, PHI.
6. Prabuddha Ganguli, " *Intellectual Property Rights*" McGraw Hill Education, 2016.

# **RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

Credit Based Grading System

## **Information Technology, VI-Semester**

### **IT-6007 Creativity and Entrepreneurship Development**

#### **Course Objective:**

- Understand and use tools for generating entrepreneurial ideas and problem solving.
- Understand and use tools for the selection of ideas.
- Understand and gain the skills that are needed to implement ideas in today's society
- Understand Entrepreneurship's part in process that includes idea generation and implementation.
- Understand the concept of Entrepreneurship and its place in today's society

#### **Course Outcomes:**

- Recognize an opportunity for a user group and frame an appropriate design challenge that addresses the need for the user.
- Practice observation, interview and empathy skills to evolve a thorough understanding of the needs of the user.
- Share and integrate team leanings.
- Generate, develop and describe creative ideas that address the design challenge.

#### **Syllabus:**

1. The concept of Entrepreneurship, its history and its place in society.
2. The concept of Entrepreneurship and its relation to concept of innovation.
3. Creative processes for idea generation and problem solving.
4. Business plan.
5. Role of creativity, innovation and business research.
6. Entrepreneurship opportunities in contemporary business environment.

#### **Reference Books :**

1. Dollinger M.J. "Entrepreneurship strategies and resources," 3<sup>rd</sup> edition Pearson Education New Delhi.
2. Panda, Shiba charan "Entrepreneurship development", Anmol publication New Delhi.
3. Richard Blundel & Nigel locket, "Exploring Entrepreneurship : practices & perspectives Oxford.
4. Charles E. Banford & Garry D. Bruton, "Entrepreneurship – A small business Approach, Mcgrawhill Education.
5. P. Narayana Reddy, "Entrepreneurship" : Text and cases, Cengage learning
6. Rajeev Roy, "Entrepreneurship" Oxford.

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VIII-Semester

### IT- 8001 – Information Security

**Branch :** Information Technology, VIII Semester

**Course:** Information Security

**Unit I:** Basic of Cryptography, secret key cryptography, Types of attack, Substitution ciphers, Transposition ciphers, block ciphers and steam ciphers, Confusion and Diffusion, Data encryption standard, round function, modes of operation, cryptanalysis, brute force attack, Security Goals (Confidentiality, Integrity, Availability).

**Unit II:** Public key Cryptography, Modulo arithmetic, Greatest common divisor, Euclidean algorithm, RSA algorithm, hash function, attack on collision resistance, Diffie hellman key exchange, Digital signature standard, elliptic curve cryptography.

**Unit III:** Authentication: One way Authentication, password based, certificate based, Mutual Authentication ,shared secret based, Asymmetric based, Authentication and key agreement, centralized Authentication, eavesdropping, Kerberos, IP security overview:- security association & Encapsulating security payload ,tunnel and transfer modes, internet key exchange protocol, Secure Socket Layer(SSL), Transport Layer Security (TLS).

**Unit IV:** Software vulnerabilities: Phishing Attacks, buffer overflow vulnerability, Format String attack, Cross Site Scripting, SQL injection Attacks, Email security:- Security services of E-mail ,Establishing keys, Privacy ,Authentication of the source, Message integrity ,Non-Repudiation, Viruses, Worms, Malware.

**Unit V:** Web Issue: Introduction, Uniform Resource Locator/uniform resource identify, HTTP, Cookies, Web security problem, Penetration Testing, Firewalls:- functionality, Polices and Access Control, Packet filters, Application level gateway, Encrypted tunnel, Security architecture, Introduction to intrusion detection system.

#### References:-

William Stalling, " Cryptography and Network security", Pearson.

Atual Kahate, " Cryptography and Network Security", TMH.

Bernard Menezes, " Network Security and Cryptography", CENGAGE Learning.

Charlie Kaufman, " Network Security", PHI.

Forouzan, "Cryptography & Network Security", TMH

Randy Weaver, " Network Infrastructure Security", Cengage Learning.

#### List of Experiment:-

- Study of Network Security fundamentals - Ethical Hacking, Social Engineering practices.
- System threat attacks - Denial of Services.
- Sniffing and Spoofing.
- Web Based Password Capturing.
- Virus and Trojans.
- Anti-Intrusion Technique – Honey pot.
- Symmetric Encryption Scheme – RC4.
- Block Cipher – S-DES, 3-DES.
- Asymmetric Encryption Scheme – RSA.
- IP based Authentication.

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VIII-Semester

### IT- 8002 – Soft Computing

**Branch :** Information Technology, VIII Semester

**Course:** Soft Computing

**Unit I:** Introduction to Neural Network: Concept, biological neural network, evolution of artificial neural network, McCulloch-Pitts neuron models, Learning (Supervise & Unsupervise) and activation function, Models of ANN-Feed forward network and feed back network, Learning Rules-Hebbian, Delta, Perceptron Learning and Windrow-Hoff, winner take all.

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

**Unit III:** Unsupervised learning: Kohonen SOM (Theory, Architecture, Flow Chart, Training Algorithm) Counter Propagation (Theory , Full Counter Propagation NET and Forward only counter propagation net), ART (Theory, ART1, ART2). Application of Neural networks in pattern and face recognition, intrusion detection, robotic vision.

**Unit IV:** Fuzzy Set: Basic Definition and Terminology, Set-theoretic Operations, Member Function, Formulation and Parameterization, Fuzzy rules and fuzzy Reasoning, Extension Principal and Fuzzy Relations, Fuzzy if-then Rules, Fuzzy Inference Systems. Hybrid system including neuro fuzzy hybrid, neuro genetic hybrid and fuzzy genetic hybrid, fuzzy logic controlled GA. 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 including JSPP (Job shop scheduling problem), TSP (Travelling salesman problem), Network design routing, timetabling problem.

#### References:-

S.N. Shivnandam, "Principle of soft computing", Wiley.

S. Rajshekaran and G.A.V. Pai, "Neural Network , Fuzzy logic And Genetic Algorithm", PHI.

Jack M. Zurada, "Introduction to Artificial Neural Network System" JAico Publication.

Pearson Prentice. Hall, 2nd Edition..Simon Haykins, "Neural Network- A Comprehensive Foudation"

Timothy J.Ross, "Fuzzy logic with Engineering Applications", McGraw-Hills 1.

- Randy L. Haupt

Sue Ellen Haupt Practical Genetic Algorithms , John Wiley & Sons, , Second Edition

#### List of Experiment:-

- Form a perceptron net for basic logic gates with binary input and output.
- Using Adaline net, generate XOR function with bipolar inputs and targets.
- Calculation of new weights for a Back propagation network, given the values of input pattern, output pattern, target output, learning rate and activation function.
- Construction of Radial Basis Function Network.
- Use of Hebb rule to store vector in auto associative neural net.
- Use of ART algorithm to cluster vectors.
- Design fuzzy inference system for a given problem.

- Maximize the function  $y = 3x^2 + 2$  for some given values of  $x$  using Genetic algorithm.
- Implement Travelling salesman problem using Genetic Algorithm.
- Optimisation of problem like Job shop scheduling using Genetic algorithm.

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VIII-Semester

### Elective –V IT-8003(1): Digital Image Processing

**Branch :** Information Technology, VIII Semester

**Course:** Digital Image Processing

**Unit I:** Image representation, fundamental steps in image processing, image model. Sampling & quantization. Neighbors of a pixel, connectivity and distance measures. Basic transformations and perspective transformations. Two dimensional Fourier transform, Discrete Fourier transform and their properties. Fast Fourier transform, Walsh Transform, Hadamard transform and Discrete Cosine transform.

**Unit II:** Image Enhancement: Intensity transformations, histogram processing, Image subtraction, image averaging, Spatial filtering-smoothing and sharpening filters, frequency domain filtering methods-low pass filtering, high pass filtering, median filtering.

**Unit III:** Image compression: Redundancy and its types. Image compression model, variable length coding, bit plane coding, constant area coding, run length coding, lossless and lossy predictive coding, transform coding.

**Unit IV:** Image restoration and Segmentation: Degradation model, effect of diagonalisation on degradation, algebraic approach. Detection of discontinuities by point, line and edge detection. Edge linking, graph theoretic techniques, thresholding techniques, region oriented segmentation.

**Unit V:** Representation & Description: Chain codes, polygonal approximations, signatures, boundary segments, skeleton, boundary descriptors, shape descriptors regional descriptors, image morphology-dilation, erosion, opening, closing, thickening, thinning, skeleton, pruning,, hit or miss transform.

#### **References:-**

- R.C Gonzalez & Richard E Wood, "Digital Image Processing" ,Addison Wesley Publishing
- Anil K Jain, "Fundamentals of Digital image processing". PHI.
- Sonka, Hlavac, Boyle, "Digital image processing and computer vision", Cengage learning, India Edition.
- B Chanda, D. Dutta Majumder, "Digital image Processing and Analysis", PHI.

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VIII-Semester

### Elective –V IT-8003(2): Data Science

**Branch :** Information Technology, VIII Semester

**Course:** Data Science

**Unit-I** Introduction, Grasping the Fundamentals of Big Data, The Evolution of Data Management, Defining Big Data, Building a Successful Big Data Management Architecture, Beginning with capture, organize, integrate, analyze, and act, Setting the architectural foundation, Performance matters, Big Data Types, Defining Structured Data, sources of big structured data, role of relational databases in big data, Defining Unstructured Data, sources of unstructured data, Integrating data types into a big data environment

**Unit-II** Statistics- Population, Sample, Sampled data, Sample space, Random sample, Sampling distribution, Variable, Variation, Frequency, Random variable, Uniform random variable, Exponential random variable, Mean, Median, Range, Mode, Variance, Standard deviation, Correlation, Linear Correlation, Correlation and Causality, Regression, Linear Regression, Linear Regression with Nonlinear Substitution, Classification, Classification Criteria, Naive Bayes Classifier, Support Vector Machine

**Unit-III** Introduction Data Analytics, Drivers for analytics, Core Components of analytical data architecture, Data warehouse architecture, column oriented database, Parallel vs. distributed processing, Shared nothing data architecture and Massive parallel processing, Elastic scalability, Data loading patterns, Data Analytics lifecycle: Discovery, Data Preparation, Model Planning, Model Building, Communicating results and findings, Methods: K means clustering, Association rules.

**Unit-IV** Data Science Tools- Cluster Architecture vs Traditional Architecture, Hadoop, Hadoop vs. Distributed databases, The building blocks of Hadoop, Hadoop datatypes, Hadoop software stack, Deployment of Hadoop in data center, Hadoop infrastructure, HDFS concepts, Blocks, Name nodes and Data nodes, Overview of HBase, Hive, Cassandra and Hypertable, Sqoop.

**Unit-V** Introduction to R, Data Manipulation and Statistical Analysis with R, Basics, Simple manipulations, Numbers and vectors, Input/Output, Arrays and Matrices, Loops and conditional execution, functions, Data Structures, Data transformations, Strings and dates, Graphics.

### **References:**

1. Judith Hurwitz, Alan Nugent, Fern Halper, Marcia Kaufman, Wiley Big Data For Dummies, 3
2. Runkler, Thomas A., Springer Vieweg Data Analytics, Models and Algorithms for Intelligent Data Analysis
3. Vignesh Prajapati Big Data Analytics with R and Hadoop, Packt Publication,



# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VIII-Semester

### Elective –V IT-8003(3): Information Theory and Coding

**Branch :** Information Technology, VIII Semester

**Course:** Information Theory and Coding

**Unit I :** Information – Entropy, Information rate, classification of codes, Source coding theorem, Shannon-Fano coding, Huffman coding, - Joint and conditional entropies, Mutual information - Discrete memory less channels – BSC, BEC – Channel capacity, Shannon limit

**Unit II :** Error Control Coding-Definitions and Principles: Hamming distance, Minimum distance decoding - Single parity codes, Hamming codes, Repetition codes - Linear block codes, Cyclic codes - Syndrome calculation, Encoder and decoder - CRC ,Convolution codes – code tree trellis, state diagram - Encoding – Decoding: Sequential search and Viterbi algorithm – Principle of Turbo coding

**Unit III :** Source Coding: TEXT, AUDIO and SPEECH:- Text: Adaptive Huffman Coding, Arithmetic Coding, LZW algorithm , Audio: Perceptual coding, Masking techniques, Psychoacoustic model, MPEG Audio layers I,II,III, Dolby AC3 ,Speech: Channel Vocoder, Linear Predictive Coding

**Unit IV:** Source Coding:IMAGE AND VIDEO: Image and Video Formats – GIF, TIFF, SIF, CIF, QCIF – Image compression: READ, JPEG – Video Compression: Principles-I,B,P frames, Motion estimation, Motion compensation, H.261, MPEG standard

**Unit V** Compression techniques- Principles,Text Compression – Static Huffman Coding – Dynamic Huffman Coding – Arithmetic Coding – Image Compression – Graphics Interchange Format , Digitized Documents Introduction To JPEG Standards.

#### Reference Books:

- 1 .R Bose, "Information Theory, Coding and Cryptography", TMH
- 2 Herbert Taub and Donald Scihiling ,"Principles of Communication Systems",McGraw Hill Publication
- 3 . R P Singh and S D Sapre "Communication systems", TMH
4. Fred Halsall, "Multimedia Communications, Applications Networks Protocols And Standards", Pearson Education,

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VIII-Semester

### Elective –VI IT-8004(1): Data Mining & Warehousing

**Branch :** Information Technology, VIII Semester

**Course:** Data Mining and Warehousing

**Unit I:** Data Warehousing: Need for data warehousing , Basic elements of data warehousing, Data Mart, Data Warehouse Architecture, extract and load Process, Clean and Transform data, Star ,Snowflake and Galaxy Schemas for Multidimensional databases, Fact and dimension data, Partitioning Strategy-Horizontal and Vertical Partitioning.

**Unit II:** Data Warehouse and OLAP technology, Multidimensional data models and different OLAP Operations, OLAP Server: ROLAP, MOLAP, Data Warehouse implementation, Efficient Computation of Data Cubes, Processing of OLAP queries, Indexing data.

**Unit III:** Data Mining: Data Preprocessing ,Data Integration and Transformation, Data Reduction, Discretizaion and Concept Hierarchy Generation , Basics of data mining, Data mining techniques, KDP (Knowledge Discovery Process), Application and Challenges of Data Mining, Introduction of Web Structure Mining, Web Usage Mining, Spatial Mining, Text Mining, Security Issue, Privacy Issue, Ethical Issue.

**Unit IV:**Mining Association Rules in Large Databases: Association Rule Mining, Single-Dimensional Boolean Association Rules, Multi-Level Association Rule, Apriori Algorithm, Fp-Growth Algorithm, Time series mining association rules, latest trends in association rules mining.

**Unit V:**Classification and Clustering Distance Measures, Types of Clustering, K-Means Algorithm, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods,Prediction, Classifier Accuracy, Categorization of methods, Partitioning methods, Outlier Analysis.

#### **References:-**

- Arun k Pujari “Data Mining Technique” University Press
- Han,Kamber, “Data Mining Concepts & Techniques”, M.Kaufman.
- P.Ponnian, “Data Warehousing Fundamentals”, John Wiley.
- M.H.Dunham, “Data Mining Introductory & Advanced Topics”, Pearson Education.
- Ralph Kimball, “The Data Warehouse Lifecycle Tool Kit”, John Wiley.
- E.G. Mallach , “The Decision Support & Data Warehouse Systems”, TMH

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VIII-Semester

### Elective –VI IT-8004(2): Internet of Things

**Branch :** Information Technology, VIII Semester

**Course:** Internet of Things

**Unit I:** Internet of Things (IoT): Vision, Definition, Conceptual Framework, Architectural view, technology behind IoT, Sources of the IoT, M2M Communication, IoT Examples .

Design Principles for Connected Devices: IoT/M2M systems layers and design standardization, communication technologies, data enrichment and consolidation, ease of designing and affordability

**Unit II:** Hardware for IoT: Sensors, digital sensors, actuators, radio frequency identification (RFID) technology, wireless sensor networks, participatory sensing technology.

Embedded Platforms for IoT: Embedded computing basics, Overview of IOT supported Hardware platforms such as Arduino, Raspberry pi, Beagle Bone, Intel Galileo

**Unit III:** IoT PROTOCOLS : IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks, Zigbee – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

**Unit IV:** Security : Understanding the risks, Modes of attack - Denial of Service Guessing the credentials , Getting access to stored credentials, Man in the middle , Sniffing network communication , Port scanning and web crawling ,Search features and wildcards ,Breaking ciphers , Tools for achieving security - Virtual Private Networks , X.509 certificates and encryption , Authentication of identities , Usernames and passwords , Using message brokers and provisioning servers ,Centralization versus decentralization

**Unit V:** IoT Applications :Home Automation- Smart Appliances , Smoke/ Gas Detection, Cities – Smart Parking ,Smart Lighting , Smart Road , Health and Lifestyle- Health and fitness monitoring, Retail- Smart Payments.

Case Studies:

Smart city streetlights:- control and monitoring

### References:

- 1.Raj Kamal “Internet of Things”, McGraw-Hill, 1<sup>st</sup> Edition, 2016
- 2.Olivier Hersent,David Boswarthick, Omar Elloumi “The Internet of Things key applications and protocols”, Wiley
3. Peter Waher, “Learning Internet of Things”, Packt publishing
- 4 Arshdeep Bahga, Vijay Madiseti, “Internet of Things ( A hands on approach)” University Press (India)

# RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

## Information Technology, VIII-Semester

### Elective –VI IT-8004(3): Unix & Shell Programming

**Branch :** Information Technology, VIII Semester

**Course:** Unix & Shell Programming

**UNIT-I:** General Overview of the System: System structure, user perspective, O/S services assumption about Hardware The Kernel and buffer cache architecture of Unix O/S, System concepts, Kernel data Structure, System administration, Buffer headers, Structure of the buffer pool, Scenarios for retrieval of the buffer, Reading and writing disk block, Advantage and disadvantage of buffer cache.

**UNIT-II:** Internal Representation of Files: Inodes, Structure of regular, Directories conversions of a path name to an inode, Super block, Inode assignment to a new file, Allocation of disk blocks, Open read write file and record close, File creation, Operation of special files change directory and change root, change owner and change mode. STAT and FSTAT, PIPES mounting and unmounting files system, Link Unlink.

**UNIT-III:** Structures of Processes and process control: Process states and transitions layout of system memory, the context of a process, manipulation of process address space, Sleep process creation/termination. The user Id of a process, changing the size of a process. Killing process with signals, job control, scheduling commands: AT and BATCH, TIME, CORN.

**UNIT-IV:** Introduction to shell scripts: shell Bourne shell, C shell, Unix commands, permissions, editors, grep family, shell variables, scripts, metacharacters and environment, if and case statements, for while and until loops. Shell programming.

**UNIT-V:** Introduction of Awk and perl Programming: Awk pattern scanning , BEGIN and END patterns, Awk arithmetic and variables, and operators, functions, perl; the chop() function, variable and operators. Networking tools: Resolving IP addressing, TELNET, FTP, Socket programming, introduction of Linux structure.

#### **References**

- Sumitabha Das “Unix concepts and Applications”.Tata McGraw Hill,
- Y.Kanetkar “Unix shell programming”, BPB Pub
- .B.W. Kernighan & R. Pike, “The UNIX Programming Environment”, PHI Learning
- S.Prata “ Advanced UNIX: A Programming's Guide”, BPB Publications, New Delhi.
- M.J. Bach “Design of UNIX O.S. “, PHI Learning
- Beck “Linux Kernel”, Pearson Education, Asia.

**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

Credit Based Grading System

**Information Technology, VIII-Semester**

**IT-8005 – Project-II**

**Branch :** Information Technology, VIII Semester

**Course:** Project-II

In VIII semester student completes implementation of major project for which literature survey and partial implementation is done by him/her in VII sem. Student is required to submit a Major Project Report for the same.

**RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

Credit Based Grading System

**Information Technology, VIII-Semester**

**IT-8006 – Lab (Elective – VI)**

**Branch :** Information Technology, VIII Semester

**Course:** Departmental Choice (Internal Assessment)

Student will be given lab work or small project to be completed based on choice of Elective VI subject .

# **RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

Credit Based Grading System

**Information Technology, VIII-Semester**

## **IT-8007 – Group Discussion (Internal Assessment)**

**Branch :** Information Technology, VIII Semester

**Course:** Group Discussion (Internal Assessment)

Students will be assigned different subjects related to technology ,social issues ,environmental ,business & Economy ,Current affairs from time to time and in sub groups .They are required to prepare for and against the motion for the allotted topic for group discussion.

Group discussion helps students to not only reach the subject but also enchases their debating skills, confidence ,presentation skills and mutual appreciation .It also helps them to confidently face such group discussion during placements and in social life.