ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::TIRUPATI
(AUTONOMOUS)

M.Tech (COMPUTER SCIENCE AND ENGINEERING)
(Effective for the batches admitted from 2019-20)

M. Tech – I Semester

S.No	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19DPC0501	Advanced Data Structures and Algorithms	3	0	0	3	40	60	100
2	PC	19DPC0502	Fundamentals of Data Science	3	0	0	3	40	60	100
3	PC	19MBA0110	Research Methodology and IPR	2	0	0	2	40	60	100
4	PE	19DPE0501/ 19DPE0502/ 19DPE0503	Elective I – Software Project Management / Advanced Computer Networks/ Artificial Neural Networks	3	0	0	3	40	60	100
5	PE	19DPE0504/ 19DPE0505/ 19DPE0506	Elective II – Artificial Intelligence / Internals of Operating Systems/ Multicore Architecture & Programming	3	0	0	3	40	60	100
6	MC	19DMC_ _ _ _	Audit Course 1: 19DMC9901: English for Research Paper Writing 19DMC0101: Disaster Management 19DMC9902: Sanskrit for Technical Knowledge 19DMC9903: Value Education	2	0	0	0	40	0	40
PRACTICAL										
7	PC	19DPC0504	Advanced Data Structures and Algorithms Lab	0	0	4	2	40	60	100
8	PC	19DPC0505	R & Analytics Lab	0	0	4	2	40	60	100
			TOTAL				18	320	420	740

M.Tech II Semester

S.No	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19DPC5806	Big Data Analytics	3	0	0	3	40	60	100
2	PC	19DPC5807	Mobile Application Development	3	0	0	3	40	60	100
3	PE	19DPE5807/ 19DPE5808/ 19DPE5809	Elective-III Internet of Things/ Network Security and Cryptography / NOSQL Databases	3	0	0	3	40	60	100
4	PE	19DPE5810/ 19DPE5811/ 19DPE5812	Elective-IV Machine Learning/ Cloud Computing/ Natural Language Processing	3	0	0	3	40	60	100
5	MC	19DMC_ _ _ _	Audit Course 2: 19AMC9904: Constitution of India 19DMC5801: Pedagogy Studies 19DMC9905: Stress Management by Yoga 19DMC9906: Personality Development through Life Enlightenment Skills	2	0	0	0	40	0	40
PRACTICAL										
6	PC	19DPC5808	Map Reduce Programming Lab	0	0	4	2	40	60	100
7	PC	19DPC5809	Mobile Application Development Lab	0	0	4	2	40	60	100
8	PR	19DPR5801	Mini Project with Seminar	2	0	0	2	40	60	100
			TOTAL				**18**	**320**	**420**	**740**

M.Tech III Semester

S.No	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PE	19DPE5813/ 19DPE5814/ 19DPE5815	Program Elective 5 – Data Preparation and Analysis/ Secure Software Design & Enterprise Computing/ Computer Vision	3	0	0	3	40	60	100
2	OE	19DOE_ _ _ _	Open Elective: 19DOE5801: Business Analytics 19DOE9001: Industrial Safety 19DOE9002:Operations Research 19DOE2002:Project Management 19DOE9004:Composite Materials 19DOE2001:Waste to Energy	3	0	0	3	40	60	100
3	PR	19DPR5802	Dissertation-I /Industrial Project	0	0	20	10	40	60	100
			TOTAL				16	120	180	300

M.Tech IV Semester

S.No	Category	Course Code	Course Title	Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
1	PR	19DPR5803	Dissertation II	0	0	32	16	60	140	200
			TOTAL				16	60	140	200

(19DPC0501) ADVANCED DATA STRUCTURES AND ALGORITHMS

L	T	P	C
3	0	0	3

Course Outcomes:
1. Able to analyze the efficiency of algorithm.
2. Understand the graph algorithms.
3. come up with analysis of efficiency and proofs of correctness
4. understand the ADT/libraries, and use it to design algorithms for a specific problem.

UNIT I: Overview of Data Structures - Arrays, Stacks, Queues, linked lists, Linked stacks and Linked queues, Applications
Algorithm Analysis - Efficiency of algorithms, Asymptotic Notations, Time complexity of an algorithm using O notation, Polynomial Vs Exponential Algorithms, Average, Best, and Worst Case Complexities, Analyzing Recursive Programs.
UNIT II: Trees and Graphs – Basics of trees and binary trees, Representation of trees and Binary trees, Binary tree Traversals, Threaded binary trees, Graphs, representation and traversals.
Binary Search Trees, AVL Trees and B Trees - Binary Search Trees: Definition, Operations and applications. AVL Trees: Definition, Operations and applications. B Trees: Definition, Operations and applications.
UNIT III: Red – Black Trees, Splay Trees and Hash Tables - Red–Black Trees, Splay Trees and their applications, Hash Tables, Hash Functions and various applications, File Organizations.
UNIT IV: Divide – and – Conquer & Greedy Method - General Method, Binary Search, Finding Maximum and Minimum, Quick Sort, Merge sort, Strassen's Matrix Multiplication, Greedy Method- General Method, Minimum Cost Spanning Trees, Single Source Shortest Path.
Back Tracking and Branch – and – Bound - General Method, 8 – Queen's Problem, Graph Coloring. Branch – and – Bound: The Method, LC Search, Control Abstraction, Bounding, 0/ 1 Knapsack Problem.
UNIT V: Dynamic Programming - General Method, All Pairs Shortest Path, Single Source Shortest Path, 0 /1 Knapsack problem, Reliability Design, Traveling Sales Person's Problem.

Text Books:

1. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, 2nd edition, University Press.

References:
1. Data Structures and Algorithms Using C++ by Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education, 2010.
2. Classic Data Structures by D. Samanta, 2005, PHI
3. Data Structures and Algorithms by G.A.V. Pai, 2009, TMH.
4. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
5. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG
6. Design and Analysis of Algorithms by E. Horowitz, S. Sahni, 3rd Edition, Galgotia.
7. Data Structures and Algorithms in C++ by Drozdek 2nd Edition, Thomson.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::TIRUPATI
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M.Tech I Semester

(19DPC0502) FUNDAMENTALS OF DATA SCIENCE

L	T	P	C
3	0	0	3

Course Outcomes:
1. Students in this course will be able to decide and predict outputs based on data
2. Apply the concept of Linear & NonLinear Programming Problem to the engineering problems.
3. Compare various methods of classifications
4. Demonstrate ability to manipulate matrices and compute Eigen values and Eigen vectors.
5. Apply the concept of sampling theory to the engineering problems.

UNIT - I
Introduction, What Is Statistical Learning?, Why Estimate f?, How Do We Estimate f?, The Trade-Off Between Prediction Accuracy and Model Interpretability, Supervised Versus Unsupervised Learning, Regression Versus Classification Problems, Assessing Model Accuracy, Measuring the Quality of Fit, The Bias-Variance Trade-of, The Classification Setting, Introduction to R, Basic Commands, Graphics, Indexing Data, Loading Data, Additional Graphical and Numerical Summaries.

UNIT – II
Linear Regression, Simple Linear Regression, Multiple Linear Regression, Other Considerations in the Regression Model, Comparison of Linear Regression with K-Nearest Neighbours, Linear Regression.

UNIT-III
Classification, Logistic Regression, Linear Discriminant Analysis, A Comparison of Classification Methods, Logistic Regression, LDA, QDA, and KNN.

UNIT- IV
Programming for basic computational methods such as Eigen values and Eigen vectors, sparse matrices, QR and SVD, Interpolation by divided differences.
Data Wrangling: Data Acquisition, Data Formats, Imputation, The split-apply-combine paradigm.

UNIT-V
Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity and Dissimilarity.
Data Warehouse: Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction.

Text Books:
1. Gareth James Daniela Witten Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning with Applications in R, February 11, 2013, web link: www.statlearning.com.
2. Mark Gardener, Beginning R The statistical Programming Language, Wiley, 2015.
3. Han, Kamber, and J Pei, Data Mining Concepts and Techniques, 3rd edition, Morgan Kaufman, 2012.

References:
1. Sinan Ozdemir, Principles of Data Science, Packt Publishing Ltd Dec 2016.
2. Joel Grus, Data Science from Scratch, Oreilly media, 2015.

(19MBA0110) RESEARCH METHDOLOGY AND IPR

L	T	P	C
2	0	0	2

Course Outcomes:
1. Understand the research problem and research process.
2. Understand research ethics.
3. Prepare a well -structured research paper and scientific presentations.
4. Explore on various IPR components and process of filing.
5. Understand the adequate knowledge on patent and rights.

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 and 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.

References:
1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2 nd Edition , "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd ,2007.

E

(19DPE0501) SOFTWARE PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes:
1. Identify the different project contexts and suggest an appropriate management strategy.
2. Practice the role of professional ethics insuccessful software development.
3. Identify and describe the key phases of project management.
4. Determine an appropriate project management approach through an evaluation of the business context and scope of the project.

UNIT I: Project Evaluation And Project Planning
Importance of Software Project Management, Activities Methodologies, Categorization of Software Projects, Setting objectives , Management Principles, Management Control, Project portfolio Management, Cost-benefit evaluation technology, Risk evaluation, Strategic program Management, Stepwise Project Planning.

UNIT II: Project Life Cycle And Effort
Software process and Process Models, Choice of Process models, mental delivery, Rapid Application development, Agile methods, Extreme Programming, SCRUM, Managing interactive processes, Basics of Software estimation, Effort and Cost estimation techniques, COSMIC Full function points, COCOMO II A Parametric Productivity Model, Staffing Pattern.

UNIT III: Activity Planning And Risk Management
Objectives of Activity planning, Project schedules, Activities, Sequencing and scheduling, Network Planning models, Forward Pass & Backward Pass techniques, Critical path (CRM) method, Risk identification, Assessment, Monitoring, PERT technique, Monte Carlo simulation, Resource Allocation, Creation of critical patterns, Cost schedules.

UNIT IV: Project Management And Control
Framework for Management and control, Collection of data Project termination, Visualizing progress, Cost monitoring, Earned Value Analysis- Project tracking, Change control- Software Configuration Management, Managing contracts, Contract Management.

UNIT V: Staffing In Software Projects
Managing people, Organizational behavior, Best methods of staff selection, Motivation, The Oldham-Hackman job characteristic model, Ethical and Programmed concerns, Working in teams, Decision making, Team structures, Virtual teams, Communications genres, Communication plans.

Text Books:
1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management – Fifth Edition, Tata McGraw Hill, New Delhi, 2012.

References Books:
1. Robert K. Wysocki "Effective Software Project Management" –Wiley Publication, 2011.
2. Walker Royce: "Software Project Management"- Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, "Managing Global Software Projects" – McGraw Hill Education (India), Fourteenth Reprint 2013.

(19DPE0502) ADVANCED COMPUTER NETWORKS

L	T	P	C
3	0	0	3

Course Outcomes:
1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
5. Identify the different types of network devices and their functions within a network
6. Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

UNIT I
Internet Design & Architecture: Overview of network building blocks, Network architecture, layers and protocols, Internet design: Challenges and Solutions
Traffic Management: Congestion control principles, TCP congestion control, IP routing: Intra-domain (OSPF/RIP) and Interdomain (BGP), Adaptive Routing, Multipath and QoS Routing, Traffic Engineering Principles, MPLS Routing.
UNIT II
Software Defined Networks (SDNs): SDN Controllers, Network Programmability, Network Function Virtualization, SDN Frameworks, Use cases for traffic monitoring & classification, bandwidth scheduling and monitoring.
UNIT III
Delay Tolerant Networks (DTNs): Delay Tolerant Network Architecture, DTN Routing Protocols, DTN Application(s): Message Dissemination in Vechicular Networks, Adhoc Network for Disaster Rescue Management, Multimedia Content Delivery Network
Multimedia Networking: Multimedia Networking Applications, Streaming Stored Audio and Video, Making the Best of the Best-Effort Service: An Internet Phone Example
UNIT I V
Wireless Networks: Wireless Networks fundamentals, Mobile IP and Micromobility Protocols, TCP performance in Wireless Networks
Overlay Network Applications: Overlay Network Applications & Protocols: P2P Networks, Content Distribution Networks (CDNs), Distributed searching systems, Resilient Overlay Networks, P2P Overlays for Delay Tolerant Networks
UNIT V
AdHoc Wireless Networks: Cellular and AdHoc Wireless Networks, Applications Of AdHoc Wireless Networks, Issues in AdHoc Wireless Networks, AdHoc Wireless Internet

Text Books:
1. Kurose James F and Keith W. Ross: Computer Networking: A Top-Down Approach Featuring the Internet
2. Ad Hoc Wireless Networks Architectures and Protocols C. Siva Ram Murthy B. S. Manoj

References:
1. W.R. Stevens, Unix Network Programming, Vol.1, Pearson Education
2. J.Walrand, P. Varaiya, High Performance Communication Networks, Morgan Kaufmann
3. Y. Zheng, S. Akhtar, Networks for Computer Scientists and Engineers,. Oxford.
4. A.S. Tanenbaum, Computer Networks, 4/e, Prentice Hall.
5. James D. McCabe, Practical Computer Analysis and Design, Harcourt Asia. 6. Darren L Spohn, Data Network Design, TMH.
6. L. Peterson and B. Davie, Computer Networks: A Systems Approach

(19DPE0503) ARTIFICIAL NEURAL NETWORKS

L	T	P	C
3	0	0	3

Course Outcomes:
1. Model Neuron and Neural Network
2. Learning Methods in Dynamic Models
3. Perform Pattern Recognition
4. Analyze Feedback Neural Networks

UNIT – I: BASICS OF ARTIFICIAL NEURAL NETWORKS
Characteristics of Neural Networks, Historical Development of Neural Network Principles, Artificial Neural Networks: Terminology, Models of Neuron, Topology, Basic Learning Laws

UNIT II: ACTIVATION AND SYNAPTIC DYNAMICS
Activation Dynamics Models, Synaptic Dynamics Models, Learning Methods, Stability and Convergence, Recall in Neural Networks.

UNIT III: FUNCTIONAL UNITS OF ANN FOR PATTERN RECOGNITION TASKs
Pattern Recognition Problem, Basic Functional Units, Pattern Recognition Tasks by the Functional Units: Pattern Recognition Tasks by Feed forward Neural Networks, Pattern Recognition Tasks by Feedback Neural Networks, Pattern Recognition Tasks by Competitive Learning Neural Networks

UNIT IV: FEEDFORWARD NEURAL NETWORKS
Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks, Analysis of Pattern Mapping Networks

UNIT V: FEEDBACK NEURAL NETWORKS
Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks, Stochastic Networks and Simulated Annealing, Boltzmann Machine

Text Books:
1. "Artificial Neural Networks", B. Yegnanarayana – PHI Publications

(19DPE0504) ARTIFICIAL INTELLIGENCE

L	T	P	C
3	0	0	3

Course Outcomes:
1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3. Demonstrate proficiency in applying scientific method to models of machine learning.

Unit – I
Foundations of AI: What is AI, History of AI, Strong and weak AI, The State of the Art.
Intelligent Agents: Agents and Environments, Good Behavior: The Concept of Rationality, The Nature of Environments, The Structure of Agents.
Unit – II
Solving Problems by Searching: Problem – Solving Agents, Example Problems, Searching for Solutions, uniformed search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions.
Unit – III
Knowledge Representation: Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information, The Internet Shopping World.
Unit – IV
Learning from Examples: Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, The Theory of Learning, Regression and Classification with Learner Models, Nonparametric Models, Support Vector Machines, Ensemble Learning, Practical Machine Learning.
Unit – V
Learning Probabilistic Models: Statistical Learning, Learning with Complete data, Learning with Hidden variables: The EM Algorithm.

Text Books:
1. "Artificial Intelligence A Modern Approach", Stuart J. Russell & Peter Norvig – Pearson.
2. "Artificial Intelligence", Elaine Rich, Kevin Knight & Shivashankar B Nair – McGraw Hill Education.

(19DPE0505) INTERNALS OF OPERATING SYSTEMS

L	T	P	C
3	0	0	3

Course Outcomes:
1. Understand the operational concepts of Buffer, Inode
2. Understand the context of process with system calls that manipulates and control process context.
3. Understand the windows architecture and get familiar with its environment

UNIT-I: BUFFER CACHE AND FILE SUB-SYSTEM
Introduction to kernel-Architecture of UNIX operating system, System Concepts, Data structures.
Buffer Cache: Buffer header, Structure of buffer pool, Reading and writing disk blocks. Files INODES,
Structure of a regular file, Directories, Super block, Inode assignment.

UNIT-II: SYSTEM CALLS AND PROCESS SUB-SYSTEM
System calls- OPEN, READ, CLOSE, WRITE, CREATE, CHMOD, CHOWN, Pipes, Mounting and Unmounting. Process Layout the system memory, context, process control, process creation, signals, process scheduling, time, clock.

UNIT-III: INTER PROCESS COMMUNICATIONS
Inter-process communications- Process tracing, System V IPC, Shared Memory, Semaphores. Network Communications- Socket Programming: Sockets, descriptors, connections, socket elements, Stream and datagram sockets.

UNIT-IV: WINDOWS SYSTEM COMPONENTS
Windows Operating System- versions, concepts and tools, Windows internals, System architecture, requirements and design goals, operating system model, architecture overview, key system components. System mechanisms- Trap dispatching, object manager, synchronization, system worker threads, windows global flags, local procedural calls, kernel event tracing.

UNIT-V: REGISTRY AND PROCESS MANAGEMENT
Windows management mechanisms- the registry, registry usage, registry data types, local structure, trouble shooting registry problems, registry internals, services, applications, accounts, service control manager, windows management instrumentation, processes, threads and jobs: Process internals, flow of create process, thread internals, examining thread creation, thread scheduling, job objects.

TEXT BOOKS:
1. Maurice J. Bach, The design of the UNIX operating system, Prentice hall of India,1991
2. Mark E. Russinovich and David A. Solomon, Microsoft Windows Internals, Microsoft Press, 2004.

REFERENCE BOOKS:
1. William Stallings, "Operating Systems: Internals and Design Principles", 5th Edition, Prentice Hall, 2005.

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::TIRUPATI
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M.Tech I Semester

(19DPE0506) MULTICORE ARCHITECTURE AND PROGRAMMING

L	T	P	C
3	0	0	3

Course Outcomes:
1. Identify the limitations of ILP and the need for multicore architectures
2. Understand multicore communication using shared memory and its advantages
3. Understand the cell performance and power efficiency beyond what is achieved by PC processors
4. Understand the pram model of parallel computation

UNIT - I
Fundamentals of Superscalar Processor Design, Introduction to Multicore Architecture – Chip Multiprocessing, homogeneous Vs heterogeneous design - SMP – Multicore Vs Multithreading. Shared memory architectures– synchronization – Memory organization – Cache Memory – Cache Coherency Protocols - Design of Levels of Caches.

UNIT - II
Multicore programming Model – Shared memory model, message passing model, transaction model – OpenMP and MPI Programming. PowerPC architecture – RISC design, PowerPC ISA, PowerPC Memory Management - Power 5 Multicore architecture design, Power 6 Architecture.

UNIT - III
Cell Broad band engine architecture, PPE (Power Processor Element), SPE (Synergistic processing element), Cell Software Development Kit, Programming for Multicore architecture.

UNIT - IV
PRAM Model – PRAM Algorithms – Parallel Reduction – Prefix Sums – List Ranking – Preorder Tree Traversal – Merging Two Sorted Lists – Graph Coloring – Reducing Number of Processors – NC Class. Classifying MIMD Algorithms – Hypercube SIMD Model – Shuffle Exchange SIMD Model – 2D Mesh SIMD Model – UMA Multiprocessor Model – Broadcase – Prefix Sums. Enumeration Sort – Lower Bound on Parallel Sorting – Odd-Even Transposition Sort –Bitonic Merge – Parallel Quick Sort – Complexity of Parallel Search – Searching on Multiprocessors.

UNIT - V
Depth Search – Breadth Depth Search – Breadth First Search – Connected Components – All pair Shortest Path – Single Source Shortest Path – Minimum Cost Spanning Tree. Matrix Multiplication on 2-D Mesh, Hypercube and Shuffle Exchange SIMD Models – Algorithms for Multiprocessors – Algorithms for Multicomputers – Mapping Data to Processors.

REFERENCES
1. Hennessey and Pateterson, "Computer Architecture A Quantitative Approach", Harcourt Asia, Morgan Kaufmann, 1999.
2. Joseph JaJa, "Introduction to Parallel Algorithms", Addison-Wesley, 1992.
3. Kai Hwang, "Advanced Computer Architecture: Parallelism, Scalability and Programmability" McGraw-Hill, 1993.
4. Richard Y. Kain, "Advanced Computer Architecture: A System Design Approach", PHI, 1999.
5. Rohit Chandra, Ramesh Menon, Leo Dagum, and David Kohr, "Parallel Programming in OpenMP", Morgan Kaufmann, 2000.
6. Michael J. Quinn, "Parallel Computing: Theory & Practice", Tata McGraw Hill Edition, 2003.
7. Ananth Grame, George Karpis, Vipin Kumar and Anshul Gupta, "Introduction to Parallel Computing", 2nd Edition, Addison Wesley, 2003.

(19DMC9901) ENGLISH FOR RESEARCH PAPER WRITING

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, students will be able to
1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title
4. Develop writing skill
5. Able to quote phrases

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.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 – IV
Skill 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
Useful phrases, how to ensure paper is as good as it could possibly be the first- time submission

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

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(19DMC0101) DISASTER MANAGEMENT

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, students will be able to
1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. 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.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 – II
Disaster Prone Areas in IndiaStudy Of Seismic Zones; Areas Prone To Floods and Droughts, Landslides andAvalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Referenceto Tsunami; Post-Disaster Diseases and Epidemics

UNIT – III
Disaster Preparedness and ManagementPreparedness: Monitoring of Phenomena Triggering a Disaster or Hazard;Evaluation of Risk: Application of Remote Sensing, Data from Meteorological andother 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.

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.

(19DMC9902) SANSKRIT FOR TECHNICAL KNOWLEDGE

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, students will be able to
1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Understanding basic Sanskrit language
4. Ancient Sanskrit literature about science & technology can be understood
5. Being a logical language will help to develop logic in students

UNIT – I
Alphabets in Sanskrit, Past/Present/Future Tense,
UNIT – II
Simple Sentences
UNIT – III
Order, Introduction of roots
UNIT – IV
Technical information about Sanskrit Literature
UNIT -V
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

REFERENCES:
1. "Abhyaspustakam" – Dr.Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-VempatiKutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi.

(19DMC9903) VALUE EDUCATION

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, students will be able to
1. Understand value of education and self- development
2. Imbibe good values in students
3. Let the should know about the importance of character
4. Learn the importance of Human values
5. 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 judgments

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, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship, Order, Introduction of roots

UNIT – IV
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

REFERENCES:
1. Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

(19DPC0504) ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

L	T	P	C
0	0	4	2

Course Outcomes: Students will able to:
1. Implement List ADTs and their operations.
2. Develop programs for sorting.
3. Develop programs for implementing trees and their traversal operations.
4. Implement graph traversal algorithms.
5. Apply algorithm design techniques

1. Write C++ programs to implement the following using an array. a) Stack ADT b) Queue ADT
2. Write C++ programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT
3. Write C++ programs to implement the deque (double ended queue) ADT using a doubly linked list and an array.
4. Write a C++ 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.
5. Write C++ programs that use recursive functions to traverse the given binary tree in a)Preorder b) inorder and c) postorder.
6. Write C++ programs that use non-recursive functions to traverse the given binary tree in a)Preorder b) inorder and c) postorder.
7. Write C++ programs for the implementation of bfs and dfs for a given graph.
8. Write C++ programs for implementing the following sorting methods: a)Merge sort b) Heap sort
9. Write a C++ program to perform the following operations a)Insertion into a B-tree b) Deletion from a B-tree
10. Write a C++ program to perform the following operation a)Insertion into an AVL-tree
11. Write a C++ program to implement all the functions of a dictionary (ADT) using hashing.
12. Write a C++ program for implementing Knuth-Morris- Pratt pattern matching algorithm.

(Note: Use Class Templates in the above Programs**)**

References:
1. Data Structures and Algorithms Using C++ by Ananda Rao Akepogu and Radhika Raju Palagiri, Pearson Education, 2010.
2. Classic Data Structures by D. Samanta, 2005, PHI
3. Data Structures and Algorithms by G.A.V. Pai, 2009, TMH.
4. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
5. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG
6. Design and Analysis of Algorithms by E. Horowitz, S. Sahani, 3rd Edition,Galgotia.
7. Data Structures and Algorithms in C++ by Drozdek 2nd Edition,Thomson.
8. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, 2nd edition, University Press

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M.Tech I Semester

(19DPC0505) R & ANALYTICS LAB

L	T	P	C
0	0	4	2

Course Outcomes:
1. Understand the basics in R programming in terms of constructs, control statements, string functions
2. Understand the use of R for Big Data analytics
3. Usage of Advanced SQL functions, Hive, Mongo DB and PIG

1. Installation of R
   Installing R in windows, R Console (R window to edit and execute R Commands), Commands and Syntax (R commands and R syntax), Packages and Libraries (Install and load a package in R), Help In R, Workspace in R.
2. Implement the data structures using R Programming
   Introduction to Data Types (Why Data Structures?, Types of Data Structures in R), Vectors, Matrices, Arrays, Lists, Factors, Data Frames, Importing and Exporting Data.
3. Implement the Graphical Analysis using R
   Creating a simple graph (Using plot() command), Modifying the points and lines of a graph (Using type, pch, font, cex, lty, lwd, col arguments in plot() command), Modifying Title and Subtitle of graph (Using main, sub, col.main, col.sub, cex.main, cex.sub, font.main, font.sub arguments in plot() command), Modifying Axes of a Graph (Using xlab, ylab, col.lab, cex.lab, font.lab, xlim, ylim, col.axis, cex.axis, font.axis arguments and axis() command), Adding Additional Elements to a Graph (Using points(), text(), abline(), curve() commands), Adding Legend on a Graph (Using legend() command), Special Graphs (Using pie(), barplot(), hist() commands), Multiple Plots (Using mfrow or mfcol arguments in par() command and layout command).
4. Implement the Descriptive Statistics using R.
   Measure of Central Tendency (Mean, Median and Mode), Measure of Positions (Quartiles, Deciles, Percentiles and Quantiles), Measure of Dispersion (Range, Median, Absolute deviation about median, Variance and Standard deviation), Measure of Distribution (Skewness and Kurtosis), Box and Whisker Plot (Box Plot and its parts, Using Box Plots to compare distribution).
5. **In memory Data Analytics**: Window and text functions in SQL; Advanced SQL functions
6. **MongoDB**: Installation of MongoDB, Features of MongoDB: CRUD operations; import and export functions, indexes, aggregate functions, dealing with Nulls, count, limit, skip and sort functions and cursors
7. **Experiments on Hive and Pig**
   Data Wrangling using ROpen refine tool for handling messy data

References:
1. Introduction to Data Science, R. Irizarry
2. R Notes for Professionals book: https://books.goalkicker.com/RBook/
3. MongoDB® Notes for Professionals book: https://books.goalkicker.com/MongoDBBook/
4. https://www.tutorialspoint.com/hive/index.htm
5. https://www.tutorialspoint.com/apache_pig/index.htm

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(19DPC5806) BIG DATA ANALYTICS

L	T	P	C
3	0	0	3

Course Outcomes:
1. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
2. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce and NOSQL in big data analytics.
3. Understand the working of Hadoop frameworks like PIG and HIVE

UNIT-I
Introduction to Big Data: Introduction to Big Data Platform – Challenges of Conventional System – Intelligent data analysis – Nature of Data – Analytic Processes and Tool – Analysis vs Reporting – Modern Data Analytic Tool – Statistical Concepts: Sampling Distributions – Re-Sampling – Statistical Inference – Prediction Error.

UNIT- II
Mining Data Streams: Introduction To Stream Concepts – Stream Data Model and Architecture - Stream Computing – Sampling Data in a Stream – Filtering Stream – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) Applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions.

UNIT – III
Hadoop: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop – Analyzing the Data with Hadoop – Scaling Out – Hadoop Streaming – Design of HDFS- Java interfaces to HDFSBasics- Developing a Map Reduce Application – How Map Reduce Works – Anatomy of a Map Reduce Job run – Failures – Job Scheduling – Shuffle and Sort – Task Execution – Map Reduce Types and Formats – Map Reduce Features.

UNIT – IV
Hadoop Environment: Setting up a Hadoop Cluster – Cluster specification – Cluster Setup and Installation – Hadoop Configuration – Security in Hadoop – Administering Hadoop – HDFS – Monitoring – Maintenance – Hadoop Benchmarks – Hadoop in the Cloud.

UNIT –V
Frameworks: Applications on Big Data Using Pig and Hive – Data Processing operators in Pig – Hive Services – HiveQL – Querying Data in Hive – fundamentals of HBase and Zookeeper – IBM Info Sphere Big Insights and Streams. Visualization - Visual data analysis techniques, interaction techniques; Systems and applications.

Text Books:
1. Michael Berthold, David J.Hand, Intelligent Data Analysis, Springer, 2007.
2. Tom White, Hadoop: The Definitive Guide Third Edition, O'reilly Media, 2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012.
4. Anand Rajaraman and Jeffrey David UIlman, Mining of Massive Datasets Cambridge University Press, 2012.

Reference Books:
1. Bill Franks, Taming the big Data tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012.
2. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
3. Jiawei Han, MichelineKamber, Data Mining Concepts and Techniques, Second Edition.

(19DPC5807) MOBILE APPLICATION DEVELOPMENT

L	T	P	C
3	0	0	3

Unit I:
Basics of Mobile Applications Development: Tools: Eclipse ADT, Android Studio. Understanding the Role of Android Application Components, Understanding the Utility of Android API, Overview of the Android Project Files, Understanding Activities, Role of the Android Manifest File, Creating the User Interface, Commonly Used Layouts and Controls, Event Handling, Displaying Messages Through Toast, Creating and Starting an Activity, Using the Edit Text Control, Choosing Options with Checkbox, Choosing Mutually Exclusive Items Using Radio Buttons

Unit II:
Building Blocks for Android Application Design: Introduction to Layouts, Linear Layout, Relative Layout, Absolute Layout, Using Image View, Frame Layout, Table Layout, Grid Layout, Adapting to Screen orientation.
Utilizing Resources and Media Resources, Creating Values Resources, Using Drawable Resources, Switching States with Toggle Buttons, Creating an Images Switcher Application, Scrolling Through Scroll View, playing Audio, Playing Video, Displaying Progress with Progress Bar, Using Assets

Unit III:
Using Selection widgets and Debugging: Using List View, Using the Spinner control, Using the GridView Control, Creating an Image Gallery Using the ViewPager Control, Using the Debugging Tool: Dalvik Debug Monitor Service(DDMS), Debugging Application, Using the Debug Perspective.
Displaying And Fetching Information Using Dialogs and Fragments: What Are Dialogs?, Selecting the Date and Time in One Application, Fragments, Creating Fragments with java Code, Creating Special Fragments

Unit IV:
Building Menus: Creating Interface Menus and Action Bars, Menus and Their Types, Creating Menus Through XML, Creating Menus Through Coding, Applying a Context Menu to a List View, Using the Action Bar, Replacing a Menu with the Action Bar, Creating a Tabbed Action Bar, Creating a Drop-Down List Action Bar

Unit V
Storing Data & Communicating with SMS and Emails: Using the SQLiteOpenHelperclasss, Accessing Databases with the ADB, Creating a Data Entry Form.
Understanding Broadcast Receivers, Using the Notification System, Sending SMS Messages with Java Code, Receiving SMS Messages, Sending Email, Working With Telephony Manager.

Text Books
1. Android Programming by B.M Harwani, Pearson Education, 2013.

References Text Books:
1. Android application Development for Java Programmers, James C Sheusi, Cengage Learning
2. Android In Action by w.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz., Dreamtech.
3. Professional Android 4 applications development, Reto Meier, Wiley India, 2012.
4. Beginning Android 4 applications development, Wei- Meng Lee, Wiley India,2013
5. PawPrints Learning Technologies, Beginning Android Development: Create Your Own Android Apps Today, 2014.
6. Erik Hellman, Android Programming: Pushing the Limits, John Wiley and sons ltd, 2014.
7. Neil Smyth, Android Studio Development Essentials.
8. Joseph Annuzzi,Jr, Lauren Darcey, Introduction to Android Application Development, Addison-Wesley, Fourth Edition.

(19DPE5807) INTERNET OF THINGS

L	T	P	C
3	0	0	3

UNIT I
Introduction - Internet of Things – **Design Principles for Connected Devices** – Web Thinking for Connected Devices – **Internet Principles** – IP – TCP – IP Protocol Suite – UDP – IP Address – MAC Address – TCP and UDP Ports – Application Layer Protocols.

UNIT II
Prototyping – Prototypes and Production – Cloud – Open Source vs Closed Source – Tapping into the Community **– Prototyping Embedded Devices** – Electronics – Embedded Computing Basics – Ardunio – Raspberry Pi – Beagle Bone Black – Electronic Imp.

UNIT III
Prototyping the Physical Design – Laser Cutting – 3D Printing – CNC Milling – Repurposing and Recycling – **Prototyping Online Components** – New API – Real Time Reactions – Other Protocols.

UNIT IV
Techniques for writing Embedded Code – Memory Management – Performance and Battery life – Libraries – Debugging – **Business Models** – Models – Funding an Internet of Things Startup.

UNIT V
Moving to Manufacture – Designing Kits – Designing Printed Circuit Boards – Manufacturing Printed Circuit Boards – Mass Producing the case and other Fixtures – Scaling up Software – **Ethics** – Characterizing the Internet of Things – Control – Environment – Solutions.

Text Books:
1. Adrian Mcewen and HakinCassimally, "Designing The Internet of Things" Wiley Publications , 2015

Reference Books:
1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on- Approach)", 1stEdition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013 CunoPfister, "Getting Started with the Internet of Things",

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(19DPE5808) NETWORK SECURITY AND CRYPTOGRAPHY

L	T	P	C
3	0	0	3

UNIT I
Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services And Security Mechanisms, Classical Encryption Techniques- Symmetric Cipher Model, Substitution Ciphers, Transposition Ciphers, Steganography, Modern Block Ciphers, Modern Stream Ciphers.
Modern Block Ciphers: Block Ciphers Principles, Data Encryption Standard (DES), Linear And Differential Cryptanalysis, Block Cipher Modes Of Operations, AES.

UNIT II
Public-Key Cryptography : Principles Of Public-Key Cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, Elgamal Cryptographic System, Elliptic Curve Arithmetic, Elliptic Curve Cryptography
Cryptographic Hash Functions: Applications Of Cryptographic Hash Functions, Requirements And Security, Hash Functions Based On Cipher Block Chaining, Secure Hash Algorithm (SHA).

UNIT III
Message Authentication Codes: Message Authentication Requirements, Message Authentication Functions, Requirements For Message Authentication Codes, Security Of Macs, HMAC, Macs Based On Block Ciphers, Authenticated Encryption.
Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols.

UNIT IV
Key Management And Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric, Distribution Of Public Keys, X.509 Certificates, Public Key Infrastructure.
Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME

UNIT V
Security At The Transport Layer (SSL And TLS) : SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security, HTTPS, SSH
Security At The Network Layer (Ipsec): Two Modes, Two Security Protocols, Security Association, Security Policy, Internet Key Exchange.
Intruders: Intruders, Intrusion Detection, Password Management, Firewalls, Viruses and Worms.

Text Books:

1. Cryptography and Network Security: Principals and Practice, William Stallings, Fifth Edition, Pearson Education.
2. Cryptography and Network Security, Behrouz A. Frouzan and Debdeep Mukhopadhyay, 2nd edition, Mc Graw Hill Education

Reference Books:

1. Network Security and Cryptography, Bernard Menezes , Cengage Learning.
2. Cryptography and Security, C.K. Shymala, N. Harini and Dr. T.R. Padmanabhan, Wiley-India.
3. Applied Cryptography, Bruce Schiener, 2nd edition, John Wiley & Sons.
4. Cryptography and Network Security, Atul Kahate, TMH.
5. Introduction to Cryptography, Buchmann, Springer.
6. Number Theory in the Spirit of Ramanujan, Bruce C.Berndt, University Press Introduction to Analytic Number Theory, Tom M.Apostol, University Press

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(19DPE5809) NO SQL DATABASES

L	T	P	C
3	0	0	3

UNIT I:
NOSQL: WHAT IT IS AND WHY YOU NEED IT: Big Data , Scalability, Sorted Ordered Column-Oriented Stores: Key/Value Stores, Document Databases Graph Databases Examples,
INTERFACING AND INTERACTING WITH NOSQL: Storing and Accessing Data, Storing Data In and Accessing Data from MongoDB, Querying MongoDB, Storing Data In and Accessing Data from Redis Querying Redis, Storing Data In and Accessing Data from HBase, Querying HBase Storing Data In and Accessing Data from Apache Cassandra, Querying Apache Cassandra,

UNIT II:
Language Bindings for NoSQL Data Stores: Language Bindings for Java Language Bindings for Python, Language Bindings for Ruby, Language Bindings for PHP **UNDERSTANDING THE STORAGE ARCHITECTURE:** Working with Column-
Oriented Databases, Contrasting Column Databases with RDBMS, Column Databases as Nested Maps of Key/Value Pairs, Laying out the Web table, HBase Distributed Storage Architecture Document Store Internals , Storing Data in Memory-Mapped Files, Guidelines for Using Collections and Indexes in MongoDB, MongoDB Reliability and Durability ,Horizontal Scaling, Understanding Key/Value Stores in Memcached and Redis Under the Hood of Memcached Redis Internals , Eventually Consistent Non-relational Databases Consistent Hashing Object Versioning, Gossip-Based Membership and Hinted Handoff

UNIT III:
PERFORMING CRUD OPERATIONS: Creating Records, Creating Records in a Document-Centric Database, Using the Create Operation in Column-Oriented Databases, Using the Create Operation in Key/Value Maps Accessing Data, Accessing Documents from MongoDB, Accessing Data from HBase, Querying Redis, Updating and Deleting Data , Updating and Modifying Data in MongoDB, HBase, and Redis, Limited Atomicity and Transactional Integrity
QUERYING NOSQL STORES: Similarities between SQL and MongoDB Query Features, Map Reduce in MongoDB, Accessing Data from Column-Oriented Databases like HBase, Querying Redis Data Stores, Changing Document Databases, Schema-less Flexibility, Exporting and Importing Data from and into MongoDB, Schema Evolution in Column- Oriented Databases, HBase Data Import and Export, Data Evolution in Key/Value Stores

UNIT IV:
INDEXING AND ORDERING DATA SETS: Essential Concepts Behind a Database Index, Indexing and Ordering in MongoDB, Creating and Using Indexes in MongoDB, Indexing and Ordering in CouchDB, Indexing in Apache Cassandra.
MANAGING TRANSACTIONS AND DATA INTEGRITY: RDBMS and ACID,
Upholding CAP, Consistency Implementations in a Few NoSQL Products

UNIT V:
USING NOSQL IN THE CLOUD: Google App Engine Data Store, Amazon SimpleDB
SCALABLE PARALLEL PROCESSING WITH MAP REDUCE: Understanding
MapReduce, MapReduce with Hbase, MapReduce Possibilities and Apache Mahout. **ANALYZING BIG DATA WITH HIVE:** Hive Basics, Back to Movie Ratings, Good Old SQL, JOIN(s) in Hive QL, **SPEECH ENHACEMENT:** Nature of inter fearing sounds, Speech enhancement techniques, Spectral subtraction, Enhancement by re-synthesis.

TEXT BOOKS:
1. Sashank Thiwari, Professional NoSQL**, Wiley-** August 2011

REFERENCE BOOKS:
1. Dan MC Creary and Ann Kelly, Making Sense of NoSQL: A guide for Managers and the Rest of Us, Dreamtech Press, 2013
2. David Hows, Peter Membrey, Eelco Plugge, Tim Hawkins, The Definitive Guide: A Complete Guide to Dealing with Big Data Using MongoDB to MongoDB, Second Edition, Apress, 2013.
3. Guy Harrison, Next Generation Databases: NoSQL, NewSQL, and Big Data, Apress, 2015.
4. Adam Fowler, "Nosql for Dummies", Wiley.

(19DPE5810) MACHINE LEARNING

L	T	P	C
3	0	0	3

UNIT I INTRODUCTION

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT II NEURAL NETWORKS AND GENETIC ALGORITHMS

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT III BAYESIAN AND COMPUTATIONAL LEARNING

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT IV INSTANCE BASED LEARNING

K- Nearest Neighbor Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

UNIT V ADVANCED LEARNING

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS

1. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

(19DPE5811) CLOUD COMPUTING

L	T	P	C
3	0	0	3

UNIT-I
Introduction to cloud computing – The Evolution of cloud computing – Hardware Evolution- Internet Software Evolution – Server Virtualization – Web Services Deliver from the cloud– Communication-as-a-service– Infrastructure-as-a-service–Monitoring-as-a-service–Platform- as-a-Service - Software-as-a-service – Building Cloud Network.

UNIT-II
Federation in the cloud – presence in the cloud – Privacy and its Relation to cloud-Based Information Systems– Security in the cloud – Common Standards in the cloud-End-User Access to the cloud Computing.

UNIT-III
Introduction – Advancing towards a Utility Model – Evolving IT infrastructure – Evolving Software Applications – Continuum of Utilities- Standards and Working Groups- Standards Bodies and Working Groups- Service Oriented Architecture- Business Process Execution Language- Interoperability Standards for Data Center Management – Utility Computing Technology- Virtualization – Hyper Threading – Blade Servers- Automated Provisioning- Policy Based Automation- Application Management – Evaluating Utility Management Technology – Virtual Test and development Environment – Data Center Challenges and Solutions – Automating the Data Center.

UNIT-IV
Software Utility Application Architecture – Characteristics of a SaaS – Software Utility Applications – Cost Versus Value – Software Application Services Framework – Common
Enablers – Conceptual view to Reality – Business profits – Implementing Database System for Multitenant Architecture.

UNIT-V
Other Design Consideration – Design of a Web Services Metering Interface – Application Monitoring Implementation – A Design for an update and Notification Policy – Transforming to Software as a Service – Application Transformation Program – Business Model Scenarios – Virtual Services for Organizations – The Future.

Text Books:
1. Guy Bunker and Darren Thomson, Delivering utiliy Computing, John Wiley & Sons Ltd, 2012.

References Books:
1. John W. Rittinghouse and Ames F. Ransome, Cloud Computing Implementation , Management and security, CRC press & Francis Group, Boca Raton LondonNew York. 2010.

2. Alfredo Mendroza, Utility Computing Technologies, Standards, andStrategies Artech House INC, 2007.

(19DPE5812) NATURAL LANGUAGE PROCESSING

L	T	P	C
3	0	0	3

UNIT – I
Introduction to Natural Language, Applications of NLP, Corpora and Corpus Analysis, Lexicon and Morphology , Syntax and Semantics.

UNIT II
Language Modeling: Introduction, n-gram models, Smoothing: Interpolation and Backoff.

UNIT III
Introduction to Machine Translation: History, Rule Based MT, Direct Transfer & INTERLINGUA Approaches, MT Evaluation.

UNIT IV
Statistical MT: Parallel Corpus and Alignment, Lexical Translation Model, Decoding Algorithms.

UNIT V
Applications: Automatic Text Categorization, Text Summarization, Information Extraction, Sentiment Analysis.

Text Books:
1. "Natural Language Processing: An Information Access Perspective", Ess Ess Publications, Kavi Narayana Murthy, 2006.
2. "Foundations of Statistical Natural Language Processing", Christopher Manning, MIT Press, 1999.

Reference Books:
1. James A.. Natural language Understanding 2e, Pearson Education, 1994
2. Bharati A., Sangal R., Chaitanya V.. Natural language processing: a Paninian perspective, PHI, 2000
3. Siddiqui T., Tiwary U. S.. Natural language processing and Information retrieval, OUP, 2008

(19DMC9904) CONSTITUTION OF INDIA

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, students will be able to
1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. 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.
4. Discuss the passage of the Hindu Code Bill of 1956.
5. Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.

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, Qualifications, 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, Pachayat raj: Introduction, PRI: ZillaPachayat, Elected officials and their roles, CEO ZillaPachayat: 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.

REFERENCES:
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.

(19DMC5801) PEDAGOGY STUDIES

L	T	P	C
2	0	0	0

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 in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school 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.

References:
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.

(19DMC9905) STRESS MANAGEMENT BY YOGA

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, students will be able to
1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency
3. To achieve overall health of body and mind
4. To overcome stress
5. Identify critical evidence gaps to guide the development.

UNIT – I
Definitions of Eight parts of yoga (Ashtanga)
UNIT – II
Yam and Niyam. Ahinsa, satya, astheya, bramhacharya and aparigraha
UNIT – III
Shaucha, santosh, tapa, swadhyay, ishwarpranidhan
UNIT – IV
Asan and Pranayam: Various yoga poses and their benefits for mind & body
UNIT -V
Regularization of breathing techniques and its effects-Types of pranayam

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

(19DMC9906) PERSONALITY DEVOLOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

L	T	P	C
2	0	0	0

Course Outcomes: At the end of the course, students will be able to
1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality andb achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students.
4. To become a person with stable mind, pleasing personality and determination
5. To awaken wisdom in students

UNIT – I
Neetisatakam-Holistic development of personality
    1. Verses- 19,20,21,22 (wisdom)
    2. Verses- 29,31,32 (pride & heroism)
    3. Verses- 26,28,63,65 (virtue)
    4. Verses- 52,53,59 (dont's)
    5. Verses- 71,73,75,78 (do's)
UNIT – II
    1. Approach to day to day work and duties.
    2. Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48,
UNIT – III
    1. Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17,
       23, 35,
    2. Chapter 18-Verses 45, 46, 48.
UNIT – IV
    1. Statements of basic knowledge.
    2. Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68
    3. Chapter 12 -Verses 13, 14, 15, 16,17, 18
UNIT -V
    1. Personality of Role model.
    2. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
    3. Chapter 4-Verses 18, 38,39
    4. Chapter18 – Verses 37,38,63

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

(19DPC5808) MAP REDUCE PROGRAMMING LAB

L	T	P	C
0	0	4	2

1. Install Apache Hadoop
2. Write a map reduce program to calculate the frequency of a given word in a given file?
3. Write a Map Reduce program to find the maximum temperature in each year?
4. Write a Map Reduce program to find the grades of student's?
5. Write a map reduce program to implement Matrix Multiplication?
6. Write a map reduce to find the maximum electrical consumption in each year given electrical consumption for each month in each year?
7. Write a map reduce to analyze weather data set and print whether the day is shiny or cool day?
8. Write a map reduce program to find the number of products sold in each country by considering sales data containing fields like

Transaction_ date	Product	Price	Payment_ Type	Name	City	State	Country	Account _ Created	Last_ Login	Latitude	Longitude

9. Write a map reduce program to find the tags associated with each movie by analyzing movie lens data?

10. XYZ.com is an online music website where users listen to various tracks, the data gets collected like shown below. The data is coming in log files and looks like as shown below.

UserId Skip		TrackId		Shared		Radio	
111115	|	222	|	0	|	1	|0
111113	|	225	|	1	|	0	|0
111117	|	223	|	0	|	1	|1
111115	|	225	|	1	|	0	|0

Write a map reduce program to get the following

- Number of unique listeners
- Number of times the track was shared with others
- Number of times the track was listened to on the radio
- Number of times the track was listened to in total
- Number of times the track was skipped on the radio

11. Write a map reduce program to find the frequency of books published each year and find in which year maximum number of books were published using the following data?

Title	Author	Published year	Author country	Language	No of pages

12. Write a map reduce program to analyze Titanic data and to find The average age of the people (both male and female) who died in the tragedy How many persons survived – traveling class wise.

The titanic data will be..
Column 1 : PassengerId   Column 2 : Survived   (survived=0 & died=1)
Column 3 : Pclass   Column 4 : Name   Column 5 : Sex

Column 6 : Age   Column 7 : SibSp   Column   8   : Parch
Column 9 : Ticket   Column 10 : Fare   Column   11   : Cabin
Column 12 : Embarked

13. Write a map reduce program to analyze Uber data set to find the days on which each basement has more trips using the following dataset

References:
1. Srinath Perera and Thilina Gunarathne Hadoop MapReduce Cookbook, Packt publishing, 2003.
2. Bill Franks, Taming the big Data tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012.
3. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O'Reilly, 2011.
4. Jiawei Han, MichelineKamber, Data Mining Concepts and Techniques, Second Edition.
5. Elsevier, Reprinted 2008. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, Intelligent Data Mining, Springer, 2007.

(19DPC5809) MOBILE APPLICATION DEVELOPMENT LAB

L	T	P	C
0	0	4	2

Using Wireless Markup language develop the APP using Android OS

1. Design and develop an Mobile App for smart phones The Easy Unit Converter using Android. This application should have approximately 20 categories to be used in your daily life. It includes following units: Acceleration, Angle, Area, Circle, Capacitor, Cooking, Data Size, Density, Data Transfer rate, Electric Current, Energy, Flow Rate, and Force.

2. Design and develop an Mobile App for smart phones Currency Converter. .This applications should synchronize online as you run it and sends you back the latest and most reliable exchange rates possible.

   This application should support following conversions:

   EUR->Euro

   GBP->British Pound

   USD->United States Dollar AUD->Australian Dollar CAD->Canadian Dollar CHF->Swiss Franc

   CNY->Chinese Yuan HKD->Hong Kong Dollar IDR->Indonesian Rupiah INR->Indian Rupee

   JPY->Japanese Yen THB->Thai Bah

3. Design and develop an Mobile App game for smart phones The Tic Tac Toe using Android.

4. Design and develop an Mobile App for smart phones , the Health Monitoring System using Android. This App should record Biochemistry Lab Parameters and if abnormal should send an SMS to doctor for Medications.

5. Design and develop an Mobile App for smart phones The Expense Manager using Android. This is an application for managing your expenses and incomes: Tracking expenses and incomes by week, month and year as well as by categories, Multiple accounts in multiple currencies, Schedule the payments and recurring payments, Take a picture of receipt, Payment alerts, Budget by day, week, month and year, Search and reports, Import and export account activities in CSV for desktop software, Customize expense categories, payer/payer, payment methods, date format, white or black background, button style etc, Account transfer, Convenient tools such calculator, currency converter, tip calculator, sales and tax calculator and credit card calculator.

References:

1. Mobile Computing: (technologies and Applications- N. N. Jani S chand
2. B.M.Hirwani- Android programming Pearson publications-2013

(19DPE5813) DATA PREPARATION AND ANALYSIS

L	T	P	C
3	0	0	3

Unit I:
Defining Data Analysis Problems:
Knowing the client, understanding the questions

Unit II:
Data Gathering and Preparation:
Data formats, parsing and transformation, Scalability and real-time issues

Unit III:
Data Cleaning:
Consistency checking, Heterogeneous and missing data, Data Transformation and segmentation

Unit IV:
Exploratory Analysis:
Descriptive and comparative statistics, Clustering and association, Hypothesis generation

Unit V: Visualization:
Designing visualizations, Time series, Geo-located data, Correlations and connections, Hierarchies and networks, interactivity

References:
1. Making sense of Data : A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt

(19DPE5814) SECURE SOFTWARE DESIGN AND ENTERPRISE COMPUTING

L	T	P	C
3	0	0	3

Unit I:
Secure Software Design
Identify software vulnerabilities and perform software security analysis, Master security programming practices, Master fundamental software security design concepts, Perform security testing and quality assurance.

Unit II:
Enterprise Application Development
Describe the nature and scope of enterprise software applications, Design distributed N-tier software application, Research technologies available for the presentation, business and data tiers of an enterprise software application, Design and build a database using an enterprise database system, Develop components at the different tiers in an enterprise system, Design and develop a multi-tier solution to a problem using technologies used in enterprise system,
Present software solution.

Unit III:
Enterprise Systems Administration
Design, implement and maintain a directory-based server infrastructure in a heterogeneous systems environment, Monitor server resource utilization for system reliability and availability, Install and administer network services (DNS/DHCP/Terminal Services/Clustering/Web/Email).

Unit IV:
Obtain the ability to manage and troubleshoot a network running multiple services, Understand the requirements of an enterprise network and how to go about managing them.

Unit V:
Handle insecure exceptions and command/SQL injection, Defend web and mobile applications against attackers, software containing minimum vulnerabilities and flaws.

References:
1. Theodor Richardson, Charles N Thies, Secure Software Design, Jones & Bartlett
2. Kenneth R. van Wyk, Mark G. Graff, Dan S. Peters, Diana L. Burley, Enterprise Software Security, Addison Wesley.

(19DPE5815) COMPUTER VISION

L	T	P	C
3	0	0	3

Unit I:
Overview, computer imaging systems, lenses, Image formation and sensing, Image analysis, pre-processing and Binary image analysis

Unit II:
Edge detection, Edge detection performance, Hough transform, corner detection

Unit III:
Segmentation, Morphological filtering, Fourier transforms

Unit IV:
Feature extraction, shape, histogram, color, spectral, texture, using CVIP tools, Feature analysis, feature vectors, distance /similarity measures, data pre-processing

Unit V:
Pattern Analysis:
Clustering: K-Means, K-Medoids, Mixture of Gaussians
Classification: Discriminant Function, Supervised, Un-supervised,   Semi- supervised
Classifiers: Bayes, KNN, ANN models; Dimensionality Reduction: PCA, LDA, ICA, and Non-parametric methods
Recent trends in Activity Recognition, computational photography, Biometrics.

References:
1. Computer Vision: Algorithms and Applications by Richard Szeliski.
2. Deep Learning, by Goodfellow, Bengio, and Courville.
3. Dictionary of Computer Vision and Image Processing, by Fisher et al.

(19DOE5801) BUSINESS ANALYTICS

L	T	P	C
3	0	0	3

Unit I
Business Analysis: Overview of Business Analysis, Overview of Requirements, Role of the Business Analyst.
Stakeholders: the project team, management, and the front line, Handling Stakeholder Conflicts.

Unit II
Life Cycles: Systems Development Life Cycles, Project Life Cycles, Product Life Cycles, Requirement Life Cycles.
Forming Requirements: Overview of requirements Attributes of Good Requirements, Types of Requirements, Requirement Sources, Gathering Requirements from Stakeholders, Common Requirements Documents.

Unit III
Transforming Requirements: Stakeholder Needs Analysis, Decomposition Analysis, Additive/Subtractive Analysis, Gap Analysis, Notations (UML & BPMN), Flowcharts, Swim Lane Flowcharts, Entity-Relationship Diagrams, State-Transition Diagrams, Data Flow Diagrams, Use Case Modeling, Business Process Modeling

Unit IV
Finalizing Requirements: Presenting Requirements, Socializing Requirements and Gaining Acceptance, Prioritizing Requirements. Managing Requirements Assets: Change Control, Requirements Tools

Unit V
Recent Trends in: Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data Journalism.

Text Book:
1. Business Analysis by James Cadle et al. Project Management:
2. The Managerial Process by Erik Larson and, Clifford Gray
3. Business analytics Principles, Concepts, and Applications by Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey, Pearson FT Press.
4. Business Analytics by James Evans, persons Education.

(19DOE9001) INDUSTRIAL SAFETY

L	T	P	C
3	0	0	3

Course Outcomes:
CO: 1 Analyze the basics of industrial safety.
CO: 2 Understand the Fundamentals of maintenance engineering
CO: 3 Apply the methods of prevention of corrosion and wear.
CO: 4 Understand the Fault tracing and their applications.
CO: 5 Understand the methods of preventive measures and maintenance

Unit I
Industrial safety: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods

Unit II
Fundamentals of maintenance engineering: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

Unit III
Wear and Corrosion and their prevention: Wear- types, causes, effects, wear reduction methods, lubricants-types and applications, Lubrication methods, general sketch, working and applications, i. Screw down grease cup, ii. Pressure grease gun, iii. Splash lubrication, iv. Gravity lubrication, v. Wick feed lubrication vi. Side feed lubrication, vii. Ring lubrication, Definition, principle and factors affecting the corrosion. Types of corrosion, corrosion prevention methods.

Unit IV
Fault tracing: Fault tracing-concept and importance, decision tree concept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic, automotive, thermal and electrical equipment's like, i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

Unit V
Periodic and preventive maintenance: Periodic inspection-concept and need, degreasing, cleaning and repairing schemes, overhauling of mechanical components, overhauling of electrical motor, common troubles and remedies of electric motor, repair complexities and its use, definition, need, steps and advantages of preventive maintenance. Steps/procedure for periodic and preventive maintenance of: i. Machine tools, ii. Pumps, iii. Air compressors, iv. Diesel generating (DG) sets, Program and schedule of preventive maintenance of mechanical and electrical equipment, advantages of preventive maintenance. Repair cycle concept and importance.

References:
1. Maintenance Engineering Handbook, Higgins & Morrow, Da Information Services.
2. Maintenance Engineering, H. P. Garg, S. Chand and Company.
3. Pump-hydraulic Compressors, Audels, Mcgrew Hill Publication.
4. Foundation Engineering Handbook, Winterkorn, Hans, Chapman & Hall London

(19DOE9002) OPERATION RESEARCH

L	T	P	C
3	0	0	3

Course Outcomes:
CO: 1 Understand the characteristics and phases, types of models, allocation in linear programming
CO: 2 Apply the concept of optimal solution, unbalanced problem, degeneracy and Transportation problem & sequencing.
CO: 3 Understand the concept of replacement of items and related problems, theory of games related problems
CO: 4 Apply the concept of the knowledge of queuing models, inventory management models.
CO: 5 Apply the knowledge of dynamic programming, the concept of the simulation and simulation languages.

Unit I
Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

Unit II
Formulation of a LPP - Graphical solution revised simplex method - duality theory – dual simplex method - sensitivity analysis - parametric programming.

Unit III
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max Flowproblem - CPM/PERT

Unit IV
Scheduling and sequencing - single server and multiple server models - deterministic Inventorymodels - Probabilistic inventory control models - Geometric Programming.

Unit V
Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

References:
1. H.A. Taha, Operations Research, An Introduction, PHI, 2008
2. H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.
3. J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
4. Hitler Libermann Operations Research: McGraw Hill Pub. 2009
5. Pannerselvam, Operations Research: Prentice Hall of India 2010
6. Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

(19DOE2002) PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, students will be able to
1. Able to understand the importance of construction project management, organization and leadership capabilities
2. Able to apply theoretical and practical aspects of project management planning techniques to achieve project goals.
3. Possess ideas on contract, tender and arbitration in construction projects.
4. Understand to apply knowledge and skills of quality and safety management in construction.
5. Have necessary knowledge in resource planning, costing and accounting.

Unit I
Introduction to Project management: Characteristics of projects, Definition and objectives of Project Management, Stages of Project Management, Project Planning Process, Establishing Project organization.

UNIT-II
Project Planning: Planning techniques- Bar Chart, Gantt Charts- Networks: basic terminology, preparation of CPM- computation of float values, critical paths-PERT- Determination of three time estimates- Comparison between CPM and PERT

UNIT-III
Resources Management: Flow chart of Resources Management, Labour's requirement, Factors behind the selection of equipment, Material Management- flow chart and functions.
Cost and Accounts Management: Cost–volume relationship- Basic Cost Control System- Principle of accounting, Account process, Balance sheet.

Unit IV
Project Implementation: Project Monitoring and Control with PERT/Cost, Computers applications in Project Management, Contract Management, Project Procurement Management.

UNIT-V
Quality management
Inspection, quality control and quality assurance in projects- Cost of quality, cost versus quality levels- ISO standards- benefits-ISO 9001-2000 family of standards- Audit- types, ISO 9001-2000 for internal audit.

Safety management
Cause for accident in construction site- -Principle of safety- Role of safety personnel's - General safety conditions

REFERENCES:
1. Kumar Neeraj Jha, Construction Project Management Theory & Practice, Pearson Education Ltd., 2014.
2. Chitkara.K.K., Construction Project Management Planning Scheduling and Controlling, TataMcGraw-Hill, 2014
3. Project Planning And Control With PERT And CPM By Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.
4. Total Project Management, The Indian Context- By : P.K.JOY- Mac Millan Publishers India Limited.

Additional Readings:
1. John M Nicholas, Project Management for Business and Technology: Principles and Practice, Prentice Hall, India, 2002.
2. N. J. Smith (Ed), Project Management, Blackwell Publishing, 2002.
3. Robert K. Wysocki, Robert Back Jr. and David B. Crane, Effective Project Management, John Wiley, 2002.
4. Jack R Meredith and Samuel J Mantel, Project Management: A Managerial Approach, John Wiley, 2000.

(19DOE9004) COMPOSITE MATERIALS

L	T	P	C
3	0	0	3

Course Outcomes:

CO: 1 Understanding of basic concepts and charactestics of geometric and physical applications of composites.

CO: 2 Explain different reinforcements and their properties.

CO: 3 Study of micromechanics and properties of composite material.

CO: 4 Study of coordinate transformations of stress and strain laws.

CO: 5 Study of elastic behaviour of unidirectional composites; Joining Methods and Failure Theories

UNIT-I

Introduction: Definitions, Composites, Reinforcements and matrices, Types of reinforcements,Types of matrices, Types of composites, Carbon Fibre composites, Properties of composites in comparison with standard materials, Reinforcements: Fibres- Glass, Silica, Kevlar, carbon, boron, silicon carbide, and born carbide fibres. Particulate composites, Polymer composites, Thermoplastics, Thermosetts, Metal matrix and ceramic composites.

UNIT-II

Manufacturing methods :

Hand and spray lay - up, injection molding, resin injection, filament winding, pultrusion, centrifugal casting and prepregs. Fibre/Matrix Interface, mechanical. Measurement of interface strength. Characterization of systems; carbon fibre/epoxy, glass fibre/polyester, etc.

UNIT-III

Micromechanics: Unidirectional composites, constituent materials and properties, elastic properties of a lamina, properties of typical composite materials, laminate characteristics and configurations. Characterization of composite properties. Mechanical Testing: Determination of stiffness and strengths of unidirectional composites;

tension, compression, flexure and shear.

UNIT-IV

Coordinate transformations: Hooke"s law for different types of materials, Hooke"s law for two dimensional unidirectional lamina, Transformation of stress and strain, Numerical examples of stress strain transformation, Graphic interpretation of stress – strain relations. Off - axis, stiffness modulus, off - axis compliance.

UNIT-V

Elastic behavior of unidirectional composites: Elastic constants of lamina, relationship between engineering constants and reduced stiffness and compliances, analysis of laminated composites, constitutive relations Joining Methods and Failure Theories: Joining –Advantages and disadvantages of adhesive and mechanically fastened joints. Typical bond strengths and test procedures.

Text Books:

1. Chawla, Krishan K, Composite Materials Science and Engineering, Springer, 3rd Edition 2012.
2. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York, 1975.

References:

1. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980.
2. L. R. Calcote, Analysis of Laminated Composite Structures, Van Nostrand Rainfold, New York, 1969.
3. Engineering Mechanics of Composite Materials by Isaac and M.Daniel, Oxford University Press, 1994

(19DOE2001) WASTE TO ENERGY

L	T	P	C
3	0	0	3

Course Outcomes: At the end of the course, students will be able to
1. Able to classify types of wastes
2. Understand the method of pyrolysis
3. Understand the use and application of Biomass gasifiers
4. Design biomass combustors
5. Analyze the properties of Biogas

Unit-I:
Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

Unit-II:
Biomass Pyrolysis: Pyrolysis – Types, slow fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.

Unit-III:
Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.

Unit-IV:
Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

Unit-V:
Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

REFERENCES:
1. Non Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
2. Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
3. Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
4. Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.