RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

VI Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business System (CSBS)

CB-601 COMPUTER NETWORKS

UNIT – I

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

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

Computer Networks Lab

1. Socket Programming using C/C++
2. Network System Administration: Understanding switches and routers

List of Experiments

1. Study & demo of all networking equipments and Functionalities.
2. Study and Verification of standard Network topologies i.e. Star, Bus, Ring etc. LAN installations and Configurations.

3. Network System Administration: Understanding switches and routers.
4. Network configuration commands using Linux.
5. Implementation of various error detection and correction mechanisms.
6. Implementation of various framing methods.
7. Implementation of various error flow control mechanisms.
8. Study and Installation of Standard Network Simulator: NS-2, NS-3, OpNet, QualNet etc. Observing Packets across the network and Performance Analysis of Routing protocols.
9. Implement & simulate various types of routing algorithm.
10. Socket programming (TCP and UDP) – Multi client chatting.
11. Develop a DNS client server to resolve the given host name or IP address.
12. Configure 802.11 WLAN.
13. Implementation of Layers for security protocols - SSL/TLS.
14. Study & Simulation of MAC Protocols like Aloha, CSMA, CSMA/CD and CSMA/CA using Standard Network Simulators.
15. Study of Application layer protocols-DNS, HTTP, HTTPS, FTP and TelNet.

Text Book(s):

1. Andrew S. Tanenbaum, David J. Wetherall, “Computer Networks” Pearson Education.
2. William Stallings, “Data and computer communications” Pearson Education India.

Reference Books(s):

1. Perlman, R., Kaufman, C., and Speciner, M. (2016). Network security: private communication in a public world. Pearson Education India.
2. Stevens, W. R., Fenner, B., and Rudoff, A. M. (2018). UNIX Network Programming Volume SMIT-SMU.
3. Douglas E Comer, “Internetworking With Tcp/Ip Principles, Protocols, And Architecture - Volume I" 6th Edition, Pearson Education.
4. Dhanashree K. Toradmalle "Computer Networks and Network Design", Wiley India
5. Dimitri Bertsekas, Robert Gallager, “Data Networks”, PHI Publication, Second Edition.
6. Kaveh Pahlavan, Prashant Krishnamurthy, “Networking Fundamentals”, Wiley Publication.
7. Uyless Black, “Computer Networks”, PHI Publication, Second Edition.
8. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, McGraw Hill.

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VI Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business System (CSBS)

CB-602 INFORMATION SECURITY

UNIT – I

Overview of Security Parameters: Confidentiality, integrity and availability; Security violation and threats; Security policy and procedure; Assumptions and Trust; Security Assurance, Implementation and Operational Issues; Security Life Cycle.

UNIT – II

Access Control Models: Discretionary, mandatory, role-based and task-based models, unified models, access control algebra, temporal and spatio-temporal models.

UNIT – III

Security Policies: Confidentiality policies, integrity policies, hybrid policies, non-interference and policy composition, international standards.

Systems Design: Design principles, representing identity, control of access and information flow, confinement problem. Assurance: Building systems with assurance, formal methods, evaluating systems.

UNIT – IV

Logic-based System: Malicious logic, vulnerability analysis, auditing, intrusion detection. Applications: Network security, operating system security, user security, program security. Special Topics: Data privacy, introduction to digital forensics, enterprise security specification.

UNIT – V

Operating Systems Security: Security Architecture, Analysis of Security in Linux/Windows. Database Security: Security Architecture, Enterprise security, Database auditing.

Lab

1. Analysis of security in Unix/Linux.
2. Administration of users, password policies, privileges and roles

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, and all contacts list using the forensics tool like SAFT.
10. Implementation to identify web vulnerabilities, using OWASP project.

Text Book(s):

1. R. Anderson, “Security engineering”. John Wiley & Sons, 2008.
2. M. Bishop, “Computer Security: Art and Science”, Pearson Education
3. M. Stamp, “Information security: principles and practice”. John Wiley & Sons, 2014.
4. William Stallings, “Cryptography and Network Security Principles and Practice” Fourth Edition, Pearson Education.

Reference Book(s):

1. C. P. Pfleeger, S. L. Pfleeger, J. Margulies, “Security in Computing”, Prentice Hall of India.
2. D. A Wheeler, Secure programming HOWTO, 2017.
3. C K Shyamala, N Harini, Dr. T R Padmanabhan, "Cryptography and Security", Wiley India
4. M. Zalewski, Google browser security handbook, 2009.
5. M. Gertz, & S. Jajodia, “Handbook of database security: applications and trends”, Springer Science & Business Media, 2007.
6. William Stallings, “Network Security Essentials: Applications and Standards”, Prentice Hall.
7. Behrouz A Ferouzan, “Cryptography and Network Security”, Tata Mc Graw Hills.
8. Jonathan Katz and Yehuda Lindell, “Introduction to Modern Cryptography”, Chapman and Hall/CRC

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VI Semester

Bachelor of Technology (B.Tech.) - Computer Science and Business System (CSBS)

CB-603 ARTIFICIAL INTELLIGENCE

UNIT – I

Introduction, Overview of Artificial intelligence: Problems of AI, AI technique, Tic-Tac-Toe problem. Intelligent Agents, Agents & environment, nature of environment, structure of agents, goal based agents, utility based agents, learning agents.

Problem Solving, Problems, Problem Space & search: Defining the problem as state space search, production system, problem characteristics, 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: 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: 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 (Language: Python/R/Lisp/Prolog)

1. Implementation of Breadth First Search.
2. Implementation of Depth First Search.
3. Implementation of Tic-Tac-Toe game.
4. Implementation of A* algorithm

5. Implementation of 8-Puzzle problem.
6. Implementation of Water-Jug problem.
7. Implementation of Travelling Salesman Problem.
8. Implementation of Monkey Banana Problem.
9. Implementation of N-Queens Problem.
10. Implementation of Unification and Resolution Algorithm
11. Implementation of Backward Chaining
12. Implementing Artificial Neural Networks for an application using python.
13. Implementation of Blocks World program
14. Implementation of SVM for an application using python.
15. Implementation of K-mean algorithm.

Text Book(s):

1. Stuart Russell and Peter Norvig, “Artificial Intelligence: A Modern Approach”, Pearson education.
2. Elaine Rich, Kevin Knight, Shivashankar B. Nair, “Artificial Intelligence”, Tata McGraw Hill.
3. Dan W. Patterson, “Introduction to Artificial Intelligence and Expert Systems”, Prentice India.
4. Dr. Nilakshi Jain, "Artificial Intelligence, As per AICTE: Making a System Intelligent", Wiley India

Reference Books(s):

1. Nils J. Nilson, “Principles of Artificial Intelligence”, Narosa Publishing House.
2. William F. Clocksin, Christopher S. Mellish, “Programming in PROLOG”, Narosa Publishing House.
3. M. Sasikumar, S. Ramani etc. “Rule based Expert System”, Narosa Publishing House.
4. Lavika Goel, "Artificial Intelligence: Concepts and Applications", Wiley India

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VI Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business System (CSBS)

CB-604 FINANCIAL & COST ACCOUNTING

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, Difference between them.

UNIT – V

Costing Systems: Elements of Cost, Cost Behaviour, Cost Allocation, OH 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.

Text Book(s):

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.
4. S.M. Shukla, "Financial Accounting", Sahitya Bhawan Publications.
5. K. L. Gupta, Dr. S.P. Gupta, "Management & Cost Accounting", Sahitya Bhawan Publications.

Reference Books(s):

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.

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VI Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business System (CSBS)

CB-605 Business Communication & Value Science – IV

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.

Text Book(s):

1. Shalini Kalia, Shailja Agarwal, "Business Communication: A Practice-Oriented Approach", Wiley India
2. Arthur H. Bell, Dayle M. Smith, K M Baharul Islam, "Business Communication, 3ed (An Indian Adaptation)", Wiley India

Web References

1. https://www.tata.com/about-us/tata-group-our-heritage

2. https://economictimes.indiatimes.com/tata-success-story-is-based-on-humanity-philanthropy-and-ethics/articleshow/41766592.cms

Online Resources

1. https://youtu.be/reu8rzD6ZAE
2. https://youtu.be/Wx9v_J34Fyo
3. https://youtu.be/F2hc2FLOdhI
4. https://youtu.be/wHGqp8lz36c
5. https://youtu.be/hxS5He3KVEM

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VI Semester

Bachelor of Technology (B. Tech.) - Computer Science and Business System (CSBS)

CB-606 (A) ROBOTICS AND EMBEDDED SYSTEMS

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- dvancements 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 Cyber security 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 MontiArc 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 open source 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.

Text Book (s):

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

Reference Books(s):

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

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VI Semester

Bachelor of Technology (B.Tech.) - Computer Science and Business System (CSBS)

CB-606 (B) MODERN WEB APPLICATIONS

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

Introduction to PHP, Numbers and Strings, Literals and Variables, Operators and Functions, arrays. Creating PHP Programs,.

PHP Form: Creating Form Controls, Using Values Returned From, Forms Using PHP - User Authentication: Creating Session, Authorization Level.

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. Design static web pages required for an online grocery store web site using HTML and CSS.
2. Design a web page with the following using HTML:
    b. To embed a map in a web page.

c. To fix the hot spots in that map.
d. Show all the related information when the hot spots are clicked.

a. 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.

3. Design 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.
4. Design a HTML page with frames, links, tables and other tags for highlighting the facilities in the Department in your College.
5. Design a web page for online cloths store with the following:
    a. Cascading style sheets.
    b. Embedded style sheets.
    c. Inline style sheets.
6. Write a JavaScript program to validate the fields required for book Store -
    a. Registration page.
    b. Create and Validate the Login page.
    c. After successful login, update the book details dynamically.
7. Write an XML file which will display the Book information which includes the following: Title of the book, Author Name, ISBN number, Publisher name, Edition, Price
8. Write PHP Program to for Book Store.
    a. Registration Page and
    b. Login Page
    c. Define Cart to select books and number of books, maintain Session for the page.
    d. Validate the Session data before completing the Order.
9. Write a PHP Code to make database connection and perform various CRUD operations.
10. Design a website for health and Fitness.

Text Book(s):

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 Book(s):

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, McGrawHill, 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.

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VI Semester

Bachelor of Technology (B.Tech.) - Computer Science and Business System (CSBS)

CB-606 (C) DATA MINING AND ANALYTICS

UNIT – I

Introduction to Data Mining: What is data mining? Related technologies - Machine Learning, DBMS, OLAP, Statistics, Stages of the Data Mining Process, Data Mining Techniques, Knowledge Representation Methods, Applications

UNIT – II

Data preprocessing: Data cleaning, Data transformation, Data reduction, Discretization and generating concept hierarchies, Installing Weka 3 Data Mining System, Experiments with Weka - filters, discretization

Data mining knowledge representation: Task relevant data, Background knowledge, Representing input data and output knowledge, Visualization techniques

Attribute-oriented analysis: Attribute generalization, Attribute relevance, Class comparison, Statistical measures

UNIT – III

Data mining algorithms - Association rules: Motivation and terminology, Example: mining weather data, Basic idea: item sets, Generating item sets and rules efficiently, Correlation analysis

Data mining algorithms - Classification: Basic learning/mining tasks, Inferring rudimentary rules: 1R, algorithm, Decision trees, covering rules

Data mining algorithms – Prediction: The prediction task, Statistical (Bayesian) classification, Bayesian networks, Instance-based methods (nearest neighbor), linear models

UNIT – IV

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: 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 ARMA models such as Yule-Walker estimation for AR Processes, Maximum likelihood and least squares estimation for ARMA 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. Create a Weather Table with the help of WEKA tool.
3. Apply Pre-Processing techniques to the training data set of Weather Table.
4. Normalize Weather Table data using Knowledge Flow.
5. Implement A-priori algorithm.
6. Implement FP Growth algorithm.
7. Implement Decision Tree learning.
8. Implement linear regression technique for statistical model building.
9. Implement Non-linear regression technique for statistical model building.
10. Implement Logistic Regression.
11. Implement classification using Multilayer perceptron.
12. Implement Bagging using Random Forests
13. Implement Bayesian networks
14. Implement K-Mean algorithm.

Text Books:

1. Jiawei Han and Micheline Kamber, “Data Mining: Concepts and Techniques”, Morgan Kaufmann Publishers, 3rd ed, 2010.
2. Lior Rokach and Oded Maimon, “Data Mining and Knowledge Discovery Handbook”, Springer, 2nd edition, 2010.
3. Daniel T. Larose, O.P. Wali, "Data Mining and Predictive Analytics, 2ed (An Indian Adaptation)", Wiley India
4. Box, G.E.P and Jenkins G.M. (1970) Time Series Analysis, Forecasting and Control, Holden-Day.

Reference Books:

1. Draper, N. R. and Smith, H. (1998). Applied Regression Analysis (John Wiley) Third Edition.
2. Hosmer, D. W. and Lemeshow, S. (1989). Applied Logistic Regression (Wiley).

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Bachelor of Technology (B.Tech.) - Computer Science and Business System (CSBS)

CB-607 Internship-III

The Internship-III is to be completed anytime during Fifth/Sixth semester. Its evaluation/credit will be added in Seventh Semester. Students can opt for Industry on their level and can go for internship. The student can choose internship based on their choice. There will be a faculty coordinator and a coordinator from the industry who will monitor student during internship. A detailed report on Internship III shall be submitted during the Seventh semester at the department level for its final evaluation.

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Bachelor of Technology (B.Tech.) - Computer Science and Business System (CSBS)

CB-608 Minor Project-II

The Minor Project-II is to be taken up with relevance to Industry and solve any real life problem. The supervisor continuously assesses the students during their project development process. At the end of the semester, Minor Project-II shall be presented at the department level for final evaluation. The Minor Project-II report shall be presented before Project Review Committee.