Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Branch: B Tech Honours (Artificial Intelligence) **Semester: III**
Subject: Probability and Statistics **Subject Code: B127371(022)**
Total Theory Periods: 40 **Total Tutorial Periods: 10**
No. of Class tests to: 2 (Minimum) **No. of Assignments to be submitted: One per Unit**
ESE Duration: Three Hours, Maximum Marks in ESE: 100 **Minimum Marks in ESE: 35**

UNIT – I: PROBABILITY AND RANDOM VARIABLES
Axioms of Probability- Bayes' Theorem -Random variables – Moments – Moment generating functions.

UNIT – II: STANDARD DISTRIBUTIONS
Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions.

UNIT – III: TWO-DIMENSIONAL RANDOM VARIABLES
Joint distribution – Marginal and conditional distribution – Co-variance – Correlation and Regression.

UNIT – IV: TESTING OF HYPOTHESIS
Sampling distributions – Testing of Hypothesis – Small samples – t Test, F Test and Chi-square Test –Large samples – Single mean – Difference in means – single proportion and difference in proportions.

UNIT – V: DESIGN OF EXPERIMENTS
Analysis of variance – One Way Classification – Completely Randomized block design – Two Way Classification – Randomized block design – Latin Square design.

TEXT BOOKS:

1. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.
2. Johnson. R.A. and Gupta. C.B., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, Asia, 7th Edition, 2007.
3. A. Chandrasekaran, G. Kavitha, "Probability, Statistics, Random Processes and Queuing Theory", Dhanam Publications, 2014.
4. Raj Kumar Bansal, Ashok Kumar Goel, Manoj Kumar Sharma, "MATLAB and its Applications in Engineering", Pearson Publication, Second Edition, 2016.

REFERENCE BOOKS:

1. Spiegel. M.R., Schiller. J. and Srinivasan. R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill Edition, 2004.
2. Devore. J.L., "Probability and Statistics for Engineering and the Sciences", Cengage Learning, New Delhi, 8th Edition, 2012.
3. Dean G. Duffy., "Advanced Engineering Mathematics with MATLAB", CRC Press, Third Edition 2013.

E BOOKS:
1. http:// nptel.ac.in/courses/ IIT-MADRAS/ Principles_of_Communication1/ Pdfs/ 1_5.pdf
2. https://www.khanacademy.org

MOOC:
1. https://www.edx.org/course/intr

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Branch: B Tech Honours (Artificial Intelligence) **Semester: III**
Subject: Analysis & Design of Algorithm **Subject Code: B127372(022)**
Total Theory Periods: 40 **Total Tutorial Periods: 10**
No. of Class tests to: 2 (Minimum) **No. of Assignments to be submitted: One per Unit**
ESE Duration: Three Hours, Maximum Marks in ESE: 100 Minimum Marks in ESE: 35

UNIT – I: INTRODUCTION TO ALGORITHM

Algorithm Definition and its properties, requirement to study algorithm, Algorithm vs. Program, Algorithm design techniques, Asymptotic Notations and their properties, recurrence relation, Fundamentals of the Analysis of Algorithmic Efficiency, Time and Space complexity analysis of Recursive and Non-recursive algorithms.

UNIT – II: ANALYSIS OF SORTING ALGORITHMS

Insertion sort, Merge Sort, Quick Sort, Introduction to Binary Heap- Building Heap, Heapify Operation, Heap Sort, Heap-Extract-MIN, Heap-Decrease-Key, and Heap-Insert operations, Sorting techniques in linear time- Counting sort and Radix Sort.

UNIT – III: GREEDY METHODS

Introduction to Greedy methodology, Fractional Knapsack problem, Huffman Encoding, Task/Job Scheduling problem, Optimal Merge Pattern, Introduction and real-time applications of Graph, Tree, and Shortest Path, Minimum Spanning Tree (MST) Algorithm- Prim's and Kruskal Algorithm, Single Source Shortest Path Algorithm- Dijkstra's and Bellmen Ford algorithm.

UNIT – IV: DYNAMIC PROGRAMMING

Introduction to Dynamic programming, Matrix-Chain Multiplication, Longest Common Subsequence, 0/1 Knapsack, Sum of Subsets, Travelling salesman problem, Backtracking, All-pair shortest path Algorithm-Floyd's Warshall algorithm.

UNIT – V: OTHER RELEVANT TOPICS

Binary Search Tree- property and Tree Traversal, B-Trees, String Matching, NP-completeness, Introduction to Approximation Algorithm and Randomized Algorithms.

TEXT BOOKS:

1. Introduction to Algorithms, 3rd Edition by T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C.Stein, PHI.
2. Fundamentals of Computer Algorithms, 2nd Edition by Ellis Horowitz, SartajSahni, and S. Rajasekaran, Silicon Press, USA.

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Branch: B Tech Honours (Artificial Intelligence) **Semester: III**
Subject: Computer Organization and Architecture **Subject Code: B127373(022)**
Total Theory Periods: 40 **Total Tutorial Periods: 10**
No. of Class tests to: 2 (Minimum) **No. of Assignments to be submitted: One per Unit**
ESE Duration: Three Hours, Maximum Marks in ESE: 100 **Minimum Marks in ESE: 35**

UNIT – I:

CPU Architecture, instruction format, control signals in CPU, micro program control unit and hard wired control unit, ALU & sequencer, look ahead carry generator. Arithmetic, Integer Arithmetic, multiplication, Booth's Algorithm, Floating point number representation, floating point arithmetic, division algorithm. Memory: Dynamic RAM organization, CACHE memory & it's mapping, cache organization in multicore Processor, virtual memory, secondary storage, IDE, SCSI, RAID, CD, DVD.

UNIT – II:

Interrupt structure of 8086, closely coupled and loosely coupled multiprocessor systems, bus arbitration, co-processor, key board & video RAM, character generator ROM, Display Card Instruction Pipelining, Introduction to the basic features & architecture of RISC & CISC processors, super scalar processor. OS Support: Component of OS, example of MS-DOS, IT'S LOADING, DOS, and BIOS interrupts.

TEXT BOOKS:

1. W. Stallings, "Computer organization and architecture," PEI.
2. C. Hamacher*et al*., "Computer organization," TMH.

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Branch: B Tech Honours (Artificial Intelligence) **Semester: III**
Subject: Discrete Structure **Subject Code: B127374(022)**
Total Theory Periods: 40 **Total Tutorial Periods: 10**
No. of Class tests to: 2 (Minimum) **No. of Assignments to be submitted: One per Unit**
ESE Duration: Three Hours, Maximum Marks in ESE: 100 **Minimum Marks in ESE: 35**

UNIT– I: Set Theory and Logic

Set, Combination of sets, Finite and Infinite sets, Un-countably infinite sets, Principle of inclusion and exclusion, Mathematical Induction, strong Induction.
Propositions, Conditional Propositions, Logical Connectivity, Propositional calculus, Universal and Existential Quantifiers, First order logic, Applications of Propositional Logic to System Specifications, Boolean Searches.

Relations, Recurrence Relations: Definitions, Equivalence Relations and partitions, Partial ordering relations and lattices, Chains and Anti chains, Warshall's Algorithm & transitive closure, Recurrence relations.

UNIT– II: Number Theory

Basics of Modulo Arithmetic, Basic Prime Number Theory, Factorization, GCD, Divisibility, Euclid's algorithm Congruence relation and its applications: Hashing function, Pseudorandom Numbers, Chinese Remainde Theorem.

Introduction to Counting

Basic Counting Techniques, Pigeonhole and Generalized Pigeonhole Principle, Permutations and Combinations..

UNIT– III: Graphs & Trees

Basic terminology, multi graphs and weighted graphs, paths and circuits, shortest path Problems, Euler and Hamiltonian paths and circuits, factors of a graph, planar graph and Kuratowski's graph, independent sets, graph coloring, Trees, rooted trees, path length in rooted trees, binary search trees, spanning trees and cut set, circuits, minimal spanning trees, Kruskal's and Prim's algorithms for minimal spanning tree. Applications of Graph Theory: In Switching and Coding Theory, Electrical Network Analysis.

UNIT– IV: Algebraic Systems Hours 6

Algebraic Systems, Groups, Semi Groups, Monoids, Subgroups, Permutation Groups, Codes and group codes, Isomorphism and Automorphisms, Homomorphism and Normal Subgroups, Ring, Field.

TEXT BOOKS:

1. C. L. LIU, "Elements of Discrete Mathematics", 2nd Edition, Tata McGraw-Hill, 2002, ISBN: 0-07-043476-X.
2. Kenneth H. Rosen, Discrete Mathematics and Its Appications, Tata McGraw-Hill Edition, 2015.
3. G. Shanker Rao, "Discrete Mathematical Structures", New Age International, 2002, ISBN: 81-224-1424-9.
4. Bernanrd Kolman, Robert C Busby, S.Ross, Discrete Mathematical Structures, PHI Learning, 2008.

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Branch: B Tech Honours (Artificial Intelligence) **Semester: III**
Subject: Database Management System **Subject Code: B127375(022)**
Total Theory Periods: 40 **Total Tutorial Periods: 10**
No. of Class tests to: 2 (Minimum) **No. of Assignments to be submitted: One per Unit**
ESE Duration: Three Hours, Maximum Marks in ESE: 100 **Minimum Marks in ESE: 35**

Course Objectives :

The focus of this course is on database design, architecture, and relational models. Normal forms, internal schema design would also be explored.

Course Outcomes:

Learner would appreciate the systematic design and principals involved in any database development.

The importance of canonical normal forms and its design in large scale database systems would be a secondary outcome of this course.

UNIT – I: **(4 HOURS)**
Introduction: Basic concepts, Advantages of a DBMS over file-processing systems, Data abstraction, Data Models and data independence, Components of DBMS and overall structure of DBMS, Data Modeling, entity, attributes, relationships, constraints, keys E-R diagrams, Components of E-R Model.

UNIT – II: **(4 HOURS)**
Relational Mode: Relational Model: Basic concepts. Attributes and domains, concept of integrity and referential constraints, schema diagram. Relational Query Languages: Relational Algebra and Relational Calculus: Tuple relational and domain relational calculus.

UNIT – III: **(4 HOURS)**
SQL: Introduction to SQL, Characteristics and advantages of SQL, SQL Data Types and Literals, DDL, Tables: Creating, modifying ,deleting, Views: Creating, dropping, Updating using Views, DML, SQL Operators, SQLDML queries, SELECT query and clauses, Set Operations ,Predicates and Joins, Set membership, Tuple variables, set comparison, ordering of tuples, aggregate functions, nested queries, Database modification using SQL Insert, Update and Delete queries, Dynamic and Embedded SQL and concept of stored procedures, Query-by- example.

UNIT – IV: **(4 HOURS)**
Relational Database Design: Notion of normalized relations, functional dependency, decomposition and properties of decomposition, Normalization using functional dependency, Multi-valued dependency and Join dependency. Storage and File Systems: Secondary Storage, RAID, File Organization, Indices, Static and Dynamic Hashing, B-trees and B+ Trees.

UNIT –V: **(4HOURS)**
Query Management and Transaction Processing: Measures of query cost, Selection operation, sorting and join operation, Transaction Concept, Components of transaction management, Concurrency and recovery system, Different concurrency control protocols such as timestamps and locking, validation, Multiple granularity, Deadlock handling, Different crash recovery methods such as log-based recovery, shadow paging, Buffer management and Remote backup system.

TEXT BOOKS:

1. Abraham Silberschatz, Henry F.Korth ,S.Sudarshan ,"Database system concepts" , 5th Edition, McGraw Hill International Edition.
2. Raghu Ramkrishnan, Johannes Gehrke, "Database Management Systems", Second Edition, McGraw Hill International Editions.

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Branch: B Tech Honours (Artificial Intelligence) **Semester: III**

Subject: Analysis & Design of Algorithm Lab **Subject Code: B127391(022)**

Maximum Marks in ESE: 40

List of Experiments:-

1. To implement insertion sort, merge sort and bubble sort.
2. To implement maximum sum of sub array problem.
3. To implement heap sort program.
4. To implement radix sort and bucket sort.
5. To implement Fibonacci sequence, linear search and binary search.
6. To implement local minima in array and local minima in grid problem.
7. To implement matrix multiplication and GCD (Greatest common Divisor).
8. To implement range minima problem.
9. To implement binary tree and binary search tree.
10. To implement shortest path in grid and majority element problem.
11. To implement multiplication of 2 numbers (using divide and conquer approach), counting inversions and quick sort.

Chhattisgarh Swami Vivekananda Technical University, Bhilai (C.G.)

Branch: B Tech Honours (Artificial Intelligence) **Semester: III**

Subject: Database Management System Lab **Subject Code: B127392(022)**

Maximum Marks in ESE: 40

List of Experiments:

1. ER diagrams exercise and SQL, PL-SQL: Modeling exercises for ER Diagrams, Identification of Attributes & Keys. Design Discussions. SQL Commands and Queries (20-25 Queries to be written and data retrieved).
2. Writing SQL Triggers &Assertions.
3. Mini Project implementation (Details of following are given to the students with functional components with project tasks:
4. Draw ER Diagram, Schema of each table required in Project, Normalize all table up to 3NF, Implementation Task: User Interface creation and Report generation.
5. The logical design performs the following tasks: Map the ER/EER diagrams to a relational schema. Be sure to underline all primary keys, include all necessary foreign keys and indicate referential integrity constraints.
6. Perform physical design based above logical design using Oracle/MSSQL on Windows platform and MySQL/Postgre SQL on Linux platform.
7. PerformDMLandDDLusingallpossibleSQLcommandsandwiththehelpanyonehost languages like C, C++, VB, etc. (i.e. embedded SQL).
8. Perform DML and DLL using PL/SQL and PL/pg SQL for the above problems.
9. Assignment based on object based database.
10. Assignment based on Indexing.
11. Design a mini project for any live problem as per SE constraints and implement using the techniques studied for above assignments.