SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

CSE701 Distributed System

Course Objectives:

1. To provide an understanding of the key concepts and principles underlying distributed systems, including architecture and models.
2. To explore the communication protocols and mechanisms used in distributed systems including remote procedure calls (RPC) and message passing.
3. To examine security challenges and mechanisms in distributed computing environments.

Unit I: Introduction to Distributed Systems:
Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

Unit II: Distributed Share Memory and Distributed File System:
Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing. Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance.

Unit III: Inter Process Communication and Synchronization:
API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC: Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: Clock Synchronization, Mutual Exclusion, Election Algorithms: Bully & Ring Algorithms.

Unit IV: Distributed Scheduling and Deadlock:
Distributed Scheduling: Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues, Deadlock-Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms

Unit V: Distributed Multimedia and Database system:
Distributed Data Base Management System (DDBMS), Types of Distributed Database, Distributed Multimedia:- Characteristics of multimedia Data, Quality of Service Managements. Case Study of Distributed System:- Amoeba, Mach, Chorus.

Reference Books:

1. Sinha, Distributed Operating System Concept & Design, PHI

2. Coulouris & Dollimore, Distributed System Concepts and Design, Pearson Pub
3. Singhal & Shivratari, Advance Concept in Operating System, McGraw Hill
4. Attiya & Welch, Distributed Computing, Wiley Pub.

Course Outcome:

At the end of the course, students should be able to:

1. Describe the fundamental principles and architectures of distributed systems.
2. Demonstrate the ability to implement communication protocols using techniques like RPC and message passing.
3. Design distributed systems that incorporate fault tolerance and reliability features.
4. Assess security challenges in distributed systems and propose appropriate security measures.

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

CSE702 Compiler Design

Course Objectives:

1. To provide a comprehensive understanding of the components and architecture of a compiler.
2. To introduce students to the principles of lexical analysis, including tokenization and regular expressions.
3. To teach syntax analysis techniques, including context-free grammars, parsing methods (top-down and bottom-up), and syntax trees.
4. To introduce various optimization techniques for improving the performance of the generated code.
5. To understand code generation techniques and how to produce target machine code.

Unit I: Introduction to Compiler & Lexical Analysis:
Introduction of Compiler, Major data Structure in compiler, BOOT Strapping & Porting, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering, Specification & Recognition of Tokens, LEX.

Unit II: Syntax Analysis & Syntax Directed Translation:
Syntax analysis: CFGs, Top down parsing, Brute force approach, recursive descent parsing, transformation on the grammars, predictive parsing, bottom up parsing, operator precedence parsing, LR parsers (SLR, LALR, LR), Parser generation. Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

Unit III: Type Checking & Run Time Environment:
Type checking: type system, specification of simple type checker, equivalence of expression, types, type conversion, overloading of functions and operations, polymorphic functions. Run time Environment: storage organization, Storage allocation strategies, parameter passing, dynamic storage allocation , Symbol table

Unit IV: Code Generation:
Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements, back patching, Procedure calls Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

Unit V: Code Optimization:

Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations ,Data flow analysis of structure flow graph Symbolic debugging of optimized code.

List of Experiments:

1. Develop a lexical analyzer to recognize a few patterns.
2. Write a programme to parse using Brute force technique of Top-down parsing.
3. Develop LL (1) parser (Construct parse table also).
4. Develop an operator precedence parser (Construct parse table also)
5. Develop a recursive descent parser
6. Write a program for generating for various intermediate code forms
   (i) Three address code (ii) Polish notation
7. Write a program to simulate Heap storage allocation strategy
8. Generate Lexical analyzer using LEX
9. Generate YACC specification for a few syntactic categories.
10. Given any intermediate code form implement code optimization techniques.

Reference Books:

5. A.V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques and Tools, Pearson Education
6. Raghavan, Compiler Design, TMH Pub.
7. Louden. Compiler Construction: Principles and Practice, Cengage Learning
8. A. C. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
9. Mak, Writing Compiler & Interpreters, Willey Pub.

Course Outcome:

At the end of the course, students should be able to:

1. Describe the main components and phases of a compiler, including their functions and interactions.
2. Design and implement a lexical analyzer using regular expressions and finite automata.
3. Construct parse trees and abstract syntax trees using different parsing techniques.
4. Identify and apply code optimization techniques to improve efficiency.
5. Produce machine code or intermediate code that can be executed on a target platform.

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

CSE703 Web Engineering

Course Objectives:

1. To provide a comprehensive understanding of the fundamental technologies and frameworks used in web development.
2. To teach Client-side Scripting languages and technologies, including HTML, CSS, and JavaScript.
3. To introduce security best practices and performance optimization techniques in web applications.

Unit I: Introduction:

Introduction: Web browsers and its functions, web optimizations; Static page design; designing static web pages with HTML5.0-HTML basic, multimedia, Graphics, Form tags, CSS 2.0 concept and its properties & CSS 3.0 properties i.e. borders, backgrounds, fonts, text effects, Buffering, Weblog, Web Cache Poisoning.

Unit II: JavaScript:

JavaScript: Document Object Model (DOM), Obtaining user inputs, memory concepts, Operators, Control Structures, Looping constructs, break, continue statements, Programmer defined functions, Scoping rules, Recursion and iteration, Array declaration and allocation, passing arrays to function, Objects: String, Date, Boolean, Window, document using cookies, form validation in Java Script, Handling Events Using JavaScript.

Unit III: PHP:

PHP: Installing and Configuring MySQL and PHP, Basic Security Guidelines, Variables, Data Types, Operators and Expressions, Constants, Flow Control Functions; Switching Flow, Loops, Code Blocks and Browser Output, Objects, Strings Processing, Form processing, Connecting to database, cookies, Session, dynamic contents.

Unit IV: Introduction to AJAX:

Exploring different Web Technologies, Creating a simple AJAX application, Interacting with the Web Server Using the XMLHttpRequest Object, Create an XMLHttpRequest Object, Interact with the Web Server. Differentiating AJAX and Non-AJAX applications. Search engine optimization for individual web pages: header entries, tags, selection of URL, alt tags, Search engine optimization for entire website: Hyperlinks and link structure, page rank of Google, click rate, residence time of website.

Unit V: E-Commerce & Security:

E- Commerce: Business Models, Infrastructure, Creating an E-commerce Web Site, Environment and Opportunities, Modes & Approaches, Marketing & Advertising concepts. Electronic Publishing issues, approaches, legalities and technologies, Secure Web document, Digital Signatures and Firewalls, Cyber crime and laws, IT Act. Electronic Cash, Electronic Payment Systems: RTGS,

NEFT, Internet Banking, Credit/Debit Card.
Security: Digital Certificates & Signatures, SSL, SET, 3D Secure Protocol.

Reference Books:

1. Roger S. Pressman, David Lowe, "Web Engineering", Tata Mc Graw Hill Publication, 2007
2. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
3. Gopalan N P , Akilandeswari, "Web Technology: A Developer s Perspective" , PHI
4. Neil Gray, "Web server Programming" Wiley
5. Chris Bates, "Web Programming: Building Internet applications" Wiley
6. Moller, "An Introduction to XML and Web Technologies", Pearson Education New Delhi, 2009
7. "Web Technologies: Black Book", Kogent, Dreamtech
8. Internet & World Wide Web How to Program, Pearson education, 3rd edition, by: H.M. Deitel, P.J. Deitel, A.B. Goldberg.
9. C. Xavier, "Web Technology & Design", Tata McGraw Hill.
10. Ivan Bay Ross, "HTML,DHTML, Java script, Perl CGI" , BPB

Course Outcome:

At the end of the course, students should be able to:

1. Explain the key technologies and frameworks used in modern web development.
2. Develop interactive client-side features using HTML, CSS, and JavaScript.
3. Create user-friendly and responsive web interfaces that adhere to design principles.
4. Identify common security vulnerabilities in web applications and implement measures to mitigate them.

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

Elective-III CSE7041 Embedded System

Course Objectives:

1. To introduce the basic concepts of embedded systems, including their architecture, components, and applications.
2. To introduce the concepts and design principles of real-time operating systems used in embedded applications.
3. To learn about interfacing techniques for sensors, actuators, and communication protocols.
4. To cover debugging techniques and testing methodologies specific to embedded systems.

Unit I: Embedded Computing:

Embedded computing: Characteristics of embedded computing applications, challenges in embedded computing system design, design hardware and software components. Hardware fundamentals: Microprocessor, Buses, DMA, UART Programmable Array Logic Application specific IC, Watch dog timers, memory caches and instruction pipelines, interrupt basics, interrupt latency.

Unit II: Embedded System Development:

Embedded system development tools: Host and target machines, linkers and locators, JTAG port, monitor, build process in an embedded system. Hardware debugging aids like in build circuit emulators and logic analyzers.

Unit III: Real Time OS:

Software architecture for implementing various tasks: round robin with / without interrupts, function queue scheduling architecture, real time operating system.

Unit IV: Communication Techniques:

Rate monotonic and EDF scheduling, priority inversion, Shared data problems and intertask communication techniques : semaphores, message queue, buffers, mailboxes, reentrancy issue, timer functions, interrupts and I/O. Evaluating Operating System Performance, Power optimization strategies for professes, ACPI.

Unit V: Network Embedded System:

Network embedded system, distributed embedded architecture, hardware and software architecture, 12 C bus, CAN bus, Myrinet, networked based design: Communication analysis performance analysis, hardware platform design, allocation and scheduling, internet embedded system.

Text Books:

1. Computers as Components: Principles of Embedded Computing System Design, Wayne Wolf, Morgan Kaufman Publishers

2. An Introduction Software Primer, David E. Simon, Pearson Education.

Reference Books:

1. Embedded System Design – A Unified Hardware/ Software Introduction, Frank Vahid& Tony Givargis John Wiley
2. Embedded System Design, Steve Heath, Oxford: Newnes
3. Fundamentals of Embedded Software where C and Assembly Meet, David W. Lewis, Pearson LPE
4. Embedded System Architecture Programming and Design, Raj Kamal, Tata-McGraw Hill
5. Introduction to the Design of Small-scale Embedded Systems, Wilmshurst, Tim, Palgrave Macmillan

Course Outcome:

At the end of the course, students should be able to:

1. Describe the fundamental components and architectures of embedded systems.
2. Apply real-time operating system concepts in the design of embedded applications.
3. Design and implement hardware-software integrated systems.
4. Interface various sensors and actuators with embedded systems using standard communication protocols.

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

Elective-III CSE7042 Digital Image Processing

Course Objectives:

1. To provide a comprehensive understanding of the principles and techniques used in digital image processing.
2. To explore various techniques for image enhancement, including spatial and frequency domain methods.
3. To understand image compression techniques and standards to reduce image storage and transmission requirements.
4. To explore methods for extracting features and recognizing patterns within images.

Unit I: Fundamentals:

Digital Image fundamentals, A simple image model, Sampling and Quantization. Relationship between pixels. Imaging geometry. Image acquisition systems, Different types of digital images.

Unit II: Transformations:

Image transformations, Introduction to Fourier transforms, Discrete Fourier transforms, Fast Fourier transform, Walsh transformation, Hadmord transformation, Discrete Cosine Transformation.

Unit III: Filtering:

Image enhancement, Filters in spatial and frequency domains, Histogram based processing. Image subtraction, Averaging, Image smoothing, Nedion filtering, Low pass filtering, Image sharpening by High pass filtering.

Unit IV: Image Encoding and Segmentation:

Image encoding and segmentation, Encoding: Mapping, Quantizer, Coder. Error free compression, Lossy Compression schemes. JPEG Compression Standard. Detection of discontinuation by point detection, Line detection, edge detection, Edge linking and boundary detection, Local analysis, Global processing via Hough transforms and graph theoretic techniques.

Unit V: Mathematical Morphology:

Mathematical morphology- Binary, Dilation, crosses, Opening and closing, Simple methods of representation, Signatures, Boundary segments, Skeleton of a region, Polynomial approximation.

Reference Books:

1. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing Pearson.
2. Rafael C Gonzalez, Richard E Woods 3rd Edition, Digital Image Processing using Matlab – TMH.
3. Sonka, Digital Image Processing & Computer Vision, Cengage Learning
4. Jayaraman, Digital Image Processing, TMH.

5. Pratt, Digital Image Processing, Wiley India
6. Annadurai, Fundamentals of Digital Image Processing, Pearson Education.

Course Outcome:

At the end of the course, students should be able to:

1. Describe fundamental concepts and techniques used in digital image processing.
2. Apply methods for representing and analyzing digital images using appropriate tools.
3. Implement image enhancement techniques in both spatial and frequency domains.
4. Discuss and implement various applications of digital image processing, such as in medical imaging, computer vision, and remote sensing.

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

Elective-III CSE7043 Modern Information Retrieval

Course Objectives:

1. To provide a comprehensive understanding of the principles and techniques underlying information retrieval (IR) systems.
2. To explore algorithms used for searching and ranking documents in response to queries.
3. To introduce concepts of relevance, precision, recall, and methods for evaluating IR systems.

Unit I: Introduction to MIR:

Introduction: Information versus data retrieval, the retrieval process, taxonomy of Information Retrieval Models.

Unit II: Retrieval Techniques:

Classic Information Retrieval Techniques: Boolean Model, Vector model, Probabilistic Model, comparison of classical models. Introduction to Alternative Algebraic models such as Latent Semantic Indexing etc.

Unit III: Introduction to Pattern Matching:

Keyword based Queries, User Relevance Feedback: Query Expansion and Rewriting, Document preprocessing and clustering, Indexing and Searching: Inverted Index construction, Introduction to Pattern matching.

Unit IV: Web Search:

Web Search: Crawling and Indexes, Search Engine architectures, Link Analysis and ranking algorithms such as HITS and Page Rank, Meta searches, Performance Evaluation of search engines using various measures, Introduction to search engine optimization.

Unit V: Online System:

Introduction to Online IR Systems, Digital Library searches and web Personalization.

Text Books:

1. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, “Modern Information Retrieval” Pearson Education
2. C. Manning, P. Raghvan and H. Schutze, “Introduction to Information Retrieval”, Cambridge University Press.

Reference Books:

1. Amy N. Langville and Carl D. Meyer, “Google’s PageRank and Beyond: The Science of Search Engine Rankings”, Princeton University Press
2. Pierre Baldi, Paolo Frasconi and PadhraicSmythe, “Modelling the internet and the web:

Probabilistic methods and Algorithms", John Wiley

Course Outcome:

At the end of the course, students should be able to:

1. Describe fundamental concepts and techniques in modern information retrieval.
2. Implement data representation and indexing methods for efficient information retrieval.
3. Identify and solve challenges related to information retrieval in web and social media environments.

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

Elective-IV CSE7051 Human Computer Interaction

Course Objectives:

1. To provide a foundational understanding of the principles and theories of human-computer interaction.
2. To explore concepts of usability, user experience, and methods for evaluating interactive systems.
3. To examine various interaction techniques and modalities, including gestures, speech, and touch.

Unit I: Introduction to HCI:
Introduction to Human Computer Interaction: HCI History, HCI Frameworks, HCI Paradigms, Aspects of Human Cognition.

Unit II: Evolution:
Introduction to Evaluation, Predictive evaluation, heuristic evaluation, User modeling, UCD Process, Usability Principles, User-centered Design, Dialog: Command Language Interface & Graphical User Interface, Dialog: Pen & PDA.

Unit III: HCI Models:
Human Abilities, IRB & Ethics, Predictive Models and Cognitive Models, Descriptive Cognitive Models, Ubiquitous Computing.

Unit IV: Design Techniques to HCI:
Natural Language & Speech, Information Visualization, Universal Design & Assistive Technology, Pervasive Computing, Tangible User Interfaces.

Unit V: User Interface:
Help & Documentation, UI Software, UI Agents, and Case Studies: Windows Swing.

Text Books:

1. Abowd and Russell Beale, “Human-Computer Interaction”, Prentice Hall
2. Donald Norman, “The Design of Everyday Things”, Basic Book Publisher.
3. John Carrol, “Human-Computer Interaction in the New Millenium”

Reference Books:

1. Paul Booth, “An Introduction to Human-Computer Interaction”, Psychology Press.
2. D. Hix and H. R. Hartson, “Developing User Interfaces: Ensuring Usability Through Product and Process”, Publisher - John Wiley.
3. Rosson & Carroll, “Usability Engineering: Scenario-Based Development of Human- Computer Interaction”, Morgan Kaufmanns.

SARDAR PATEL UNIVERSITY, BALAGHAT

School of Engineering and Technology

Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

Course Outcome:

At the end of the course, students should be able to:

1. Describe the fundamental principles and theories of human-computer interaction.
2. Implement user-centered design methodologies in the development of interactive systems.
3. Create effective user interfaces that enhance user interaction across various platforms.
4. Analyze and discuss emerging trends in HCI and their implications for future interface design.

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

Elective-II CSE7052 Data Science & Big Data

Course Objectives:

1. To provide a comprehensive understanding of the fundamental concepts, techniques, and tools used in data science.
2. To teach methods for data collection, cleaning, and preprocessing to prepare data for analysis.
3. To understand the principles and technologies used in big data, including distributed computing and storage solutions.
4. To analyze real-world applications of data science and big data in various domains, such as healthcare, finance, and marketing.

Unit I: Understanding Data:

Understanding Data: Data Wrangling and Exploratory Analysis, Data Transformation & Cleaning, Feature Extraction, Data Visualization. Introduction to contemporary tools and programming languages for data analysis like R and Python.

Unit II: Analysis of Data:

Statistical & Probabilistic analysis of Data: Multiple hypothesis testing, Parameter Estimation methods, Confidence intervals, Bayesian statistics and Data Distributions.

Unit III: Machine Learning:

Introduction to machine learning: Supervised & unsupervised learning, classification & clustering Algorithms, Dimensionality reduction: PCA & SVD, Correlation & Regression analysis, Training & testing data: Over fitting & Under fitting.

Unit IV: Information Retrieval:

Introduction to Information Retrieval: Boolean Model, Vector model, Probabilistic Model, Text based search: Tokenization, TF-IDF, stop words and n-grams, synonyms and parts of speech tagging.

Unit IV: Web Search & Big Data:

Introduction to Web Search& Big data: Crawling and Indexes, Search Engine architectures, Link Analysis and ranking algorithms such as HITS and Page Rank, Hadoop File system & Map Reduce Paradigm.

Text Books:

1. Field Cady, “The Data Science Handbook” , 1/e ,2018,Publisher: Wiley
2. Sinan Ozdemir, “Principles of Data Science “, 1/e, 2016Packt Publishing Limited

SARDAR PATEL UNIVERSITY, BALAGHAT
School of Engineering and Technology
Syllabus

Course: B.Tech **Semester: VII**

Branch: Computer Science and Engineering **w.e.f. Academic Session: 2024-25**

Reference Books:

1. Peter Bruce, “Practical Statistics for Data Scientists: 50 Essential Concepts”,Shroff/O'Reilly; First edition, 2017
2. Pang-Ning Tan, “Introduction to Data Mining”, Pearson Edu.
3. Ricardo Baeza-Yates and Berthier Ribeiro-Neto, “Modern Information Retrieval”, Pearson Education.

Course Outcome:

At the end of the course, students should be able to:

1. Describe the key concepts and techniques used in data science and big data.
2. Implement methods for data collection, cleaning, and preprocessing to prepare datasets for analysis.
3. Work with big data technologies, such as Hadoop and Spark, to handle and analyze large datasets.
4. Analyze case studies and evaluate the impact of data science solutions in various industries.