DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Scheme (Third Year)

Fifth Semester

S. No.	Subject Code	Course Title	Subject Name	L	T	P	Credits
1	CS105101CS	Program Core	Compiler Design	3	1	0	**4**
2	CS105102CS	Program Core	Database Management System	3	1	0	**4**
3	CS105103CS	Program Core	Operating System	3	1	0	**4**
4	CS1052XXCS	Program Elective	Elective – I	3	0	0	**3**
5	CS1053XXCS	Open Elective	Open Elective - I	3	0	0	**3**
6	CS105401CS	Laboratory	Database Management System Lab	0	0	2	**1**
7	CS105402CS	Laboratory	Operating System & Compiler Design Lab	0	0	2	**1**
8	CS105701CS	Internship	Summer Internship I				**1**
		Total Credits					**21**

Program Elective-I		**Open Elective-I**	
Subject Code	**Subject Name**	**Subject Code**	**Subject Name**
CS105201CS	Advanced Data Structures	CS105301CS	Web Technology
CS105202CS	Advanced Computer Architecture	CS105302CS	Data Science
CS105203CS	Computer Graphics	CS105303CS	Advanced Java Technologies
CS105204CS	Embedded System		

Compiler Design

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Compiler Design	3-1-0, (4)	EPR	CS105101CS

[Pre-requisites:
1. Theory of Automata and Formal languages
2. Data Structures and Algorithms
3. Computer architecture (assembly programming)]

Course Objectives

1. To acquire modern compilers knowledge in particular, the lexical analysis, syntax, and semantic analysis, code generation and optimization phases of compilation.
2. To acquire the knowledge of designing various parsers without using compiler generation tools.
3. To learn the new code optimization techniques to improve the performance of a program regarding speed & space.
4. To learn the new code optimization techniques to improve the performance of a program regarding speed & space.

Course Content

Unit-1 Introduction and Lexical Analysis:

Compilers, Analysis of the source program, Phases of a compiler, Cousins of the Compiler, Grouping of Phases, Compiler construction tools, Lexical Analysis, Role of Lexical Analyzer, Input Buffering, Specification of Tokens (Regular expression, Finite automata, Conversion of FAs') , Context-Free Grammars, Writing Grammars.

Unit-2 Syntax Analysis:

Role of the parser – Top-Down parsing – Recursive Descent Parsing – Predictive Parsing –Bottom-up parsing – Shift Reduce Parsing – Operator Precedence Parsing – LR Parsers – SLR Parser – Canonical LR Parser – LALR Parser.

Unit-3 Semantic analysis and Intermediate codes:

Intermediate languages–Declarations – Assignment Statements – Boolean Expressions –Case Statements – Back patching–Procedure calls Runtime Environments–Source Language issues–Storage Organization – Storage Allocation strategies–Access to non-local names-Parameter Passing, Error detection and recovery.

Unit-4 Code Optimization and Generation:

Introduction – Principal Sources of Optimization – Optimization of basic Blocks – DAG, representation of Basic Blocks -Introduction to Global Data Flow Analysis –Issues in the design of code generator – The target machine–Runtime Storage management – Basic Blocks and Flow Graphs – Next use Information – A simple Code generator – Peephole Optimization.

Course Materials

Required Text: Text books

1. Alfred V. Aho, Ravi Sethi, and Jeffrey D. Ullman, "Compilers: Principles, Techniques, and Tools" Addison-Wesley, Second Edition.
2. Kenneth C. Louden, "Compiler Construction: Principles and Practice", Thompson Learning.

Optional Materials: Reference Books

1. Alfred V. Aho, Jeffrey D Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education Asia.
2. Steven S. Muchnick, "Advanced Compiler Design Implementation", MorganKaufmann Publishers.
3. C. N. Fisher and R. J. LeBlanc "Crafting a Compiler with C", Pearson Education.
4. Dhamdhere, D. M.,"Compiler Construction Principles and Practice", 2nd edition, Macmillan India Ltd., New Delhi.
5. HenkAlblas and Albert Nymeyer, "Practice and Principles of Compiler Building with C", PHI.

Database Management System

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Database Management System	3-1-0, (4)	EPR	CS105102CS

[Pre-requisites: Nil]

Course Objectives

1. To understand the fundamentals of database management systems.
2. To learn to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.
3. To understand query processing and techniques involved in query optimization.
4. To understand the principles of storage structure and recovery management.

Course Content

Unit-1 Introduction To Data Base & The Relational Data Model, SQL:

Introduction to DBMS, Type of Data Models, Schema and instances, DBMS Architecture and Data Independence, Entity - Relationship Model, Attributes and Keys, Relationship Types, Weak Entity set, Strong Entity Set, Enhanced E–R Modeling, Specialization and Generalization, Relational data model concepts, constraints, relational algebra, relational calculus, Tuple relational calculus. SQL: DDL, DML, DCL, Types of constraints, Defining different constraints on a table, Defining & Dropping integrity constraints in the alter table command, View.

Unit-2 Database Design Techniques and Indexing Techniques:

Functional Dependencies and Normalization for Relational Databases: Informal design guidelines for relation schemes, Functional dependencies, and Normal forms based on primary keys, General definitions of second and third normal forms, Boyce- Codd normal form. Multi valued & Join Dependencies, 4th & 5th Normalization. Indexes, Multi level indexes, Dynamics Multilevel indexes using B trees and B+- Trees.

Unit-3 Query & Transaction Processing:

Query processing stages, Query interpretation, Query execution plan, Table scans, Fill factor, Multiple index access, Methods for join tables scans, Structure of a query optimizer. Transaction Processing: Types of failures, ACID property, schedules and recoverability, serializability of schedules, Levels of transaction consistency, Deadlocks, Nested transaction, Transaction benchmarking.

Unit-4 Concurrency Control & Crash Recovery:

Concurrency Control: Different type of concurrency control techniques & their comparative analysis, Locking techniques, Time- stamp ordering, Multi-version techniques, Optimistic techniques, Multiple granularity. Failure classification, Different type of Recovery techniques & their comparative analysis, deferred update, immediate update, Shadow paging, Check points, On-line backup during database updates.

Course Materials

Required Text: Text books

1. Database system concept, Korth & Sudarshan, MH.
2. Fundamentals of Database Systems , Elmasri & Navathe, Pearson Education

Optional Materials: Reference Books

1. Introduction to Database Systems , C.J. Date, Pearson Education.
2. Principles of Database Systems", 2nd Edn., Ullman, J.O, Galgotia Publications.

Operating System

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Operating System	3-1-0, (4)	EPR	CS105103CS

[Pre-requisites:

1. Fundamentals of Computer architectures
2. Programming languages Such as C/C++/JAVA, etc.
3. Data Structures]

Course Objectives

1. To understand (functions, structures, and history) of modern of operating systems.
2. To learn various process management concepts including scheduling, synchronization, deadlocks, multithreading, etc.
3. To learn concepts of memory management including virtual memory.
4. To learn issues related to file system interface and disk management.
5. To study with various types of Modern operating systems.

Course Content

Unit-1 Introduction of OS and Process:

Introduction of OS: Functions and services of OS, Types of OS, Architectures of OS etc. Process concept: Introduction of Process, process Control Block, Process States, and Transitions, Operations on Processes, advantages, comparison with program, Threads, multithreading, user level threads, kernel level threads, advantages, comparison with process. Process scheduling: concepts, types of schedulers, scheduling criteria, and scheduling Algorithms, Algorithm evaluation.

Unit-2 Processes Synchronization and Deadlocks:

Mutual Exclusion, the critical section problem, Software and Hardware solutions for mutual exclusion, semaphores, Classical problems in concurrency, Deadlock-System model, Deadlock characterization, Deadlock handling methods- Prevention, Avoidance and Detection, Recovery from deadlock.

Unit-3 Memory Management:

Base machine, resident Monitor, multiprogramming with fixed partition, Multiprogramming with variable Partitions, Paging, Segmentation, paged segmentation, Virtual Memory concepts, Demand paging, performance, page Replacement algorithms, Allocation of frames, Thrashing, cache memory organization impact on performance.

Unit-4 Disk and File Management:

File system: File Concepts, attributes, operations, File organization and Access mechanism, File sharing, Implementation issues. Disk I/O, Disk Scheduling Algorithms, disk space allocation methods, Directory structure, free disk space management, Case studies: UNIX, Windows, Android etc. operating systems.

Course Materials

Required Text: Text books

1. Operating System concepts, Silberscatz A and Peterson, Peter B. Galvin , J.L, PE-LPE

Optional Materials: Reference Books

1. Operating System Design & Implementation, Tanenbaum, A.S., PHI.
2. Operating systems H.M. Deital Pearson Education
3. Operating System Concept & Design, Milenkovic M, McGraw Hill.
4. Operation System, Stalling William, Maxwell MCMillan International Editions.

Advanced Data Structure

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Advanced Data Structure	3-0-0, (3)	EPR	CS105201CS

[Pre-requisites: Data Structures]

Course Objectives

1. To introduce and practice advanced algorithms and programming techniques necessary for developing sophisticated computer application programs
2. To get accustomed with various programming constructs such as divide – and-conquer, backtracking, and dynamic programming.
3. To understand and use various data-structures in applications
4. To learn new techniques for solving specific problems more efficiently and for analyzing space and time requirements.

Course Content

Unit-1 Analysis of Algorithms

Review of order of growth of functions, recurrences, probability distributions, Average case analysis of algorithms, Randomized Algorithms–Analysis-NP–Complete and NP–Hard Problems–Amortized Analysis

Unit-2 Heaps

Min Heap – Min – max Heaps – Deaps – Leftist heaps–Skew leftist heaps–Binomial Heaps–Lazy binomial heaps–Fibonacci Heaps.

Unit-3 Trees

AVL Trees –Red-Black Trees–Splay Trees-B trees-Multi-way search trees–Tries.

Unit-4 Advanced Tree Structures and Geometric Algorithms

Point–trees–Quadtrees -K-d trees–TV-trees–Segment trees–Static and Dynamic, Geometric algorithms–line segment intersection –Map over lay detection –Voronoi diagram

Course Materials

Required Text: Text books

1. T.H.Cormen, C.E.Leiserson, R.L.Rivest, Introduction to Algorithms, Prentice hall.
2. Advanced Data Structures Theory and Applications, By Suman Saha, Shailendra Shukla.

Optional Materials: Reference Books

1. H.S.Wilf, Algorithms and complexity, Prenticehall.

Advanced Computer Architecture

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Advanced Computer Architecture	3-0-0, (3)	EPR	CS105202CS

[Pre-requisites: Computer Architecture]

Course Objectives

1. Understand the Concept of Parallel Processing, its applications and the performance of different scalar vector Computers.
2. Analyse the Pipelining performance for a given set of Instructions.

Course Content

Unit-1 Theory of Parallelism:

The State of Computing, Multiprocessors and Multicomputer, Multivector and SIMD Computers, PRAM and VLSI Models, Architectural Development Tracks.

Unit-2 Program and Network Properties:

Conditions of Parallelism, Program Partitioning and Scheduling, Program Flow Mechanism, System Interconnect Architectures. **Principles of Scalable Performance:** Performance Metrics and Measure, Parallel Processing Applications, Speedup Performance Law, Scalability Analysis and Approaches.

Unit-3 Processors and Memory Hierarchy:

Advanced Processor Technology, Superscalar and Vector Processors, Memory Hierarchy Technology, Virtual Memory Technology. **Bus, Cache, and Shared Memory :** Backplane Bus System, Cache Memory Organizations, Shared-Memory Organizations, Sequential and Weak Consistency Model.

Unit-4 Pipelining and Superscalar Techniques:

Linear Pipeline Processor, Nonlinear Pipeline Processor, Instruction Pipeline Design, Arithmetic Pipeline Design, Superscalar and Superpipeline Design. **Multiprocessors and Multicomputers:** Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Three Generations of Multi-computers, Message-Passing Mechanism. **Case Studies:** Multivector Multiprocessors, Compound Vector Processing, SIMD Computer Organizations.

Course Materials

Required Text: Text books

1. Kai Hwang, Advanced Computerarchitecture:Parallelism, Scalability, Programmability, McGraw-Hill, Inc.

Optional Materials: Reference Books

1. John L. Hennessy and David A. Patterson, Computer Architecture: A quantitative approach, 5th edition, Morgan Kaufmann Elseveir.
2. Kai Hwang and Naresh Jotwani, Advanced Computer Architecture (SIE): Parallelism, Scalability, Programmability, McGraw Hill Education 3/e.
3. J.P. Shen and M.H. Lipasti, Modern Processor Design, MC Graw Hill, Crowfordsville.
4. Current Literature (Papers from ISCA, Micro, HPCA, ICCD, and IEEE Trans. on Computers, IEEE Architecture Letters).

Computer Graphics

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Computer Graphics	3-0-0, (3)	EPR	CS105203CS

[Pre-requisites: Nil]

Course Objectives

1. To understand the concepts of computer graphics.
2. To understand an overview of interactive computer graphics, two dimensional system and mapping.
3. To understand the importance of drawing algorithms, two-dimensional transformation; Clipping, filling and an introduction to 3-D graphics.

Course Content

Unit-1 Overview of Graphics System:

Introduction of computer graphics, Display Systems: Display units, Raster scan & Random scan system, line-circle ellipse generating algorithm, filled area primitives, 2-D & 3-D transformation, Clipping: Liang Barsky 2-D clipping :Cohen Sutherland, Polygon clipping: Sutherland Hodgeman & Weiler-Atherton polygon clipping.

Unit-2 Curves & Surfaces:

Basic concept of Curve and surface , Bezier Curves-Need for cubic parametric curves, continuity, Generation though Bernstein polynomials, Condition for smooth joining of 2 segments, Convex Hull property, B-Spline Curves: Knot vectors uniform and open uniform curves, Uniform, Periodic B-splines, Open, Uniform B-splines, Non-uniform, rational B-splines, Beta splines, subdividing curves, Drawing curves using forward differences.

Unit –3: Projections & Hidden Surface Removal:

Parallel projection on xy-plane(including oblique view), Perspective projection-1, 2 and 3 Vanishing points, Hidden Surface Removal: Back face removal, Floating Horizon method for curved objects, Z-Buffer or depth buffer algorithm, Painter's algorithm(Depth sorting method), Binary space partitioning trees, Scanline algorithm, Warnock's algorithm(Area subdivision method).

Unit –4: Multimedia & Computer Graphics Application:

Illumination model , Computing reflection vector, Gouraud and Phong Tracing, Texture mapping & their characteristics, Basic ray tracing algorithm, Constructive solid geometry methods –Octrees and Fractals, Color models, Concept of Multimedia, Data Compression Techniques, Animation: In-between using rotation and translation, Procedural animation, Image Transformation- Translation and rotation, Morphing, Motion Control (Key framing), Spline Driven animation. OpenGL primitives: Functions, sample programs for drawing 2-D, 3-D objects; event handling and view manipulation, basics of Graphics Card and Nvedia, Application of Computer Graphics and Multimedia.

Course Materials

Required Text: Text books

1. Computer graphics-Hearn and Baker, PHI
2. Computer Graphics, Foley, PE-LPE

Optional Materials: Reference Books

1. Procedural Elements of Computer graphics, Rogers, McGraw Hill
2. Computer graphics, Harringtons S., McGraw Hill.
3. Computer Graphics, Schaum Series.

Embedded System

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Embedded System	3-0-0, (3)	EPR	CS105204CS

[Pre-requisites: Nil]

Course Objectives

1.

Course Content

Unit-1 Introduction to Embedded System:

Introduction, Processors in Embedded System, Memory and Hardware Elements in the Embedded Systems, Software embedded into a System- Part 1 ROM image and Programming Languages, Embedded System Design- Part 2, Embedded System Architecture, Classification of Embedded Systems, Development Skills Requirements for Embedded Systems, Embedded Systems Examples.

Unit-2 Introduction to 8051 & Processor organisation:

8051 Architecture, Instruction Set and Interrupts, 8051 IO ports, Circuits and IO Programming and External Memory Circuits, 8Counters and Timers in 8051, Serial Data Communication Input/Output in 8051, ATMEL AVR and ARM Microcontrollers, Real World Interfacing - Part 1, Real World Interfacing - Part 2, Interfacing examples with keyboard, displays, D/A and A/D Conversions, Bus Arbitration Mechanisms, **Processor organisation** and Instruction Level Parallism, 80x86 Architecture, ARM, SHARC, TigerSHARC and DSPs, Memory Organisation, Types Of Memory, Memory Addresses Allocation and Memory Map, Performance Metrics, Processor, Microcontroller And Memory Selection.

Unit –3: IO Port Types & Interrupts:

Serial And Parallel IO Ports, Synchronous And Asynchronous Ports Or Devices Communication And Communication protocols, Exemplary Protocol ?HDLC, RS232C And UART Communication, SPI, SCI, SI And SDIO Port/Devices For Serial Data Communication, Parallel Port Devices, Distributed Network Of Embedded Systems, Internet Enabled Systems Network Protocols, Serial Bus Communication Protocol I2C, Serial Bus Communication Protocol CAN, Serial Bus Communication Protocol USB, Ethernet Protocol, Parallel Bus Device Protocol ARM Bus, Parallel Bus Device Protocols PCI Buses. Programmed I/O (busy and wait) method for ports and devices, and the need for interrupt driven IOs, **Interrupt and Interrupt Service Routine** Concept, Software Interrupts, Software and Hardware Interrupt Sources, Interrupt Service Threads as Second Level Interrupt Handlers, Interrupt Vector mechanism, Masking of Interrupt Sources, and Interrupt Priorities for Multiple Sources of Interuppt, Interrupt latency and Service deadline,

Unit –4: Device Driver & RTOS:

Device Driver Multiple functions in a device, Device types, Physical and Virtual device functions, Device Driver Programming, Introduction to RTOSes, Micro-Controller/OS-II, RTOSes, Micro-Controller/OS-II Features, Micro-Controller/OS-II System level and task Functions, Micro-Controller/OS-II Time set, get and delay functions, Micro-Controller/OS-II (MUCOS) Memory Functions, Micro-Controller/OS-II Semaphore Functions, Micro-Controller/OS-II Mailbox IPC functions, Micro-Controller/OS-II Queue IPC functions, Basic RTOS Functions in VxWorks, VxWorks System, Task servicing and Semaphore Functions, VxWorks functions for Queues and Pipes.

Course Materials

Required Text: Text books

1. Embedded Systems- Architecture, Programming and Design | 3rd Edition by Raj Kamal.

Optional Materials: Reference Books

1. The 8051 Microcontroller and Embedded Systems: Using Assembly and C by Mazidi
2. AVR Microcontroller and Embedded Systems: Using Assembly and C
3. Making Embedded Systems by Elecia White
4. The Firmware Handbook (Embedded Technology) by Jack Ganssle

Web Technology

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Web Technology	3-0-0, (3)	EPR	CS105301CS

[Pre-requisites: Nil]

Course Objectives

1. To understand, analyze and build dynamic and interactive web sites.
2. To manage server software and server side tools.
3. To understand current and evolving Web languages for integrating media and user interaction in both front end and back end elements of a Web site.
4. To analysis and reporting of web data using web analytics.
5. Applying different testing and debugging techniques and analyzing the web site effectiveness.

Course Content

Unit-1 JavaScript:

Functions- Introduction, Program Modules in JavaScript, Programmer-Defined Functions, Function Definitions, Random-Number Generation, Example: Game of Chance, Duration of Identifiers, Scope Rules, JavaScript Global Functions, Recursion, Example Using Recursion: Fibonacci Series, Recursion vs. Iteration, JavaScript Internet and World Wide Web Resources. JavaScript arrays, JavaScript objects.

Unit-2 Extensible Markup Language (XML) & Introduction to JSON:

Introduction to Structuring Data, XML Namespaces, Document Type Definitions (DTDs) and Schemas, Document Type Definitions, W3C XML Schema Documents, XML Vocabularies, Chemical Markup Language (CML). **Other Markup Languages**- Document Object Model (DOM), DOM Methods, Simple API for XML (SAX), Extensible Style sheet Language (XSL), Simple Object Access Protocol (SOAP), Internet and World Wide Web Resources, Introduction to JSON, Syntax, Data Types, Objects, Schema, Comparison with XML JSON with Perl.

Unit-3 Web Servers (IIS, PWS and Apache):

Introduction, HTTP Request Types, System Architecture, Client-Side Scripting versus Server-Side Scripting, Accessing Web Servers, Microsoft Internet Information Services (IIS), Microsoft Personal Web. Multimedia, PHP, String Processing and Regular Expressions, Form processing and Business logic, Dynamic content, Database connectivity, Introduction to Applets and Servlets, JDBC connectivity, JSP and Web development Frameworks.

Unit-4 Introduction to Node JS & Django:

Introduction to Node JS, Setup Dev Environment in Node JS, Node JS Modules: Functions Buffer Module, Module Types, Core Modules, Local Modules, - Node Package Manager, File System, Events, Introduction to Django, Installation of Django, The Basics of Dynamic Web Pages, The Django Template System, Interacting with a Database: Models, The Django Administration Site, Form Processing, Advanced Views and URL configurations, Generic Views, Extending the Template Engine, Generating Non-HTML Content, Sessions, Users and Registration.

Course Materials

Required Text: Text books

1. Deitel and Nieto, Internet and World Wide Web - How to Program, 5th Edition, PHI.
2. Bai and Ekedhi, The Web Warrior Guide to Web Programming, 3rd Edition, Thomson.

Optional Materials: Reference Books

1. Steven Holzner,"HTML Black Book", Dremtech press.
2. Web Technologies, Black Book, Dreamtech Press.
3. Web Applications: Concepts and Real World Design, Knuckles, Wiley-India.

Data Science

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Data Science	3-0-0, (3)	EPR	CS105302CS

[Pre-requisites: Nil]

Course Objectives

1. To understand the data science process and exploration.
2. To learn Machine learning algorithms.
3. To get knowledge on types of learning, processes, techniques and models.
4. To know about the research that requires the integration of large amounts of data.

Course Content

Unit-1 Introduction Data Science and Math's

The art of data science, Data volume, velocity, Variety. Introduction to machine learning, prediction and forecasts, Theories, models, Institution, causality, Prediction, correlation, Math's: Exponential, logarithms and computing. Normal Distribution, Poisson Distribution, Moments of a continuous random variable, Combining random variables, Vector Algebra, Statistical Regression Diversification, Matrix Equations.

Unit-2 Visualization:

Data pre-processing, exploratory data analysis and high-quality visualization. Advanced scientific plots - stacked histograms for multivariate data, bi-variate scatter plots, parallel coordinate plot, table plot, mosaic plot etc.

Unit-3 Statistical Learning, Liner Regression:

Statistical learning Introduction, estimate f, trade off between prediction Accuracy and model Interpretability, supervised versus unsupervised learning, Regression versus classification problems, Estimating the Coefficients, Assessing the Accuracy of the Coefficient Estimates, Assessing the Accuracy of the Model, Qualitative Predictors, Extensions of the Linear Model, Potential Problems

Unit-4 Resampling Methods and Classification:

Logistic Regression, The Logistic Model, Estimating the Regression Coefficients, Making Predictions, Multiple Logistic Regression, Logistic Regression for >2 Response Classes, Linear Discriminant Analysis, A Comparison of Classification Methods, Linear Discriminant Analysis, Quadratic Discriminant Analysis, K-Nearest Neighbors

Course Materials

Required Text: Text books

1. Data Science: Theories, Models, Algorithms, And Analytics by Sanjiv Ranjan Das
2. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data 1st Edition, Hadley Wickham, Garrett Grolemund
3. An Introduction to Statistical Learning with Applications in R, Gareth James, Daniela Witten, Trevor Hastie Robert Tibshirani.

Optional Materials: Reference Books

1. Practical Statistics for Data Scientists, Peter Bruce & Andrew Bruce.
2. Vijay Kotu, Bala Deshpande, "Data Science: Concepts and Practice", Second Edition, Elsevier Publications.

Advanced Java Technologies

[5th Semester, Third year]

Course Description

Offered by Department	Credits	Status	Code
Advanced Java Technologies	3-0-0, (3)	EPR	CS105303CS

[Pre-requisites: Java Programming]

Course Objectives

1. To gain the knowledge of J2EE architecture.
2. To learn networking, and database manipulation.
3. To develop web applications using Java Servlet.

Course Content

Unit-1 Generics:

Generics: Generics example, A Generic Class with Two Type Parameters, The General Form of a Generic Class, Bounded Types, Generic Interfaces, Generic Class Hierarchies, Type Inference with Generics, Local Variable Type Inference and Generics, Ambiguity Errors.

Unit-2 Lambda Expressions:

Introducing Lambda Expressions, Block Lambda Expressions, Generic Functional Interfaces, Passing Lambda Expressions as Arguments, Lambda Expressions and Exceptions, Lambda Expressions and Variable Capture, Method References, Constructor References, Predefined Functional Interfaces.

Unit-3 Java Beans and Servlets:

Java Beans and Servlets: Advantages of Java Beans, Bound and Constrained Properties, Java, Beans API, The Life Cycle of a Servlet, Servlet Development Options, Using Tomcat, A Simple Servlet, The Servlet API, The javax.servlet Package, Reading Servlet Parameters, The javax.servlet.http Package, Handling HTTP Requests and Responses, Cookies, Session Tracking.

Unit-4 GUI Programming with JavaFX:

JavaFX GUI Programming, The JavaFX Packages, The Stage and Scene Classes, Nodes and Scene Graphs, The Application Class and the Lifecycle Methods, A JavaFX Application Skeleton, The Application Thread, A Simple JavaFX Control: Label, Using Buttons and Events, JavaFX Control, Using Image and Image View, Toggle Button, Radio Button, Check Box, List View, Combo Box, Text Field, Scroll Pane, Tree View, Disabling a Control, Javafx Menu, Add Mnemonics and Accelerators to Menu Items, Use Radio Menu Item and Check Menu Item.

Course Materials

Required Text: Text books

1. Java The Complete Reference, Ninth Edition, Herbert Schildt, Oracle Press, McGraw Hill Education.
2. Professional Java Server Programming, J2EE 1.3 Edition, Subrahmanyam Allamaraju, Apress Publisher.

Optional Materials: Reference Books

1. Core Java, Volume II: Advanced Features, Cay Horstmann and Gary Cornell, Pearson Publication.
2. JDBC API Tutorial and Reference, Maydene Fisher, Jon Ellis, Jonathan Bruce, Addison Wesley.

Database Management System (Lab)

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Database Management System (Lab)	0-0-2, (1)	EPR	CS105401CS

[Pre-requisites: Nil]

Course Objectives

1. To explain basic database concepts, applications, data models, schemas and instances.
2. To demonstrate the use of constraints and relational algebra operations.
3. To describe the basics of SQL and construct queries using SQL.
4. To emphasize the importance of normalization in databases.
5. To facilitate students in Database design.
6. To familiarize issues of concurrency control and transaction management.

Course Content

1. Creating tables, Renaming tables.
2. Data constraints (Primary key, Foreign key, Not Null), Data insertion into a table.
3. Viewing data from tables.
4. Filtering table data.
5. Creating table from another table.
6. Inserting data into a table from another table.
7. Delete, alter, and update operations.
8. Grouping data, aggregate functions
9. Oracle functions (mathematical, character functions)
10. Sub-queries
11. Set operations.
12. Joins.
13. PL/SQL (Anonymous block, control structure)
14. PL/SQL (Procedures)
15. Triggers
16. Cursors

Course Materials

Required Text: Text books

1. James, Paul and Weinberg, Andy Oppel, SQL: The Complete Reference,3 rd Edition, McGraw Hill.
2. MySQL (TM): The Complete Reference by Vikram Vaswani.

Optional Materials: Reference Books

1. Michael McLaughlin, Oracle Database 11g PL/SQL Programming, Oracle press.

Operating System & Compiler Design (Lab)

[5th Semester, Third Year]

Course Description

Offered by Department	Credits	Status	Code
Operating System & Compiler Design (Lab)	0-0-2, (1)	EPR	CS105402CS

[Pre-requisites:

1. Fundamentals of Computers & architectures
2. Programming languages Such as C/C++/JAVA, etc.
3. Data Structures]

Course Objectives

1. To learn Unix commands and shell programming
2. To implement various CPU Scheduling Algorithms
3. To implement Process Creation and Inter Process Communication.
4. To implement Deadlock Avoidance and Deadlock Detection Algorithms
5. To implement Page Replacement Algorithms
6. To implement File Organization and File Allocation Strategies
7. To implement LEX program and understand the YACC.

Course Content

1. Working with Different Operating Systems a. Study the DOS environment and practice commands for various activities like , File Handling, Text Processing, System Administration, Process Management, Archival, Network, File Systems, Advanced Commands
2. Work with some configuration commands & create batch files in the DOS environment.
3. Install and configure Linux and work with Linux commands for the activities given in experiment 1.
4. Write a program for the implementation of various CPU scheduling algorithms (FCFS, SJF, Priority).
5. Write a program for the implementation of various page replacement algorithms (FIFO , Optimal, LRU).
6. Write a program for the implementation of system calls (Fork and V-fork) of Unix operating systems.
7. Write a program for the implementation of the Producer-Consumer problem.
8. Write a program for the implementation of Readers Writers problem.
9. Write a program for the implementation of Banker's algorithm.
10. Write a program to simulate the concept of semaphores.
11. Write a program to simulate the concept of inter process communication.
12. Write a program for the implementation of various memory allocation algorithms (First fit, Best fit, and Worst fit).
13. Write a program for the implementation of various Disk scheduling algorithms (FCFS, SCAN, SSTF, C-SCAN).
14. Design a lexical analyzer for the given language. The lexical analyzer should ignore redundant spaces, tabs and new lines, comments etc.
15. Implement the lexical analyzer using JLex, flex or other lexical analyzer generating tools.
16. Write a LEX Program to convert the substring abc to ABC from the given input string.
17. Design a LALR bottom up parser for the given language
18. Convert the BNF rules into Yacc form and write code to generate abstract syntax tree
19. A program to generate machine code from the abstract syntax tree generated by the parser.
20. Program to Generate Machine Code.

Course Materials

Required Text: Text books

1. An Introduction to Operating Systems, P.C.P Bhatt, 2nd edition, PHI.
2. Principles of Compiler Design. – A.V Aho, J.D Ullman ; Pearson Education.
3. Lex &yacc , -John R Levine, Tony Mason, Doug Brown; O'reilly.
4. Compiler Construction, - LOUDEN, Thomson.

Optional Materials: Reference Books

1. Modern Operating Systems, Andrew S Tanenbaum , 3rd Edition, PHI
2. Engineering a compiler – Cooper& Linda, Elsevier
3. Modern Compiler Design – Dick Grune,Henry E.Bal, Cariel TH Jacobs, Wiley Dreatech