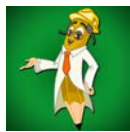




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ANNA UNIVERSITY, CHENNAI
NON - AUTONOMOUS COLLEGES AFFILIATED ANNA UNIVERSITY
MASTER OF COMPUTER APPLICATIONS (2 YEARS)
REGULATIONS – 2021
CHOICE BASED CREDIT SYSTEM

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

Graduates will be able to:

- I. Apply their computing skills to analyse, design and develop innovative software products to meet the industry needs and excel as software professionals.
- II. Pursue lifelong learning and do research in the computing field based on solid technical foundations.
- III. Communicate and function effectively in teams in multidisciplinary fields within the global, societal and environmental context.
- IV. Exhibit professional integrity, ethics and an understanding of responsibility to contribute technical solutions for the sustainable development of society.

2. PROGRAM SPECIFIC OUTCOMES (PSOs) :

1. Able to select suitable data models, appropriate architecture, and platform to implement a system with good performance.
2. Able to design and integrate various system based components to provide user interactive solutions for various challenges.
3. Able to develop applications for real time environment using existing and upcoming technologies.

ANNA UNIVERSITY, CHENNAI
NON - AUTONOMOUS COLLEGES AFFILIATED ANNA UNIVERSITY
MASTER OF COMPUTER APPLICATIONS (2 YEARS)
REGULATIONS – 2021
CHOICE BASED CREDIT SYSTEM
I TO IV SEMESTERS CURRICULA AND 1st SEMESTER SYLLABI
SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA4151	Applied Probability and Statistics for Computer Science Engineers	FC	3	1	0	4	4
2.	RM4151	Research Methodology and IPR	RMC	2	0	0	2	2
3.	MC4101	Advanced Data Structures and Algorithms	PCC	3	0	0	3	3
4.	MC4102	Object Oriented Software Engineering	PCC	3	0	0	3	3
5.	MC4103	Python Programming	PCC	3	0	0	3	3
6.	MC4104	Fundamentals of Accounting	PCC	3	0	2	5	4
7.		Audit Course – I*	AC	2	0	0	2	0
PRACTICALS								
8.	MC4111	Advanced Data Structures and Algorithms Laboratory	PCC	0	0	4	4	2
9.	MC4112	Python Programming Laboratory	PCC	0	0	4	4	2
10.	MC4113	Communication Skills Enhancement – I	EEC	0	0	2	2	1
TOTAL				19	1	12	32	24

*Audit course is optional

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MC4201	Full Stack Web Development	PCC	3	0	0	3	3
2.	MC4202	Advanced Database Technology	PCC	3	0	0	3	3
3.	MC4203	Cloud Computing Technologies	PCC	3	0	0	3	3
4.	MC4204	Mobile Application Development	PCC	3	0	2	5	4
5.	MC4205	Cyber Security	PCC	3	0	0	3	3
6.		Professional Elective I	PEC	3	0	0	3	3
7.		Audit Course – II*	AC	2	0	0	2	0
PRACTICALS								
8.	MC4211	Advanced Database Technology Laboratory	PCC	0	0	4	4	2
9.	MC4212	Full Stack Web Development Laboratory	PCC	0	0	4	4	2
10.	MC4213	Communication Skills Enhancement– II	EEC	0	0	2	2	1
TOTAL				20	0	12	32	24

*Audit course is optional

SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MC4301	Machine Learning	PCC	3	0	0	3	3
2.	MC4302	Internet of Things	PCC	3	0	0	3	3
3.		Professional Elective II	PEC	3	0	0	3	3
4.		Professional Elective III	PEC	3	0	0	3	3
5.		Professional Elective IV	PEC	3	0	2	5	4
6.		Open Elective	OEC	3	0	0	3	3
PRACTICALS								
7.	MC4311	Machine Learning Laboratory	PCC	0	0	4	4	2
8.	MC4312	Internet of Things Laboratory	PCC	0	0	4	4	2
TOTAL				18	0	10	28	23

SEMESTER IV

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	MC4411	Project Work	EEC	0	0	24	24	12
TOTAL				0	0	24	24	12

TOTAL NO. OF CREDITS: 83

PROFESSIONAL ELECTIVES

SEMESTER II, ELECTIVE I

S.No.	COURSE CODE	COURSE TITLE	CATE-GORY	CONTACT PERIODS	L	T	P	C
1.	MC4001	Software Project Management	PEC	3	3	0	0	3
2.	MC4002	Professional Ethics in IT	PEC	3	3	0	0	3
3.	MC4003	E - Learning	PEC	3	3	0	0	3
4.	MC4004	Advances in Operating System	PEC	3	3	0	0	3
5.	MC4005	Information Retrieval Techniques	PEC	3	3	0	0	3
6.	MC4006	Soft Computing Techniques	PEC	3	3	0	0	3
7.	MC4007	Operations Research	PEC	3	3	0	0	3
8.	MC4008	Business Data Analytics	PEC	3	3	0	0	3

SEMESTER III, ELECTIVE II

S.No.	COURSE CODE	COURSE TITLE	CATE-GORY	CONTACT PERIODS	L	T	P	C
1.	MC4009	DevOps and Microservices	PEC	3	3	0	0	3
2.	MC4010	Advances in Networking	PEC	3	3	0	0	3
3.	MC4011	Digital Image Processing	PEC	3	3	0	0	3
4.	MC4012	Social Network Analytics	PEC	3	3	0	0	3
5.	MC4013	Cryptocurrency and Blockchain Technologies	PEC	3	3	0	0	3
6.	MC4014	Bio Inspired learning	PEC	3	3	0	0	3
7.	MC4015	Digital Marketing	PEC	3	3	0	0	3

SEMESTER III, ELECTIVE III

S.No.	COURSE CODE	COURSE TITLE	CATE-GORY	CONTACT PERIODS	L	T	P	C
1.	MC4016	Software Architecture	PEC	3	3	0	0	3
2.	MC4017	Digital Forensics	PEC	3	3	0	0	3
3.	MC4018	Wireless Networking	PEC	3	3	0	0	3
4.	MC4019	Data Visualization Techniques	PEC	3	3	0	0	3
5.	MC4020	Data Mining and Data Warehousing Techniques	PEC	3	3	0	0	3
6.	MC4021	Agile Methodologies	PEC	3	3	0	0	3
7.	MC4022	Organizational Behavior	PEC	3	3	0	0	3

SEMESTER III, ELECTIVE IV

S.No.	COURSE CODE	COURSE TITLE	CATE-GORY	CONTACT PERIODS	L	T	P	C
1.	MC4023	Web Design	PEC	5	3	0	2	4
2.	MC4024	C# and .NET	PEC	5	3	0	2	4
3.	MC4025	Big Data Mining and Analytics	PEC	5	3	0	2	4
4.	MC4026	Software Quality and Testing	PEC	5	3	0	2	4
5.	MC4027	Advanced Java Programming	PEC	5	3	0	2	4
6.	MC4028	Network Programming and Security	PEC	5	3	0	2	4

AUDIT COURSES (AC)

Registration for any of these courses is optional to students

SL. NO	COURSE CODE	COURSE TITLE	PERIODS PER WEEK			CREDITS
			L	T	P	
1.	AX4091	English for Research Paper Writing	2	0	0	0
2.	AX4092	Disaster Management	2	0	0	0
3.	AX4093	Constitution of India	2	0	0	0
4.	AX4094	நற்றமிழ் இலக்கியம்	2	0	0	0

BRIDGE COURSES

(For the M.C.A students admitted under non-computer-science background category)

SL. NO.	COURSE CODE	COURSE TITLE	CONTACT PERIODS	L	T	P	C
Classes are to be conducted and completed before the start of the class of first semester, Examinations will be conducted along with first semester							
1.	BX4001	Data Structures and Algorithms	5	3	0	2	4
2.	BX4002	Problem Solving and Programming in C	5	3	0	2	4
Classes are to be conducted and completed before the start of the class of second semester, Examinations will be conducted along with second semester							
3.	BX4003	Introduction to Computer Organization and Operating Systems	3	3	0	0	3
4.	BX4004	Database Management Systems	5	3	0	2	4
Classes are to be conducted and completed before the start of the class of third semester, Examinations will be conducted along with third semester							
5.	BX4005	Mathematical Foundations of Computer Science	3	3	0	0	3
6.	BX4006	Basics of Computer Networks	3	3	0	0	3

**MA4151 APPLIED PROBABILITY AND STATISTICS FOR COMPUTER SCIENCE ENGINEERS
(COMMON TO CSE, MCA, MULTIMEDIA)**

L T P C
3 1 0 4

COURSE OBJECTIVES:

- To encourage students to develop a working knowledge of the central ideas of Linear Algebra.
- To enable students to understand the concepts of Probability and Random Variables.
- To understand the basic probability concepts with respect to two dimensional random variables along with the relationship between the random variables and the significance of the central limit theorem.
- To apply the small / large sample tests through Tests of hypothesis.
- To enable the students to use the concepts of multivariate normal distribution and principal components analysis.

UNIT I LINEAR ALGEBRA 12

Vector spaces – norms – Inner Products – Eigenvalues using QR transformations – QR factorization – generalized eigenvectors – Canonical forms – singular value decomposition and applications – pseudo inverse – least square approximations.

UNIT II PROBABILITY AND RANDOM VARIABLES 12

Probability – Axioms of probability – Conditional probability – Baye's theorem – Random variables – Probability function – Moments – Moment generating functions and their properties – Binomial, Poisson, Geometric, Uniform, Exponential, Gamma and Normal distributions – Function of a random variable.

UNIT III TWO DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Functions of two dimensional random variables – Regression curve – Correlation.

UNIT IV TESTING OF HYPOTHESIS 12

Sampling distributions – Type I and Type II errors – Small and Large samples – Tests based on Normal, t, Chi square and F distributions for testing of mean, variance and proportions – Tests for independence of attributes and goodness of fit.

UNIT V MULTIVARIATE ANALYSIS 12

Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components – Populations principal components – Principal components from standardized variables.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able to

- apply the concepts of Linear Algebra to solve practical problems.
- use the ideas of probability and random variables in solving engineering problems.
- be familiar with some of the commonly encountered two dimension random variables and be equipped for a possible extension to multivariate analysis.
- use statistical tests in testing hypothesis on data.

- develop critical thinking based on empirical evidence and the scientific approach to knowledge development.

REFERENCES:

1. Dallas E Johnson, "Applied multivariate methods for data Analysis", Thomson and Duxbury press, Singapore, 1998.
2. Richard A. Johnson and Dean W. Wichern, "Applied multivariate statistical Analysis", Pearson Education, Fifth Edition, 6th Edition, New Delhi, 2013.
3. Bronson, R., "Matrix Operation" Schaum's outline series, Tata McGraw Hill, New York, 2011.
4. Oliver C. Ibe, "Fundamentals of Applied probability and Random Processes", Academic Press, Boston, 2014.
5. Johnson R. A. and Gupta C.B., "Miller and Freund's Probability and Statistics for Engineers", Pearson India Education, Asia, 9th Edition, New Delhi, 2017.

RM4151 RESEARCH METHODOLOGY AND IPR L T P C
2 0 0 2

UNIT I RESEARCH DESIGN 6

Overview of research process and design, Use of Secondary and exploratory data to answer the research question, Qualitative research, Observation studies, Experiments and Surveys.

UNIT II DATA COLLECTION AND SOURCES 6

Measurements, Measurement Scales, Questionnaires and Instruments, Sampling and methods. Data - Preparing, Exploring, examining and displaying.

UNIT III DATA ANALYSIS AND REPORTING 6

Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS 6

Intellectual Property – The concept of IPR, Evolution and development of concept of IPR, IPR development process, Trade secrets, utility Models, IPR & Bio diversity, Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

UNIT V PATENTS 6

Patents – objectives and benefits of patent, Concept, features of patent, Inventive step, Specification, Types of patent application, process E-filing, Examination of patent, Grant of patent, Revocation, Equitable Assignments, Licences, Licensing of related patents, patent agents, Registration of patent agents.

TOTAL : 30 PERIODS

REFERENCES:

1. Cooper Donald R, Schindler Pamela S and Sharma JK, "Business Research Methods", Tata McGraw Hill Education, 11e (2012).
2. Catherine J. Holland, "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press, 2007.

3. David Hunt, Long Nguyen, Matthew Rodgers, "Patent searching: tools & techniques", Wiley, 2007.
4. The Institute of Company Secretaries of India, Statutory body under an Act of parliament, "Professional Programme Intellectual Property Rights, Law and practice", September 2013.

MC4101

ADVANCED DATA STRUCTURES AND ALGORITHMS

L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the usage of algorithms in computing
- To learn and use hierarchical data structures and its operations
- To learn the usage of graphs and its applications
- To select and design data structures and algorithms that is appropriate for problems
- To study about NP Completeness of problems.

UNIT I ROLE OF ALGORITHMS IN COMPUTING & COMPLEXITY ANALYSIS 9

Algorithms – Algorithms as a Technology -Time and Space complexity of algorithms- Asymptotic analysis-Average and worst-case analysis-Asymptotic notation-Importance of efficient algorithms- Program performance measurement - Recurrences: The Substitution Method – The Recursion-Tree Method- Data structures and algorithms.

UNIT II HIERARCHICAL DATA STRUCTURES 9

Binary Search Trees: Basics – Querying a Binary search tree – Insertion and Deletion- Red Black trees: Properties of Red-Black Trees – Rotations – Insertion – Deletion -B-Trees: Definition of B -trees – Basic operations on B-Trees – Deleting a key from a B-Tree- Heap – Heap Implementation – Disjoint Sets - Fibonacci Heaps: structure – Mergeable-heap operations- Decreasing a key and deleting a node-Bounding the maximum degree.

UNIT III GRAPHS 9

Elementary Graph Algorithms: Representations of Graphs – Breadth-First Search – Depth-First Search – Topological Sort – Strongly Connected Components- Minimum Spanning Trees: Growing a Minimum Spanning Tree – Kruskal and Prim- Single-Source Shortest Paths: The Bellman-Ford algorithm – Single-Source Shortest paths in Directed Acyclic Graphs – Dijkstra's Algorithm; Dynamic Programming - All-Pairs Shortest Paths: Shortest Paths and Matrix Multiplication – The Floyd-Warshall Algorithm

UNIT IV ALGORITHM DESIGN TECHNIQUES 9

Dynamic Programming: Matrix-Chain Multiplication – Elements of Dynamic Programming – Longest Common Subsequence- Greedy Algorithms: – Elements of the Greedy Strategy- An Activity-Selection Problem - Huffman Coding.

UNIT V NP COMPLETE AND NP HARD 9

NP-Completeness: Polynomial Time – Polynomial-Time Verification – NP- Completeness and Reducibility – NP-Completeness Proofs – NP-Complete Problems.

TOTAL : 45 PERIODS

SUGGESTED ACTIVITIES:

1. Write an algorithm for Towers of Hanoi problem using recursion and analyze the

- complexity (No of disc-4)
2. Write any one real time application of hierarchical data structure
 3. Write a program to implement Make_Set, Find_Set and Union functions for Disjoint Set Data Structure for a given undirected graph $G(V,E)$ using the linked list representation with simple implementation of Union operation
 4. Find the minimum cost to reach last cell of the matrix from its first cell
 5. Discuss about any NP completeness problem

COURSE OUTCOMES:

CO1:Design data structures and algorithms to solve computing problems.

CO2:Choose and implement efficient data structures and apply them to solve problems.

CO3:Design algorithms using graph structure and various string-matching algorithms to solve real-life problems.

CO4: Design one's own algorithm for an unknown problem.

CO5: Apply suitable design strategy for problem solving.

REFERENCES

1. S.Sridhar," Design and Analysis of Algorithms", Oxford University Press, 1st Edition, 2014.
2. Adam Drozdex, "Data Structures and algorithms in C++", Cengage Learning, 4th Edition, 2013.
3. T.H. Cormen, C.E.Leiserson, R.L. Rivest and C.Stein, "Introduction to Algorithms", Prentice Hall of India, 3rd Edition, 2012.
4. Mark Allen Weiss, "Data Structures and Algorithms in C++", Pearson Education, 3rd Edition, 2009.
5. E. Horowitz, S. Sahni and S. Rajasekaran, "Fundamentals of Computer Algorithms", University Press, 2nd Edition, 2008.
6. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.

MC4102

OBJECT ORIENTED SOFTWARE ENGINEERING

L T P C

3 0 0 3

COURSE OBJECTIVES:

- To understand the phases in object oriented software development
- To gain fundamental concepts of requirements engineering and analysis.
- To know about the different approach for object oriented design and its methods
- To learn about how to perform object oriented testing and how to maintain software
- To provide various quality metrics and to ensure risk management.

UNIT I SOFTWARE DEVELOPMENT AND PROCESS MODELS

9

Introduction to Software Development – Challenges – An Engineering Perspective – Object Orientation – Software Development Process – Iterative Development Process – Process Models – Life Cycle Models – Unified Process – Iterative and Incremental – Agile Processes.

UNIT II MODELLING OO SYSTEMS 9

Object Oriented Analysis (OOA / Coad-Yourdon), Object Oriented Design (OOD/Booch), Hierarchical Object Oriented Design (HOOD), Object Modeling Technique (OMT) – Requirement Elicitation – Use Cases – SRS Document – OOA - Identification of Classes and Relationships, Identifying State and Behavior – OOD - Interaction Diagrams – Sequence Diagram – Collaboration Diagrams - Unified Modeling Language and Tools.

UNIT III DESIGN PATTERNS 9

Design Principles – Design Patterns – GRASP – GoF – Dynamic Object Modeling – Static Object Modeling.

UNIT IV SYSTEM TESTING 9

Software testing: Software Verification Techniques – Object Oriented Checklist :- Functional Testing – Structural Testing – Class Testing – Mutation Testing – Levels of Testing – Static and Dynamic Testing Tools - Software Maintenance – Categories – Challenges of Software Maintenance – Maintenance of Object Oriented Software – Regression Testing

UNIT V SOFTWARE QUALITY AND METRICS 9

Need of Object Oriented Software Estimation – Lorenz and Kidd Estimation – Use Case Points Method – Class Point Method – Object Oriented Function Point – Risk Management – Software Quality Models – Analyzing the Metric Data – Metrics for Measuring Size and Structure – Measuring Software Quality - Object Oriented Metrics

SUGGESTED ACTIVITIES:

1. Discuss the different phases in any domain like Health Monitoring System using extreme programming
2. Describe Business Requirement Specification (BRS) and SRS (Software Requirement Specification) for any Project like Automatic Intelligent Plant Watering System .using any one of requirement analysis tool
3. Identify the classes , relationship between classes and draw standard UML diagrams using any one UML modeling tool (eg: ArgoUML that supports UML 1.4 and higher)
4. for a system (eg: Conference Management System, student management system)
5. Test the above UML for all the scenarios identified using Selenium /JUnit / Apache JMeter
6. Perform COCOMO estimation for Book Management System to find effort and development time considering all necessary cost estimation factors. (Use GanttPRO Software for estimation)

COURSE OUTCOMES:

On completion of the course the student would be able to :

CO1: Design object oriented software using appropriate process models.

CO2: Differentiate software processes under waterfall and agile methodology.

CO3: Design and Develop UML diagrams for software project.

CO4: Apply Design Patterns for a software process.

CO5: Categorize testing methods and compare different testing tools for software process.

CO6: Analyze object oriented metrics and quality for software engineering processes.

TOTAL: 45 PERIODS

REFERENCES:

1. Yogesh Singh, RuchikaMalhotra, “ Object – Oriented Software Engineering”, PHI Learning Private Limited ,First edition,2012
2. Ivar Jacobson. Magnus Christerson, PatrikJonsson, Gunnar Overgaard, “Object Oriented Software Engineering, A Use Case Driven Approach”, Pearson Education, Seventh Impression, 2009
3. Craig Larman, “Applying UML and Patterns, an Introduction to Object-Oriented Analysis and Design and Iterative Development”, Pearson Education, Third Edition, 2008.
4. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, Kelli A. Houston, “Object Oriented Analysis & Design with Applications, Third Edition, Pearson Education,2010
5. Roger S. Pressman, “Software Engineering: A Practitioner’s Approach, Tata McGraw-Hill Education, 8th Edition, 2015

MC4103

PYTHON PROGRAMMING

**L T P C
3 0 0 3**

COURSE OBJECTIVES:

- To develop Python programs with conditionals, loops and functions.
- To use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python
- To use modules, packages and frameworks in python
- To define a class with attributes and methods in python

UNIT I BASICS OF PYTHON

9

Introduction to Python Programming – Python Interpreter and Interactive Mode– Variables and Identifiers – Arithmetic Operators – Values and Types – Statements. Operators – Boolean Values – Operator Precedence – Expression – Conditionals: If-Else Constructs – Loop Structures/Iterative Statements – While Loop – For Loop – Break Statement-Continue statement – Function Call and Returning Values – Parameter Passing – Local and Global Scope – Recursive Functions

UNIT II DATA TYPES IN PYTHON

9

Lists, Tuples, Sets, Strings, Dictionary, Modules: Module Loading and Execution – Packages – Making Your Own Module – The Python Standard Libraries.

UNIT III FILE HANDLING AND EXCEPTION HANDLING

8

Files: Introduction – File Path – Opening and Closing Files – Reading and Writing Files –File Position –Exception: Errors and Exceptions, Exception Handling, Multiple Exceptions

UNIT IV MODULES, PACKAGES AND FRAMEWORKS

10

Modules: Introduction – Module Loading and Execution – Packages – Making Your Own Module – The Python Libraries for data processing, data mining and visualization- NUMPY, Pandas, Matplotlib, Plotly-Frameworks- -Django, Flask, Web2Py

UNIT V OBJECT ORIENTED PROGRAMMING IN PYTHON

9

Creating a Class, Class methods, Class Inheritance, Encapsulation, Polymorphism, class method

vs. static methods, Python object persistence.

SUGGESTED ACTIVITIES:

1. Display a multiplication Table Both players are given the same string, S ; Both players have to make substrings using the letters of the string S.
Player A has to make words starting with consonants. Player B has to make words starting with vowels. The game ends when both players have made all possible substrings. Do Scoring
2. Write a function definition for JTOI() in Python that would display the corrected version of entire content of the file .TXT (has wrongly alphabet J in place of alphabet I) with all the alphabets "J" to be displayed as an alphabet "I" on screen.
3. Consider a CSV file of profit of 10 items in monthly sales of a year . Read this file using Pandas or NumPy or using the in-built matplotlib function. Perform the following task.
4. Read Total profit of all months and show it using a line plot
Read all product sales data and show it using a multi-line plot
Read each item sales data of each month and show it using a scatter plot
Read each item product sales data and show it using the bar chart
Read sales data of bathing soap of all months and show it using a bar chart.
Calculate total sale data an year for each product and show it using a Pie chart
5. Create a Python class called Bank Account which represents a bank account, having as attributes: account Number (numeric type), name (name of the account owner as string type), balance. Create a constructor with parameters: account Number, name, balance. Create a Deposit() method which manages the deposit actions. Create a Withdrawal() method which manages withdrawals actions

COURSE OUTCOMES:

On completion of the course the student would be able to :

- CO1:** Develop algorithmic solutions to simple computational problems
- CO2:** Represent compound data using Python lists, tuples and dictionaries.
- CO3:** Read and write data from/to files in Python Programs
- CO4:** Structure simple Python programs using libraries, modules etc.
- CO5:** Structure a program by bundling related properties and behaviors into individual objects.

TOTAL : 45 PERIODS

REFERENCES

1. Reema Thareja, "Python Programming using Problem Solving Approach", Oxford University Press, First edition, 2017
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, Shroff, O'Reilly Publishers, 2016 (<http://greenteapress.com/wp/thinkpython/>)
3. Guido van Rossum, Fred L. Drake Jr., "An Introduction to Python – Revised and Updated for Python 3.2, Network Theory Ltd., First edition, 2011
4. ohn V Guttag, "Introduction to Computation and Programming Using Python", Revised and Expanded Edition, MIT Press, 2013
5. Charles Dierbach, "Introduction to Computer Science using Python", Wiley India Edition, First Edition, 2016

COURSE OBJECTIVES:

- To understand the basic principles of Accounting
- To understand the Double entry system and the preparation of ledger.
- To understand the process and importance of electronic accounting system.
- To Prepare the estimate for various business activities such as purchase, sale, production and cash budgets
- To ensure the decision making process of an organization.

UNIT I INTRODUCTION TO ACCOUNTING**15**

Introduction to Financial, Cost and Management Accounting - Objectives of Financial Accounting – Accounting Principles, Concepts and Conventions – Book keeping and Accounting

Practical exercise session using Tally.:

1. Company Creation, Creating Groups
2. Creation of Ledgers and Vouchers

UNIT II MANAGEMENT ACCOUNTING AND BOOK KEEPING**15**

Meaning-Objectives of Management Accounting-Accounting System – Preparation of Journal, Ledger, Cash Book and Trial Balance – Errors disclosed and not disclosed by Trial Balance –Final Accounts - Ratio Analysis

Practical exercise session using Tally.:

1. Creating Contra, Journals, Credit and Debit Notes
2. Preparing Trial Balance and Final Accounts

UNIT III BUDGETS AND BUDGETARY CONTROL**15**

Budgets and Budgetary Control-Meaning-Types-Sales Budget-Production Budget-Cost of Production Budget-Flexible Budgeting-Cash Budget-Master Budget-Zero Base Budgeting-Computerized Accounting – with adjustments

Practical sessions using Advanced tools in MS-Excel:

1. Preparing Revenue Management and Portfolio Selection
2. Preparing Final Accounts with Adjustments

UNIT IV FINANCIAL MANAGEMENT**15**

Objectives of Financial Management- preparation of Suspense Account – Depreciation – Meaning and Types – Methods of Charging and Providing depreciation – Inventory

Practical exercise session using Tally.:

1. Preparing Inventory Creation, Purchase order, Sales Order
2. Preparing Sales Journal, Rejections, Delivery Note.

UNIT V BANK RECONCILIATION STATEMENT AND REPORTING**15**

Preparing Bank Reconciliation Statement (simple problems) – Insurance Claim – Average Clause - Export and Import of Data, Data Security,

Practical exercise session using Tally.:

1. Preparing the Bank Reconciliation Statement
2. Preparing the Trading, Profit And Loss Account and Trial Balance

TOTAL : 75 PERIODS

COURSE OUTCOMES:

On completion of the course the student would be able to :

- CO1. Able to understand the basic concepts of Accounting standards.
- CO2. Able to understand the process of maintaining Accounts in an organization
- CO3. Helps to understand and calculating the financial position of an organization
- CO4. Helps to understand Financial Management concepts and its components
- CO5. It helps to understand the importance of BRS and generation of various financial reports

REFERENCES:

1. S.N.Maheswari, "Financial and Management Accounting", Sultan Chand & Sons, 5 edition, 2010
2. I.M.Pandey, "Financial Management", Vikas Publishing House Pvt. Ltd., 9th Edition, 2009.
3. M.Y.Khan and P.K.Jain, "Financial Management , Text, Problems and Cases", Tata McGraw Hill, 5th Edition, 2008.
4. Reddy and Murthy, Financial Accounting by Margham Publications, 2015, Chennai
5. I.M.Pandey, "Management Accounting", Vikas Publishing House Pvt. Ltd., 3rd Edition, 2009
6. Advanced Accounting, R.L.Gupta and P.K.Gupta, Advanced Accounting, Sultan Chand, New Delhi

MC4111

**ADVANCED DATA STRUCTURES AND ALGORITHMS
LABORATORY**

**L T P C
0 0 4 2**

COURSE OBJECTIVES:

- To acquire the knowledge of using advanced tree structures
- To learn the usage of heap structures
- To understand the usage of graph structures and spanning trees
- To understand the problems such as matrix chain multiplication, activity selection and Huffman coding
- To understand the necessary mathematical abstraction to solve problems.

LIST OF EXPERIMENTS:

- 1: Implementation of recursive function for tree traversal and Fibonacci
- 2: Implementation of iteration function for tree traversal and Fibonacci
- 3: Implementation of Merge Sort and Quick Sort
- 4: Implementation of a Binary Search Tree
- 5: Red-Black Tree Implementation
- 6: Heap Implementation
- 7: Fibonacci Heap Implementation
- 8: Graph Traversals
- 9: Spanning Tree Implementation
- 10: Shortest Path Algorithms (Dijkstra's algorithm, Bellman Ford Algorithm)
- 11: Implementation of Matrix Chain Multiplication
- 12: Activity Selection and Huffman Coding Implementation

HARDWARE/SOFTWARE REQUIREMENTS

- 1: 64-bit Open source Linux or its derivative
- 2: Open Source C++ Programming tool like G++/GCC

TOTAL : 60 PERIODS

COURSE OUTCOMES:

- CO1:** Design and implement basic and advanced data structures extensively
- CO2:** Design algorithms using graph structures
- CO3:** Design and develop efficient algorithms with minimum complexity using design techniques
- CO4:** Develop programs using various algorithms.
- CO5:** Choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.

REFERENCES:

1. Lipschutz Seymour, "Data Structures Schaum's Outlines Series", Tata McGraw Hill, 3rd Edition, 2014.
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
3. <http://www.coursera.org/specializations/data-structures-algorithms>
4. http://www.tutorialspoint.com/data_structures_algorithms
5. <http://www.geeksforgeeks.org/data-structures/>

MC4112

PYTHON PROGRAMMING LABORATORY

**L T P C
0 0 4 2**

COURSE OBJECTIVES:

- Develop Python programs with conditionals, loops and functions
- Represent compound data using Python lists, tuples, dictionaries
- Read and write data from/to files in Python
- Implement NumPy, Pandas, Matplotlib libraries
- Implement object oriented concepts

LIST OF EXPERIMENTS:

Note: The examples suggested in each experiment are only indicative. The lab instructor is expected to design other problems on similar lines.

- 1: Python programming using simple statements and expressions (exchange the values of two variables, circulate the values of n variables, distance between two points).
- 2: Scientific problems using Conditionals and Iterative loops.
- 3: Linear search and Binary search
- 4: Selection sort, Insertion sort
- 5: Merge sort, Quick Sort
- 6: Implementing applications using Lists, Tuples.
- 7: Implementing applications using Sets, Dictionaries.
- 8: Implementing programs using Functions.
- 9: Implementing programs using Strings.
- 10: Implementing programs using written modules and Python Standard Libraries (pandas, numpy, Matplotlib, scipy)
- 11: Implementing real-time/technical applications using File handling.
- 12: Implementing real-time/technical applications using Exception handling.
- 13: Creating and Instantiating classes

HARDWARE/SOFTWARE REQUIREMENTS

- 1: Processors: Intel Atom® processor Intel®Core™i3processor
- 2: Disk space: 1GB.
- 3: Operating systems: Windows 7, macOS and Linux
- 4: Python versions: 2.7, 3.6, 3.8

TOTAL : 60 PERIODS

COURSE OUTCOMES:

On completion of the laboratory course, the student should be able to

- CO1:** Apply the Python language syntax including control statements, loops and functions to solve a wide variety of problems in mathematics and science.
- CO2:** Use the core data structures like lists, dictionaries, tuples and sets in Python to store, process and sort the data
- CO3:** Create files and perform read and write operations
- CO4:** Illustrate the application of python libraries.
- CO5:** Handle exceptions and create classes and objects for any real time applications

REFERENCES:

- 1. Allen B. Downey , “ Think Python: How to Think Like a Computer Scientist”, Second Edition, Updated for Python 3, Shroff/O’Reilly Publishers, 2016.
- 2. Shroff “Learning Python: Powerful Object-Oriented Programming; Fifth edition, 2013.
- 3. David M.Baezly “Python Essential Reference”. Addison-Wesley Professional; Fourth edition, 2009.
- 4. David M. Baezly “Python Cookbook” O’Reilly Media; Third edition (June 1, 2013)
- 5. <http://www.edx.org/>

MC4113

COMMUNICATION SKILLS ENHANCEMENT – I

L	T	P	C
0	0	2	1

COURSE OBJECTIVES:

- To provide opportunities to learners to practice English and thereby make them proficient users of the language.
- To enable learners to fine-tune their linguistic skills (LSRW) with the help of technology.
- To improve the performance of students’ listening, speaking, reading and writing skills and thereby enhance their career opportunities.

LIST OF ACTIVITIES:

- 1. Listening:
 - Listening and practicing neutral accents
 - Listening to short talks and lectures and completing listening comprehension exercises
 - Listening to TED Talks
- 2. Speaking:
 - Giving one minute talks
 - Participating in small Group Discussions
 - Making Presentations
- 3. Reading:

- Reading Comprehension
 - Reading subject specific material
 - Technical Vocabulary
4. Writing:
- Formal vs Informal Writing
 - Paragraph Writing
 - Essay Writing
 - Email Writing

REFERENCES / MANUALS / SOFTWARE: Open Sources / websites

TOTAL: 30 PERIODS

COURSE OUTCOMES:

On completion of the course, the students will be able to:

- Listen and comprehend lectures in English
- Articulate well and give presentations clearly
- Participate in Group Discussions successfully
- Communicate effectively in formal and informal writing
- Write proficient essays and emails

OBJECTIVES:

- Be familiar with basic techniques of algorithm analysis.
- Be exposed to the concept of ADTs.
- Learn linear data structures-List, Stack and Queue.
- Learn nonlinear data structures-Tree and Graphs.
- Be exposed to sorting, searching and hashing algorithms

UNIT I INTRODUCTION**9 +6**

Introduction - Abstract Data Types (ADT) – Arrays and its representation –Structures – Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm – analysis frame work – Asymptotic notations, Properties, Recurrence Relation.

Lab Experiments:

1. Develop a program to perform various array operations
2. Write a program to find running time complexity by considering each statement in the program for a given set of numbers.

UNIT II LINEAR DATA STRUCTURES - STACK, QUEUE**9 +6**

Stack ADT – Operations on Stack - Applications of stack – Infix to postfix conversion – evaluation of expression - Queue ADT – Operations on Queue - Circular Queue - Applications of Queue.

Lab Experiments:

1. Write a program to convert infix to postfix using stack data structure
2. Develop a program to perform circular queue operations

UNIT III LINEAR DATA STRUCTURES – LIST**9+6**

List ADT - Array-based Implementation - Linked list implementation - Singly Linked Lists – Circularly linked lists – Doubly Linked Lists - Applications of linked list – Polynomial Addition.

Lab Experiments:

1. Perform Polynomial Manipulation using Single Linked List.
2. Implement the various operations in double linked list.

UNIT IV SEARCHING, SORTING AND HASH TECHNIQUES**9 +6**

Searching: Linear search – Binary Search- comparison of linear search and binary search, Sorting algorithms: Insertion sort - Bubble sort – selection sort - Hashing: Hash Functions – Separate Chaining – Open Addressing – Rehashing.

Lab Experiments:

1. Write a program to perform binary search
2. Write a program to sort a given set of numbers and compare among Bubble Sort, Selection Sort and Insertion Sort with respect to computational complexity.

UNIT V NON LINEAR DATA STRUCTURES - TREES AND GRAPHS**9 +6**

Trees and its representation – left child right sibling data structures for general trees- Binary Tree – Binary tree traversals — Binary Search Tree - Graphs and its representation - Graph Traversals - Depth-first traversal – breadth-first traversal-Application of graphs.

Lab Experiments:

1. Write a program to delete a node from a given Binary search tree
2. Write a program to perform Graph Traversals

TOTAL : 75 PERIODS

COURSE OUTCOMES:

Upon Completion of the course, the students will be able to

- analyze algorithms and determines their time complexity.
- understand the concepts of data types, data structures and linear structures
- apply data structures to solve various problems
- apply different Sorting, Searching and Hashing algorithms.
- understand non-linear data structures

REFERENCES

1. Anany Levitin "Introduction to the Design and Analysis of Algorithms" 3rd Edition, Pearson Education
2. A.K. Sharma, "Data Structures using C", 2nd Edition, Pearson Education Asia, 2013
3. E. Horowitz, Anderson-Freed and S.Sahni, "Fundamentals of Data structures in C", 2nd Edition, University Press, 2007
4. E. Balagursamy, "Data Structures using C", Tata McGraw Hill 2015 Reprint
5. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, India, 2016
6. Jean Paul Tremblay and Paul G. Sorensen, "An Introduction to Data Structures with Applications", 2nd Edition, Tata McGraw Hill, New Delhi, 2017.

BX4002

PROBLEM SOLVING AND PROGRAMMING IN C

L T P C
3 0 2 4

COURSE OBJECTIVES:

- To understand the basic concepts of problem solving approaches and to develop the algorithms
- Apply the techniques of structured (functional) decomposition to break a program into smaller pieces and describe the mechanics of parameter passing.
- To design, implements, test, and apply the basic C programming concepts

UNIT I INTRODUCTION TO COMPUTER PROBLEM SOLVING 9

Introduction – The Problem Solving aspect – Top down design – Implementation of algorithm – Program Verification – The efficiency of algorithms – The analysis of algorithms – Fundamental Algorithms

UNIT II PROGRAMMING AND ALGORITHMS 9

Programs and Programming – building blocks for simple programs -pseudo code representation – flow charts - Programming Languages - compiler –Interpreter, Loader and Linker - Program execution – Classification of Programming Language - Structured Programming Concept – Illustrated Problems: Algorithm to check whether a given number is Armstrong number or not- Find factorial of a number

UNIT III BASICS OF 'C', INPUT / OUTPUT & CONTROL STATEMENTS 9 +10

Introduction- Identifier – Keywords - Variables – Constants – I/O Statements - Operators - Initialization –

Expressions – Expression Evaluation – Lvalues and Rvalues – Type Conversion in C –Formatted input and output functions - Specifying Test Condition for Selection and Iteration- Conditional Execution - and Selection – Iteration and Repetitive Execution- go to Statement – Nested Loops- Continue and break statements.

Lab Experiments:

Write programs to get some input , perform some operation and display the output using I/O statements

Write a program to execute some specific statements based on the test condition

Write programs to implement nested loop

UNIT IV **ARRAYS, STRINGS, FUNCTIONS AND POINTERS** **9 +10**

Array – One dimensional Character Arrays- Multidimensional Arrays- Arrays of Strings – Two dimensional character array – functions - parameter passing mechanism scope – storage classes – recursion - comparing iteration and recursion- pointers – pointer operators - uses of pointers- arrays and pointers – pointers and strings - pointer indirection pointers to functions - Dynamic memory allocation.

Lab Experiments

1. Write a program in C to get the largest element of an array using the function.
2. Display all prime numbers between two intervals using functions.
3. Reverse a sentence using recursion.
4. Write a C program to concatenate two strings

UNIT V **USER-DEFINED DATATYPES & FILES** **9 +10**

Structures – initialization - nested structures – structures and arrays – structures and pointers - union– type def and enumeration types - bit fields - File Management in C – Files and Streams – File handling functions – Sequential access file- Random access file – Command line arguments.

Lab Experiments:

1. Write a C program to Store Student Information in Structure and Display it.
2. The annual examination is conducted for 10 students for five subjects.
3. Write a program to read the data from a file and determine the following:

Total marks obtained by each student; Topper of the class

COURSE OUTCOMES:

- Able to design a computational solution for a given problem.
- Able to break a problem into logical modules that can be solved (programmed).
- Able to transform a problem solution into programs involving programming constructs.
- To write programs using structures, strings, arrays, pointer and files for solving complex computational problem.
- Able to introduce modularity using functions and pointers which permit ad hoc runtime polymorphism.

TOTAL : 75 PERIODS

REFERENCES:

1. Deitel and Deitel, “C How to Program”, Pearson Education. 2013, 7th Edition
2. Byron S Gottfried, —Programming with C, Schaums Outlines, Second Edition, Tata McGraw-Hill, 2006
3. Brian W. Kernighan and Dennis M. Ritchie, “The C programming Language”, Edition? 2nd edition 2015, Pearson Education India
4. How to solve it by Computer, R. G. Dromey, Pearson education, Fifth Edition, 2007
5. Kamthane, A.N., “Programming with ANSI and Turbo C”, Pearson Education, Delhi, 3rd Edition,

2015

6. PradipDey, ManasGhosh, —Computer Fundamentals and Programming in C, Second Edition, Oxford University Press, 2013.

**BX4003 INTRODUCTION TO COMPUTER ORGANIZATION AND OPERATING SYSTEM L T P C
3 0 0 3**

COURSE OBJECTIVES:

- To learn the basic structure and operations of a computer.
- To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit.
- To understand the memory hierarchies, cache memories and virtual memories and to learn the different ways of communication with I/O devices.
- To understand the basic concepts and functions of Operating Systems
- To understand Process and various Scheduling Algorithms of OS

UNIT I BASIC STRUCTURE AND ARITHMETIC OPERATIONS 9

.Functional Units – Basic Operational Concepts – Instructions: Language of the Computer – Operations, Operands – Instruction representation – Logical operations – Decision Making – MIPS Addressing-Arithmetic for Computers

UNIT II PROCESSOR AND CONTROL UNIT 9

A Basic MIPS implementation – Building a Datapath – Control Implementation Scheme – Pipelining – Pipelined datapath and control – Handling Data Hazards & Control Hazards – Exceptions.

UNIT III MEMORY & I/O SYSTEMS 9

Memory Hierarchy - Memory technologies – cache memory – measuring and improving cache performance – virtual memory –Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure –Interface circuits – USB

UNIT IV OPERATING SYSTEMS OVERVIEW 9

Operating system overview-objectives and functions, Evolution of Operating System- Operating System Structure - System Calls- Processes – Process Concept, Inter-process Communication

UNIT V PROCESS MANAGEMENT 9

CPU Scheduling – Scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Threads Overview– The critical-section problem, Semaphores, Classical problems of synchronization, Critical regions

TOTAL : 45 PERIODS

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Understand the basics structure of computers, operations and instructions.
- Design arithmetic and logic unit, control unit.
- Understand the various memory systems and I/O communication.
- Understand operating system functions, types, system calls
- Analyze Process and various scheduling algorithms

REFERENCES:

1. David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Fifth Edition, Morgan Kaufmann / Elsevier
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012
3. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne - Operating System Concepts, 9th Edition, John Wiley and Sons Inc., 2012.
4. John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill, 2012
5. John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.
6. Andrew S. Tanenbaum - Modern Operating Systems, 4th Edition, Pearson Education, 2014.

BX4004

DATABASE MANAGEMENT SYSTEMS

**L T P C
3 0 2 4**

OBJECTIVES:

- To understand the fundamentals of data models and conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To know about data storage techniques and query processing.
- To impart knowledge in transaction processing, concurrency control techniques and recovery procedures.

UNIT I INTRODUCTION 9

File systems versus Database systems – Data Models – DBMS Architecture – Data Independence – Data Modeling using Entity – Relationship Model –E-R Modeling.

UNIT II RELATIONAL MODEL AND QUERY EVALUATION 9

Relational Model Concepts – Relational Algebra – SQL – Basic Queries – Complex SQL Queries – Views – Constraints

UNIT III DATABASE DESIGN & APPLICATION DEVELOPMENT 9

Functional Dependencies – Non-loss Decomposition – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form – Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT IV TRANSACTION PROCESSING 9

Query Processing-Transaction Processing – Properties of Transactions - Serializability – Transaction support in SQL - Locking Techniques –Validation Techniques — Recovery concepts – Shadow paging – Log Based Recovery.

UNIT V FILES AND INDEXING 9

File operations – Hashing Techniques – Indexing – Single level and Multi-level Indexes – B+ tree – Static Hashing

LIST OF EXPERIMENTS:

Data Definition Commands to create, describe, alter, rename, drop and truncate the tables

1. Data Manipulation Commands for inserting, deleting, updating and retrieving in Tables
2. Transaction Control Language Commands like Commit, Rollback and Save Point
3. Illustrate the statements to create index and drop index
4. Perform database querying using simple query, nested query, subquery and join operations
5. Create a PL/SQL block to implement implicit and explicit cursors
6. Create a PL/SQL block to implement procedures and functions
7. Create a PL/SQL block to execute triggers
8. Execute a procedure which handles exception using PL/SQL
9. Create a embedded PL/SQL block to connect with any host language like 'C'

COURSE OUTCOMES:

Upon Completion of the course, the students will be able to

- Understand the basic concepts of the database and data models.
- Design a database using ER diagrams and map ER into Relations and normalize the relations
- Acquire the knowledge of query evaluation to monitor the performance of the DBMS.
- Develop a simple database applications using normalization.
- Acquire the knowledge about different special purpose databases and to critique how they differ from traditional database systems.

TOTAL : 75 PERIODS

REFERENCES:

1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Seventh Edition, McGraw Hill, 2017.
2. RamezElamassri and ShankantBNavathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education Delhi, 2017
3. RaghuRamakrishnan, —Database Management SystemsII, Fourth Edition, McGrawHill College Publications, 2015.
4. Lee Chao, "Database Development and Management", Auerbach Publications, 1st edition, 2010
5. Carlos Coronel, Peter Rob, and Stephen Morris, "Database Principles Fundamentals of Design, Implementation, and Management –10th Edition", Course Technology, Cengage Learning, 2013
6. C.J. Date, "An Introduction to Database Systems", Eighth Edition, Pearson Education Delhi, 2003

BX4005

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

L T P C

3 0 0 3

COURSE OBJECTIVES:

- To introduce Mathematical Logic and their rules for validating arguments and programmes.
- To introduce counting principles for solving combinatorial problems.
- To give exposure to Graph models and their utility in connectivity problems.
- To introduce abstract notion of Algebraic structures for studying cryptographic and its related areas.
- To introduce Boolean algebra as a special algebraic structure for understanding logical circuit problems.

UNIT I LOGIC AND PROOFS 9

Propositional Logic – Propositional Equivalences – Predicates and Quantifiers – Nested Quantifiers – Rules of Inference – Introduction to Proofs – Proof Methods and Strategy.

UNIT II COMBINATORICS 9

Mathematical Induction – Strong Induction and Well Ordering – The Basics of Counting - The Pigeonhole Principle – Permutations and Combinations – Recurrence Relations Solving Linear Recurrence Relations Using Generating Functions – Inclusion – Exclusion – Principle and Its Applications

UNIT III GRAPHS 9

Graphs and Graph Models – Graph Terminology and Special Types of Graphs – Matrix Representation of Graphs and Graph Isomorphism – Connectivity – Euler and Hamilton Paths.

UNIT VI ALGEBRAIC STRUCTURES 9

Groups – Subgroups – Homomorphisms – Normal Subgroup and Coset – Lagrange's Theorem – Definitions and Examples of Rings and Fields.

UNIT V LATTICES AND BOOLEAN ALGEBRA 9

Partial Ordering – Posets – Lattices as Posets – Properties of Lattices – Lattices as Algebraic Systems – Sub Lattices – Direct Product And Homomorphism – Some Special Lattices – Boolean Algebra

TOTAL : 45 PERIODS

COURSE OUTCOMES:

- CO1: Apply Mathematical Logic to validate logical arguments and programmes.
- CO2: Apply combinatorial counting principles to solve application problems.
- CO3: Apply graph model and graph techniques for solving network other connectivity related problems.
- CO4: Apply algebraic ideas in developing cryptograph techniques for solving network security problems.
- CO5: Apply Boolean laws in developing and simplifying logical circuits.

REFERENCES:

1. Kenneth H.Rosen, "Discrete Mathematics and its Applications", Tata McGraw Hill Pub. Co.Ltd., Seventh Edition, Special Indian Edition, New Delhi, 2011.
2. Tremblay J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, 30th Reprint, New Delhi, 2011.
3. Ralph. P. Grimaldi, "Discrete and Combinatorial Mathematics: An Applied Introduction", Pearson Education, 3rd Edition, New Delhi, 2014.
5. ThomasKoshy, "Discrete Mathematics with Applications", 2nd Edition, Elsevier Publications, Boston, 2006.
6. SeymourLipschutz and Mark Lipson,"Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., Third Edition, New Delhi, 2013

COURSE OBJECTIVES:

- To understand networking concepts and basic communication model
- To understand network architectures and components required for data communication.
- To analyze the function and design strategy of physical, data link, network layer and transport layer
- To acquire basic knowledge of various application protocol for internet security issues and services

UNIT I NETWORK FUNDAMENTALS 9

Uses of Networks – Categories of Networks -Communication model –Data transmission concepts and terminology – Protocol architecture – Protocols – OSI – TCP/IP – LAN Topology - Transmission media

UNIT II DATA LINK LAYER 9

Data link control - Flow Control – Error Detection and Error Correction - MAC – Ethernet, Token ring, Wireless LAN MAC – Blue Tooth – Bridges.

UNIT III NETWORK LAYER 9

Network layer – Switching concepts – Circuit switching – Packet switching –IP – Datagrams –IP addresses- IPV6– ICMP – Routing Protocols – Distance Vector – Link State- BGP

UNIT IV TRANSPORT LAYER 9

Transport layer –service –Connection establishment – Flow control – Transmission control protocol – Congestion control and avoidance – User datagram protocol

UNIT V APPLICATIONS AND SECURITY 9

Applications - DNS- SMTP – WWW –SNMP- Security –threats and services - DES- RSA.

COURSE OUTCOMES:

On Completion of the course, the students should be able to:

- Able to trace the flow of information from one node to another node in the network
- Able to Identify the components required to build different types of networks
- Able to understand the functionalities needed for data communication into layers
- Able to choose the required functionality at each layer for given application
- Able to understand the working principles of various application protocols and fundamentals of security issues and services available

TOTAL : 45 PERIODS

REFERENCES:

1. Larry L. Peterson & Bruce S. Davie, "Computer Networks – A systems Approach", Fifth Edition, Morgan Kaufmann, 2012.
2. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition, 2012.
3. Andrew S. Tannenbaum, David J. Wetherall, "Computer Networks" Fifth Edition, Pearson Education 2011.
4. Forouzan, "Data Communication and Networking", Fifth Edition, TMH 2012.

5. William Stallings, —Data and Computer CommunicationsII, Tenth Edition, Pearson Education, 2013.
6. Larry L. Peterson & Bruce S. Davie, “Computer Networks – A systems Approach”, Fifth Edition, Morgan Kaufmann, 2012.

AUDIT COURSES

AX4091

ENGLISH FOR RESEARCH PAPER WRITING

L T P C
2 0 0 0

COURSE OBJECTIVES:

- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

UNIT I INTRODUCTION TO RESEARCH PAPER WRITING 6
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II PRESENTATION SKILLS 6
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT III TITLE WRITING SKILLS 6
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT IV RESULT WRITING SKILLS 6
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V VERIFICATION SKILLS 6
Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission

TOTAL: 30 PERIODS

COURSE OUTCOMES:

- CO1 –Understand that how to improve your writing skills and level of readability
- CO2 – Learn about what to write in each section
- CO3 – Understand the skills needed when writing a Title
- CO4 – Understand the skills needed when writing the Conclusion
- CO5 – Ensure the good quality of paper at very first-time submission

REFERENCES:

1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

2. Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006
3. Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
4. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.

AX4092

DISASTER MANAGEMENT

L T P C
2 0 0 0

COURSE OBJECTIVES:

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

UNIT I INTRODUCTION

6

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II REPERCUSSIONS OF DISASTERS AND HAZARDS

6

Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III DISASTER PRONE AREAS IN INDIA

6

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

UNIT IV DISASTER PREPAREDNESS AND MANAGEMENT

6

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V RISK ASSESSMENT

6

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

TOTAL : 30 PERIODS

COURSE OUTCOMES:

- CO1: Ability to summarize basics of disaster
- CO2: Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- CO3: Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.

CO4: Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.

CO5: Ability to develop the strengths and weaknesses of disaster management approaches

REFERENCES

1. Goel S. L., Disaster Administration And Management Text And Case Studies”, Deep & Deep Publication Pvt. Ltd., New Delhi, 2009.
2. Nishitha Rai, Singh AK, “Disaster Management in India: Perspectives, issues and strategies “New Royal book Company, 2007.
3. Sahni, Pardeep Et. Al. ,” Disaster Mitigation Experiences And Reflections”, Prentice Hall Of India, New Delhi, 2001.

AX4093

CONSTITUTION OF INDIA

L T P C
2 0 0 0

COURSE OBJECTIVES:

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional
- Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History, Drafting Committee, (Composition & Working)

UNIT II PHILOSOPHY OF THE INDIAN CONSTITUTION

Preamble, Salient Features

UNIT III CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT IV ORGANS OF GOVERNANCE

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT V LOCAL ADMINISTRATION

District's Administration head: Role and Importance, □ Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT VI ELECTION COMMISSION

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

TOTAL: 30 PERIODS

COURSE OUTCOMES

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

SUGGESTED READING

1. The Constitution of India,1950(Bare Act),Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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நற்றமிழ் இலக்கியம்

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UNIT I

சங்க இலக்கியம்

6

1. தமிழின் துவக்க நூல் தொல்காப்பியம்
- எழுத்து, சொல், பொருள்
2. அகநானூறு (82)
- இயற்கை இன்னிசை அரங்கம்
3. குறிஞ்சிப் பாட்டின் மலர்க்காட்சி
4. புறநானூறு (95,195)
- போரை நிறுத்திய ஔவையார்

UNIT II

அறநெறித் தமிழ்

6

1. அறநெறி வகுத்த திருவள்ளுவர்
- அறம் வலியுறுத்தல், அன்புடைமை, ஒப்புறவு அறிதல், ஈகை, புகழ்
2. பிற அறநூல்கள் - இலக்கிய மருந்து
- ஏலாதி, சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை (தூய்மையை வலியுறுத்தும் நூல்)

UNIT III

இரட்டைக் காப்பியங்கள்

6

1. கண்ணகியின் புரட்சி
- சிலப்பதிகார வழக்குரை காதை

2. சமூகசேவை இலக்கியம் மணிமேகலை
- சிறைக்கோட்டம் அறக்கோட்டமாகிய காதை

UNIT IV

அருள்நெறித் தமிழ்

6

1. சிறுபாணாற்றுப்படை

- பாரி முல்லைக்குத் தேர் கொடுத்தது, பேகன் மயிலுக்குப் போர்வை கொடுத்தது, அதியமான் ஓளவைக்கு நெல்லிக்கனி கொடுத்தது, அரசர் பண்புகள்

2. நற்றிணை

- அன்னைக்குரிய புன்னை சிறப்பு

3. திருமந்திரம் (617, 618)

- இயமம் நியமம் விதிகள்

4. தர்மச்சாலையை நிறுவிய வள்ளலார்

5. புறநானூறு

- சிறுவனே வள்ளலானான்

6. அகநானூறு (4) - வண்டு

நற்றிணை (11) - நண்டு

கலித்தொகை (11) - யானை, புறா

ஐந்திணை 50 (27) - மான்

ஆகியவை பற்றிய செய்திகள்

UNIT V

நவீன தமிழ் இலக்கியம்

6

1. உரைநடைத் தமிழ்,

- தமிழின் முதல் புதினம்,

- தமிழின் முதல் சிறுகதை,

- கட்டுரை இலக்கியம்,

- பயண இலக்கியம்,

- நாடகம்,

2. நாட்டு விடுதலை போராட்டமும் தமிழ் இலக்கியமும்,

3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும்,

4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும்,

5. அறிவியல் தமிழ்,

6. இணையத்தில் தமிழ்,

7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்.

TOTAL: 30 PERIODS

தமிழ் இலக்கிய வெளியீடுகள் / புத்தகங்கள்

1. தமிழ் இணைய கல்விக்கழகம் (Tamil Virtual University)

- www.tamilvu.org

2. தமிழ் விக்கிப்பீடியா (Tamil Wikipedia)

- <https://ta.wikipedia.org>

3. தர்மபுர ஆதின வெளியீடு

4. வாழ்வியல் களஞ்சியம்
 - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்
5. தமிழ்கலைக் களஞ்சியம்
 - தமிழ் வளர்ச்சித் துறை (thamilvalarchithurai.com)
6. அறிவியல் களஞ்சியம்
 - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்