SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

SYLLABUS

B.Tech(Computer Science and Business System) VI Semester

CB-601 COMPUTER NETWORK

Objectives:

- Understand the concepts of computer networks and learn techniques for bandwidth utilization.
- Be exposed to various addressing schemes and error detection-correction of data.
- Learn the routing protocols, transport layer, flow control and congestion control algorithms.
- Be familiar with real time applications of networking devices and tools.
- To write different applications using different types of sockets.

UNIT – I

FUNDAMENTALS AND PHYSICAL LAYER: Introduction: Computer networks and distributed systems, Classifications of computer networks, Preliminaries of layered network structures. Data communication components: Representation of data and its flow, various connection topology, Protocols and standards, OSI model, Transmission Media. LAN: Wired LAN, Wireless LAN, Virtual LAN. Techniques for Bandwidth utilization: Multiplexing - Frequency division, Time division and Wave division, Concepts on spread spectrum.

UNIT – II

DATA LINK LAYER AND MEDIUM ACCESS SUB LAYER: Fundamentals of Error Detection and Error Correction, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go-back–N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols -Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT – III

NETWORK LAYER: Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP–Delivery, Forwarding and Unicast Routing protocols.

UNIT – IV

TRANSPORT LAYER: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), SCTP Congestion Control; Quality of Service (QoS), QoS improving techniques - Leaky Bucket and Token Bucket algorithms.

UNIT – V

APPLICATION LAYER AND SECURITY:

Application Layer: DNS, DDNS, TELNET, EMAIL, FTP, WWW, HTTP, SNMP, Bluetooth, Firewalls.

Network Security: Electronic mail, Directory services and network management, Basic concepts of Cryptography.

List of Experiments

1. Learn to use basic commands.
2. Configuration of Network in Linux Environment.
3. Assignment of IP Address to computers.
4. Implementation of Subnet mask in IP addressing.

5. Implementation of setup of a Local Area Network (using Switches) – Minimum 3 nodes and Internet.
6. To capture, save, and analyse network traffic on TCP / UDP / IP / HTTP / ARP /DHCP /ICMP /DNS using Wireshark Tool.
7. Write a socket PING program to test the server connectivity.
8. Study of system administration and network administration.
9. Study of socket programming and client server model using TCP and UDP.
10. Programs using TCP Sockets (like date and time server & client, echo server & client, chat etc.)
11. Programs using UDP Sockets (like echo server, chat, simple DNS).
12. Simulation of sliding window.
13. Implementation of ARP.

Course Outcomes:

1. On completion of the course, the students will be able to:
2. Choose the required functionality at each layer for given application.
3. Trace the flow of information from one node to another node in the network.
4. Apply the knowledge of addressing scheme and various routing protocols in data communication to select optimal path.
5. Monitor the traffic within the network and analyze the transfer of packets.
6. Develop real time applications of networks using socket programming.

Text Book

1. Andrew S. Tanenbaum and David J. Wetherall, “Computer Networks”, 5th edition, Pearson education, 2016.
2. William Stallings, “Data and Computer Communication”, 10th edition, Pearson education, 2017.

Reference Books:

3. Kaufman, R. Perlman and M. Speciner, “Network Security”, Pearson education, 2017.
4. W. Richard Stevens, “UNIX Network Programming, Vol. 1,2 & 3”, Prentice-Hall of India, 2004.

Online Resources

5. https://www.umsl.edu/~sauterv/analysis/488_f01_papers/quillin.htm
6. https://medium.com/omarelgabrys-blog/object-oriented-analysisand-design-introduction-part-1-a93b0ca69d36

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-602 INFORMATION SECURITY

Objectives:

- To understand the overview of computer security.
- To understand the information security policy and system design.
- To understand techniques of system security.
- To learn about various applications of system security.
- To learn about operating system and database security.

UNIT-I

OVERVIEW OF COMPUTER SECURITY: The Basic Components- Confidentiality, integrity and availability; Security policy and procedure; Assumptions and Trust; Security Assurance, Implementation and operational issues; Security Life Cycle -Access Control Models: Role based Model.

UNIT-II

SECURITY POLICIES AND SYSTEM DESIGN: Types of Security Policies-Confidentiality policies: Goals of Confidentiality Policies, The Bell-LaPadula Model- Integrity policies: Biba Integrity Model, Clark-Wilson Integrity Model -Hybrid policies: Chinese Wall Model, Clinical Information Systems Security Policy. Access Control Mechanisms: Access Control Lists- Information Flow:

Compiler-Based Mechanisms, Execution-Based Mechanisms- Confinement Problem: Isolation, Covert Channels- Assurance: Building Secure and Trusted Systems- Evaluating Systems: Goals of Formal Evaluation.

UNIT-III

SYSTEM SECURITY: Malicious Logic: Trojan Horses, Computer Viruses, Computer Worms- Vulnerability Analysis: Penetration Studies, Vulnerability Classification-Auditing: Anatomy of an Auditing System, Auditing Mechanisms, Audit Browsing- Intrusion Detection: Architecture, Organization of Intrusion Detection Systems- Design Principles- Representing Identity: Files and Objects, Users, Groups and Roles, Naming and Certificates.

UNIT-IV

APPLICATIONS: Network Security: Policy Development, Network Organization- System Security: Policy- User Security: Policy, Access, Files and Devices- Program Security: Requirements and Policy, Design, Case Study: Common Security-Related Programming Problems.

UNIT-V

OPERATING SYSTEM AND DATABASE SECURITY: Operating System Security: Security Architecture, Analysis of Security in Linux/Windows-Database Security: Security Architecture, Database Auditing-Case Study: Discretionary Access Control.

LIST OF EXPERIMENTS

1. Analysis of security in Unix/Linux.
2. Administration of users, password policies, privileges and roles.
3. Implementation of discretionary access control and mandatory access control.
4. Demonstrate intrusion detection system (ids) using any tool Eg. Snort or any other software.
5. Implementation of IT audit, malware analysis and vulnerability assessment and generate the report.
6. Implementation of mobile audit and generate the report of the existing artifacts.
7. Implementation of OS hardening and RAM dump analysis to collect the artifacts and other

information.

8. Implementation of digital forensics tools for disk imaging, data acquisition, data extraction and data analysis and recovery.
9. Perform mobile analysis in the form of retrieving call logs, SMS log, all contacts list using the forensics tool like SAFT.
10. Implementation to identify web vulnerabilities, using OWASP project.

Course Outcomes:

1. On completion of the course, the students will be able to
2. Discuss the basics of information security and international standards.
3. Analyse information security policy and system design.
4. Comprehend system level security.
5. Apply system level security in various environments.
6. Analyze the operating system and database security methods.

Text Book(s):

1. Ross Anderson, “Security Engineering: A Guide to Building Dependable Distributed Systems”, Third Edition, Wiley, 2021.
2. M. Bishop, “Computer Security: Art and Science”, 2nd Edition, Pearson Education, 2019.
3. M. Stamp, “Information Security: Principles and Practice”, 2nd Edition, Wiley, 2011.

Reference Books:

1. C.P. Pfleeger, S.L. Pfleeger, J. Margulies, “Security in Computing”, 5th Edition, Prentice Hall, 2015.
2. David Wheeler, “Secure Programming HOW TO”, v3.010 Edition, 2003.
3. Michael Zalewski, “Browser Security Handbook”, Google Inc., 2009.
4. M. Gertz, S. Jajodia, “Handbook of Database Security”, Springer, 2008.

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-603 ARTIFICIAL INTELLIGENCE

Objectives:

- To understand the intelligent agents and formulate a problem in search space.
- To analyze the problem and learn the different search techniques.
- To learn the constraint satisfaction problem and game theory.
- Study the system of knowledge representation using rules and reasoning.
- To gain knowledge on probabilistic reasoning and expert systems.

UNIT-I

INTRODUCTION TO ARTIFICIAL INTELLIGENCE AND PROBLEM-SOLVING AGENT: Intelligent agents, agents & environment, nature of environment, structure of agents, goal-based agents, utility-based agents, learning agents. Problems of AI, AI technique, Tic - Tac - Toe problem. Defining the problem as state space search, production system, problem characteristics, and issues in the design of search programs.

UNIT-II

SEARCH TECHNIQUES: Problem solving agents, searching for solutions; uniform search strategies: breadth first search, depth first search, depth limited search, bidirectional search, comparing uniform search strategies. Heuristic search strategies – Greedy best-first search, A* search, AO* search, memory bounded heuristic search: local search algorithms & optimization problems: Hill climbing search, simulated annealing search, local beam search.

UNIT-III

CONSTRAINT SATISFACTION PROBLEMS AND GAME THEORY: Local search for constraint satisfaction problems. Adversarial search, Games, optimal decisions & strategies in games, the minimax search procedure, alpha-beta pruning, additional refinements, iterative deepening.

UNIT-IV

KNOWLEDGE & REASONING: Knowledge representation issues, representation & mapping, approaches to knowledge representation. Using predicate logic, representing simple fact in logic, representing instant & ISA relationship, computable functions & predicates, resolution, natural deduction. Representing knowledge using rules, Procedural verses declarative knowledge, logic programming, forward verses backward reasoning, matching, control knowledge.

UNIT-V

PROBABILISTIC REASONING AND EXPERT SYSTEMS: Representing knowledge in an uncertain domain, the semantics of Bayesian networks, Dempster-Shafer theory, Planning Overview, components of a planning system, Goal stack planning, Hierarchical planning, other planning techniques.

Expert Systems: Representing and using domain knowledge, expert system shells, and knowledge acquisition.

List of Experiments

1. Programs on Problem Solving
   a. Write a program to solve 8 Queens problem
   b. Solve any problem using depth first search
   c. Implement MINIMAX algorithm
   d. Implement A* algorithm
2. Programs on Decision Making and Knowledge Representation
   a. Introduction to PROLOG

b. Implementation of Unification and Resolution Algorithm.
c. Implementation of Backward Chaining

3. Programs on Planning and Learning
   a. Implementation of Blocks World program.
   b. Implementation of SVM for an application using python.
   c. Implementing Artificial Neural Networks for an application using python.
   d. Implementation of Decision Tree
   e. Implementation of K-mean algorithm

Text Books:

4. Stuart J. Russell, Peter Norwig , "Artificial Intelligence –A Modern approach", 3rd Pearson Education, 2016.
5. Artificial Intelligence, Russel, Pearson

Reference Books:

1. Ritch & Knight, "Artificial Intelligence", Third Edition, Tata McGraw Hill, 2009.
2. Patterson, "Introduction to Artificial Intelligence & Expert Systems", First Edition, Pearson, 2015.
3. Saroj Kaushik, "Logic & Prolog Programming", First Edition, New Age International, 2008.
4. Joseph C. Giarratano, Gary D. Riley,"Expert Systems: Principles and Programming", Fourth Edition, Cengage, 2007.

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-604 FINANCIAL & COST ACCOUNTING

Objectives:

- To create an awareness about the importance and usefulness of the accounting concepts and their managerial implications.
- To develop an understanding of the financial statements and the underlying principles and learn to interpret financial statements.
- To create awareness about cost accounting, different types of costing and cost management.
- Understand how financial statement information can help solve business problems and increase the ability to read and understand financial statements and related information.

UNIT-I

ACCOUNTING CONCEPT: Introduction, Techniques and Conventions, Financial Statements- Understanding & Interpreting Financial Statements. Company Accounts and Annual Reports- Audit Reports and Statutory Requirements, Directors Report, Notes to Accounts, Pitfalls.

UNIT-II

ACCOUNTING PROCESS: Book Keeping and Record Maintenance, Fundamental Principles and Double Entry, Journal, Ledger, Trial Balance, Balance Sheet, Final Accounts ,Cash Book and Subsidiary Books, Rectification of Errors.

UNIT-III

FINANCIAL STATEMENTS: Form and Contents of Financial Statements, Analyzing and Interpreting Financial Statements, Accounting Standards.

Class Discussion: Corporate Accounting Fraud- A Case Study of Satyam.

UNIT-IV

CASH FLOW AND FUND FLOW TECHNIQUES: Introduction, How to prepare – Cash flow and Fund flow, Difference between them.

UNIT-V

COSTING SYSTEMS: Elements of Cost, Cost Behavior, Cost Allocation, Overhead Allocation, Unit Costing, Process Costing, Job Costing, Absorption Costing, Marginal Costing, Cost Volume Profit Analysis, Budgets, ABC Analysis.

Class Discussion: Application of costing concepts in the Service Sector.

Course Outcomes:

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

1. Understand the theories, concept, and evolution of management.
2. Demonstrate the ability to employ the management way of thinking.
3. Understand how organizations work and find it easier to grasp the intricacies of other management areas such as finance, marketing, strategy etc.
4. Understand the qualities of a leader in the managerial aspect in future terms.
5. Understand the managerial ethics and CSR and its importance.

Text Books:

1. Robert N Anthony, David Hawkins, Kenneth Marchant, “Accounting: Texts and Cases”, Thirteenth

Edition, McGraw-Hill, 2017.
2. M.Y.Khan & P.K.Jain, "Management Accounting", Tata McGraw Hill, 2011.
3. R.Narayanaswamy, Financial Accounting – A managerial perspective, Fifth Edition, PHI Learning, New Delhi, 2011.

Reference Books:

1. Jan Williams, "Financial and Managerial Accounting – The basis for business Decisions", Fifteenth Edition, Tata McGraw Hill Publishers, 2010.
2. Horngren, Surdem, Stratton, Burgstahler, Schatzberg, "Introduction to Management Accounting", Sixteenth Edition, PHI Learning, 2014.

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-605 Business Communication & Value Science-IV

Objectives:

- To recognize the best practices of communicative writing.
- To understand the importance of emotional intelligence in personal and professional lives.
- To understand how stress impacts life and work.
- To use the best practices to manage stress.
- To understand how to make start-ups and public speaking.

UNIT-I

COMMUNICATIVE WRITING: Concepts: Principles of Communicative writing – Formal Business letters – Writing Proposals – Use of charts in communicative writing – use of business idioms – corporate terms. Activity: Group business proposals – presentation of proposal – Story telling using charts and graphs (demonstrative speech).

UNIT-II

EMOTIONAL INTELLIGENCE: Concepts: Concepts of emotional intelligence – Its importance in human life and professional life – difference between Emotional quotient and Intelligent quotient – Corporate etiquette Activity: Any two Anubhaav activities – 10 ways to build Emotional Intelligence by Daniel Goleman – Mock interview.

UNIT-III

CONFLICT MANAGEMENT: Concepts: Conflicts – Corporate and workplace conflicts – reason and impacts of conflicts – guidelines to manage conflicts. Teams - role of team player – stress – stress management – importance of feedbacks – Time Management. Activity: Creating posters with stress management tips – open house discussion on challenges of time management –Tracking time activity.

UNIT-IV

CORPORATE SOCIAL RESPONSIBILITY: Concepts: Corporate Social Responsibility - Social responsibilities of companies - Diversity in workplace – Individual social responsibility – Social connect – life skills – empathy. Activity: Discussion & Role play in diversity – Ubuntu story of social responsibility – creating audio embedded PPT on the concept of social responsibility.

UNIT-V

DESIGN THINKING & PUBLIC SPEAKING: Concepts: Design thinking – importance of start-ups – Proof of concept for start-ups – Best practices – Art of Public speaking Activity: Pitch in start-up idea – watching videos of public speaking – Finding similarities among world famous speeches – watching videos of Sw. Vivekananda's speech – Martin Luther King's My Dream speech.

List of Experiments

1. Write formal business letter for proposal of goods item.
2. Create a presentation based on business proposal.
3. Perform activities to test IQ.
4. Perform activities to build emotional intelligence.
5. Create posters based on social issues.
6. Create a presentation based on social issues and our responsibility.
7. Create a presentation based on new startup idea.
8. Perform an activity based on public speaking.
9. Perform group discussion on current social issues.

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Course Outcomes:

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

1. Recognize the best practice of Communicative writing.
2. Apply emotional intelligence in real life scenarios.
3. Identify the best practices of stress management.
4. Recognize the attributes needed to function and grow in a corporate environment.
5. Apply the best practices of public speaking.

Reference Books:

1. Daniel Goleman," Emotional Intelligence: Why it Can Matter More Than IQ", Bloomsbury, 2004.
2. Ryback David, "Putting Emotional Intelligence To Work", CRC Press, 1998.
3. Dale Carnegie, "How to Develop Self Confidence and Improve Public Speaking - Time - Tested Methods of Persuasion", Ebury Publishing, 1998.
4. Chris Anderson, "TED Talks: The official TED guide to public speaking: Tips and tricks for giving unforgettable speeches and presentations", Hachette, 2016.

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CB-606 (A) Robotics and Embedded Systems

Objectives:

- To understand the concept of Industry 4.0 and technologies for cognitive robotics
- To understand the fundamentals of robotics operating systems
- To understand the role of AI in cognitive robotics
- To understand and demonstrate the role of Data Science and their working principles in robotics
- To demonstrate the concepts of cloud computing with robot on various real time applications

UNIT-I

INTRODUCTION TO MODERN DAY ROBOTICS AND THEIR INDUSTRIAL APPLICATIONS:

Industry 4.0 Concept: Background and Overview-Industry 4.0 technologies: implementation patterns in manufacturing companies-Evolution of Industrial Robots and their Applications-Advancements in Robotics and Its Future Uses-Types of robotics in various fields for applications.

Technologies essential for Cognitive Robotics: Computer systems and Technologies relevant to modern day robotics- Robotic Process Automation: Overview of RPA and its applications-RPA, AI, and Cognitive Technologies for Leaders- Introduction to Robotics: Analysis, Control, Applications.

UNIT-II

BASICS OF ROBOTIC OPERATING SYSTEM: Basics of Robotic operating System: ROS for beginners an overview- Introduction to the Robot Operating System (ROS) Middleware - Secure communication for the Robot Operating System - An Introduction to Robot Operating System: The Ultimate Robot Application Framework by Adnan.

Quality of Service and Cybersecurity Communication Protocols -Analysis for the Robot Operating System Robotics systems communication- Threat modelling using ROS.

Towards cloud robotic system: A case study of online co-localization for fair resource competence-A Case Study on Model-Based Development of Robotic Systems using Monti Arc with Embedded Automata.

UNIT-III

AI IN THE CONTEXT OF COGNITIVE ROBOTICS AND ROLE OF AI IN ROBOTICS: Foundation for Advanced Robotics and AI- A Concept for a Practical Robot Design Process- Demo to train A Robot Using AI - Deep learning core applications-Deep learning business applications.

Introduction to computer vision and application of Vision Systems in Robotics: Concepts of computer vision and the how vision systems are becoming essential part of Robotics-Computer Vision: Models, Learning, and Inference - Mastering Computer Vision with TensorFlow 2.x: Build advanced computer vision applications using machine learning and deep learning techniques-Machine Vision Applications- Application areas for vision systems-Robot inspection case study-Autonomous driving using 3D imaging case study.

UNIT-IV

DATA SCIENCE AND BIG DATA IN THE CONTEXT OF COGNITIVE ROBOTICS: Cognitive Technologies: The Next Step Up for Data and Analytics in robotics-Cognitive Deep Learning Technology for Big Data Cognitive Assistant Robots for Reducing Variability in Industrial Human-Robot Activities.

Introduction to Python and R Programming in the context of Robotics: Introduction to Python - Python Functions for Data Science-Basic ROS Learning Python for robotics- An introduction to R - The R in Robotics rosR: A New Language Extension for the Robot Operating System.

Artificial Intelligence and Robotics - The Review of Reliability Factors Related to Industrial Robots -Failure analysis of mature robots in automated production- Data Analytics for Predictive Maintenance of Industrial Robots - Failure Is an Option: How the Severity of Robot Errors Affects Human-Robot Interaction.

UNIT-V

CONCEPTS OF CLOUD COMPUTING, CLOUD PLATFORMS AND IT APPLICATIONS IN ROBOTICS: Learning Cloud Computing: Core Concepts - Cloud Computing: Private Cloud Platforms -Robot as a Service in Cloud Computing -Cloud Computing Technology and Its Application in Robot Control - A Comprehensive Survey of Recent Trends in Cloud

Robotics Architectures and Applications - Google's cloud robotics and high computing needs of industrial automation and systems-The role of cloud and opensource software in the future of robotics-The Power of Cloud Robotics by Robotics Industry Association.

List of Experiments

1. Build a Self-Driving Robot that can automatically follow a line
2. Build a basic obstacle-avoiding robot and improve the design to help it avoid getting stuck
3. Build a Humanoid Robot
4. Autonomous Robot Navigation using Computer Vision for exhaustive path-finding
5. A Mobile Autonomous Chemical Detecting Robot
6. Build a voice controlled robot
7. Web-Controlled Mobile Video-Enabled Robotic Litter Collection Device
8. Utilizing Artificial Neural Networks to Create a Learning Robot
9. Hospital Sanitizing Robot
10. Autonomous Robotic Vehicle: Saving lives, preventing accidents one at a time
11. Build a robot with Python and 3D Printed Robotic Arm
12. Build an Intelligent Irrigation Control System
13. AI-powered Hearing Aid
14. Fire Extinguishing Robot
15. Remote Operated Spy Robot Circuit

Course Outcomes:

1. Develop skills of using advanced software for solving practical problems in robotics pertaining to various industries
2. Understand the basics of Robotic operating systems and communication system
3. Understand basic concepts and technological advancements in AI and robotics
4. Understand and apply several statistical analysis techniques, business analytics for cognitive robotics and programming of robots using python and R languages
5. Understand and apply the cloud computing concepts in robotics

Text Books:

3. Saeed Benjamin Niku, “Introduction to Robotics: Analysis, Control, Applications”, Wiley Publishers, 2nd edition, 2011.
4. Simon J. D. Prince, “Computer Vision: Models, Learning, and Inference”, Cambridge University Press, 2012.
5. Francis X. Govers,” Artificial Intelligence for Robotics: Build Intelligent Robots that Perform Human Tasks Using AI Techniques”, Packt publishing, 2018.

Reference Books:

1. Krishnendu Kar, “Mastering Computer Vision with TensorFlow 2.x: Build Advanced Computer Vision Applications Using Machine Learning and Deep Learning Techniques”, Packt publishing, 2020.
2. Armando Vieira, Bernardete Ribeiro,” Introduction to Deep Learning Business Applications for Developers from Conversational Bots in Customer Service to Medical Image processing”,Apress, 2018.
3. Steve Heath, "Embedded System Design 2nd Edition", EDN Series for Design Engineers, 2003

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-606 (B) MODERN WEB APPLICATIONS

Objectives:

- To understand different internet technologies.
- Know the importance of object oriented aspects of scripting.
- Understand creating database connectivity using PHP and MySQL.

UNIT-I

INTRODUCTION TO INTERNET & WORLD WIDE WEB: History of the Internet & World-Wide Web, Web Browsers, Web Servers, Uniform Resource Locator, Tools and Web Programming Languages. Web Standards, Categories of Web Applications, Characteristics of Web Applications, Tiered Architecture.

UNIT-II

HYPERTEXT MARKUP LANGUAGE (HTML) AND CASCADING STYLE SHEETS (CSS): HTML: Basic HTML page, Text Formatting, Table, Headers, Linking, Images, List, Meta Elements.

CSS: Inline, Internal and External Style Sheet, Bootstrap-CSS Text, CSS forms, CSS components drop down.

UNIT-III

JAVASCRIPT AND EXTENSIBLE MARKUP LANGUAGE(XML):

JavaScript: Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script, Bootstrap- JS Alert, JS Button, JS popover.

XML: Introduction, Structuring Data, Document Type Definition, XML Vocabularies, Document Object Model (DOM) with JavaScript, Extensible Stylesheet Language Transforms (XSL).

UNIT-IV

PHP BASICS: Writing Basic PHP Programs: Creating PHP Programs, Numbers and Strings, Literals and Variables, Operators and Functions.

Form & PHP: Creating Form Controls, Using Values Returned From, Forms Using PHP.

UNIT-V

PHP DATABASE CONNECTIVITY: PHP Database Connectivity: Connecting to MySQL Server, Selecting Databases, Checking for Errors, Closing the MySQL Server Connection.

Manipulating Data in MySQL Using PHP: Inserting, Viewing, Updating and Deleting Records, Manipulating joined tables.

User Authentication: Creating Session, Authorization Level.

List of Experiments

1. Create a HTML page with frames, links, tables and other tags for highlighting the facilities in the Department in your College. State the assumptions you make (business logic you are taking into consideration).
2. Create a web page with the following using HTML:
   a. To embed a map in a web page.
   b. To fix the hot spots in that map.
   c. Show all the related information when the hot spots are clicked.
   d. Embed an image map picture (India map) on a Web page that provides different links to other

Web pages (different states) and show the all the related information depending on where a user clicks on the image.

e. Create a webpage to embed a human body image, identify and display all the related information about the human body parts (head, eye, nose, finger etc.) based on the user clicks on the human body image map.

3. Create a web page with the following:
   a. Cascading style sheets.
   b. Embedded style sheets.
   c. Inline style sheets.
   d. Use your college information for the web pages.
4. Create a User Registration form with First Name, Last name, Address, City, State, Country, Pincode, Username and Password fields for a General login webpage and satisfy the following criteria:
   a. Create a validate() function that does the following:
   b. Checks that the First Name, Last Name, City, Country, Username, and Password fields are filled out.
   c. Checks that the Pincode is exactly 6 numeric.
   d. Checks that the state is exactly two characters.
   e. Checks that the email is a valid email address.
      i. false if email has fewer than 6 characters
      ii. false if email does not contain an @ symbol
      iii. false if email does not contain a period (.)
      iv. true otherwise
5. Write a DTD for a XML document that declares an address book containing contacts. Each contact has a name and address. An address should contain attributes for street name, state and phone number. Write a XML document and validate it against this DTD.
6. Create and save a XML document at the server, which contains 10 users information. Write a Program, which takes user Id as an input and returns the user details by taking the user information from the XML document.
7. Create a XML to represent the BOOKS catalog that has the following elements (TITLE, ISBN NO, AUTHOR, PUBLISHER, and PRICE). Display the book details styled with XSLT.
8. Create an Extensible markup language to represent the students mark information of a class. Create a webpage to display all the students consolidated mark statement with pass (green color) or fail (red color) using XSLT.
9. Write programs in PHP to create three-tier applications:
   a. for conducting on-line examination.
   b. for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
10. Session tracking using hidden form fields and Session tracking for a hit count.
11. Convert the static webpages of programs 1 to 4 into dynamic web pages using PHP and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml.
12. Write a PHP program for Employee Details which includes EmpID, Name, Designation, Salary, DOJ, etc., to connect with the database and execute queries to retrieve and update data. Prepare the report for single and group of employees based on the end user needs.
13. Consider a Library Management System. Develop a JavaScript program that will validate the controls in the forms you have created for the application. State the assumptions you make (business logic you are taking into consideration). Note: Your application must access a database using PHP.

Course Outcomes:

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

1. Construct a basic website using HTML and Cascading Style Sheets.
2. Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.
3. Construct simple web pages in PHP and to represent data in XML format.
4. Design and implement server side programs using PHP.

5. Do database manipulation using MySQL and authenticate data.

Text Books:

1. Deitel P. J., Deitel H. M. and Deitel A., "Internet and World Wide Web: How to Program", Fifth Edition, Pearson Prentice Hall, 2012.
2. Jon Duckett, "HTML & CSS: Design and Build Websites", First Edition, John Wiley & Sons, 2011.
3. Naramore E., Gerner J., Scouarnec Y.L., et al., "Beginning PHP5, Apache, MySQL Web Development: Programmer to Programmer", John Wiley & Sons Inc., 2005.

Reference Books:

1. Sebesta R. W.," Programming the World Wide Web", Eight Edition, Pearson, 2014.
2. Pressman R. and Lowe D.," Web Engineering: a practitioner's approach", First Edition, Mc GrawHill, 2008.
3. Kappel G., et al.," Web Engineering: The Discipline of systematic Development of Web Applications", First Edition, John Wiley & Sons, 2006.
4. Suh W., "Web Engineering: Principles and Techniques", Idea Group Inc., 2005.
5. Ullman L ," PHP for the Web: Visual Quick Start Guide", Fifth Edition, Peach pit Press, 2016.

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-606 (C) DATA MINING AND ANALYTICS

Objectives:

- To introduce the fundamental concepts of data mining and data representation.
- To learn the data preprocessing task and attribute oriented analysis
- To understand the association rules, classification and prediction algorithms
- To learn and apply the linear and non-linear models of data analysis
- To understand the time series analysis and aspects of prescriptive analysis

UNIT-I

INTRODUCTION AND KNOWLEDGE REPRESENTATION: Introduction - Related technologies - Machine Learning, DBMS, OLAP, Statistics, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Task relevant data, Background knowledge, Representing input data and output knowledge, Visualization techniques, Applications.

UNIT-II

DATA PREPROCESSING: Data preprocessing: Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies. Attribute-oriented analysis: Attribute generalization, Attribute relevance, Class comparison, Statistical measures.

UNIT-III

ASSOCIATION AND MINING METHODS: Association rules: Motivation and terminology, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis. Classification: Basic learning/mining tasks, Inferring rudimentary rules: 1R, algorithm, Decision trees, covering rules. Prediction: The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance- based methods (nearest neighbor), linear models.

UNIT-IV

LINEAR AND NON-LINEAR MODELS:

Descriptive analytics: Data Modeling, Trend Analysis, Simple Linear Regression Analysis Forecasting models: Heuristic methods, predictive modeling and pattern discovery, Logistic Regression: Logit transform, ML estimation, Tests of hypotheses, Wald test, LR test, score test, test for overall regression, multiple logistic regression, forward, backward method, interpretation of parameters, relation with categorical data analysis. Interpreting Regression Models, Implementing Predictive Models.

Generalized Linear model: Link functions such as Poisson, binomial, inverse binomial, inverse Gaussian, Gamma. Non Linear Regression (NLS): Linearization transforms, their uses & limitations, examination of non-linearity, initial estimates, iterative procedures for NLS, grid search, Newton-Raphson, steepest descent, Marquardt's methods. Introduction to semiparametric regression models, additive regression models. Introduction to nonparametric regression methods

UNIT-V

TIME SERIES ANALYSIS:

Time Series Analysis: Auto - Covariance, Auto-correlation and their properties. Exploratory time series analysis, Test for trend and seasonality, Exponential and moving average smoothing, Holt – Winter smoothing, forecasting based on smoothing.

Linear time series models: Autoregressive, Moving Average, Autoregressive Moving Average and Autoregressive Integrated Moving Average models; Estimation of ARIMA models such as Yule-Walker estimation for AR Processes, Maximum likelihood and least squares estimation for ARIMA Processes, Forecasting using ARIMA models.

Prescriptive Analytics: Mathematical optimization, Networks modeling-Multi-objective optimization-Stochastic modeling, Decision and Risk analysis, Decision trees.

List of Experiments:

1. Installing Weka and exploring a dataset.
2. Loading a dataset and visualizing the Data
3. Preprocessing a dataset from a real domain (Medical/Retail/Banking)
4. Building a classifier- Run Decision Tree, Naïve Bayesian Classifier, NN classifier and SVM.
5. Mining Association Rules- Run Apriori Algorithm.
6. Building a statistical model using a sample dataset – preprocessing, hypothesis building, model fitting, model validation and interpretation of results.
7. Implementation of linear regression technique for statistical model building.
8. Implementation of Non-linear regression technique for statistical model building.

Course Outcomes:

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

1. Understand the fundamentals of data mining and data representation.
2. Perform preprocessing tasks for the data set.
3. Apply association rules and predictive methods for data mining.
4. Build data models using linear and non-linear regression techniques.
5. Gain knowledge on time series analysis and prescriptive analysis.

Text Books:

4. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Third Edition, Elsevier, 2012.
5. Lior Rokach and Oded Maimon, "Data Mining and Knowledge Discovery Handbook", Springer, 2nd edition, 2010.
6. Ian H. Witten, Eibe Frank and Mark A. Hall "Data Mining: Practical Machine Learning Tools and Techniques", Fourth Edition, Elsevier, 2017.

Reference Books:

9. Draper, N. R. and Smith, H., "Applied Regression Analysis", Third Edition, John Wiley, 1998.
10. Hosmer, D. W. and Lemeshow, S., "Applied Logistic Regression", Third Edition, Wiley, 2003.
11. Daniel T.Larose, "Data Mining Methods and Models", Wiley-Interscience, 2006.
12. Jason Brownlee "Machine Learning Mastery with Weka" ,2020.
13. http://garfield.library.upenn.edu/classics1989/A1989AV48500001.pdf

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

B.TECH
COMPUTER SCIENCE AND BUSINESS SYSTEM
SEMESTER VII SYLLABUS

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

SYLLABUS

B.Tech(Computer Science and Business System) VII Semester

CB-701 USABILITY DESIGN OF SOFTWARE APPLICATIONS

Objectives:

- To learn the fundamentals of User Centered Design, their relevance and contribution to businesses.
- To study the principles of heuristic evaluation for interactive design.
- To understand the appreciation of user research, solution conceptualization and validation as interwoven activities in the design and development lifecycle.
- To familiarize the facets of User Experience (UX) Design, particularly as applied to the digital artefacts.
- To implement complex mobile/web applications.

UNIT-I INTRODUCTION TO USER CENTRED DESIGN

Basics of User Centred Design-Elements-Models and approaches-User Centred Design Principles-Usability-UCD Process-Analysis tools: personas, scenarios, and essential use cases with examples-User-Centred Design and Agile aspects of User Centred Design.

UNIT-II INTERACTIVE DESIGN EVALUATION

Introduction to Interactive Design process – Interactive design in practice – Introducing evaluation – Evaluation: Inspection, Analysis and Models – Inspection: Heuristic Evaluation: 10 Heuristic Principles, Examples – Case study: A Heuristic Evaluation of Iraq E-Portal.

UNIT-III DEVELOPMENT OF APPLICATION

Case Study: Development of any application like mobile or web based on User Centred Design – Design lifecyle: Establishing Requirements, Design, Prototyping and Construction.

UNIT-IV UX RESEARCH

Understanding users, their goals, context of use, and environment of use. Research Techniques: Contextual Enquiry, User Interviews, Competitive Analysis for UX.

UNIT-V ITERATIVE PRODUCT DEVELOPMENT

The Problem with Complexity - Iterative Product Development - Scenarios and Persona Technique, Design Thinking Technique: Discovery and brainstorming - Concept Development - Prototyping Techniques : Paper, Electronic, Prototyping Tools – Review and feedback

List of Experiments

1. Product Appreciation Assignment – Evaluating the product from User Centred Design aspects such as functionality, ease of use, ergonomics, and aesthetics.
2. Heuristic Evaluation: Group Assignment initiation (Website and App) Evaluation for key tasks of the app or website for heuristic principles, severity, recommendations.
3. Students will identify a project in the given domain (Healthcare, E-Commerce, Online Learning Platforms, Gaming, Point-of-Sale, Smart Things) and its related website or mobile app to redesign. They will take this redesign project through the design lifecycle:
   Discovery
   Define Design
   Implement (Design Prototype) Usability
   Testing
   The below design methods and techniques will be imparted w.r.t. the group project selected by the students.
4. Presentation of Persona for the group project
5. Task flow detailing for the project
6. Project Prototyping Iteration 1
7. Project Prototyping Iteration 2
8. Final Product Demo(Mobile or Web Application)

Course Outcomes:

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

- Understand the fundamentals and importance of User-Centred design.
- Perform design evaluation by applying the heuristic principles.

- Develop an application focusing on the design aspects.
- Do research on understanding user requirement.
- Perform iterative product development using prototyping technique.

Text Book (s):

1 Jenny Preece, Helen Sharp and Yvonne Rogers, "Interaction Design: Beyond Human-Computer Interaction", 3rd Edition, 2004.
2 Jonny Schneider , "Understanding Design Thinking, Lean, and Agile", 1st Edition, 2020.

Reference Books:

1 Alan Cooper and Robert Reimann, "About Face", John Wiley, 4th Edition.
2 Elizabeth Goodman, Mike Kuniavsky, Andrea Moed, "Observing the User Experience: A Practitioner's Guide to User Research", 2nd Edition, 2012.
3 Jesse James Garrett, The Elements of User Experience: User-Centered Design for the Web and Beyond, 2nd Edition, 2010.

SCHOOL OF INFORMATION TECHNOLOGY, RGPV BHOPAL

CB-702 IT Workshop (Matlab)

Objectives:

- To introduce the students with the basic features of MATLAB for problem solving.
- To introduce the students about the Mathematical functions like matrix generation and Plotting with multiple data sets, line styles and colors.
- To introduce the students about the Array operations and solving Linear equations in MATLAB.
- To introduce the students about the control flow and operators using if-end structures and loops.

UNIT-I INTRODUCTION TO MATLAB

Introduction to MATLAB: History, basic features, strengths and weaknesses, good programming practices and plan your code. Working with variables, workspace and miscellaneous commands: Creating MATLAB variables, overwriting variable, error messages, making corrections, controlling the hierarchy of operations or precedence, controlling the appearance of floating point number, managing the workspace, keeping track of your work session, entering multiple statements per line, miscellaneous commands.

UNIT-II MATRIX, ARRAY AND BASIC MATHEMATICAL FUNCTIONS

Matrix generation, entering a vector, entering a matrix, matrix indexing, colon operator, linear spacing, creating a sub-matrix, dimension, matrix operations and functions matrix generators, special matrices, array and array operations, solving linear equations, other mathematical functions.

UNIT-III BASIC PLOTTING

Overview, creating simple plots, adding titles, axis labels, and annotations, multiple data sets in one plot, specifying line styles and colours.

UNIT-IV INTRODUCTION TO PROGRAMMING

Introduction to programming: Introduction, M-File Scripts, script side-effects, M-File functions, anatomy of a M-File function, input and output arguments, input to a script file, output commands. Control flow and operators: "if ... end" structure, relational and logical operators, "for ... end" loop, "while ... end" loop, other flow structures, operator precedence, saving output to a file.

UNIT-V DEBUGGING M-FILES

Debugging process, preparing for debugging, setting breakpoints, running with breakpoints, examining values, correcting and ending debugging, correcting an M-file.

List of Experiments

1. Programs using mathematical, relational expressions and the operators.
2. Vectors and Matrices: Programs using array operations and matrix operations (such as matrix multiplication).
3. Programs on input and output of values.
4. Selection Statements: Experiments on if statements, with else and elseif clauses and switch statements.
5. Loop Statements and Vectorizing Code: Programs based on the concepts of counted (for) and conditional (while) loops.
6. Programs based on scripts and user-defined functions.
7. Programs on Built-in text manipulation functions and conversion between string and number types.
8. Programs based on two main data structures: cell arrays and structures.
9. Programs based on Data Transfer
10. Programs based on Advanced Functions.
11. Introduction to Object-Oriented Programming and Graphics.
12. Programs based on Advanced Plotting Techniques.
13. Programs based on sound files and image processing.
14. Programs based on Advanced Mathematics.

Course Outcomes:

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

- Write fundamental programs in MATLAB, creating variables and mathematical functions.
- Understand how to program matrix operations, array operations and how to solve the system of linear equations.
- Program the fundamentals concepts of basic Plotting consisting of simple and multiple data sets in one plot.
- Understand how to program M-file scripts, M- file functions, Input –output Arguments and program control flow operators, loops, flow structures.
- Use the debugging process and debugging M-files.

Text Books:

1 Rafael C. Gonzalez, Richard E. Woods, Steven Eddins, "Digital Image Processing using MATLAB", Pearson Education, Inc., 2004.

2 Stormy Attaway, Butterworth-Heinemann, "MATLAB: A Practical Introduction to Programming and Problem Solving", 5th Edition, 2018.

References:

1 https://www.mathworks.com/content/dam/mathworks/mathworks-dot com/moler/exm/book.pdf

2 https://www.mathworks.com/help/releases/R2014b/pdf_doc/matlab/getstart.pdf