CODE: MA21107 **REF NO: To be filled by CD office**

Probability and Statistics

Credits: 03 **Teaching Scheme: -** Theory 03 Hrs/Week

Prerequisites:

1. Elementary idea of differential and integral calculus, Permutations, Combinations and Binomial Theorems of 10+2 standard.

Objectives:

1. To introduce the fundamental concepts of probability and probability distributions.
2. To make students of aware some of the readily applied probability distributions such as Binomial Distribution, Poisson distribution, Normal distribution, Gama, Weibull distribution, Chi-Squared distributions, etc.
3. To make students aware of Sampling distributions such as *t* and *F* – Distributions and their applications in estimating the parameters such as mean and variance.
4. To introduce the concept of testing of hypothesis.
5. To make students aware of the concept of correlation and regression.
6. To introduce the concept of Stochastic Process

Course Details:

Unit 1: Title - Elementary Probability Theory and Random Variables: (08 Hrs)

U1.1 Probability: Introduction, Probability of an event, additive and multiplication rules, conditional probability, Bayes' rule, random variable, discrete and continuous probability distribution, Joint probability distribution, Mathematical expectation, Variance and co-variance of random variables, Mean and co-variance of linear combination of random variables, Chebyshev theorem. **[T_2]**

U1.2 Self Study Topics : Weak and Strong laws of Large Numbers.

Unit 2: Title - Some Probability Distributions: (08 Hrs)

U2.1 Binomial, Poisson, Uniform, Normal, Gamma, Exponential, Weibull and Chi-square distributions. Moments and Moment Generating functions of the above distributions. **[T_2]**

U2.2 Self Study Topics: Negative Binomial, Geometric, Hyper-geometric, and Beta Distributions

Unit 3: Title - Sampling Distributions and applications to Estimation of Parameters: (08 Hrs)

U3.1. Sampling Distribution: Random Sampling, Some Important Statistics, Sampling

Distributions, Sampling Distributions of means, Sampling distribution of S^2, *t*- distribution, *F*-distribution. **[T2]**

Estimation of parameter: Methods of estimation, Estimating the mean and variance of a single sample, Standard error, Prediction intervals, Tolerance limits, Estimating the difference between means of two samples, Estimating proportion and variance of a single sample, Estimating the difference between two proportions and ratio of variances of two samples, Maximum likelihood estimation, Characteristics of a good estimator. **[T2]**

U3.2. Self Study Topics : Estimating a proportion of a single sample, Estimating the difference between two proportions of two Samples.

Unit 4: Title - Testing of Hypotheses, Linear Regression and Correlation (08 Hrs)

U4.1 Test of hypothesis: one and two tailed test, test on a single mean when variance is known & variance is unknown. Test on two means, tests on single and two proportions. One and two sample test for variance. **[T2]**

Introductory concepts of Correlation and Regression: Karl Pearson Coefficient of Correlation, Regression and Lines of Regression. **[T1]**

U4.2. Self Study Topics : Multiple Linear Regression.

Unit 5: Title - Stochastic Process (08 Hrs)
U5.1 Definition of Stochastic Process, The Poisson Process, Birth-and-Death Process, Markov Chains **[T3]**

U5.2. Self Study Topics : Renewal Theory.

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books:

T1. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, 11th Revised Edition, 2002.
Chapters: 10 (101 – 10.4), 11(11.1, 11.2(11.2.1-11.2.3)).

T2. Probability & Statistics for Engineers & Scientists, Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, and Keying Ye, Pearson Education, Eight Edition, Third Impression, 2009.
Chapters 2, 3(3.1- 3.4), 4(4.1 - 4.4), 5 (5.3, 5.6), 6 (6.1 – 6.8, 6.10), 7(7.3), 8(8.1 –, 8.2, 8.4- 8.8), 9(9.3 – 9.8, 9.12, 9.13), 10 (10.2, 10.3, 10.5, 10.7, 10.8, 10.11 – 10.13).

T3. Probability Statistics and Queuing Theory with Computer Science Applications, Arnold Allen, Elsevier India Pvt. Ltd., New Delhi, 2nd Edition, 2005.
Chapters: 4, 7(7.1)

Reference Books:

R1. Probability and Statistics for Engineers, Jay L. Devore, Cengage Learning, India Edition, 2008.
R2. Statistics for Engineers and Scientists, William Navadi, Tata McGraw-Hill Publishing Company Limited, New Delhi, Second Edition, 2008.
R3. Probability and Statistical Inference, Robert V. Hogg, Elliot A. Tanis, Jagan Mohan Rao, Pearson Education, Seventh Edition, 2006.
R4. Probability, Statistics and Random Processess, T. Veerarajan, Tata McGraw-Hill Publishing Company Limited, New Delhi, Third Edition, 2008.
R5. Advanced. Engineering Mathematics, Erwin Kreyszig, John Willy and Sons, 8th Edition, 1999.
R6. Introduction to Probability and Statistics, William Mendenhall, Robert J. Beaver & Barbara M. Beaver, CENGAGE Learning India Pvt. Ltd., New Delhi, 13th Edition, 2009.
R7. An Introduction to Probability and Statistics, Vijay K. Rohatgi, A.K. Md. Ehsanes Saleh, John Wiley & Sons, INC., Second Edition, 2006.
R8. Probability and Statistics for Science and Engineering, G. Shankar Rao, Univeristy Press, 1st Edition, 2011.
R9. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 43rd Edition, 2014.

Course Outcomes:

After taking this course, the student should be able to –

1. Compute probabilities by modeling sample spaces and applying rules of permutations and combinations, additive and multiplicative laws and conditional probability
2. Construct the probability distribution of a random variable, based on a real-world situation, and use it to compute expectation and variance
3. Compute probabilities based on practical situations using the binomial, Poisson, Gamma, Exponential, Weibull, Chi-Squared, and Normal distributions.
4. Use the normal distribution to test statistical hypotheses and to compute confidence intervals.
5. Apply sampling distributions in estimating statistical parameters.
6. Apply the concepts of Null and Alternative Hypothesis for testing hypotheses.
7. Apply the concepts of correlation, regression and method of least square.
8. Comprehend the Introductory concepts of the Stochastic Process

COURSE CODE: IT20102 **REF NO: To be filled by CD office**

Database Engineering

Credits: 3 **Teaching Scheme: -** Theory 3 Hrs/Week

Prerequisites:
1. Computer Programming
2. Knowledge of Data Structures

Objectives:
To introduce database systems and learn the techniques of data modeling, database design, data retrieval and database management.

Course Details:

Unit 1: Title - Introduction to DBMS and ER Data Model (7 Hrs)

U1.1

Data Storage: File processing system, Disadvantages; DBMS: Need of DBMS, Terms: Data, Database, Metadata, Data Dictionary, Database System, Database Management System, Data Abstraction, Data Independence, System Architecture of DBMS, Data Model: Definition, ER and Relational Data Model, Object Oriented, Object Relational Models; ER Model: Entity, Entity Set, Attributes, Primary Key, Relationship, Types and Attributes of Relationship, Role, Cardinality Ratio, Participation Constraint, Weak Entity Set, EER Features.

U1.2

Self Study: Hierarchical and Network Data Models, Comparison of Different Data Models, Selection as 1. Entity Vs Attribute, 2. Entity Vs Relationship, 3. Binary Vs Ternary Relationship, Tools for Designing ER Model, Introduction of Popularly used Relational

Unit 2: Title - Relational Data Model (7 Hrs)

U2.1

Relational Data Model: Terms: Relation, Schema, Attributes, Tuples, Domains, Relation Degree (or Arity) and Cardinality, Relation Intention and Extension, Super Key, Candidate Key, Primary Key and Foreign Key, Relational Model Constraints, Schema Diagram, ER to Relation Mapping, Detailed storage architecture, Magnetic disk RAID Storage Access, File & Record Organization Indexing and order indices (B, B+ Tree).

U2.2

Self Study: Characteristics of Relation, Codd's Twelve Rules for Relational DBMS, Reverse Engineering: Relational Database into ER/ EER Model.

Unit 3: Title - Relational Algebra and Relational Calculus (8 Hrs)

U3.1

Relational Algebra and its Operations: Set Theoretic Operators (Union, Intersection, Cartesian product, Division), Relational Algebra operators (Projection, Selection, Join, Rename

Relational Calculus: TRC, DRC

Database Language: SQL (DDL, DML, DCL), QBE

U3.2

Self study: Case study Using PL/SQL, DB functions (Date, Timestamp), Cursors

Unit 4: Title – Normalization (7 Hrs)

U4.1

Normalization: Anomalies of un-Normalized Relation, Need of Normalization, Pros and Cons of Normalization, Functional Dependency: Trivial, Full, Partial, Transitive, Multivalued, Join, Inclusion Dependency, Dependency Diagram, Inference Rules for Functional Dependencies, Closure of Functional Dependencies, Algorithms to find: 1. Candidate Key, 2. Closure of Attribute Set, 3. Minimal Cover of Functional Dependencies, Normal Forms: Checking of Lossless Join Decomposition and Dependency Preservation, Normal Forms: 1NF, 2NF, 3NF, BCNF, 4NF.

U4.2

Self study: Normal Forms: 5NF and DKNF, Normalization at Conceptual Level.

Unit 5: Title- Transaction Management (7 Hrs)

U5.1

Complexity Theory: Transaction: Concept, ACID properties, Transaction States; Schedule: Definition, Types of Schedule, Serializability, Conflict and View Serializability, Precedence Graph, Recoverable Schedule, Cascade less Schedule, Deadlock, Concurrency Control Protocols: Lock Based, Timestamp Based Protocol, Recovery System: Log based Recovery, Checkpoint, Shadow paging.

U5.2

Self study: Tree and Multi version Protocol for Concurrency Control, ARIES Recovery Technique, Deadlock Handling.

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books

T1. "Database System Concepts", Silberschatz, Korth, Sudarshan, McGraw Hill International Edition, ISBN- 0-07-228363-7, 4th Edition.
T2. "Fundamentals of Database Systems", Elmasri and Navathe, Pearson Education, ISBN 81-297-0228-2, 4th Edition.

Reference Books

R1. "Database Systems", Thomas Connolly and Carolyn Begg, Pearson Education, ISBN 81-7808-861-4, 3rd Edition.
R2. "Database Management Systems", Ramakrishnan and Gehrke, McGraw-Hill International Edition, ISBN 0-07-115110-9, 3rd Edition.
R3. An introduction to Database System – Bipin Desai, Galgotia Publications

Course Outcomes:

Upon completion of the course, graduates will be able to –

1. Differentiate the database concepts from conventional file storage system and describe DBMS architecture, relational, hierarchical and network database models
2. Be able to analyze application data using E-R modeling and describe the logical and physical database designs.
3. Learn relational algebra, calculus and apply structured query language (SQL) for database definition and manipulation.
4. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
5. Use transaction management systems and recover methods

COURSE CODE: IT20102 **REF NO: To be filled by CD office**

Database Engineering Tutorial

Credits: 01 **Teaching Scheme: -** Tutorial 01 Hrs/Week

Prerequisites:
1. Computer Programming
2. Knowledge of Data Structures

Objectives:
To introduce database systems and learn the techniques of data modeling, database design, data retrieval and database management.

Course Details:

List of Contents

Tutorial No. 1: Basics of Database Management System

Tutorial No. 2: Relational algebra operations and sample problems.

Tutorial No. 3: Understanding relational calculus and sample problems.

Tutorial No. 4: Understanding ER model with extended ER features, and mapping of ER model to relation.

Tutorial No. 5: Understanding storage structure and access strategy.

Tutorial No. 6: Overview of functional and multi-valued dependency and concepts of normalization.

Tutorial No. 7: Understanding different types of normal forms.

Tutorial No. 8: Concepts of SQL and PL/SQL.

Tutorial No. 9: Understanding concepts of transaction processing systems

Tutorial No. 10: Overview of concurrency control and recovery concepts. ,

Text Books
T1. "Database System Concepts", Silberschatz, Korth, Sudarshan, McGraw Hill International Edition, ISBN- 0-07-228363-7, 4th Edition.
T2. "Fundamentals of Database Systems", Elmasri and Navathe, Pearson Education, ISBN 81-297-0228-2, 4th Edition.

Reference Books
R1. "Database Systems", Thomas Connolly and Carolyn Begg, Pearson Education, ISBN 81-7808-861-4, 3rd Edition.
R2. "Database Management Systems", Ramakrishnan and Gehrke, McGraw-Hill International Edition, ISBN 0-07-115110-9, 3rd Edition.
R3. An introduction to Database System – Bipin Desai, Galgotia Publications

Course Outcomes:

Upon completion of the course, graduates will be able to –

1. Differentiate the database concepts from conventional file storage system and describe DBMS architecture, relational, hierarchical and network database models
2. Be able to analyze application data using E-R modeling and describe the logical and physical database designs.
3. Learn relational algebra, calculus and apply structured query language (SQL) for database definition and manipulation.
4. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database.
5. Use transaction management systems and recover methods

COURSE CODE: IT20302 **REF NO: To be filled by CD office**

Database Engineering Lab

Credits: 1 **Teaching Scheme:** Laboratory 2 Hrs/Week

Prerequisites:
1. Computer Programming
2. Knowledge of Data Structures

Objectives: To implement queries by using Structured Query Language.

Course Details:

List of Practicals:

Experiment No. 1: Use of DDL commands.
Experiment No. 2: Use DML commands.

Experiment No. 3: Use of DQL commands.

Experiment No. 4: Programs using Relational Operators such as JOIN, PROJECT etc

Experiment No. 5. .Programs using PL/SQL.

Experiment No. 6: Programs on Database Triggers.

Experiment No. 7: Programs on Packages.

Experiment No. 8:. Development of an example program using Check Point Technique

Experiment No. 9: Development of an example Concurrent Program and Serialization using Locking Protocol.

Experiment No. 10: Development of a JAVA program with JDBC.

Text Books:

T1. "Oracle 8i-PL/SQL programming", SCOTT Urman, TMH-2000

T2. "ORACLE 10g Lab Guide", Rob, Coronel & Crockett, International Edition

T3."The Programming Language Of Oracle", IVAN BAYROSS, BPB Publication, Edition, Year of Publication.

Reference Books

R1. "Oracle 9i-the Complete Reference", Loney, TMH-2000

Note: At least one Text Book and one Reference Book must be from Foreign Author/Foreign Publisher.

Upon completion of the course, graduates will be able to –

1. Apply the concept for database design, create database, and develop queries
2. Implement different database programs using procedures, function, and cursor.
3. Implement database features such as triggers, packages etc.
3. Implement ODBC/JDBC connectivity with programming languages and write programs to store and retrieve data by using queries.
4. Use transaction management systems and recovery methods.

COURSE CODE: CS20104 **REF NO: To be filled by CD office**

Design & Analysis of Algorithms

Credits: 3 **Teaching Scheme: -** Theory 3 Hrs/Week

Prerequisites:

1. Computer programming
2. Data Structures

Objectives:

1. To solve basic problem using different design strategies of algorithm.
2. To analyze time complexity using asymptotic notation.

Course Details:

Unit 1: Title Overview of Time Complexity analysis, Divide and Conquer (6 Hrs)

U1.1

Introduction to design and analysis of algorithms, Growth of Functions, Asymptotic notations (Big Oh, small oh, Big Omega, Theta notations). Recurrences, Solution of recurrences by substitution, Iteration, recursion tree and Master methods. Priority Queue, Analyzing Quick sort, Merge sort, Heap sort, Lower bounds for sorting.

U1.2

Self Study: Counting sort, Selection Sort and Insertion Sort, Binary search, Hashing.

Unit 2: Title - Dynamic Programming and Greedy Strategies (6 Hrs)

U2.1

General strategy of Dynamic programming, Matrix Chain multiplication, and Longest common subsequence, Activity-selection problem, Knapsack problem, Huffman codes.

U2.2

Self Study: Assembly Line Scheduling and 0/1 Knapsack problem

Unit 3: Title- Disjoint sets and Graph Algorithm (6 Hrs)

U3.1

Disjoint sets: Disjoint set operations, Linked list representation, Disjoint set forests, Minimum Spanning Trees, Kruskal and Prim's algorithms, Single- Source shortest paths (Bellman-ford and Dijkstra's algorithms), All-pairs shortest paths (Floyd – Warshall Algorithm).

U3.2

Self Study: Breadth first and depth-first search

Unit 4: Title- Branch and Bound, Back tracking, String Matching (6 Hrs)

U4.1

Branch and Bound: General Strategy of Branch and Bound and back tracking, 0/1 Knapsack, Travelling Salesperson Problem, n-Queen's problem, General strategy for string matching, Robin-Karp Algorithm.

U4.2
Self Study: Subset sum problem, **N**aïve-string matching

Unit 5: Title- Complexity Theory, Approximation algorithms (6 Hrs)

U5.1
Complexity Theory: Overview of deterministic and non deterministic Algorithms. Time Complexity classes P, NP, Co-NP, Notion of NP-hardness and NP-completeness. NP-Complete problems (without proof), Traveling Salesman Problem.

U5.2
Self Study: Vertex-Cover Problem,

Note: Five assignments to be given to the students on self study, comprising of one assignment from each unit.

Text Books
T1. Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm", PHI 2nd edition, 2001. ISBN 81-203-2141-3
T2. Horowitz, Sahani, "Fundamentals of computer Algorithms", Galgotia. 2nd Edition, 1998.ISBN 81-7515-257-5

Reference Books
R1. Bressard, Bratley "Fundamentals of Algorithmics." ,PHI, 2nd Edition,1996, ISBN 81-203-1131-0.
R2. Algorithms by Sanjay Dasgupta, Umesh Vazirani – McGraw-Hill Education.

R3. Algorithm Design – Goodrich, Tamassia, Wiley India.
R4. Jon Kleinberg, Eva Tardos "Algorithm Design", Pearson, 1st edition, 2005. ISBN 978-81-317-0310-6

Note: At least one Text Book and one Reference Book must be from Foreign Author/Foreign Publisher.

Course Outcomes:

Upon completion of the course, graduates will be able –
1. To analyze asymptotic notation and worst, average and best case analysis using suitable mathematical tools.
2. To design efficient algorithms for computational problems using appropriate algorithmic paradigm.
3. To understand different graph algorithms and string matching problems.
4. To analyze the complexity of different class of problems.
5. To explain the role of randomization and approximation in computation

COURSE CODE: CS20104 **REF NO: To be filled by CD office**

Design & Analysis of Algorithms TUTORIAL

Credits: 01 **Teaching Scheme: -** Tutorial 01 Hrs/Week

Prerequisites:
1. Computer programming
2. Data Structures

Objectives:
1. To analyze time complexity using asymptotic notation.
2. To solve problems using different algorithm design strategies.
3. Concepts of class P, NP, NP-C, NP-Hard, Co-NP.

Course Details:

List of Contents

Tutorial No.1: Basics of Asymptotic notations such as Big Oh, small oh, Big Omega, Theta notations.

Tutorial No.2: Solving Recurrence relation by substitution, Iteration, recursion tree and Master methods.

Tutorial No.3: Analyzing the time complexity of different sorting and searching algorithms.

Tutorial No.4: General strategy of Dynamic programming and Greedy strategies.

Tutorial No.5: Solving MCM, LCS, Knapsack and Hoffman's code problems.

Tutorial No.6: Overview of Graph searching algorithm such as BFS and DFS.

Tutorial No.7. Principles of Minimum spanning tree and solving problem on single source shortest path.

Tutorial No.8: General Strategy of Branch and Bound and back tracking

Tutorial No.9: Overview of classes P, NP, Co-NP, Notion of NP-hardness and NP-C.

Tutorial No.10: Overview of string matching algorithm and solving problems.

Text Books

T1. Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm", PHI 2nd edition, 2001. ISBN 81-203-2141-3

T2. Horowitz, Sahani, "Fundamentals of computer Algorithms", Galgotia. 2nd Edition,

1998.ISBN 81-7515-257-5

Reference Books

R1. Bressard, Bratley "Fundamentals of Algorithmics." ,PHI, 2nd Edition,1996, ISBN 81-203-1131-0.
R2. Algorithms by Sanjay Dasgupta, Umesh Vazirani – McGraw-Hill Education.

R3. Algorithm Design – Goodrich, Tamassia, Wiley India.

R4. Jon Kleinberg, Eva Tardos "Algorithm Design", Pearson, 1st edition, 2005. ISBN 978-81-317-0310-6

Note: At least one Text Book and one Reference Book must be from Foreign Author/Foreign Publisher.

Course Outcomes:

Upon completion of the course, graduates will be able –

1. To analyze asymptotic notation and worst, average and best case analysis using suitable mathematical tools.
2. To design efficient algorithms for computational problems using appropriate algorithmic paradigm.
3. To understand different graph algorithms and string matching problems.
4. To analyze the complexity of different class of problems.
5. To explain the role of randomization and approximation in computation

COURSE CODE: CS20304 **REF NO: To be filled by CD office**

Design and Analysis of Algorithms Lab

Credits: 01 **Teaching Scheme:** Laboratory 02 Hrs/Week

Prerequisites:
1. Computer programming
2. Data Structures

Objectives:
1. To implement Different algorithms by using a Programming language.

Course Details:

List of Sample Programs:

Experiment No. 1:
Problem solution using a stack of characters, convert an infix string to postfix string.

Experiment No. 2:
Problem solution using insertion, deletion, searching of a BST.

Experiment No. 3:
(a) Problem solution using binary search and linear search in a program
(b) Problem solution using a heap sort.

Experiment No. 4:
(a) Problem solution using DFS/ BFS for a connected graph.
(b) Problem solution using Dijkstra's shortest path algorithm using BFS.

Experiment No. 5:
(a) Write a program to implement Huffman's algorithm.
(b) Problem solution using MST (Kruskal / Prim) algorithm.

Experiment No. 6:
(a) Write a program requiring an application of Quick sort algorithm.
(b) Write a program requiring an application of merge sort algorithm.
(c) Compare the performance of Quick sort and Merge Sort algorithms.

Experiment No. 7:
Problem solution using Strassen's matrix multiplication algorithm.

Experiment No. 8:
Write down a program to find out a solution for 0 / 1 Knapsack problem.

Experiment No. 9:
Problem solution using dynamic programming (Longest Common Subsequence).

Experiment No. 10:

Write a program to find out the solution to the N-Queen problem using Dynamic programming and back tracking.

Text Books

T1. Thomas H Cormen and Charles E.L Leiserson, "Introduction to Algorithm", PHI 2nd edition, 2001. ISBN 81-203-2141-3
T2. Horowitz, Sahani, "Fundamentals of computer Algorithms", Galgotia. 2nd Edition, 1998.ISBN 81-7515-257-5

Reference Books

R1. Bressard, Bratley "Fundamentals of Algorithmics." ,PHI, 2nd Edition,1996, ISBN 81-203-1131-0.
R2. Algorithms by Sanjay Dasgupta, Umesh Vazirani – McGraw-Hill Education.

R3. Algorithm Design – Goodrich, Tamassia, Wiley India.
R4. Jon Kleinberg, Eva Tardos "Algorithm Design", Pearson, 1st edition, 2005. ISBN 978-81-317-0310-6

Note: At least one Text Book and one Reference Book must be from Foreign Author/Foreign Publisher.

Course Outcomes:

Upon completion of the course, graduates will be able –

1. To analyze asymptotic notation and worst, average and best case analysis using suitable mathematical tools.
2. To design efficient algorithms for computational problems using appropriate algorithmic paradigm.
3. To understand different graph algorithms and string matching problems.
4. To analyze the complexity of different class of problems.
5. To explain the role of randomization and approximation in computation

COURSE CODE: IT20103 REF NO: To be filled by CD office

CLOUD COMPUTING

Credits: 3 **Teaching Scheme:** Theory 3 Hrs/Week

Prerequisites:

1. Computer Programming
2. Data Communications & Computer Networks

Objectives:

1. To understand the concepts of Networking and Cloud Computing.
2. To define an IT Infrastructure and describe its components.
3. To identify the need for Data Center Virtualization.
4. To define Data Center Networking and discuss the challenges encountered without Network Virtualization.
5. To describe the features and components of virtualization software (VMware vSphere).

Unit-1: Title - Overview of Computing Paradigm: [4 Hrs]

U1.1: Recent trends in Computing: Grid computing, Cluster computing, Distributed computing, Utility computing, and Cloud computing.
U1.2 Self Study: Data Communications reference models (OSI, TCP/IP), Digital Transmission (Transmission Modes, Line Coding, Sampling),

Unit-2: Title - Introduction to Cloud Computing [6 Hrs]

U2.1 Introduction to Cloud Computing: Cloud Computing (NIST Model), History of Cloud Computing, Cloud service providers, Properties, Characteristics & Disadvantages.

Cloud Computing Architecture: Cloud Computing Stack: Working of Cloud Computing, Role of Networks in Cloud computing, Protocols used, Role of Web services.

Service Models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS).
Deployment Models: Public, Private, Community and Hybrid Clouds.

U2.2 Self Study: Evolution of cloud computing, Service management in Cloud Computing.

Unit-3: Title - Data Center Servers and Virtualization [8 Hrs]

U3.1 Data Center Design: DC Topology, Scale and Management.
Data Center Server: Server Building Blocks, Server Availability, Server Security.
Data Center Virtualization: Data Center Virtualization Overview, Virtualization Availability, Virtualization Server Hierarchy, Functions and Benefits, Virtualization Performance.

U3.2 Self Study: Data Center Storage Hierarchy

Unit-4: Title - Data Center Networking [8 Hrs]

U4.1 Data Center Network Requirements, Architecture, Design Factors for Data Center Networks, Virtual Ethernet, Data Center Routing, Addressing, Transport layer protocols.

Network Virtualization: Virtualization Technologies for the Data Center Network: Switching techniques, Traffic patterns, Network Node virtualization, Virtual Network Services.

Server virtualization software: VMware VSphere, Features and Components of VMware VSphere, VSphere e Solutions to Data Center Challenges.

U4.2 Self Study: Virtual Network Security

Unit-5: Title - Virtual Machine Management [8 Hrs]

U5.1 Virtual Machine Management: Configuration, Placement and Resource Allocation. Creating and Configuring Hyper-V Network Virtualization, Overview of Backup and Restore Options for Virtual Machines, Protecting Virtualization Infrastructure by Using Data Protection Manager.

Power efficiency in Virtual Data centers, Fault Tolerance in Virtual Data Centers, Resource Scheduling, Performance.

U5.2 Self Study: ACE Virtual Contexts and Case Studies

Text Books:

T1. Windows Server 2012 Hyper-v Installation and Configuration Guide, Aidan Finn, , Patrick Lownds , Michel Luescher , Damian Flynn , John Wiley and Sons.
T2. IT Infrastructure and Its Management: Phalguni Gupta and Surya Prakash,Tata McGraw-Hill, 2009.
T3. Cloud Computing: Concepts, Technology & Architecture, Thomas Erl, Ricardo Puttini, Zaigham Mahmood, Prentice Hall, 2013

Reference Books:

R1. IBM Data Center Networking: Planning for Virtualization and Cloud Computing, 1st Edition (May 2011).
R2. Data Center Networks: Topologies, Architectures and Fault-Tolerance Characteristics, By Yang Liu, Jogesh K Muppala, Malathi Veeraraghavan, Dong Lin, Mounir Hamdi, Springer.

R3. Mastering in Cloud Computing: R.Buyya, Christian Vecchiola, and Thamarai Selvi , Tata McGraw Hill Education Private Limited, India, ISBN-13: 978-1-25-902995-0

R4**.** Data Communications and Networking: Behrouz A. Forouzan, Tata McGraw-Hill, 4th Edition.

Outcome

Students will be able to:

1. Understand and differentiate different modes in the computing paradigm.
2. Understand the role of networking in the cloud architecture, and differentiate cloud service models.
3. Analyze and model data center virtualization.
4. Analysis data center networking requirement and use different virtualization technologies and related software.
5. Manage virtual machines and data center.

COURSE CODE: **EC21104** REF NO: To be filled by CD office

SWITCHING CIRCUITS AND LOGIC DESIGN

Credits:02 **Teaching Scheme:** - Theory 03Hrs/Week

Prerequisites: Nil

Course Details:

Unit1

Number System, Logic Gates & Coding (08Hrs)

U1.1. Introduction to Number Systems, Data Representation, Binary, Octal, Hexadecimal and Decimal Number System and their inter-conversion, Binary Arithmetic, Complements, Complement arithmetic, Standard logic gates, Derived gates, Binary Coded Decimal codes, Gray code, Error Detecting and Correcting Codes.

U1.2. Weighted Codes, Excess-3 Code, EBCDIC Code, ASCII.

Unit2

Boolean Algebra (07Hrs)

U2.1. Boolean Algebra, Simplification of logic function using Boolean algebra, De Morgan's Theorem, Sum-of-Products and Product of-Sums forms of Boolean function, Canonical and Standard forms, Universal logic gates, NAND implementation, Karnaugh map up to 4 variables, Don't care conditions, Prime Implicants and Essential Prime Implicants.

U2.2. XOR Equivalence, NOR implementation, 5 variable K-Map.

Unit3

Combinational Logic Circuits (09Hrs)

U3.1. Adders (Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel Adders, CLA, 4-Bit Adder/Subtractor Circuit), Binary Multiplier, Multiplexers and Demultiplexers, Decoders and Encoders, Priority Encoder, Binary to Gray Code Converters, 2-Bit and 3-Bit Magnitude Comparators.

U3.2. Decimal Adder, Gray to Binary Code Converters, 4-Bit Magnitude Comparator, Parity Generator and Checker.

Unit4

Sequential Logic Circuits (09Hrs)

U4.1. Concept of Latches, Flipflops, Conversion of Flipflops, Master-Slave Flipflops, Analysis and Synthesis of Sequential Logic Circuits, Shift Registers, Asynchronous & Synchronous Counters.

U4.2. State Reduction and State Assignment, Non-binary counters.

Unit5
Digital System Design **(07Hrs)**

U5.1. Semiconductor Memories: RAMs and ROMs, Logic Array, PROM, Different logic families: TTL, ECL, CMOS. Introduction to VHDL, Writing simple VHDL Programs for logic gates.
U5.2. PAL and PLA, RTL and DTL Logic Families, Writing simple VHDL Programs for simple combinational circuits (dataflow modeling).

Note: Five assignments to be given to the students on self-study, comprising of one assignment from each unit.

TextBooks:

T1. "Digital Design: with an introduction to the Verilog HDL", Mano, M. Morris and Michael D Ciletti,Pearson India, 5th Edition, 2013.
T2. "Digital Systems – Principles and Applications", Ronald J. Tocci, Neal S. Widemer and Gregory L. Moss,Pearson Education, 10th Edition, 2009.
T3. "A VHDL Primer", J. Bhasker, PHI Learning, 3rd Edition, 2009

ReferenceBooks

R1. "Digital Fundamentals", Thomas L. Floyd,Pearson India, 10th Edition, 2011.
R2. "Modern Digital Electronics", R. P. Jain, Tata Mcgraw Hill Publication, 4th Edition, 2003.
R3. "Digital Electronics, Principles and Integrated Circuit", Anil K. Maini,Wiley India Pvt. Ltd., 1st Edition, 2007.

Note: At least one Text Book and one Reference Book must be from Foreign Author/Foreign Publisher.

Course Outcomes:

CO1: Understand the basic knowledge of Number systems, logic gates and coding techniques.
CO2: Apply the fundamental concepts of Boolean Algebra and K-Maps to simplify the design of digital logic circuits.
CO3: Understand the design and use of logic gates to design various combinational circuits.
CO4: Understand the knowledge of flipflops to design various sequential circuits and Finite State Machines.
CO5: Apply basic knowledge of logic families for the design of computer memory and write programs using VHDL to simulate and test various digital circuits.

COURSE CODE:: EC21304 **REF NO: To be filled by CD office**

SWITCHING CIRCUITS AND LOGIC DESIGN LAB

Credits:01 **Teaching Scheme: -** Laboratory 02Hrs/Week

Prerequisites: Nil

Course Details:

List of Practicals: (*Any*10**)**

Experiment No.1: Study of logic behavior of AND, OR, NAND, NOR, EX-OR, EX NOR, Invert and Buffer gates, use of Universal NAND Gate.

Experiment No.2: Gate-level minimization of Boolean functions and their implementation using universal NAND and NOR gates.

Experiment No.3: design, assemble and test of Combinational Circuits (Half Adder, Full Adder, Half Subtractor, Full Subtractor, 2-bit adder Subtractor).

Experiment No.4: design, assemble and test of Combinational Circuits (binary to gray code converters, gray to binary code converter and 7 segment display).

Experiment No.5: Binary Multiplier: design and implement a circuit that multiplies 4-bit unsigned numbers to produce an 8-bit product.

Experiment No.6: Design of 4:1 multiplexers and 1:4 de-multiplexers and Implementation of Boolean Functions using multiplexers.

Experiment No.7: Assemble, Test and Investigate operation of SR, D, J-K and T flip-flops.

Experiment No.8: Design and investigate the operation of all types of shift registers.

Experiment No.9: Design, assemble and test 4-bit ripple up counter and 4-bit synchronous down counters

Experiment No.10: Memory Unit: Investigate the behavior of RAM unit and its storage capacity – 16 X 4 RAM: testing, simulating and memory expansion

Experiment No.11: VHDL simulation and implementation of various combinational circuits

Experiment No.12: VHDL simulation and implementation of various sequential circuits

Text Books:

T1. Lab manuals.

Note: At least one Text Book and one Reference Book must be from Foreign Author/Foreign Publisher

Course Outcomes:

CO1: Understand the basic knowledge of Number systems, logic gates and coding techniques.
CO2: Apply the fundamental concepts of Boolean Algebra and K-Maps to simplify the design of digital logic circuits.
CO3: Understand the design and use of logic gates to design various combinational circuits.
CO4: Understand the knowledge of flipflops to design various sequential circuits and Finite State Machines.
CO5: Apply basic knowledge of logic families for the design of computer memory and write programs using VHDL to simulate and test various digital circuits.

COURSE CODE: IT24353 **REF NO: _____**

Web Technology Lab

Credits: 1 **Teaching Scheme: -** Laboratory 2 Hrs/Week

Prerequisites:

1. Computer Programming

Objectives:

1. To introduce the basic techniques involved in designing web pages.
2. To introduce client side scripting with Javascript.
3. To know the advantages and use of CSS.
4. To use CGI/Perl.
5. To use XML.

List of Practicals:

Experiment No. 1. Download, Install and Configure apache http server for windows and linux. Design HTML web pages demonstrating the use of various text formatting tags and media file embedding tags

Experiment No. 2. Demonstrate the use of HTML5 elements like video, audio, canvas etc.

Experiment No. 3. Design HTML pages using tables and frames.

Experiment No. 4. Get acquainted with the use of Javascript objects like Window, Screen, Location, Document, History, Frame, Navigator etc.

Experiment No. 5. Demonstrate the use of event handling in javascript.

Experiment No. 6. Design HTML form embedding javascript code for client side validation.

Experiment No. 7. Get acquainted with JQuery JavaScript library.

Experiment No. 8. Use different style properties in inline, embedded and external style sheets.

Experiment No. 9. Get acquainted with creation, display and parsing of XML documents.

Experiment No. 10. Demonstrate the use of CGI/Perl.

Text Books:

T1. HTML 5 Black Book: Covers CSS3, Javasvript, XML, XHTML, AJAX, PHP and jQuery, (with cd), by Kogent Learning Solutions Inc., Dreamtech press

T2. Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP, BPB Publication, 4th Edition, Ivan Bayross

T3. Web Technologies, Uttam K Roy, Oxford

Course Outcomes:

Upon completion of the course, graduates will be able to –

- Understand the new features available in HTML5
- Build interactive web pages using java script.
- Differentiate between webpage structure and style
- Develop web pages with CGI/Perl
- Use XML document