MALLA REDDY TECHNICAL CAMPUS

A Constituent Unit of MALLA REDDY VISHWAVIDYAPEETH
Deemed to be University
Approved by UGC & AICTE New Delhi
Maisammaguda, Medchal (Dist), Hyderabad - 500100, Telangana

COURSE STRUCTURE
M. Tech - COMPUTER SCIENCE AND ENGINEERING
Admitted from A.Y. 2026-27 Batch

I Year I Semester

S. No	Subject Code	Course Code	Course Title	L	T	P	C
1	25MFC101	PC	Mathematical Foundations of Computer Science	2	1	0	3
2	25ADS101	PC	Advanced Data Structures	3	0	2	4
3	25RMI101	HS	Research Methodology and IPR	2	0	0	2
4	25ACN101	PC	Advanced Computer Networks	3	0	2	4
5		PE	Professional Elective-1	3	1	0	4
6		PE	Professional Elective-2	3	1	0	4
7		AC	Audit Course-1	2	0	0	0
Total				**18**	**3**	**4**	**21**

I Year II Semester

S. No	Subject Code	Course Code	Course Title	L	T	P	C
1.	25ADA201	PC	Advanced Algorithms	3	0	2	4
2.		PE	Professional Elective-3	3	1	0	4
3.		PE	Professional Elective-4	3	1	0	4
4.		PE	Professional Elective-5	3	1	0	4
5.		OE	Open Elective	3	0	0	3
6.		PC	Mini Project with Seminar	0	0	4	2
8.		AC	Audit Course-2	2	0	0	0
Total				**17**	**3**	**6**	**21**

II Year I Semester

S. No	Subject Code	Course Code	Course Title	L	T	P	C
1	25DWR301	PRJ	Dissertation Work Review – I	0	0	26	13
Total				**0**	**0**	**26**	**13**

II Year II Semester

S. No	Subject Code	Course Code	Course Title	L	T	P	C
1	25DWR401	PRJ	Dissertation Work Review - II	0	0	14	7
2	25DVV401	PRJ	Dissertation Viva-Voce	0	0	12	6
Total				**0**	**0**	**26**	**13**

AUDIT COURSE 1

Subject Code	Title
25EFR101	English for Research Paper Writing
25DIS101	Disaster Management
25UHV101	Universal Human values – Understanding Harmony & Ethics
25VED101	Value Education

AUDIT COURSE 2

Subject Code	Title
25COI201	Constitution of India
25PED201	Pedagogy Studies
25SMY201	Stress Management by Yoga
25PDP201	Personality Development through Life Enlightenment Skills

OPEN ELECTIVES

Subject code	Title
25IPR201	Intellectual Property Rights
25GAI201	Generative AI
25IDS201	Intrusion Detection systems

PROFESSIONAL ELECTIVES

Subject code	Professional Elective - 1
25DPL101	Database Programming with PL/SQL
25DEL101	Deep Learning
25NLP101	Natural Language Processing

Subject code	Professional Elective – 2
25APC101	Applied Cryptography
25SQE101	Software Quality Engineering
25MMD101	Mining Massive Datasets

Subject code	Professional Elective - 3
25ECC201	Enterprise Cloud Concepts
25ASN201	Adhoc Sensor Networks
25PAC201	Parallel Computing

Subject code	Professional Elective - 4
25BIO201	Bio Informatics
25CSC201	Cyber Security
25RPA201	Robotic Process Automation

Subject code	Professional Elective - 5
25DIF201	Digital Forensics
25AOS201	Advanced Operating Systems
25QUC201	Quantum Computing

M.Tech- CSE FIRST YEAR SYLLABUS(I-I)

Admitted from A.Y.2025-26 Batch

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

L	T	P	C
2	1	0	3

Course Objectives

- Introduces the elementary discrete mathematics for computer science and engineering.
- Topics include formal logic notation, methods of proof, induction, sets, relations, graph theory, permutations and combinations, counting principles; recurrence relations and generating functions.

Course Outcomes

- Ability to understand and construct precise mathematical proofs.
- Ability to use logic and set theory to formulate precise statements.
- Ability to analyze and solve counting problems on finite and discrete structures.
- Ability to describe and manipulate sequences.
- Ability to apply graph theory in solving computing problems.

UNIT – I

The Foundations Logic and Proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalence, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

UNIT – II

Basic Structures, Sets, Functions, Sequences, Sums, Matrices and Relations: Sets, Functions, Sequences & Summations, Cardinality of Sets and Matrices Relations, Relations and Their Properties, n-ary Relations and Their Applications, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings.

UNIT – III

Algorithms, Induction and Recursion: Algorithms, The Growth of Functions, Complexity of Algorithms. Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Correctness.

UNIT – IV Discrete Probability and Advanced Counting Techniques:

An Introduction to Discrete Probability. Probability Theory, Bayes' Theorem, Expected Value and Variance. Advanced Counting Techniques: Recurrence Relations, Solving Linear Recurrence Relations, Divide-and-Conquer Algorithms and Recurrence Relations, Generating Functions, Inclusion-Exclusion, Applications of Inclusion-Exclusion

UNIT – V

Graphs: Graphs and Graph Models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-

Path Problems, Planar Graphs, Graph Coloring. Trees: Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
2. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE BOOKS:

1. Discrete and Combinatorial Mathematics - an applied introduction: Ralph.P. Grimald, Pearson education, 5th edition.
2. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill publishing co

ADVANCED DATA STRUCTURES

L	T	P	C
3	0	2	4

Course Objectives

- Introduces the heap data structures such as leftist trees, binomial heaps, Fibonacci and min- max heaps
- Introduces a variety of data structures such as disjoint sets, hash tables, search structures and digital search structures

Course Outcomes

- Ability to select the data structures that efficiently model the information in a problem
- Ability to understand how the choice of data structures impact the performance of programs
- Design programs using a variety of data structures, including hash tables, search structures and digital search structures

UNIT – I Heap Structures

Introduction, Min-Max Heaps, Leftist trees, Binomial Heaps, Fibonacci heaps

UNIT – II Hashing and Collisions

Introduction, Hash Tables, Hash Functions, different Hash Functions: Division Method, Multiplication Method, Mid-Square Method, Folding Method, Collisions

UNIT – III

Search Structures: OBST, AVL trees, Red-Black trees, Splay trees, Multiway Search Trees: B-trees, 2-3 trees

UNIT – IV Digital Search Structures

Digital Search trees, Binary tries and Patricia, Multiway Tries, Suffix trees, Standard Tries, Compressed Tries

UNIT – V Pattern matching

Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-Pratt algorithm, Naïve String, Harspool, Rabin Karp

LIST OF PROGRAMS

1. Write a program to perform the following operations:
    a. Insert an element into a binary search tree.
    b. Delete an element from a binary search tree.
    c. Search for a key element in a binary search tree.

2. Write a program for implementing the following sorting methods:
    a. Merge sort b) Heap sort c) Quick sort

3. Write a program to perform the following operations:
    a. Insert an element into a B- tree.
    b. Delete an element from a B- tree.
    c. Search for a key element in a B- tree.

4. Write a program to perform the following operations:
    a. Insert an element into a Min-Max heap
    b. Delete an element from a Min-Max heap
    c. Search for a key element in a Min-Max heap

5. Write a program to perform the following operations:
    a. Insert an element into a Lefiist tree
    b. Delete an element from a Leftist tree
    c. Search for a key element in a Leftist tree
6. Write a program to perform the following operations:
    a. Insert an element into a binomial heap
    b. Delete an element from a binomial heap.
    c. Search for a key element in a binomial heap

7. Write a program to perform the following operations:
    a. Insert an element into a AVL tree.
    b. Delete an element from a AVL search tree.
    c. Search for a key element in a AVL search tree.

8. Write a program to perform the following operations:
    a. Insert an element into a Red-Black tree.
    b. Delete an element from a Red-Black tree.
    c. Search for a key element in a Red-Black tree.

9. Write a program to implement all the functions of a dictionary using hashing.

10. Write a program for implementing Knuth-Morris-Pratt pattern matching algorithm.

11. Write a program for implementing Brute Force pattern matching algorithm.

12. Write a program for implementing Boyer pattern matching algorithm

TEXT BOOKS:

1. Fundamentals of data structures in C++ Sahni, Horowitz, Mehatha, Universities Press.
2. Introduction to Algorithms, TH Cormen, PHI

REFERENCE BOOKS:

1. Design methods and analysis of Algorithms, SK Basu, PHI.
2. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

RESEARCH METHODOLOGY AND IPR

L	T	P	C
2	0	0	2

Course Objectives:

- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

Course Outcomes: At the end of this course, students will be able to

- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT- I:

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem.

Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT- II:

Effective literature studies approaches, analysis, Plagiarism, Research ethics

UNIT- III:

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT- IV:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT- V:

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

TEXT BOOKS:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"

REFERENCE BOOKS:

1. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
2. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.
3. Mayall, "Industrial Design", McGraw Hill, 1992.
4. Niebel, "Product Design", McGraw Hill, 1974.
5. Asimov, "Introduction to Design", Prentice Hall, 1962.
6. Robert P. Merges, Peter S. Menell, Mark A. Lemley, "Intellectual Property in New Technological Age", 2016.
7. T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand, 2008

ADVANCED COMPUTER NETWORKS

L	T	P	C
3	0	2	4

Course Objectives

This course aims to provide advanced background on relevant computer networking topics to have a comprehensive and deep knowledge in computer networks.

Course Outcomes

- Understanding of holistic approach to computer networking
- Ability to understand the computer network protocols and their applications
- Ability to design simulation concepts related to packet forwarding in networks

UNIT – I

Data-link protocols: Ethernet, Token Ring and Wireless (802.11). Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies, IEEE 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs), Multiple access schemes Routing and Internetworking: Network–Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intra-domain Routing Protocols, Inter-domain Routing Protocols, Congestion Control at Network Layer.

UNIT – II Transport and Application Layer Protocols: Client-Server and Peer-To-Peer Application Communication, Protocols on the transport layer, reliable communication. Routing packets through a LAN and WAN. Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control. Principles of Network Applications.

UNIT – III

The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, building a Simple Web Server Creating simulated networks and passing packets through them using different routing techniques. Installing and using network monitoring tools

UNIT – IV

Wireless and Mobile Networks: Introduction, Wireless links and Network Characteristics - CDMA, Wifi: 802.11 Wireless LANS, Cellular internet access, Mobility management: Principles

UNIT – V

Multimedia networking: Multimedia networking applications, streaming stored video, Voice-over-IP, Protocols for real-time conversational applications.

TEXT BOOKS:

1. Computer Networking: A Top-Down Approach, James F. Kuros and Keith W. Ross, Pearson, 6th Edition, 2012.
2. Computer Networks and Internets, Duglas E. Comer, 6th Edition, Pearson.

REFERENCE BOOKS:

1. A Practical Guide to Advanced Networking, Jeffrey S. Beasley and Piyasat Nilkaew, Pearson, 3rd Edition, 2011
2. Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, Prentice Hall

Professional Elective - 1

DATABASE PROGRAMMING WITH PL/SQL

L	T	P	C
3	1	0	4

Course Objectives:

- Knowledge on significance of SQL fundamentals.
- Evaluate functions and triggers of PL/SQL
- Knowledge on control structures, packages in PL/SQL and its applications

Course Outcomes:

- Understand importance of PL/SQL basics
- Implement functions and procedures using PL/SQL
- Understand the importance of triggers in database

UNIT - I

PL/SQL Basics: Block Structure, Behavior of Variables in Blocks, Basic Scalar and Composite Data Types, Control Structures, Exceptions, Bulk Operations, Functions, Procedures, and Packages, Transaction Scope

UNIT - II

Language Fundamentals & Control Structures: Lexical Units, Variables and Data Types, Conditional Statements, Iterative Statements, Cursor Structures, Bulk Statements, Introduction to Collections, Object Types: Varray and Table Collections, Associative Arrays, Oracle Collection API.

UNIT - III

Functions and Procedures: Function and Procedure Architecture, Transaction Scope, Calling Subroutines, Positional Notation, Named Notation, Mixed Notation, Exclusionary Notation, SQL Call Notation, Functions, Function Model Choices, Creation Options, Pass-by-Value Functions, Pass-by- Reference Functions, Procedures, Pass-by-Value Procedures, Pass-by-Reference Procedures, Supporting Scripts.

UNIT - IV

Packages: Package Architecture, Package Specification, Prototype Features, Serially Reusable Precompiler Directive, Variables, Types, Components: Functions and Procedures, Package Body, Prototype Features, Variables, Types, Components: Functions and Procedures, Definer vs. Invoker Rights Mechanics, Managing Packages in the Database Catalog, Finding, Validating, and

Describing Packages, Checking Dependencies, Comparing Validation Methods: Timestamp vs. Signature.

UNIT - V

Triggers: Introduction to Triggers, Database Trigger Architecture, Data Definition Language Triggers, Event Attribute Functions, Building DDL Triggers, Data Manipulation Language Triggers, Statement- Level Triggers, Row-Level Triggers, Compound Triggers, INSTEAD OF Triggers, System and Database Event Triggers, Trigger Restrictions, Maximum Trigger Size, SQL Statements, LONG and LONG RAW Data Types.

TEXT BOOKS:

1. Oracle Database 12c PL/SQL Programming Michael McLaughlin, McGrawHill Education

REFERENCES:

1. Benjamin Rosenzweig, Elena Silvestrova Rakhimov, Oracle PL/SQL by example Fifth Edition

2. Dr. P. S. Deshpande, SQL & PL / SQL for Oracle 11g Black Book

Professional Elective - 1

DEEP LEARNING

L	T	P	C
3	1	0	4

Course Objectives: students will be able

- To understand complexity of Deep Learning algorithms and their limitations
- To be capable of performing experiments in Deep Learning using real-world data.

Course Outcomes:

- Implement deep learning algorithms, understand neural networks and traverse the layers of data
- Learn topics such as convolutional neural networks, recurrent neural networks, training deep networks and high-level interfaces
- Understand applications of Deep Learning to Computer Vision
- Understand and analyze Applications of Deep Learning to NLP

UNIT - I

Introduction: Feed forward Neural networks, Gradient descent and the back propagation algorithm, Unit saturation, the vanishing gradient problem, and ways to mitigate it. RelU Heuristics for avoiding bad local minima, Heuristics for faster training, Nestors accelerated gradient descent, Regularization, Dropout

UNIT - II

Convolutional Neural Networks: Architectures, convolution/pooling layers, Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures. Deep Unsupervised Learning: Auto encoders, Variational Auto-encoders, Adversarial Generative Networks, Auto-encoder and DBM Attention and memory models, Dynamic Memory Models

UNIT - III

Applications of Deep Learning to Computer Vision: Image segmentation, object detection, automatic image captioning, Image generation with Generative adversarial networks, video to text with LSTM models, Attention Models for computer vision tasks

UNIT - IV

Applications of Deep Learning to NLP: Introduction to NLP and Vector Space Model of Semantics, Word Vector Representations: Continuous Skip-Gram Model, Continuous Bag-of-Wordsmodel (CBOW), Glove, Evaluations and Applications in word similarity

UNIT - V

Analogy reasoning: Named Entity Recognition, Opinion Mining using Recurrent Neural Networks: Parsing and Sentiment Analysis using Recursive Neural Networks: Sentence Classification using Convolutional Neural Networks, Dialogue Generation with LSTMs

TEXT BOOKS:

1. Deep Learning by Ian Goodfellow, Yoshua Bengio and Aaron Courville, MIT Press.
2. The Elements of Statistical Learning by T. Hastie, R. Tibshirani, and J. Friedman, Springer.
3. Probabilistic Graphical Models. Koller, and N. Friedman, MIT Press.

REFERENCES:

1. Bishop, C, M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

Professional Elective - 1

NATURAL LANGUAGE PROCESSING

L	T	P	C
3	1	0	4

Prerequisites:

1. Data structures and compiler design

Course Objectives

Introduction to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes

- Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
- Understand and carry out proper experimental methodology for training and evaluating
- empirical NLP systems
- Manipulate probabilities, construct statistical models over strings and trees, and estimate
- parameters using supervised and unsupervised training methods.
- Design, implement, and analyze NLP algorithms; and design different language modeling Techniques

UNIT – I

Finding the Structure of Words: Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches, Features

UNIT - II

Syntax I: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms

UNIT – III

Syntax II: Models for Ambiguity Resolution in Parsing, Multilingual Issues Semantic Parsing I: Introduction, Semantic Interpretation, System Paradigms, Word Sense

UNIT – IV

Semantic Parsing II: Predicate-Argument Structure, Meaning Representation Systems

UNIT - V

Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Bayesian parameter estimation, Language Model Adaptation, Language Models- class based, variable length, Bayesian topic based, Multilingual and Cross Lingual Language Modeling

REFERENCE BOOKS:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication.

Professional Elective - 2

APPLIED CRYPTOGRAPHY

L	T	P	C
3	1	0	4

Course Objectives:

Knowledge on significance of cryptographic protocols and symmetric and public key algorithms

Course Outcomes:

- Understand the various cryptographic protocols
- Analyze key length and algorithm types and modes
- Illustrate different public key algorithms in cryptosystems
- Understand special algorithms for protocols and usage in the real world.

UNIT – I

Foundations: Terminology, Steganography, Substitution Ciphers and Transposition Ciphers, Simple XOR, One-Time Pads, Computer Algorithms, Large Numbers,
Cryptographic Protocols: Protocol Building Blocks: Introduction to Protocols, Communications Using Symmetric Cryptography, One-Way Functions, One-Way Hash Functions, Communications Using Public-Key Cryptography, Digital Signatures, Digital Signatures with Encryption, Random and Pseudo-Random-Sequence Generation

UNIT – II

Cryptographic Techniques: Key length: Symmetric Key length, Public key length, comparing symmetric and public key length.
Algorithm types and modes: Electronic Codebook Mode, Block Replay, Cipher Block Chaining Mode, Stream Cipher, Self-Synchronizing Stream Ciphers, Cipher-Feedback Mode, Synchronous Stream Ciphers, Output-Feedback Mod, Counter Mode, Other Block-Cipher Modes.

UNIT – III

Public-Key Algorithms: Background, Knapsack Algorithms, RSA, Pohlig-Hellman, Rabin, ElGamal, McEliece, Elliptic Curve Cryptosystems, LUC, Finite Automaton Public-Key CryptosystemsPublic-Key Digital Signature Algorithms: Digital Signature Algorithm (DSA), DSA Variants, Gost Digital Signature Algorithm, Discrete Logarithm Signature Schemes, Ong-Schnorr-Shamir, ESIGN

UNIT – IV

Special Algorithms for Protocols: Multiple-Key Public-Key Cryptography, Secret-Sharing Algorithms, Subliminal Channel, Undeniable Digital Signatures, Designated Confirmer Signatures, Computing with Encrypted Data, Fair Coin Flips, One-Way Accumulators, All-or-Nothing Disclosure of Secrets, Fair and Failsafe Cryptosystems, Zero-Knowledge Proofs of Knowledge, Blind Signatures, Oblivious Transfer, Secure Multiparty Computation, Probabilistic Encryption, Quantum Cryptography

UNIT - V

Real World Approaches: IBM Secret key management protocol, ISDN, Kerberos, KryptoKnight, Privacy enhanced mail (PEM), Message security protocol (MSP), PGP, Public-Key Cryptography Standards (PKCS), Universal Electronic Payment System (UEPS).

TEXT BOOKS:

1. Bruce Schneier, Applied Cryptography, Second Edition: Protocols, Algorithms, and Source Code in C (cloth)

Professional Elective - 2

SOFTWARE QUALITY ENGINEERING

L	T	P	C
3	1	0	4

Course Objectives:

- Knowledge on significance of Quality, quality assurance, quality engineering.

Course Outcomes:

- Understand software quality and its perspectives
- Analyze defect prevention and defect reduction in software quality assurance
- Illustrate software quality engineering activities and its process

UNIT - I

Software Quality: Quality: perspectives and expectations, Quality frameworks and ISO-9126, correctness and defects: Definitions, properties and Measurements, A historical perspective of quality, software quality.

UNIT - II

Quality Assurance: Classification: QA as dealing with defects, Defect prevention- Education and training, Formal method, Other defect prevention techniques, Defect Reduction - Inspection: Direct fault detection and removal, Testing: Failure observation and fault removal, other techniques and risk identification, Defect Containment- software fault tolerance, safety assurance and failure containment

UNIT - III

Quality Engineering: Activities and process, Quality planning: Goal setting and Strategy formation, Quality assessment and Improvement, Quality engineering in software process.

UNIT - IV

Test Activities, Management and Automation: Test planning and preparation, Test execution, Result checking and measurement, Analysis and follow- up, Activities People and Management, Test Automation.

UNIT - V

Coverage and usage testing based on checklist and partitions: Checklist based testing and its limitations, Testing for partition Coverage, Usage based Statistical testing with Musa's operational profiles, Constructing operational profiles

Case Study: OP for the cartridge Support Software

TEXT BOOKS:

1. Jeff Tia`n, Software Quality Engineering, Testing, Quality Assurance, and Quantifiable improvement
2. Richard N. Taylor, Software Architecture: Foundations, Theory, and Practice

Professional Elective - 2

MINING MASSIVE DATASETS

L	T	P	C
3	1	0	4

Prerequisites:

- Students should be familiar with Data mining, algorithms, basic probability theory and Discrete math.

Course Objectives:

- This course will cover practical algorithms for solving key problems in mining of massive datasets.
- This course focuses on parallel algorithmic techniques that are used for large datasets.
- This course will cover stream processing algorithms for data streams that arrive constantly, page ranking algorithms for web search, and online advertisement systems that are studied in detail.

Course Outcomes:

- Handle massive data using MapReduce.
- Develop and implement algorithms for massive data sets and methodologies in the context of data mining.
- Understand the algorithms for extracting models and information from large datasets
- Develop recommendation systems.
- Gain experience in matching various algorithms for particular classes of problems.

UNIT - I:

Data Mining-Introduction-Definition of Data Mining-Statistical Limits on Data Mining, **MapReduce and the New Software Stack-**Distributed File Systems, MapReduce, Algorithms Using MapReduce.

UNIT - II:

Similarity Search: Finding Similar Items**-**Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Distance Measures.
Streaming Data: Mining Data Streams-The Stream Data Model , Sampling Data in a Stream, Filtering Streams.

UNIT - III:

Link Analysis-PageRank, Efficient Computation of PageRank, Link Spam

Frequent Itemsets-Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream.

Clustering-The CURE Algorithm, Clustering in Non-Euclidean Spaces, Clustering for Streams and Parallelism.

UNIT - IV:

Advertising on the Web-Issues in On-Line Advertising, On-Line Algorithms, The Matching Problem, The Adwords Problem, Adwords Implementation.

Recommendation Systems-A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering, Dimensionality Reduction, The NetFlix Challenge.

UNIT - V:

Mining Social-Network Graphs-Social Networks as Graphs, Clustering of Social-Network Graphs, Partitioning of Graphs, Simrank, Counting Triangles.

TEXT BOOK:

- Jure Leskovec, Anand Rajaraman, Jeff Ullman, Mining of Massive Datasets, 3rd Edition.

REFERENCES:

1. Jiawei Han & Micheline Kamber , Data Mining – Concepts and Techniques 3rd Edition Elsevier.
2. Margaret H Dunham, Data Mining Introductory and Advanced topics, PEA.
3. Ian H. Witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, Morgan Kaufmann.

AUDIT COURSE - 1

ENGLISH FOR RESEARCH PAPER WRITING

L	T	P	C
2	0	0	0

Prerequisite: None

Course objectives: Students will be able to:

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

UNIT-I:

Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II:

Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction

UNIT-III:

Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV:

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,

UNIT-V:

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. useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

TEXT BOOKS/ REFERENCES:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

AUDIT COURSE - 1

DISASTER MANAGEMENT

L	T	P	C
2	0	0	0

Prerequisite: None

Course Objectives: Students will be able to

- learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- critically understand the strengths and weaknesses of disaster management approaches,
- planning and programming in different countries, particularly their home country or the countries they work in

UNIT-I:

Introduction:

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

Disaster Prone Areas in India:

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-II:

Repercussions of Disasters and Hazards:

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 Preparedness and Management:

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-IV:

Risk Assessment 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.

UNIT-V:

Disaster Mitigation:

Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

TEXT BOOKS/ REFERENCES:

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies "'New Royal book Company.
2. Sahni, Pardeep Et. Al. (Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep &Deep Publication Pvt. Ltd., New Delhi.

AUDIT COURSE - 1

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY & ETHICS

L	T	P	C
2	0	0	0

Course Objectives:

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

UNIT-1: Introduction to Value Education

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education),Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.

UNIT-II: Harmony in the Human

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

UNIT-III: Harmony in the Family and Society

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

UNIT-IV : Harmony in the Nature/Existence

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

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

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

REFERENCES BOOKS:

1. A Foundation Course in Human Values and Professional Ethics" Gaur, R. Sangal, G.P. Bagaria
2. Human Values" A.N. Tripathi, Professional Ethics and Human Values"Author: M. Govindarajan, S. Natarajan, V.S. Senthilkumar,
3. The Bhagavad Gita" (for foundational ethical concepts and human values)
4. The Dhammapada" (Buddhist text — values of compassion, right conduct, etc.)
5. "Ethics for the New Millennium" by Dalai Lama

AUDIT COURSE - 1

VALUE EDUCATION

L	T	P	C
2	0	0	0

Prerequisite: None

Course Objectives: Students will be able to

- Understand value of education and self- development
- Imbibe good values in students
- Let the should know about the importance of character

Course outcomes: Students will be able to

- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

UNIT-I:

Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgements

UNIT-II:

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

UNIT-III:

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness.

UNIT-IV:

Avoid fault Thinking. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

UNIT-V:

Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation, Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively

TEXT BOOKS/ REFERENCES:

1. Chakroborty, S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

M.Tech- FIRST YEAR SYLLABUS(I-II)

Admitted from A.Y.2025-26 Batch

ADVANCED ALGORITHMS

L	T	P	C
3	0	2	4

Course Objectives

- Introduce students to the advanced methods of designing and analyzing algorithms.
- The student should be able to choose appropriate algorithms and use it for a specific problem.
- To familiarize students with basic paradigms and data structures used to solve advanced algorithmic problems.
- Students should be able to understand different classes of problems concerning their computation difficulties.
- To introduce the students to recent developments in the area of algorithmic design.

Course Outcomes

After completion of course, students would be able to:

- Analyze the complexity/performance of different algorithms.
- Determine the appropriate data structure for solving a particular set of problems.
- Categorize the different problems in various classes according to their complexity

UNIT – I

Sorting: Review of various sorting algorithms, topological sorting

Graph: Definitions and Elementary Algorithms: Shortest path by BFS, shortest path in edge-weighted case (Dijkstra's), depth-first search and computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

UNIT – II

Matroids: Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application to MST.

Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

UNIT – III

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP- decomposition

UNIT – IV

Shortest Path in Graphs: Floyd-Warshall algorithm and introduction to dynamic programming paradigm. More examples of dynamic programming.

Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials. Application: Interpolation problem.

Discrete Fourier Transform (DFT): In complex field, DFT in modulo ring. Fast Fourier Transform algorithm. Schonhage-Strassen Integer Multiplication algorithm.

UNIT – V

Linear Programming: Geometry of the feasibility region and Simplex algorithm NP-completeness: Examples, proof of NP-hardness and NP-completeness.

Recent Trends in problem solving paradigms using recent searching and sorting techniques by applying recently proposed data structures.

LIST OF EXPERIMENTS

1. Implement assignment problem using Brute Force method
2. Perform multiplication of long integers using divide and conquer method.
3. Implement a solution for the knapsack problem using the Greedy method.
4. Implement Gaussian elimination method.
5. Implement LU decomposition
6. Implement Warshall algorithm
7. Implement the Rabin Karp algorithm.
8. Implement the KMP algorithm.
9. Implement Harspool algorithm
10. Implement max-flow problem

REFERENCES:

1. Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms".
2. Aho, Hopcroft, Ullman "The Design and Analysis of Computer Algorithms".
3. Kleinberg and Tardos."Algorithm Design".

Professional Elective - 3

ENTERPRISE CLOUD CONCEPTS

L	T	P	C
3	1	0	4

Course Objectives

- Knowledge on significance of cloud computing and its fundamental concepts and models.

Course Outcomes

- Understand importance of cloud architecture
- Illustrating the fundamental concepts of cloud security
- Analyze various cloud computing mechanisms
- Understanding the architecture and working of cloud computing

UNIT – I

Understanding Cloud Computing: Origins and influences, Basic Concepts and Terminology, Goals and Benefits, Risks and Challenges. Fundamental Concepts and Models: Roles and Boundaries, Cloud Characteristics, Cloud Delivery Models, Cloud Deployment Models.

UNIT – II

Cloud-Enabling Technology: Broadband Networks and Internet Architecture, Data Center Technology, Virtualization Technology, Cloud Computing Mechanisms: Cloud Infrastructure Mechanisms: Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud Usage Monitor, Resource Replication.

UNIT – III

Cloud Management Mechanisms: Remote Administration System, Resource Management System, SLA Management System, Billing Management System, Case Study Example Cloud Computing Architecture Fundamental Cloud Architectures: Workload Distribution Architecture, Resource Pooling Architecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load Balancing Architecture, Cloud Bursting Architecture, Elastic Disk Provisioning Architecture, Redundant Storage Architecture, Case Study Example

UNIT – IV

Cloud-Enabled Smart Enterprises: Introduction, Revisiting the Enterprise Journey, Service-Oriented Enterprises, Cloud Enterprises, Smart Enterprises, The Enabling Mechanisms of Smart Enterprises Cloud-Inspired Enterprise Transformations: Introduction, The Cloud Scheme for Enterprise Success, Elucidating the Evolving Cloud Idea, Implications of the Cloud on Enterprise Strategy, Establishing a Cloud-Incorporated Business Strategy

UNIT – V

Transitioning to Cloud-Centric Enterprises: The Tuning Methodology, Contract Management in the Cloud Cloud-Instigated IT Transformations Introduction, Explaining Cloud Infrastructures, A Briefing on Next-Generation Services, Service Infrastructures, Cloud Infrastructures, Cloud Infrastructure Solutions, Clouds for Business Continuity, The Relevance of Private Clouds, The Emergence of Enterprise Clouds

TEXT BOOKS:

1. Erl Thomas, Puttini Ricardo, Mahmood Zaigham, Cloud Computing: Concepts, Technology & Architecture 1st Edition,
2. Pethuru Raj, Cloud Enterprise Architecture, CRC Press

REFERENCES:

James Bond,The Enterprise Cloud, O'Reilly Media, Inc

Professional Elective - 3

ADHOC SENSOR NETWORKS

L	T	P	C
3	1	0	4

Prerequisites: Computer Networks

Course Objectives

- To understand the challenges of routing in ad-hoc and sensor networks
- To understand various broadcast, mutlicast and geocasting protocols in ad hoc and sensor networks
- To understand basics of Wireless sensors, and Lower Layer Issues and Upper Layer Issues of WSN

Course Outcomes:

- Understand the concepts of sensor networks and applications
- Understand and compare the MAC and routing protocols for adhoc networks
- Understand the transport protocols of sensor networks

UNIT – I

Introduction to Ad Hoc Networks: Characteristics of MANETs, Applications of MANETs and Challenges of MANETs. Routing in MANETs Criteria for classification, Taxonomy of MANET routing algorithms, Topology-based routing algorithms-Proactive: DSDV, WRP; Reactive: DSR, AODV, TORA; Hybrid: ZRP; Position- based routing algorithms-Location Services-DREAM, Quorum-based, GLS; Forwarding Strategies Greedy Packet, Restricted Directional Flooding-DREAM, LAR; Other routing algorithms-QoS Routing, CEDAR.

UNIT – II

Data Transmission: Broadcast Storm Problem, Rebroadcasting Schemes-Simple-flooding, Probability-based Methods, Area-based Methods, Neighbour Knowledge-based: SBA, Multipoint Relaying, AHBP. Multicasting: Tree-based: AMRIS, MAODV; Mesh-based: ODMRP, CAMP; Hybrid: AMRoute, MCEDAR.

UNIT – III

Geocasting: Data-transmission Oriented-LBM; Route Creation Oriented-GeoTORA, MGR. TCP over Ad Hoc TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT – IV

Basics of Wireless Sensors and Lower Layer Issues: Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer, Routing Layer.

UNIT – V

Upper Layer Issues of WSN: Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks – Theory and Applications, Carlos Corderio Dharma P.Aggarwal, World Scientific Publications, March 2006, ISBN – 981-256-681-3

2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN – 978-1-55860-914-3 (Morgan Kauffman)

REFERENCE BOOKS:

1. C. Siva Ram Murthy, B.S. ManojAd Hoc Wireless Networks: Architectures and Protocols

2. Taieb Znati Kazem Sohraby, Daniel Minoli, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley.

Professional Elective - 3

PARALLEL COMPUTING

L	T	P	C
3	1	0	4

Course Objectives

1. To introduce the foundations of parallel Computing
2. To learn various parallel computing architectures and programming models
3. To gain knowledge of writing efficient parallel programs

Course Outcomes

1. Ability to understand the concepts of parallel architectures
2. Ability to select the data structures that efficiently model the information in a problem.
3. Ability to develop an efficient parallel algorithm to solve it.
4. Ability to implement an efficient and correct code to solve it, analyse its performance

UNIT – I

Parallel Computing: Introduction, Motivation and scope - Parallel Programming Platforms – Basic Communication Operations

UNIT – II

Principles of Parallel Algorithm Design - Analytical Modelling of Parallel Programs

UNIT – III

Programming using Message Passing Paradigm (MPI) – Programming Shared Address Space Platforms (PThreads)

UNIT – IV

Dense Matric Algorithms (Matrix-Vector Multiplication, Matrix-Matrix Multiplication) – Sorting Algorithms (Issues, Bubble Sort, Quick Sort, Bucket Sort, Enumeration Sort, Radix Sort)

UNIT – V

Graph Algorithms (Minimum Spanning Tree: Prim's Algorithm - Single-Source Shortest Paths: Dijkstra's Algorithm) Search Algorithms (DFS, BFS)

TEXT BOOKS:

1. Introduction to Parallel Computing, Second Edition, Ananth Grama, George Karypis, Vipin Kumar, Anshul Gupta, Addison-Wesley, 2003, ISBN: 0201648652

REFERENCES:

1. Parallel Computing – Theory and Practice, Second Edition, Michaek J. Quinn, Tata McGrawHill Edition.

2. Parallel Computers – Architectures and Programming, V. Rajaraman, C. Siva Ram Murthy, PHI.

Professional Elective - 4

BIO INFORMATICS

L	T	P	C
3	1	0	4

Course Objectives:

- Knowledge on concepts of bioinformatics and biological motivations of sequence analysis

Course Outcomes:

- Understand the Central Dogma & XML (Bio XML) for Bioinformatics
- Analyze Perl (Bioperl) for Bioinformatics
- Illustrate Databases technology, architecture and its interfaces
- Understand Sequence Alignment Algorithms, Phylogenetic Analysis

UNIT -I:

The Central Dogma & XML (Bio XML) for Bioinformatics: Watson's definition, information flow, from data to knowledge, Convergence, the organization of DNA, the organization of Proteins, Introduction, Differences between HTML and XML, fundamentals of XML, fundamentals of XML namespaces. Introduction to DTDs, Document type Declarations, Declaring elements, declaring attributes, working with entities XML Schemas, Essential Concepts, working with simple types, working with complex types, Basic namespaces issues.

UNIT -II:

Perl (Bioperl) for Bioinformatics: Representing sequence data, program to store a DNA sequence, concatenating DNA fragments, Transcription, Calculating the reverse complement in Perl, Proteins, files, reading proteins in files, Arrays, Flow control, finding motifs, counting Nucleotides, exploding strings into arrays, operating on strings, writing to files, subroutines and bugs.

UNIT -III:

Databases: Flat file, Relational, object-oriented databases, object Relational and Hypertext, Data life cycle, Database Technology, Database Architecture, Database Management Systems and Interfaces.

UNIT -IV:

Sequence Alignment Algorithms: Biological motivations of sequence analysis, the models for sequence analysis and their biological motivation, global alignment, local alignment, End free-space alignment and gap penalty, Sequence Analysis tools and techniques.

UNIT -V:

Phylogenetic Analysis: Introduction, methods of Phylogenetic analysis, distance methods, the neighbor- Joining (NJ) method, The Fitch/ Margoliash method, character-based methods, Other methods, Tree evaluation and problems in phylogenetic analysis, Clustering, Protein structure visualization and Protein structure prediction.

TEXT BOOKS:

- S.C. Rastogi, N. Mendiratta, "Bioinformatics Methods and Applications", CBS publications, 2004
- James D. Tisdall, "Beginning Perl for Bioinformatics" O'Reilly media, 1st Edition, 2001

REFERENCE BOOKS:

- D.R. Westhead, J.H. Parish, "Bioinformatics" Viva books private limited, New Delhi (2003)
- Att Wood, "Bioinformatics" Pearson Education, 2004
- Bryan Bergeron, M.D, "Bioinformatics Computing" Pearson Education, 2003

Professional Elective - 4

CYBER SECURITY

L	T	P	C
3	1	0	4

Course Objectives:

1. To understand various types of cyber-attacks and cyber-crimes
2. To learn threats and risks within context of the cyber security
3. To have an overview of the cyber laws & concepts of cyber forensics
4. To study the defensive techniques against these attacks

Course Outcomes:

1. Analyze and evaluate the cyber security needs of an organization.
2. Understand Cyber Security Regulations and Roles of International Law
3. Design and develop a security architecture for an organization.
4. Understand fundamental concepts of data privacy attacks

UNIT - I:

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy

UNIT - II:

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

UNIT - III:

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

UNIT - IV:

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations

UNIT - V:

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc Cybercrime: Examples and Mini-Cases Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances. Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley

2. B.B. Gupta, D.P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335,2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.

2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&FGroup.

Professional Elective - 4

ROBOTIC PROCESS AUTOMATION

L	T	P	C
3	1	0	4

Course Objectives: Aim of the course is to make learners familiar with the concepts of Robotic Process Automation.

Course Outcomes:

- Describe RPA, where it can be applied and how it's implemented.
- Identify and understand Web Control Room and Client Introduction
- Understand how to handle various devices and the workload
- Understand Bot creators, Web recorders and task editors

UNIT - I

Introduction to Robotic Process Automation & Bot Creation Introduction to RPA and Use cases – Automation Anywhere Enterprise Platform – Advanced features and capabilities – Ways to create Bots

UNIT - II

Web Control Room and Client Introduction - Features Panel - Dashboard (Home, Bots, Devices, Audit, Workload, Insights) - Features Panel – Activity (View Tasks in Progress and Scheduled Tasks) - Bots (View Bots Uploaded and Credentials)

UNIT - III

Devices (View Development and Runtime Clients and Device Pools) - Workload (Queues and SLA Calculator) - Audit Log (View Activities Logged which are associated with Web CR) - Administration (Configure Settings, Users, Roles, License and Migration) - Demo of Exposed API's – Conclusion – Client introduction and Conclusion.

UNIT - IV

Bot Creator Introduction – Recorders – Smart Recorders – Web Recorders – Screen Recorders - Task Editor – Variables - Command Library – Loop Command – Excel Command – Database Command - String Operation Command - XML Command

UNIT - V

Terminal Emulator Command - PDF Integration Command - FTP Command - PGP Command - Object Cloning Command - Error Handling Command - Manage Windows Control Command - Workflow Designer - Report Designer

TEXT BOOKS:

1. Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath: Create Software robots. With the leading RPA tool – UiPath Kindle Edition.

REFERENCES:

1. Robotic Process Automation A Complete Guide - 2020 Edition Kindle Edition.

Professional Elective - 5

DIGITAL FORENSICS

L	T	P	C
3	1	0	4

Pre-Requisites: Cybercrime and Information Warfare, Computer Networks

Course Objectives:

- provides an in-depth study of the rapidly changing and fascinating field of computer forensics.
- Combines both the technical expertise and the knowledge required to investigate, detect and prevent digital crimes.
- Knowledge on digital forensics legislations, digital crime, forensics processes and procedures, data acquisition and validation, e-discovery tools
- E-evidence collection and preservation, investigating operating systems and file systems, network forensics, art of steganography and mobile device forensics

Course Outcomes: On completion of the course the student should be able to

- Understand relevant legislation and codes of ethics.
- Computer forensics and digital detective and various processes, policies and procedures.
- E-discovery, guidelines and standards, E-evidence, tools and environment.
- Email and web forensics and network forensics.

UNIT - I

Digital Forensics Science: Forensics science, computer forensics, and digital forensics.

Computer Crime: Criminalistics as it relates to the investigative process, analysis of cyber criminalistics area, holistic approach to cyber-forensics

UNIT - II

Cyber Crime Scene Analysis:

Discuss the various court orders etc., methods to search and seizure electronic evidence, retrieved and un-retrieved communications, Discuss the importance of understanding what court documents would be required for a criminal investigation.

Evidence Management & Presentation:

Create and manage shared folders using operating system, importance of the forensic mindset, define the workload of law enforcement, Explain what the normal case would look like, Define who should be notified of a crime, parts of gathering evidence, Define and apply probable cause.

UNIT - IV

Computer Forensics: Prepare a case, Begin an investigation, Understand computer forensics workstations and software, Conduct an investigation, Complete a case, Critique a case, **Network Forensics:** open-source security tools for network forensic analysis, requirements for preservation of network data.

UNIT - V

Mobile Forensics: mobile forensics techniques, mobile forensics tools.

Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008.

Recent trends in mobile forensic technique and methods to search and seizure electronic evidence

TEXT BOOKS:

1. John Sammons, The Basics of Digital Forensics, Elsevier
2. John Vacca, Computer Forensics: Computer Crime Scene Investigation, Laxmi Publications

REFERENCES:

1. William Oettinger, Learn Computer Forensics: A beginner's guide to searching, analyzing, and securing digital evidence, Packt Publishing; 1st edition (30 April 2020), ISBN: 1838648178.
2. Thomas J. Holt, Adam M. Bossler, Kathryn C. Seigfried-Spellar, Cybercrime and Digital Forensics: An Introduction, Routledge.

Professional Elective - 5

Advanced Operating Systems

L	T	P	C
3	1	0	4

Course Objectives

- To understand main components of Real time Operating system and their working
- To study the operations performed by OS as a resource manager
- To understand the scheduling policies of DOS
- To implement the working principles of OS

Course Outcomes

- Explain what a real-time operating system (RTOS) is, how real-time operating systems are useful for measurement and control applications
- Understand distributed operating system design issues, features and principles of working
- Analyze functions of Network operating systems
- Understand kernel Issues and development principles

UNIT – I

Real-time Operating Systems: Introduction to Real-Time Operating Systems, Definitions, Role of an OS in Real Time Systems, Important Terminology and Concepts Example

UNIT – II

Real-Time Applications: How Real-Time OSs Differ from General-Purpose OSs, Design issues, principles and case study.

UNIT - III

Distributed Operating System: Introduction to Distributed Systems, Definitions, Goals, Advantages of Distributed Systems over Centralized Systems, Advantages of Distributed Systems over Independent PCs, Disadvantages of Distributed Systems Design issues, features and principles of working, case study.

UNIT - IV

Network Operating System: Introduction to Network operating system, Definitions, Different types of network operating systems, Function of Network operating systems, Design issues, working principles and characteristic features, case study.

UNIT - V

Kernel Development: Introduction, Overview, Issues and development principles, case study.

TEXT BOOKS:

1. Applied Operating System Concepts, A. Silberschatz, Wiley, 2000

2. Operating System Principles, Lubemir F. Bic and Alan C. Shaw, Pearson Education, 2003

3. Distributed Operating Systems, Andrew S. Tanenbaum, PHI

REFERENCE BOOKS:

1. Operating Systems: Internal and Design Principles, Stallings, 6th Ed., PE

2. Modern Operating Systems, Andrew S. Tanenbaum, 3rd Ed., PE

3. Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Ed., John Wiley UNIX User Guide, Ritchie & Yates

Professional Elective - 5

QUANTUM COMPUTING

L	T	P	C
3	1	0	4

Course Objectives

- To introduce the fundamentals of quantum computing
- The problem-solving approach using finite dimensional mathematics

UNIT – I

Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory.

Complex Numbers: Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrice, Transcendental Numbers.

UNIT – II

Basic Physics for Quantum Computing: The Journey to Quantum, Quantum Physics Essentials, Basic Atomic Structure, Hilbert Spaces, Uncertainty, Quantum States, Entanglement

Basic Quantum Theory: Further with Quantum Mechanics, Quantum Decoherence, Quantum Electrodynamics, Quantum Chromodynamics, Feynman Diagram Quantum Entanglement and QKD, Quantum Entanglement, Interpretation, QKE.

UNIT – III

Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, The D-Wave Quantum Architecture.

Quantum Hardware: Qubits, How Many Qubits Are Needed? Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.

UNIT – IV

Quantum Algorithms: What Is an Algorithm? Deutsch's Algorithm, Deutsch-Jozsa Algorithm, Bernstein-Vazirani Algorithm, Simon's Algorithm, Shor's Algorithm, Grover's Algorithm.

UNIT – V

Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve

The Impact of Quantum Computing on Cryptography: Asymmetric Cryptography, Specific Algorithms, Specific Applications

TEXTBOOKS:

1. Nielsen M. A., Quantum Computation and Quantum Information, Cambridge University Press
2. Dr. Chuck Easttom, Quantum Computing Fundamentals, Pearson

REFERENCE :

1. Quantum Computing for Computer Scientists by Noson S. Yanofsky and Mirco A. Mannucci
2. Benenti G., Casati G. and Strini G., Principles of Quantum Computation and Information, Vol. Basic Concepts, Vol
3. Basic Tools and Special Topics, World Scientific. Pittenger A. O., An Introduction to Quantum Computing Algorithms

OPEN ELECTIVES

INTELLECTUAL PROPERTY RIGHTS

L	T	P	C
3	0	0	3

Course Outcomes:

- Distinguish and Explain various forms of IPRs.
- Identify criteria to fit one's own intellectual work in particular form of IPRs.
- Apply statutory provisions to protect particular form of IPRs

UNIT I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT III

Law of copyrights: Fundamental of copyright law, originality of material, rights of reproduction, rights to perform the work publicly, copyright ownership issues, copyright registration, notice of copyright, international copyright law. Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT IV

Trade Secrets: Trade secret law, determination of trade secret status, liability for misappropriations of trade secrets, protection for submission, trade secret litigation. Unfair competition: Misappropriation right of publicity, false advertising.

UNIT V

New development of intellectual property: new developments in trade mark law; copyright law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copyright law, international patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOKS:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.

2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

OPEN ELECTIVES

Generative AI

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce the foundations, evolution, and core concepts of AI, ML, DL, NLP, and Generative AI.
- To develop understanding of advanced neural architectures and generative models such as GANs, VAEs, and Transformers.
- To explore Large Language Models, prompt engineering, and their real-world applications.
- To familiarize learners with frameworks, multimodal applications, and ethical considerations in Generative AI.

Course Outcomes: At the end of the course, the student should be able to

- Demonstrate knowledge of AI foundations, generative models, and advanced neural architectures.
- Apply generative AI techniques to create solutions for text, image, video, and multimodal tasks.
- Design, fine-tune, and optimize Large Language Models for specific applications.
- Evaluate ethical, social, and legal implications of Generative AI deployments and propose mitigation strategies.

UNIT I

Foundations of AI and Generative Models Introduction and historical evolution to Artificial Intelligence (AI), Machine Learning (ML), Natural Language Processing (NLP)and Deep Learning (DL), Structure of Artificial Neural Networks (ANNs), Mathematical and computational foundations of generative modeling, Overview of generative models and their applications across various domains; Importance of Generative AI in modern applications, Transfer learning and in advancing Generative AI

UNIT II

Advanced Neural Architectures for Generative AI Variational Autoencoders (VAEs): principles and applications, Generative Adversarial Networks (GANs): architecture and working principles; Transformer architecture and attention mechanisms (in detail); Long Short-Term Memory Networks (LSTMs) and the limitations of traditional RNNs/LSTMs, Advanced Transformer architectures and techniques, Pre-training and transfer learning strategies for generative models

UNIT III

Large Language Models and Prompt Engineering Overview of Large Language Models (LLMs), GPT architecture, variants, and working principles, Prétraining and fine-tuning GPT models for applications (e.g., chatbots, text generation), Case study: GPT-based customer support chatbot, BERT architecture, pre-training objectives, and fine-tuning, Prompt Engineering: Designing effective prompts, controlling model behavior, and improving output quality, Fine-tuning language models for creative writing and chatbot development

UNIT IV

Multi-Agent Systems and Generative AI Applications Introduction to Multi-Agent Systems (MAS),Types of agents: reactive, deliberative, hybrid, and learning agents, Multi-agent collaboration and orchestration for generative tasks, Use cases: autonomous research assistants, cooperative creative generation, distributed problem-solving, Frameworks and tools: AutoGen, CrewAI, Hugging GPT for LLM-powered multi-agent systems, Generative AI applications: Art, Creativity, Image/Video generation, Music composition, Healthcare, Finance, Real-world case studies and deployment challenges

UNIT V

Frameworks, Multimodal Applications, and Ethics LangChain framework: components and LLM application development, Retrieval-Augmented Generation (RAG), Embeddings, Indexing networks, and Vector databases, Generative AI across modalities: Text, Code, Image, and Video generation, Image and Video generation using GANs and VAEs, Multimodal Generative AI: integration and training strategies, Ethical considerations: bias, fairness, trust, and responsible AI deployment, Social and legal implications of Generative AI, Risk mitigation strategies and real-world ethical case studies

TEXT BOOKS

1. Altaf Rehmani, Generative AI for Everyone: Understanding the Essentials and Applications of This Breakthrough Technology.

2. Charu C. Aggarwal, Neural Networks and Deep Learning: A Textbook. Joseph Babcock, Raghav Bali, Generative AI with Python and TensorFlow 2, 2024.

REFERENCES:

1. Josh Kalin, Generative Adversarial Networks Cookbook.
2. Jesse Sprinter, Generative AI in Software Development: Beyond the Limitations of Traditional Coding, 2024.

OPEN ELECTIVES
Intrusion Detection systems

L	T	P	C
3	0	0	3

Prerequisites: Computer Networks, Computer Programming

Course Objectives:

- Compare alternative tools and approaches for Intrusion Detection through quantitative analysis to determine the best tool or approach to reduce risk from intrusion.
- Identify and describe the parts of all intrusion detection systems and characterize new and emerging IDS technologies according to the basic capabilities all intrusion detection systems share.

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

- Possess a fundamental knowledge of Cyber Security.
- Understand what vulnerability is and how to address most common vulnerabilities.
- Know basic and fundamental risk management principles as it relates to Cyber Security and Mobile Computing.
- Have the knowledge needed to practice safer computing and safeguard your information using Digital Forensics.
- Understand basic technical controls in use today, such as firewalls and Intrusion Detection systems.
- Understand legal perspectives of Cyber Crimes and Cyber Security

UNIT - I

The state of threats against computers, and networked systems-Overview of computer security solutions and why they fail-Vulnerability assessment, firewalls, VPN's -Overview of Intrusion Detection and Intrusion Prevention, Network and Host-based IDS

UNIT - II

Classes of attacks - Network layer: scans, denial of service, penetration Application layer: software exploits, code injection-Human layer: identity theft, root access-Classes of attackers-Kids/hackers/sop Hesitated groups-Automated: Drones, Worms, Viruses

UNIT - III

A General IDS model and taxonomy, Signature-based Solutions, Snort, Snort rules, Evaluation of IDS, Cost sensitive IDS

UNIT - IV

Anomaly Detection Systems and Algorithms-Network Behavior Based Anomaly Detectors (rate based)- Host-based Anomaly Detectors-Software Vulnerabilities-State transition, Immunology, Payload Anomaly Detection

UNIT - V

Attack trees and Correlation of alerts- Autopsy of Worms and Botnets-Malware detection - Obfuscation, polymorphism- Document vectors. Email/IM security issues-Viruses/Spam-From signatures to thumbprints to zero-day detection-Insider Threat issues-Taxonomy-Masquerade and Impersonation Traitors, Decoys and Deception-Future: Collaborative Security

TEXT BOOKS:

1. Peter Szor, The Art of Computer Virus Research and Defense, Symantec Press ISBN 0-321- 30545-3.
2. Markus Jakobsson and Zulfikar Ramzan, Crimeware, Understanding New Attacks and Defenses.

REFERENCE BOOKS:

1. Saiful Hasan, Intrusion Detection System, Kindle Edition.

2. Ankit Fadia, Intrusion Alert: An Ethical Hacking Guide to Intrusion Detection.

AUDIT COURSE - 2

CONSTITUTION OF INDIA

L	T	P	C
2	0	0	0

Course Objectives

- 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 of nationhood 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),
Philosophy of the Indian Constitution: Preamble, Salient Features.

UNIT – II Contours of Constitutional Rights & 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 – III Organs of Governance:
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions.

UNIT – IV Local Administration:

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of 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 – V Election Commission:

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

REFERENCE / T EX T BOOKS:

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

AUDIT COURSE - 2

PEDAGOGY STUDIES

L	T	P	C
2	0	0	0

Course Objectives

Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.

Identify critical evidence gaps to guide the development.

UNIT – I Introduction and Methodology:

Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.

UNIT – II Thematic overview:

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT – III

Evidence on the effectiveness of pedagogical practices, Methodology for the indepth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the scho curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT – IV Professional development:

Alignment with classroom practices and follow-up support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

UNIT – V Research gaps and future directions:

Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

REFERENCE / TEXT BOOKS:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

AUDIT COURSE - 2

STRESS MANAGEMENT BY YOGA

L	T	P	C
2	0	0	0

Course Objectives

- To achieve overall health of body and mind
- To overcome stress

UNIT – I :

Definitions of Eight parts of yog. (Ashtanga)

UNIT – II :

Yam and Niyam

UNIT – III :

Do`s and Don't's in life.

i. Ahinsa, satya, astheya, bramhacharya and aparigraha

ii. Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT – IV :

Asan and Pranayam

UNIT – V :

i. Various yog poses and their benefits for mind & body

ii. Regularization of breathing techniques and its effects-Types of pranayama

REFERENCE/ TEXT BOOKS:

1. 1. 'Yogic Asanas for Group Tarining-Part-I": Janardan Swami Yogabhyasi Mandal, Nagpur 2."Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama
2. (Publication Department), Kolkata

AUDIT COURSE - 2

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

L	T	P	C
2	0	0	0

Course Objectives

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

UNIT – I :

Neetisatakam-Holistic development of personality

- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

UNIT – II :

Neetisatakam-Holistic development of personality

- Verses- 52,53,59 (dont's)
- Verses- 71,73,75,78 (do's)

UNIT – III :

Approach to day to day work and duties.

- Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

UNIT–IV :

Statements of basic knowledge.

- Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta

UNIT – V Practices for Ensuring Human Purpose – III:

- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

REFERENCE BOOKS:

1. "Srimad Bhagavad Gita" by Swami Swarupananda Advaita Ashram (Publication Department), Kolkata.
2. Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.