RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

V Semester

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

CB-501 SOFTWARE DESIGN WITH UML

UNIT – I

INTRODUCTION TO SOFTWARE ENGINEERING AND UML: Introduction- Software Engineering Concepts- Development activities- Managing software development- UML introduction- modeling concepts- Project organization and communication.

UNIT – II

REQUIREMENTS ELICITATION AND ANALYSIS: Introduction-Requirement Elicitation Concepts-Requirements Elicitation Activities- Managing Requirements Elicitation- Case Study: ARENA-Analysis concepts- Analysis activities: From Use cases to Objects- Managing Analysis.

UNIT – III

STATIC UML DIAGRAMS: Class Diagram- Elaboration - Domain Model- Finding conceptual classes and description classes- Associations- Attributes- Domain model refinement- Finding conceptual class Hierarchies- Aggregation and Composition- Relationship between sequence diagrams and use cases - When to use Class Diagrams

UNIT – IV

DYNAMIC UML DIAGRAMS: Dynamic Diagrams- UML interaction diagrams - System sequence diagram - Collaboration diagram- When to use Communication Diagrams- State machine diagram and Modelling - When to use State Diagrams-Activity diagram- When to use activity diagrams Implementation Diagrams- UML package diagram-When to use package diagrams- Component and Deployment Diagrams- When to use Component and Deployment diagrams

UNIT – V

DESIGN PATTERNS: Design Pattern- Describing Design Patterns- How design patterns solve design problems- Selecting a design Pattern- Using a design pattern- Case Study: Designing a Document Editor

Text Book

1. Bernd Bruegge and Allen H. Dutoit, "Object-Oriented Software Engineering: using UML, Patterns, and Java", Third Edition, Prentice Hall, 2010.

Reference Books:

1. Erich Gamma, Richard Helm, Ralph Johnson, and John M. Vlissides, "Design Patterns: Elements of Reusable Object-Oriented Software" Addison-Wesley Professional, 1994.
2. Ali Bahrami, "Object Oriented Systems Development", McGraw Hill Edition, 2017.

Online Resources

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

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V Semester

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

CB-502 COMPILER DESIGN

UNIT – I

Introduction: Phases of compilation and overview. Lexical Analysis (scanner): Regular languages, finite automata, regular expressions, relating regular expressions and finite automata, scanner generator, lex, flex.

UNIT – II

Syntax Analysis (Parser): Context-free languages and grammars, push-down automata, LL(1) grammars and top-down parsing, operator grammars, LR(0), SLR(1), LR(1), LALR(1) grammars and bottom-up parsing, ambiguity and LR parsing, LALR(1) parser generator, yacc, bison

UNIT – III

Semantic Analysis: Attribute grammars, syntax directed definition, evaluation and flow of attribute in a syntax tree.

Symbol Table: Basic structure, symbol attributes and management. Run-time environment: Procedure activation, parameter passing, value return, memory allocation, scope.

UNIT – IV

Intermediate Code Generation: Translation of different language features, different types of intermediate forms.

Code Improvement (optimization): control-flow, data-flow dependence etc.; local optimization, global optimization, loop optimization, peep-hole optimization etc.

UNIT – V

Architecture dependent code improvement: instruction scheduling (for pipeline), loop optimization (for cache memory) etc. Register allocation and target code generation.

Advanced topics: Type systems, data abstraction, compilation of Object Oriented features and non-imperative programming languages.

Lab

Assignments using Lex and Yaac

Books:

1. Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. Ullman. Pearson Education
2. Lex &Yacc, Levine R. John, Tony Mason and Doug Brown, O'Reilly

Reference Books:

1. The Design and Evolution of C++, Bjarne Stroustrup.
2. Compiler Design, Raghavan, TMH Pub.
3. Compiler Construction: Principles and Practice, Louden, Cengage Learning
4. Compiler Design in C, A. C. Holub. Prentice-Hall Inc., 1993.
5. Writing compiler & Interpreters, Mak, Willey Pub.

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V Semester

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

CB-503 FUNDAMENTALS OF MANAGEMENT

UNIT – I

Management Theories: Concept and Foundations of Management, Evolution of Management Thoughts [Pre-Scientific Management Era (before 1880), Classical management Era (1880-1930), Neo-classical Management Era (1930-1950), Modern Management era (1950-on word). Contribution of Management Thinkers: Taylor, Fayol, Elton Mayo etc.

UNIT – II

Functions of Management- Planning, Organizing, Staffing, Directing, Controlling

UNIT – III

Organization Behavior: Introduction, Personality, Perception, Learning and Reinforcement, Motivation, Group Dynamics, Power & Influence, Work Stress and Stress Management, Decision Making, Problems in Decision Making, Decision Making, Organizational Culture, Managing Cultural Diversity

UNIT – IV

Organizational Design: Classical, Neoclassical and Contingency approaches to organizational design; Organizational theory and design, Organizational structure (Simple Structure, Functional Structure, Divisional Structure, Matrix Structure)

UNIT – V

Managerial Ethics: Ethics and Business, Ethics of Marketing & advertising, Ethics of Finance & Accounting, Decision – making frameworks, Business and Social Responsibility, International Standards, Corporate Governance, Corporate Citizenship, Corporate Social Responsibility

Leadership: Concept, Nature, Importance, Attributes of a leader, developing leaders across the organization, Leadership Grid.

Home Assignment:

The topic for class discussion will be mentioned beforehand and students should be ready to discuss these topics (in groups) in class. Students are required to meet in groups before coming to class and prepare on the topic. Few topics are mentioned below as examples. Instructor can add or change any topic as per requirement.

1. Topic: Corporate social responsibility (CSR) and HRM implications: What does it mean to be socially responsible within an increasingly financially driven market economy?
2. Topic: Leaders are Born, Not Made! The debate

Text Books:

1. Understanding the Theory and Design of Organizations by Richard L. Daft, 11e, Cengage, 2020
2. Management by James Arthur, Finch Stoner, R. Edward Freeman, and Daniel R Gilbert 6th Ed; Publisher: Pearson Education/Prentice Hall
3. Organizational Behaviour by Stephen P. Robbins, Prentice Hall, 2013

Reference Books:

1. Organizational Behaviour by Fred Luthans, Mc Graw-Hill, 2013
2. Organizational Behavior by Stephen P. Robbins, Timothy A. Judge, Neharika Vohra, 16e, Pearson Education, 2016

3. Business Ethics: Ethical Decision Making & Cases, by O. C. Ferrell, John Fraedrich, Linda Ferrell, 12th edition, Cengage,2017

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V Semester

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

CB-504 Business Strategy

UNIT – I

Introduction to Strategic Management, Importance of Strategic Management, Vision and Objectives, Schools of thought in Strategic Management, Strategy Content, Process, and Practice, Fit Concept and Configuration Perspective in Strategic Management

UNIT – II

Internal Environment of Firm- Recognizing a Firm's Intellectual Assets, Core Competence as the Root of Competitive Advantage, Sources of Sustained Competitive Advantage, Business Processes and Capabilities-based Approach to Strategy.

UNIT – III

External Environments of Firm- Competitive Strategy, Five Forces of Industry Attractiveness that Shape Strategy, The concept of Strategic Groups, and Industry Life Cycle, Generic Strategies, Generic Strategies and the Value Chain.

UNIT – IV

Corporate Strategy, and Growth Strategies, The Motive for Diversification, Related and Unrelated Diversification, Business Portfolio Analysis, Expansion, Integration and Diversification, Strategic Alliances, Joint Ventures, and Mergers & Acquisitions

UNIT – V

Strategy Implementation: Structure and Systems, The 7S Framework, Strategic Control and Corporate Governance

Home Assignment:

- Latest business events would be discussed in class and students should be ready to discuss these events (in groups). The topic will be mentioned beforehand. Students are required to meet in groups before coming to class and prepare on the topic.
- There will be periodic homework assignments relating to the course concepts or mini-cases. Specific instructions will be given separately.

Final Project:

Students (in groups) are required to work on a project and submit the project report and deliver presentation. The topic of the project will be given later.

Text Books:

1. Contemporary Strategic Management by Robert M. Grant, 7th Edition, Blackwell, 2012
2. Competitive Strategy by Michael E. Porter, The Free Press, 1980
3. Competitive Advantage by Michael E. Porter, The Free Press, 1985

Reference Books:

1. Competitive Strategy, 1980.M.E. Porter,
2. Competitive Advantage, 1985 Richard Rumelt (2011).

3. Good Strategy Bad Strategy: The Difference and Why It Matters by Richard Rumelt, Profile Books Ltd, 2013
4. Strategic Management by Francis Cherunilam, 4th Edition, HPH, 2016
5. Strategic Management and Business Policy by Azhar Kazmi, McGraw Hill Education, 2018

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V Semester

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

CB-505 Business Communication & Value Science-III

Unit I

SWOT and Motivation in Real Life Scenarios, SWOT and Life Positions; Create your SWOT; SWOT Vs. TOWS – The Balancing Act; Presentation on the strengths identified to survive in the VUCA World; Motivation; Scenario based activity on identifying and leveraging motivation; Present findings and approaches as groups.

Unit II

Pluralism in Cultural Spaces Rivers of India; Awareness and respect for pluralism in cultural spaces; Rhythms of India (Cultures in India; Global, Glocal, Translocational, Debate on Global, Glocal, tanslocational impacts; Cross-cultural communication; Culture shock; Gender awareness - Gender awareness campaign

Unit III

Role of science in nation building, Role of science post- independence, Introduction to technical writing, Basic rules of technical writing through examples. Practice activity on technical writing. Application of technical writing in real-life scenarios. Maslow's theory - Recognize how motivation helps real life - Leverage motivation in real-life scenarios.

Unit IV

Introduction to Artificial Intelligence, Importance of AI, AI in Everyday Life

Text Book(s)

1. Kumar, Sanjay and Pushp Lata. English Language and Communication Skills for Engineers, Oxford University Press.

Reference Books

2. Pringle, A. S., & O'Keefe, S. S. (2009). Technical Writing 101: A Real-World Guide to Planning and Writing Technical Content (3rd ed.). Scriptorium Publishing Services, Inc.
4. Alred, G. J., Brusaw, C. T., &Oliu, W. E. (2011). Handbook of Technical Writing, Tenth Edition (10th ed.). St. Martin's Press.
5. Reynolds, S., Valentine, D., &Munter, M. M. (2019). Guide to Cross-Cultural Communications (2nd Edition) (Guide to Series in Business Communication) (2nd ed.). Pearson
6. Hurn, B., & Tomalin, B. (2016). Cross-Cultural Communication: Theory and Practice (1st ed. 2013 ed.). Palgrave Macmillan.

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V Semester

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

CB-506 (A) Conversational Systems

Unit I

Fundamentals of Conversational Systems:

Introduction: Overview, Case studies, Explanation about different modes of engagement for a human being, History and impact of AI.

Underlying Technologies: Natural Language Processing, Artificial Intelligence and Machine Learning, NLG, Speech-To-Text, Text-To-Speech, Computer Vision etc.

Introduction to Top players in Market – Google, MS, Amazon &Market trends.

Messaging Platforms (Facebook, WhatsApp) and Smart speakers – Alexa, Google Home and other new channels. Ethical and Legal Considerations in AI Overview

Unit II

Foundational Blocks for Programming: Basic Python programming concepts, Node Basics.

Natural Language Processing: Introduction: Brief history, Basic Concepts, Phases of NLP, Application of chatbots etc. General chatbot architecture,

Basic concepts in chatbots: Intents, Entities, Utterances, Variables and Slots, Fulfillment. Lexical Knowledge Networks (WordNet, Verbnet, PropBank, etc). Lexical Analysis, Part-of-Speech Tagging, Parsing/Syntactic analysis, Semantic Analysis, Word Sense Disambiguation. Information Extraction, Sentiment Analysis), Affective NLG

Unit III

Building a chatbot/Conversational AI system: Fundamentals of Conversational Systems (NLU, DM and NLG), Chatbot framework & Architecture, Conversational Flow & Design, Intent Classification (ML and DL based techniques), Dialogue Management Strategies, Natural Language Generation, UX design, APIs and SDKs, Usage of Conversational Design Tools.

Introduction to popular chatbot frameworks – Google Dialog flow, Microsoft Bot Framework, Amazon Lex, RASA Channels: Facebook Messenger, Google Home, Alexa, WhatsApp, Custom Apps. Overview of CE Testing techniques, A/B Testing, Introduction to Testing Frameworks - Botium /Mocha ,Chai. Security & Compliance – Data Management, Storage, GDPR, PCI.

Unit IV

Role of ML/AI in Conversational Technologies –Brief Understanding on how Conversational Systems uses ML technologies in ASR, NLP, Advanced Dialog management, Language Translation, Emotion/Sentiment Analysis, Information extraction, etc. to effectively converse

Unit V

Contact Centers: Introduction to Contact centers – Impact & Terminologies. Case studies & Trends, How does a Virtual Agent/Assistant fit in here?

Overview on Conversational Analytics: Conversation Analytics: The need of it, Introduction to Conversational Metrics.

Future– Where are we headed? Summary, Robots and Sensory Applications overview, XR Technologies in Conversational Systems, XR-Commerce, What to expect next? – Future technologies and market innovations overview.

Text Books:

1. Designing Voice User Interfaces: Principles of Conversational Experiences 1st Edition by Cathy Pearl, O'Reilly
2. Conversational Interfaces: Principles of Successful Bots, Chatbots & Messaging Apps By Mariya Yao

References:

1. Bot Business 101: How to start, run & grow your Bot / AI business By Ekim Kaya
2. Designing Bots: Creating Conversational Experiences By Amir Shevat O'Reilly
3. Designing Conversational Interfaces By Alper Çuğun

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V Semester

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

CB-506 (B) Cloud, Microservices & Application

Unit I

Cloud Fundamentals; Cloud Service Components, Cloud service/Deployment Models. Cloud components Guiding Principle with respect to utilization/Security/Pricing. and the applications of Cloud.. Public Cloud Platforms overview and their usage.

Unit II

Application architectures-Monolithic & Distributed, Microservice fundamental and design approach, Cloud Native applications-12 Factors App.

Unit III

Application integration process/Apification Process, API Fundamental. Microservice /API management, Spring boot Fundamental and design of microservice, API tools. Developer Portal. Applications of Microservice and APIFICATION.

Unit IV

Devops fundamentals: Tools and Applications Containerization Process and application. Python-Refresher, Use cases for cloud application development.

Unit V

Design and developing solution steps using containers & containerization of application and deployment using Kubernetes, Cloud Security and Monitoring Tools

Text Books:

1. Cloud Computing: Principles and Paradigms by RajkumarBuyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011
2. Cloud Computing Virtualization Specialist Complete Certification Kit - Study Guide Book, Ivanka Menken Gerard Blokdijk, 2009
3. Cloud Security: A Comprehensive Guide to Secure Cloud Computing By Ronald L. Krutz, Russell Dean Vines

Reference Books:

1. Cloud Computing: A Practical Aprroach, Anthony T.Velte, TobeJ.Velte, Robert Elsenpeter, Publication Person Education, 2009
2. Storage Virtualization: Technologies for Simplifying Data Storage and Management, Tom Clark, Addison-Wesley, 2005
3. Cloud Computing Technologies and Strategies of the Ubiquitous Data Center, Curtis Franklin Jr.Brian J.S. Chee, 2010
4. Introduction to Cloud Computing: Business & Technology, Timothy Chou,2009

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V Semester

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

CB-506 (C) Machine Learning

UNIT – I

Introduction to Machine Learning (ML); Relationship between ML and human learning; A quick survey of major models of how machines learn; Example applications of ML.

UNIT – II

Classification: Supervised Learning; The problem of classification; Feature Engineering; Training and testing classifier models; Cross-validation; Model evaluation (precision, recall, F1-mesure, accuracy, area under curve); Statistical decision theory including discriminant functions and decision surfaces; Naive Bayes classification; Bayesian networks; Decision Tree and Random Forests; k-Nearest neighbor classification; Support Vector Machines; Artificial neural networks including backpropagation; Applications of classifications; Ensembles of classifiers including bagging and boosting.

UNIT – III

Hidden Markov Models (HMM) with forward-backward and Vierbi algorithms; Sequence classification using HMM; Conditional random fields; Applications of sequence classification such as part-of-speech tagging.

UNIT – IV

Regression: Multi-variable regression; Model evaluation; Least squares regression; Regularization; LASSO; Applications of regression

UNIT – V

Association rule mining algorithms including apriori, Expectation-Maximization (EM) algorithm for unsupervised learning. Clustering: Average linkage; Ward's algorithm; Minimum spanning tree clustering; K- nearest neighbours clustering; BIRCH; CURE; DBSCAN, Anomaly and outlier detection methods.

Text Books:

1. Machine Learning, Tom M. Mitchell, vMcGraw-Hill
2. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007

References:

1. Machine Learning: An Algorithmic Perspective, Stephen Marshland, Taylor & Francis
2. Machine Learning: The art and science of algorithms that make sense of data, Peter Flash, Cambridge. University press
3. The Elements of Statistical Learning, Trevor Hastie, Robert Tibshirani, Jerome Friedman, Springer 2009
4. Pattern Classification, 2/e, R.O. Duda, P.E. Hart, D.G. Stork, Wiley, 2001
5. Pattern Recognition and Machine Learning, C. Bishop, Springer, 2007
6. Introduction to Machine Learning, 3/e, E. Alpaydin, Prentice-Hall, 2014
7. Foundations of Machine Learning, A.Rostamizadeh, A. Talwalkar, M. Mohri, MIT Press
8. Statistical Pattern Recognition, 3/e, A. Webb, Wiley, 2011