Curriculum for UG Degree Course in BTech. Computer Engineering
(Academic Year: 2024-25 Onwards)

Second Year | Semester-III

Course Code	Course Title	Teaching Scheme Hours / Week			Credits	Examination Scheme			Total Marks
		L	T	P		ISE	ESE	Pr/Or	
23PCCE301	Database Management Systems	3	0	0	**3**	50	50	00	**100**
23PCCE302	Data Structures	3	0	0	**3**	50	50	00	**100**
23PCCE303	Digital Systems and Computer Organization	3	0	0	**3**	50	50	00	**100**
23PCCE304	Discrete Mathematics and Statistics	3	0	0	**3**	50	50	00	**100**
23OE301	*Open Elective-I	3	0	0	**3**	50	50	00	**100**
23VEC301	Universal Human Values	2	1	0	**3**	50	50	00	**100**
23AEC301	Design Thinking	1	1	0	**2**	50	00	00	**50**
23PCCE301L	Database Management Systems Laboratory	0	0	2	**1**	25	00	25	**50**
23PCCE302L	Data Structures Laboratory	0	0	4	**2**	25	00	25	**50**
	Total	**18**	**02**	**06**	**23**	**400**	**300**	**50**	**750**

* 23OE301 Open Elective-I
  A. Intellectual Property Rights
  B. Digital Marketing
  C. Law for Engineers
  D. Organizational Behavior
  E. Project Management

APPROVED BY
Department of Computer Engineering
Secretary Academic Council
MKSSS's Cummins College of Engineering
For Women, Pune-411052

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23PCCE301 DATABASE MANAGEMENT SYSTEMS

Teaching Scheme
Lecture: 3 Hours/Week

Examination Scheme
In-semester: 50 Marks
End-semester: 50 Marks
Credits: 3

Course Objectives

To facilitate the learners to

1. Learn fundamental elements of relational database management systems.
2. Develop queries using Structured Query Language (SQL) to retrieve the required data from the database.
3. Build database schema using an entity relationship diagram (ERD) and normalization.
4. Understand Transaction management in a Database management System.
5. Understand the design of query languages and the use of semantics for query optimization.

Course Outcomes
After completion of the course, students will be able to

1. Illustrate the basic principles of database management systems.
2. Apply the knowledge of SQL to retrieve the required data from the database.
3. Build the Entity Relationship diagram for the system considering its constraints and design issues.
4. Make use of various Transaction management techniques to solve analytical problems on serializability.
5. Illustrate the various storage systems and indexing techniques for accessing the database in an efficient manner.

Unit I: Introduction to Database Management Systems
File processing system Vs DBMS, Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Relational Databases, Database Architecture, Types of databases.

Unit II: Relational Model
Relational data model concept, Structure of relational databases, Fundamental relational algebra operations, Additional relational algebra operations, Extended relational algebra operations, Null values, Modification to database, Other relational languages.

Unit III: SQL and PL/SQL

SQL: Basic structure and operations, Data Definition Language (DDL), Data Manipulation Language (DML), Aggregate functions, Join conditions, Nested subqueries, Views and Indexes, PL/SQL-Procedures, Functions and Triggers, Cursors in SQL.

Unit IV: E-R model

Entity, Attributes, Relationships, Constraints, E-R model design; Reduction to Relational Schemas, Relational Database Design, Normalization : Anomalies of unnormalized database, Decomposition using functional dependencies, Normalisation types - 1NF, 2NF, 3NF and BCNF.

Unit V: Transactions and Concurrency control

Basic concepts, States, Atomicity, Consistency, Isolation, Durability - ACID properties, Concurrent execution, Serializability, Recoverability, Concurrency control - Timestamps and locking protocols, Validation based protocols, Deadlock handling; Recovery- Log-based recovery, Shadow-paging.

Unit VI: Indexing, Hashing and Query Optimization

Basic concepts, Ordered Indices, B+ tree index file, Static and dynamic hashing, Query Processing - Overview, measures of query cost, Selection and join operations, Sort operation, Evaluation of expressions, Query Optimization.

Text Books

1. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, 'Database System Concepts', McGraw Hill, (7th edition), (2019).
2. Raghu Ramakrishnan and Johannes Gehrke, 'Database Management Systems', McGraw Hill, (3 rd Edition), (2003).
3. Ramez Elmasri and Shamkant B. Navathe, 'Database Systems', Pearson, (6th Edition), (2013).

References

1. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom, "Database Systems: The Complete Book", Second Edition, Pearson, 2008, ISBN 978-0131873254.
2. C. J. Date, 'An Introduction to Database Systems', Pearson, (8th Edition), (2006).
3. Thomas Connally, Carolyn Begg, 'Database Systems', Pearson, (4th Edition), (2012).
4. Atul Kahate , 'Introduction to Database Management Systems', Second Edition, Pearson, ISBN 9788131700785, (2009).

Web References

1. https://www.khanacademy.org/computing/computer-programming/sql
2. https://onlinecourses.nptel.ac.in/noc22_cs91/preview
3. https://www.mysql.com/

23PCCE302 DATA STRUCTURES

Teaching Scheme
Lecture: 3 Hours/Week

Examination Scheme
In-semester: 50 Marks
End-semester: 50 Marks
Credits: 3

Prerequisites: Programming Skills in C Language, Object oriented paradigm in Java

Course Objectives
To facilitate the learner to

1. Learn and understand various methods of searching and sorting.
2. Analyze algorithms using time complexity analysis.
3. Demonstrate ability to use linear data structures like stack and queues to solve problems.
4. Utilize non linear data structures like trees and graphs for solving problems in various domains.
5. Understand and apply the concepts of hashing.

Course Outcomes
After completion of the course, students will be able to

1. Make use of various methods of sorting and searching to solve problems.
2. Analyze various algorithms using frequency count and asymptotic notations.
3. Apply suitable linear data structures such as linked lists, stacks, and queues to solve problems.
4. Utilize suitable non linear data structures –Trees and Graphs to solve a problem.
5. Solve a given problem effectively using hashing techniques.

Unit I: Introduction to Algorithms, Sorting and Searching Algorithms

Introduction to Algorithms, Pseudo code, Abstract Data Types (ADT), Arrays as ADT, Introduction to Data Structures, Frequency Count, Analyzing Algorithm using Frequency count, Time complexity of an Algorithm, Asymptotic notations, Best, Worst and Average case analysis of an Algorithm, Sorting: Bubble sort, Insertion sort, Quick Sort, Searching: Linear Search, Binary Search, Time complexity analysis.
Case study: Timsort.

Unit II: Linked List

Concept of Linked List, Comparison of Sequential organizations and Linked organizations, Linked List using Dynamic Memory Management, Linked List as an ADT, Singly Linked List, Doubly Linked List, Circular Linked List, Time complexity analysis.
Case study: Garbage collection.

Unit III: Stack and Queue

Stack as an ADT, Representation and Implementation of Stack using Sequential and Linked organization, Applications of Stack- simulating recursion using Stack, arithmetic expression conversion and evaluation, Queue as an ADT, Representation and Implementation of Linear Queue, Circular Queue, Time complexity analysis.
Case study: Priority queue in bandwidth Management.

Unit IV: Trees

Introduction to Non Linear Data Structure, Binary Trees, Types of Binary Trees, Properties of Binary Trees, Binary Tree as Abstract Data Type, Representation using Sequential and Linked Organization, Binary Tree creation, Recursive and Non Recursive Tree Traversals, Binary Search Tree and its operations, B-Tree, Heap as ADT, Time complexity analysis.
Case study: Expression tree, Heap as priority queue.

Unit V: Graphs

Basic Terminologies, Storage Representation, Graph Traversals, Graph as Abstract Data Type, Spanning Trees, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Single Source Shortest Path Algorithm, Time complexity analysis. Case study: Google maps.
Case study: Google maps.

Unit VI: Hashing

General idea of Hashing, Hash Table, Hash function, Rehashing, Issues in Hashing, Collision Resolution Strategies: Linear Probing, Open addressing and Chaining, Time complexity analysis.
Case study: Telephone dictionary.

Text Books

1. Robert Lafore, "Data Structures Algorithms in JAVA", Techmedia,(2 nd edition,(2007).
2. Sartaj Sahani, "Data Structures, Algorithms and Applications in JAVA", Universities Press (2 nd edition),(2004).

Reference Books

1. Goodrich, Tamassia, Goldwasser, "Data Structures and Algorithms in JAVA", Wiley publication, (6th edition).(2022).
2. M. Weiss, "Data Structures and Algorithm Analysis in JAVA**",** *Pearson Education* (3rd edition), (2012).
3. R. Gillberg, B. Forouzn, "Data Structures: A Pseudocode approach with C",
4. Cenage Learning, (2 nd edition). (2007).
5. Brassard and Bratley, "Fundamentals of Algorithmics", Prentice Hall India/Pearson Education, (2 nd edition) (1996).
6. Yedidyah Langsam, Moshe J Augenstein, Aron M Tenenbaum, "Data Structures using C and C++" , Pearson Education, (2 nd edition),(1990).
7. A. Aho, J. Hopcroft, J. Ulman, "Data Structures and Algorithms", Pearson Education, (1 st edition),(1983).

Online/Web/Other References

https://nptel.ac.in/courses/106/102/106102064/.
https://www.cs.usfca.edu/~galles/visualization/Algorithms.html.
http://web.stanford.edu/class/cs166/

23PCCE303 DIGITAL SYSTEMS AND COMPUTER ORGANIZATION

Teaching Scheme
Lecture: 3 Hours/Week

Examination Scheme
In-semester: 50 Marks
End-semester: 50 Marks
Credits: 3

Prerequisite : Basic Electrical and Electronics Engineering.

Course Objectives
To facilitate the learner to

1. Understand the basic digital circuits and logic design.
2. Understand the techniques for designing combinational and sequential circuits.
3. Understand the concept of computer organization.
4. Understand the concepts of instruction pipelining and cache memory organization for design issues in computer systems.

Course Outcomes
After completion of the course, students will be able to

1. Apply the knowledge of basic digital circuits for the design of combinational circuits.
2. Apply the knowledge of sequential components for the design of sequential circuits.
3. Relate the basic building blocks, their coordination and instruction characteristics in computer organization.
4. Make use of concepts of instruction pipelining and memory structure in computer organization.

UNIT I: Combinational Circuits

Minimization of Product of Sum and Sum of Product, functions and realization using logic gates, Introduction to Numbers and Codes, Binary Coded Decimal (BCD), Gray, Excess-3 and their applications, Code conversion, Integer and floating point number representation, Signed and unsigned numbers

UNIT II: Applications of Combinational Logic Design

Realization of basic combinational functions like comparison, decoding, multiplexing, demultiplexing, Design of Half Adder and Full Adder, Design of Half Subtractor and Full Subtractor, BCD Adder, Introduction to Carry Propagation Adder.

UNIT III: Sequential Circuit Design

Flip flops, working principle, types of flip flops, types of clocks, preset and clear, Excitation tables, Flip Flop conversions, Design of Asynchronous and Synchronous counters, Design of Mod-n counters.

UNIT IV: Applications of Sequential Circuit

Shift registers, Sequence generators, lockout conditions, Sequence detectors using Moore and Mealy, Introduction to Algorithmic State Machines (ASM) charts, notations, design of a simple controller using ASM.

UNIT V: Introduction to Computer Organization

Introduction to Computer Organization, Functional components and their Interconnection, Register organization, Case study of Intel 8086, Number and size of registers, General purpose registers, Design and Organizational issues of registers, Control Unit organization, Hardwired and microprogrammed control units.

UNIT VI: Instruction Pipelining and Memory

Instruction cycle, type of instructions, types of operands, Instructions characteristics, design issues of instructions, addressing modes, Instruction pipelining, performance and hazards of pipelining, Reduced Instruction Set Computer (RISC), Complex Instruction Set Computer (CISC) architectures. Types of memory, Role of cache memory, Cache memory organization, mapping techniques

Text Books

1. R. P. Jain, 'Modern Digital Electronics', Tata McGraw-Hill, (5th Edition), (2019).
2. AnandKumar, 'Fundamentals of Digital Circuits', PHI Learning, (4th Edition), (2016)
3. Hamacher, Z. Vranesic and S. Zaky, 'Computer Organization and Embedded Systems',

McGrawHill, (5th Edition), (2017).
4. W. Stallings, 'Computer Organization and Architecture - Designing for Performance', Prentice Hall of India, (10th Edition), (2016)

Reference Books

1. Anil Maini, 'Digital Electronics: Principles and Integrated Circuits', Wiley India Ltd, (2019).
2. Malvino, D. Leach, 'Digital Principles and Applications', Tata Mc-Graw Hill, (8th edition), (2014).
3. John P Hays, 'Computer Architecture and Organization', McGraw-Hill Publication, (3rd Edition), (2017)
4. A. Tanenbaum, 'Structured Computer Organization', Pearson, (6th Edition), (2016).

Online/Web/Other References

NPTEL series – nptel.ac.in/courses/117105080/ (Digital System Design by Prof. D. Roychoudhary, Dept. of Computer Science and Engineering, IIT Kh.).
Online Chapters – WilliamStallings.com/COA/COA8e.html.

23PCCE304 DISCRETE MATHEMATICS AND STATISTICS

Teaching Scheme
Lectures: 3 Hours / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objectives
To facilitate the learner to

1. Understand basics involved in set theory and logic.
2. Understand the basics of probability and probability distribution.
3. Learn concepts of relations and functions to solve the problems.
4. Relate the fundamentals of graphs and trees to real-life applications.
5. Utilize the fundamentals of statistics to solve the problems.

Course Outcomes
After completion of the course, students will be able to

1. Solve problems on concepts of set theory, mathematical induction and logic.
2. Apply concepts of probability to solve mathematical problems.
3. Apply relations and functions for problem solving.
4. Make use of the fundamentals of graphs and trees to various applications.
5. Make use of descriptive statistical methods on different types of data.

UNIT I: Sets, Logic and Propositional Calculus

Fundamentals of set theory, Multi-Sets, Power Set, Principle of Inclusion and Exclusion, Principle of Mathematical Induction, Applications of Set, Propositions, Logical Connectives, Algebra of Propositions, Conjunctive and Disjunctive Normal Forms, Predicates and Quantifiers, Nested Quantifiers, Applications of Logic.

UNIT II: Probability and Distributions

Fundamentals of Probability, Conditional probability, Bayes theorem, Random variables-discrete and continuous, Distributions - Frequency, Binomial, Poisson, Normal, Sampling, Central Limit Theorem.

UNIT III: Relations and Functions

Introduction to Relations, Properties of Binary Relations, Composition of Relations, Closure of Relations, Warshall's Algorithm, Partial Ordering Relations, Hasse Diagram, Lattice, Function, Types of function, Composition of Functions, Inverse Functions, Pigeonhole Principle.

UNIT IV: Graph and Tree

Basic Terminologies of Graph, Types of Graphs, Isomorphic Graphs, Paths and Circuits, Hamiltonian, Euler Paths and Circuits, Planar Graph, Applications of Graph - Graph Coloring Problem, Travelling Salesman Problem, Properties of Trees, Types of Trees, Spanning Tree, Fundamental Circuits and Cut Sets, Transport Network.

UNIT V: Descriptive Statistics

Introduction, Univariate, Bivariate and Multivariate data and its analysis, Measure of Central Tendency, Types of Averages - Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean, Relationship among averages, Dispersion of Data - Standard Deviation, Variance, Data Classification, Five Number Summary.

Textbooks

1. C. L. Liu and D. P. Mohapatra, "Elements of Discrete Mathematics", 4th Edition, Tata McGraw-Hill, 2017, ISBN 978-1-25-900639-5.
2. Kenneth H. Rosen, "Discrete Mathematics and its Applications", 7th Edition, 2012, Tata McGraw-Hill, ISBN 978-0-07-338309-5.
3. S.P. Gupta, "Statistical Methods", 41st Edition, 2011, ISBN :978-81-8054-862-8, Sultan Chand and Sons publication.

Reference Books

1. B. Kolman, R. Busby and S. Ross, "Discrete Mathematical Structures", 6th Edition, Pearson Education, 2009, ISBN 81-7808-556-9.
2. Seymour Lipsehutz and Marc Lars Lipson "Discrete Mathematics", 3rd Special Indian Edition, ISBN-13: 978-0-07-060174-1.
3. J. P. Tremblay and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1997, Tata McGraw-Hill, ISBN 0-07- 463113-6.
4. E. Goodaire and M. Parmenter, "Discrete Mathematics with Graph Theory", third edition, Pearson Education, 2008, ISBN 81 – 7808 – 827 – 4.
5. N. Deo, "Graph Theory with application to Engineering and Computer Science", Eastern Economy Edition, Prentice Hall of India, 1990, 0 – 87692 – 145 – 4.

Online / Web / Other References

1. 12 Week NPTEL course, https://nptel.ac.in/courses/106/106/106106183/#

23VEC301 UNIVERSAL HUMAN VALUES

Teaching Scheme
Lectures: 2 Hours / Week
Tutorial: 1 Hour / Week

Examination Scheme
In Semester: 50 Marks
End Semester: 50 Marks
Credits: 3

Course Objectives
To facilitate the learner to

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Course Outcomes
After completion of the course, students will be able to

1. Understand the significance of value inputs in formal education and start applying them in their life and profession
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Analyze the value of harmonious relationship based on trust and respect in their life and profession
4. Examine the role of a human being in ensuring harmony in society and nature.
5. Apply the understanding of ethical conduct to formulate the strategy for ethical life and profession.

UNIT I: Introduction to Value Education

Understanding Value Education ,Self exploration as the Process for Value Education, Continuous Happiness and Prosperity which is the Basic Human Aspirations, Right Understanding,

Relationship and Physical Facility, Current Scenario for Happiness and Prosperity, Method to Fulfill the Basic Human Aspirations.

UNIT II: Harmony in the Human Being

Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Program to ensure self-regulation and Health.

UNIT III: Harmony in the Family and Society

Harmony in the Family, Family being the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, Trust which is the Foundational Value in Relationship, Respect as the Right Evaluation, Understanding Harmony in the Society, Vision for the Universal Human Order.

UNIT IV: Harmony in the Nature or Existence

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels and the Holistic Perception of Harmony in Existence.

UNIT V: Implications of the Holistic Understanding, a Look at Professional Ethics

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models, Typical Case Studies with Strategies for Transition towards Value-based Life and Profession.

Textbooks

1. R. R. Gaur, R. Asthana, G. P. Bagaria, “The Textbook A Foundation Course in Human Values and Professional Ethics”, Excel Books, New Delhi, (2nd Revised Edition), (2019).
2. R. R. Gaur, R. Asthana, G. P. Bagaria, “Teachers’ Manual for A Foundation Course in Human Values and Professional Ethics”, Excel Books, New Delhi, (2nd Revised Edition), (2019).

Reference Books

1. A. Nagaraj,"Jeevan Vidya: EkParichaya", Jeevan Vidya Prakashan, Amarkantak, (1999).
2. A.N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, (2004).
3. Mohandas Karamchand Gandhi, "The Story of My Experiments with Truth", Prakash books Publishers, Daryaganj, New Delhi, (1983).
4. E. F. Schumacher, "Small is Beautiful", Harper CollinsPublishers, Noida, Uttar Pradesh, (2010).
5. Cecile Andrews, "Slow is Beautiful", New Society Publishers, Canada, (2006).
6. J. C. Kumarappa, "Economy of Permanence", Sarva Seva Sangh Prakashan, Wardha, Sevagram, (2017).
7. Pandit Sunderlal ,"Bharat Mein Angreji Raj", Prabhat Prakashan, New Delhi (2018).
8. Dharampal,"Rediscovering India", Society for Integrated Development of Himalayas, (2003).
9. Mohandas Karamchand Gandhi, " Hind Swaraj or Indian Home Rule", Navajivan Publication House, Ahemadabad (2003).
10. Maulana Abdul Kalam Azad, "India Wins Freedom", Orient BlackSwan, (1989)
11. Romain Rolland, " Swami Vivekananda", Advaita Ashram Publication Ramkrishna Math, (2nd Edition), (2010).
12. Romain Rolland, "Gandhi", Srishti Publishers & Distributor, (2002).
13. Annie Leonard, "The story of stuff", Little, Brown Book Group, (2005).

Online / Web / Other References

1. NPTEL course on Humanities and social sciences
https://nptel.ac.in/courses/109/104/109104068/

3AEC301 DESIGN THINKING

Teaching Scheme
Lectures: 1 Hour / Week
Tutorial: 1 Hour / Week

Examination Scheme
In Semester: 50 Marks
Credits: 2

Course Objectives

To familiarize students with

1. Design Thinking process
2. User centric approach for designing a solution.
3. Problem analysis with various methods
4. Applications of Design Thinking

Course Outcomes
After completion of the course, students will be able to

1. Apply the design process for real world problems.
2. Apply types of thinking ideas into visuals or prototypes.
3. Analyze problems with various methods and approaches for innovative user centric solutions.
4. Recommend a solution based on stages of Design Thinking.

UNIT I: Introduction to Design thinking

Human Centred Design approach, Concept of Design Thinking. Features of Design Thinking, Process of thinking, Creative thinking, Lateral thinking, User centric approach and personas, Thinking hats.

UNIT II: Stages of Design Thinking

Empathy: Difference Between Empathy and Sympathy, Empathy Techniques, Empathy Maps, define: Identification of Problem, Defining and Refining of Problem Statement, Ideate: Process of Ideation, Prototyping, Testing.

UNIT III: Design thinking approaches

Visualization, Journey Mapping, Value Chain Analysis, Mind Mapping, Development, Assumption Testing, Prototype, Co-Creation, Learning Launches, Story Telling.

UNIT IV: Design Thinking for Strategic Innovations and its applications

Strategic Management, Innovation Management, Frameworks for Innovation, Types of Innovations: Disruptive vs. Sustaining innovation, Radical vs. incremental innovation, Architectural vs. Modular Innovation, The Innovation Matrix, Business Model Innovation
Applications: Product Development, Process Development, Service Management.

Textbooks

1. Bryan Lawson, "How designers think: The design process demystified", 4th Edition, Butterworth Architecture
2. Nigel Cross, "Design Thinking", Berg Publishers – 2011

Reference Books

1. Makarand Ramesh Velankar, Leena Manojkumar Panchal, "Design Thinking Primar", Techknowledge Publications- September 2023, ISBN: 978-93-5563-711-6
2. Ben Crothers, "Design Thinking Fundamentals", O'Reily
3. Tim Brown, "Change by Design: How Design Thinking Transforms Organizations", HarperCollins – 2009.
4. Susan Weins Chenk, "Hundred things every designer needs to know about people", New Riders Publication
5. Vijay Kumar, "101 Design Methods: A Structured Approach for Driving Innovation in Your Organization", Wiley Publication
6. Roger L. Martin, "Design of Business: Why Design Thinking is the Next Competitive Advantage" Harvard Business Press
7. Karl Ulrich, "Design: Creation of Artifacts in Society" - 2011
8. Bala Ramadurai, "Karmic Design Thinking"
9. T. Amabile, "How to kill creativity", SAGE Publication - 2006

10. William Lidwell, Kritina Holden, Jill Butler, "Universal principles of Design ", Rockport Publishers
11. Bella Martin, Bruce Hanignton, Bruce M Hanington "Universal methods of design", Rockport Publishers - 2012
12. Roman Kizanie, "Empathy: Why it matters, how to get it", Tarcher Perigee Publishers
13. Karla McLaren, "The Art of Empathy: A complete Guide to life's most essential skill", Sounds True Publishers

23PCCE301L DATABASE MANAGEMENT SYSTEMS LABORATORY

Teaching Scheme
Practical : 02 Hours/Week

Examination Scheme
In semester: 25 Marks
End Semester: 25 Marks
Credits : 1

Course Objectives
To facilitate learners to
1. Write Structured Query Language (SQL) queries.
2. Implement PL/SQL stored procedures and functions.
3. Develop 2 tier database applications.
4. Build Entity Relationship (ER) Diagram for database applications.

Course Outcomes
After completion of the course, students will be able to
1. Apply the knowledge of Structured Query Language (SQL) clauses to query the relational database.
2. Use the knowledge of PL/SQL to solve the given problem.
3. Implement the database connectivity from any high-level language using a suitable driver.
4. Construct ER diagrams by applying normalization rules to the database application.

Preamble

The lab is designed in such a way that the student can apply the DBMS concepts and implement the SQL commands. Once they are thorough with the SQL commands, they can build a database application using front end and back-end concepts. Motivation here is that the students should get a good practice of the SQL, PL/SQL. Faculty members are encouraged to use different database systems and design different queries such that all the SQL clauses are covered.

Group A assignments are mandatory where students will write and execute the SQL queries using DDL and DML commands. From Group B three assignments can be given to the students such that each assignment is implemented in some or the other batch. Group B assignments based on the PL/SQL concepts like stored procedures, functions, cursors and triggers. Group C assignment is about developing a database application using database connectivity programming using any language, creating ER diagrams for the same application and normalizing the tables for it.

Suggestive List of Assignments

Assignments Group A (Mandatory)

1. Execute SQL Data Definition Language (DDL) statements to create tables and insert data into the tables. Make use of the Sequence feature.

2. Execute SQL queries for suitable database applications using SQL Data Manipulation Language (DML) statements: Insert, Select, Update and Delete.

3. Execute SQL queries for suitable database applications using SQL DML statements: all types of Join, Sub-Query and View.

Assignments Group B (Any 3)

Group B1 (Any 1)

1. Consider an IPL (Indian Premier League) system. Assume you have tables for players (players), teams (teams), and matches (matches). The goal is to retrieve information about players from a specific team and display their performance in a match. Create a PL/SQL stored procedure using cursors to retrieve information about players from a specific team and display their performance.

2. Consider an IPL (Indian Premier League) system where there are two tables in which the players' data is stored. Write a PL/SQL block of code that will merge the data from the "old_players" table to the "new_players" table. If the data in the first table already exists in the second table then that data should be skipped. Make suitable assumptions wherever necessary.

3. Implement a PL/SQL stored procedure for populating the "Grade" field in the 'Students' table which indicates the grade secured by every student in the class. (first class/ Distinction etc). (use cursors preferably).

Group B2 (Any 1)

1. Implement a database trigger which will ensure that when data is inserted in the Players table, the Player name is always in Upper case.

2. Implement a database trigger which will ensure that when data in the players table is updated, the old copy is preserved in the Transaction Log table along with the date and userID.

3. Implement a database trigger which will ensure that when data in the players table is deleted, it is first copied in the Ex-Players table along with the date of deletion.

Group B3 (Any 1)

1. Implement a PL/SQL function to calculate the number of distinction holders, first class holders, second class holders in the class.
2. Implement a PL/SQL function to calculate the total number of runs scored by each team for the IPL (Indian Premier League) system.

Assignments Group C

1. Develop real life 2 tier/3 tier database applications using frontend and backend concepts. Draw an ER diagram for the selected application and normalize the database up to appropriate normal form.

23PCCE302L DATA STRUCTURES LABORATORY

Teaching Scheme
Lectures:4 Hours/Week

Examination Scheme
In Semester: 25 Marks
End Semester: 25 Marks
Credits: 2

Prerequisites:
1. Programming Skills in C Language Laboratory
2. Programming Skills in Java Laboratory

Course Objectives
To facilitate the learner to
1. Implement various Searching, Sorting and Hashing methods.
2. Use appropriate linear data structure for a given problem statement.
3. Develop a solution for a given problem using non-linear data structures.
4. Implement small applications using data structures.

Course Outcomes
After completion of the course, students will be able to
1. Implement various Searching, Sorting and Hashing methods.
2. Develop a solution for a given problem using linear data structures.
3. Develop a solution for a given problem using non linear data structures.
4. Design a small application using data structures.

Preamble

The laboratory assignments are designed in a set of groups A, B and C such that students will be able to design and implement solutions for a given problem using various data structures.Motivation here is that students should be able to code the basic algorithm and select appropriate data structures to implement the solution of given problem. Faculty members are encouraged to expand problem statements with variations. Assignments can be framed and expanded in such a way that it explores concepts, logic of solution and identification of proper data structures for simple application. Students will be encouraged to solve open problems in different domains. Faculty will appropriately adopt assignments on similar lines as the examples shown here.

Group B assignments are designed in such a way that students will choose appropriate data structures to implement solutions to a given problem. Faculty members should choose the assignments from group A in such a way that all the units of the syllabus of Data Structures are covered. In group C assignments students will design an algorithmic solution for selected problems using concepts covered in the subject Data Structures.

The laboratory assignments of group A and B are to be submitted by students individually using JAVA object oriented programming language. Group C assignments may be performed in a group of 2 to 4 students from the same batch. For each assignment program code with sample output is to be submitted as a soft copy.

Suggestive List of Assignments

Group A : (Any 6)

1 The College Library maintains records of books. Book records contain basic information about books. Book records are to be listed in the specific order. List of books of specific authors are to be searched. Use appropriate data structure to perform sorting, searching operations of book data effectively.

2 Students roll numbers and percentages of SY class are stored. Implement operations to arrange students' records in ascending/ descending order based on their marks using various sorting methods.

3 The Department of Computer Engineering has a 'Code Club'. Students of second, third and final year can subscribe to membership. Design a system to maintain club membership information to add, delete, and modify details of records with ease. Use appropriate data

structure.

4 A concordance is an alphabetical list of the principal words used in a book ,listing every instance of each word with its immediate context. Implement a concordance list for insertion of new words.

5 Design mobile phone contact list which stores name and contact number in ascending order. Develop a code to search a particular contact details of specified name, insert new contact and delete particular contact from list.

6 A food delivery application used to take the orders from customers. Display the menus on screen and give options to select different menus. Generates the bill and delivers the orders on a first come first serve basis.

7 An airport is developing a computer simulation of air traffic control that handles events such as landings and takeoffs. Each event has a time stamp that denotes the time when the event will occur . Develop a code for inserting an event and exacting the most recent event and display all events.

8 A dictionary stores keywords and its meanings as a key value pair. Use appropriate data structure that will provide minimum comparisons to find any keyword. Provide facility to adding new keywords, deleting keywords and modifying meaning of keywords.

9 Company wants to lease phone lines to connect its offices of different cities with each other. Company charges different amounts of money to connect different pairs of offices. Solve the problem using graph data structures to connect all offices of a company with a minimum cost.

10 In universities, each student is assigned a unique prn number that can be used to retrieve information about them. Develop a code to insert and retrieve information of students.

11 A newspaper delivery boy drops newspapers every day in a society having many lanes and houses. Design a program to provide different paths that he could follow. Solve the problem by suggesting appropriate data structures.

12 Implement Stack as ADT using linked list or array. Use the same ADT to evaluate a given postfix expression.

Group B: (Any three)

1 **Subset Sum Problem:** Given a set of non-negative integers and a value **sum**, the task is to check if there is a subset of the given set whose sum is equal to the given **sum**.

Input:

N = 6

arr[] = {3, 34, 4, 12, 5, 2}

sum = 9

Output: 1

Explanation: Here there exists a subset with

sum = 9, 4+3+2 = 9

2 Given an array of jobs where every job has a deadline and associated profit if the job is finished before the deadline. It is also given that every job takes a single unit of time, so the minimum possible deadline for any job is 1. Maximize the total profit if only one job can be scheduled at a time.

JobID	Deadline	Profit
a	2	100
b	1	19
c	2	27
d	1	25
e	3	15

3 Graph coloring refers to the problem of coloring vertices of a graph in such a way that no two adjacent vertices have the same color.

4 Jesse loves cookies and wants the sweetness of some cookies to be greater than value . To do this, two cookies with the least sweetness are repeatedly mixed. This creates a special combined cookie with:

sweetness =(1* Least sweet cookie+2* 2nd least sweet cookie).

This occurs until all the cookies have a sweetness .

Given the sweetness of a number of cookies, determine the minimum number of operations required. If it is not possible, return .

Example
k=9
A[2,7,3,6,4,6]

The smallest values are . 2&3
Remove them then return 2+2*3 to the array. Now [8,7,6,4,6]
Remove 4,6 and return4+2*6 to the array. Now .[16,8,7,6]
Remove 6,7 return 6+2*7 and A[20,16,8] .
Finally, remove 16,8 and return8+2*16 to . NowA[40,20,16] .
All values are >9 so the process stops after iterations.

Return

5 There are a number of plants in a garden. Each of the plants has been treated with some amount of pesticide. After each day, if any plant has more pesticide than the plant on its left, being weaker than the left one, it dies.

You are given the initial values of the pesticide in each of the plants. Determine the number of days after which no plant dies, i.e. the time after which there is no plant with more pesticide content than the plant to its left.

Example

// pesticide levels=[3,6,2,7,5]

Use a 1-indexed array. On day 1 , plants 2 and 4 die leaving p'= [3,2,5] . On day 2 , plant 3 in p' dies leaving p"=[3,2]. There is no plant with a higher concentration of pesticide than the one to its left, so plants stop dying after day

6 **Knight tour problem:** The Knight's Tour problem is about finding a sequence of moves for the knight on a chessboard such that it visits every square on the board exactly one time. It is a type of Hamiltonian path problem in graph theory, where the squares represent the vertices and the knight's moves represent the edges of the graph.

Group C:

Create a small application using appropriate data structures showcasing proficiency in problem definition, requirement gathering, modular solution design with distinct separation of abstract data types and their utilization, crafting clear function prototypes, and effectively distributing tasks among functions.