SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (AUTONOMOUS)

(Affiliated to JNTUK, Kakinada), (Recognized by AICTE, New Delhi)
Accredited by NAAC with 'A' Grade
CHINNA AMIRAM (P.O):: BHIMAVARAM :: W.G.Dt., A.P., INDIA :: PIN: 534 204

Estd:1980

SCHEME OF INSTRUCTION & EXAMINATION
(Regulation R19)
M.TECH (INFORMATION TECHNOLOGY)
DEPARTMENT OF INFORMATION TECHNOLOGY
(With effect from **2019-2020**Admitted Batch onwards**)**
I-SEMESTER

Subject Code.	Name of the Subject	Category.	C	L	T	P	Internal Marks	External Marks	Total Marks
M19 IT 1101	Discrete Mathematical Structures	PC	3	3	0	0	25	75	100
M19 IT 1102	Advanced Data Structures	PC	3	3	0	0	25	75	100
#PE-I	Program Elective-I	PE	3	3	0	0	25	75	100
#PE-II	Program Elective-II	PE	3	3	0	0	25	75	100
M19 RD 1101	Research Methodology and IPR	CC	2	2	0	0	25	75	100
M19 IT 1113	Advanced Data Structures Lab	PC	2	0	0	4	25	75	100
M19 IT 1114	Computing Lab	PC	2	0	0	4	25	75	100
#AC-1	Audit course -1	AC	0	2	0	0	0	0	0
		Total	**18**	**16**	**0**	**8**	**175**	**525**	**700**

	Code	Course		Code	Course
#PE-I	M19IT1103	Artificial Intelligence	**# AC 1 & 2**	M19AC0001	English for Research Paper Writing
	M19IT1104	Service Oriented Architectures And Web Security		M19AC0002	Disaster Management
	M19IT1105	Internet of Things		M19AC0003	Sanskrit for Technical Knowledge
	M19IT1106	Optimization Techniques		M19AC0004	Value Education
	M19IT1107	Parallel Computer Architecture		M19AC0005	Constitution of India
#PE-II	M19IT1108	Bigdata Analytics		M19AC0006	Pedagogy Studies
	M19IT1109	Principles Of Cryptography		M19AC0007	Stress Management by Yoga
	M19IT1110	Cluster And Grid Computing		M19AC0008	Personality Development through Life Enlightenment Skills.
	M19IT1111	Imaging and Multimedia Systems			
	M19IT1112	Advanced Graph Theory			

Code	Category	L	T	P	C	I.M	E.M	Exam
M19IT1101	**PC**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

DISCRETE MATHEMATICAL STRUCTURES

(Program Core-1)

Course Objectives:

1.	To understand the mathematical fundamentals that is prerequisites for a variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems, Bioinformatics, Machine learning.
2.	To develop the understanding of mathematical and logical basis to many modern techniques in information technology like machine learning, programming language design and concurrency.
3.	To study various sampling and classification problems.

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

S.No	Outcome	Knowledge Level
1.	Utilize basic concepts of discrete and continuous probability theory.	K3
2	Make use of parametric families of distributions in analyzing problems	K3
3	Apply least squares method to fit best suitable curve for a given data	K3
4	Identify population parameters using different methods of estimation	K3
5.	Utilize the concepts of graph theory and trees in solving problems.	K3
6	Make use of counting techniques to solve combinational enumerator problem. Also solve recurrence relations by the use of different methods	K3

SYLLABUS

UNIT-I (10 Hrs)	Review on basic Probability concepts- sample space -Addition and Multiplication theorems- Bay's theorem- Random variables (Discrete & Continuous). Probability mass, density and cumulative distribution functions(for discrete & continuous random variables)-Joint distribution function- discrete & continuous random variables- conditional distribution- Expected value, Variance- Conditional expectation- Central limit theorem, probabilistic inequalities- Chebychev's inequality, Jenson's inequality- Cauchy – Schwartz inequatility- Convergence in probability- Markov chains.
UNIT-II (10 Hrs)	**Parametric families of distributions**: Binomial, Poisson, Normal, Uniform, exponential and Gamma distribution, derivation of basic characteristics, Hyper geomentric & multinomial distributions.
UNIT-III (10 Hrs)	**Statistical inference, introduction to multivariate Statistical models**: Scatter diagram, fitting of straight line, parabola, power and exponential curves: ax^b, ab^x, ae^{bx} using method of least square approximation, multiple regression (linear equations)- principal component analysis. **Random Samples**: Sampling distributions of Estimators, efficient and unbiased estimation, point & interval estimator: Method of moments and maximum likelyhood estimator.

UNIT-IV (10 Hrs)	**Graph Theory**: Isomorphism, Planar graphs, Euler's and Hamiltonian circuits or Euler's cycles: graph coloring- Choramotic number. **Trees:** Introduction- Trees- Labeled tree- some diagrams on directed and undirected trees, Review of Basic properties of a tree- Sequential representation of a binary tree.
UNIT-V (10 Hrs)	**Counting Methods**: Permutation & Combination with & without repetition: Principal inclusion & exclusion: Specials technique to solve combinational enumerator problem. **Recurrence relation**: Order & Degree of recurrence relation, Solution of Linear homogeneous and non- homogeneous recurrence relation with constant coefficient using methods of generating function, characteristic roots & particular solution by method of undeterment coefficients.

Text Books:

1.	Murrey R. Spiegel, Probability & Statistics, Schaum's Outline Series McGraw-Hill.
2.	Rosen K.H., Discrete Mathematical Structure, Sixth Edition, McGraw-Hill- International Edition.
3.	Miller and Freund's, Probability & Statistics for Engineers, Eighth Edition, By Pearson.
4.	Swapna Kumar chakraborty and Bikash kanti sarkar, Discrete Mathematics, Oxford Higher Education.

Reference Books:

1.	Alan Tucker, Applied Combinatorics, 6th Edition, Wiley.
2.	C.L.Liu, Elements of Discrete Mathematics, 2nd Edition, McGraw-Hill Book Company
3.	John Vince, Foundation Mathematics for Computer Science, Springer
4.	K. Trivedi, Probability and Statistics with reliability, Queuing and Computer Science Applications, 2nd edition, John Wiley and Sons Ltd. Chichester, UK.
5.	M. Mitzenmacher and E. Upfal, Probability and Computing: Randomized Algorithms and Probabilistic Analysis, Cambridge University Press.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1102	**PC**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

ADVANCED DATA STRUCTURES

(Program Core-2)

Course Objectives:

1.	The student should be able to choose appropriate data structures, understand the ADT/libraries, and use it to design algorithms for a specific problem.
2.	Students should be able to understand the necessary mathematical abstraction to solve problems.
3.	To familiarize students with advanced paradigms and data structure used to solve algorithmic problems.
4.	Student should be able to come up with analysis of efficiency and proofs of correctness.

Course Outcomes

After completion of course, students would be able to:

S.No	Outcome	Knowledge Level
1.	Analyze programming problem statements.	K4
2.	Apply divide and conquer strategy to searching using iterative and/or recursive solutions.	K3
3.	Analyze algorithms for text processing applications and develop algorithms for computational geometry problems.	K4
4.	Analyze applications using data structure algorithms.	K4

SYLLABUS

UNIT-I (10 Hrs)	**Dictionaries:** Definition, Dictionary Abstract Data Type, Implementation of Dictionaries. **Hashing:** Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.
UNIT-II (10 Hrs)	**Skip Lists:** Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists
UNIT-III (10 Hrs)	**Trees:** Binary Search Trees, AVL Trees, Red Black Trees, Trees, B-Trees, Splay Trees
UNIT-IV (10 Hrs)	**Text Processing:** Sting Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

UNIT-V (10 Hrs)	**Computational Geometry:** One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quad trees, k- D Trees. Recent Trends in Hashing, Trees, and various computational geometry methods for efficiently solving the new evolving problem
Text Books:	
1.	Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2.	M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.
Reference Books:	
1.	PETER BRASS , ”Advanced Data Structures” , CAMBRIDGE UNIVERSITY PRESS, 2008.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1103	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

ARTIFICIAL INTELLIGENCE

(Program Elective-1)

Course Objectives:

1.	Gain a historical perspective of AI and its foundations.
2.	Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
3.	Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4.	Experience AI development tools such as an „AI language", expert system shell, and/or data mining tool. Experiment with a machine learning model for simulation and analysis.
5.	Solve problems with uncertain information using Bayesian approaches.

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

S.No	Outcome	Knowledge Level
1.	Able to design & construct knowledge using representation tools & use of problem solving strategies for real time problem solving in terms intelligent agents	K3
2.	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.	K3
3.	Able to apply various reasoning techniques to solve the uncertain & incomplete problems using probability theory	K3
4.	Able to solve problems by designing the ANN models for classification & prediction	K5

SYLLABUS

UNIT-I (10 Hrs)	**Introduction to artificial intelligence:** Introduction , history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of AI languages, current trends in AI, **Problem solving: state-space search and control strategies:** Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction
UNIT-II (10 Hrs)	**Problem reduction and game playing:** Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games, **Logic concepts:** Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic
UNIT-III (10 Hrs)	**Knowledge representation:** Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames, **advanced knowledge representation techniques:**

	Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web, **Expert system and applications:** Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools
UNIT-IV (10 Hrs)	**Uncertainty measure: probability theory:** Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory , **Fuzzy sets and fuzzy logic:** Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.
UNIT-V (10 Hrs)	**Machine learning paradigms:** Introduction, machine learning systems, supervised and unsupervised learnings, inductive learning, deductive learning, clustering, support vector machines, case based reasoning and learning, **Artificial neural networks:** Introduction, artificial networks, single layer feed forward networks, multi layered forward networks, design issues of artificial neural networks
Text Books:	
1.	Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2.	Artificial intelligence, A modern Approach, 2nd ed, Stuart Russel, Peter Norvig, PEA
3.	Artificial Intelligence- 3rd ed, Rich, Kevin Knight, Shiv Shankar B Nair, TMH
4.	Introduction to Artificial Intelligence, Patterson, PHI
Reference Books:	
1.	Artificial intelligence, structures and Strategies for Complex problem solving, 5th ed, George F Lugar, PEA
2.	Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3.	Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1104	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

SERVICE ORIENTED ARCHITECTURES AND WEB SECURITY

(Program Elective-1)

Course Objectives:

1.	To provide an overview of XML Technology and modeling databases inXML
2.	The students will learn the concepts of SOA and Web services, some of the prevailing standards and technologies of WebServices
3.	The students will also learn the approaches for providing security for XML documents as well as messages exchanged among WebServices

Course Outcomes By the end of this course student will be able to

S.No	Outcome	Knowledge Level
1.	Demonstrate XML Technology and modelling databases in XML	K2
2.	Analyze SOA and Web services, some of the prevailing	K4
3.	Analyze standards and technologies of Web Services and Security Frame Works	K4

SYLLABUS

UNIT-I (10 Hrs)	**XML Technology:** XML – XML and Web - Name Spaces – XML Document Structure - Structuring with Schemas and DTD - Modeling Databases in XML – XQuery
UNIT-II (10 Hrs)	**SOA Basics :** Service Oriented Architecture (SOA) – Comparing SOA with Client-Server and Distributed architectures - Characteristics of SOA – Benefits of SOA -- Principles of Service orientation – Service layers - Business Process management
UNIT-III (10 Hrs)	**Web Services (WS) :** SOA and Web Services – Web Services Protocol Stack – Service descriptions – WSDL – Messaging with SOAP – Service discovery – UDDI. Service-Level Interaction patterns – XML and Web Services - Enterprise Service Bus - .NET and J2EE Interoperability.
UNIT-IV (10 Hrs)	**WS Technologies and Standards :**Web Services Technologies - JAX-RPC, JAX-WS. Web Service Standards – WS-RM, WS-Addressing, WS-Policy. Service Orchestration and Choreography – Composition Standards - BPEL. Service Oriented Analysis and Design.
UNIT-V (10 Hrs)	**XML and WS Security :**XML Security Overview – Canonicalization – XML Security Framework – XML Encryption – XML Signature – XKMS Structure. Web Services Security - XACML - WS-Security.

Text Books:

1. Ron Schmelzer et al. “XML and Web Services”, Pearson Education, 2008. (Unit 1 and3)

2.	Thomas Erl, " Service Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005 (Unit 2, 3, 4, and5)
3.	Frank P.Coyle, "XML, Web Services and the Data Revolution", Pearson Education, 2002 (Unit 5)
Reference Books:	
1.	Eric Newcomer, Greg Lomow, "Understanding SOA with Web Services", Addison Wesley, 2005.
2.	James McGovern, Sameer Tyagi, Michael E Stevens, Sunil Mathew, "Java Web Services Architecture", Elsevier,2011.
3.	Mark O" Neill, et al., "Web Services Security", Tata McGraw-Hill Edition,2003.
4.	Sandeep Chatterjee and James Webber, "Developing Enterprise Web Services: An Architect's Guide", Prentice Hall, 2004

Code	Category	L	T	P	C	I.M	E.M	Exam
M19IT1105	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

INTERNET OF THINGS
(Program Elective-1)

Course Objectives:

1.	To Understand Smart Objects and IoT Architectures.
2.	To learn about various IOT-related protocols.
3.	To build simple IoT Systems using Arduino and Raspberry Pi.
4.	To understand data analytics and cloud in the context of IoT.
5.	To develop IoT infrastructure for popular applications.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Evaluate the concept of 'internet of things' in different contexts.	K4
2.	Analyze various protocols for IoT.	K4
3.	Design a PoC of an IoT system using Rasperry Pi/Arduino.	K6
4.	Apply data analytics and use cloud offerings related to IoT.	K3
5.	Analyze applications of IoT in real time scenario.	K4

SYLLABUS

UNIT-I (10 Hrs)	**FUNDAMENTALS OF IoT:** Evolution of Internet of Things, Enabling Technologies, IoT Architectures,oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.
UNIT-II (10 Hrs)	**IoT PROTOCOLS:** IT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.
UNIT-III (10 Hrs)	**DESIGN AND DEVELOPMENT:** Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Board details, IDE programming, Raspberry Pi, Interfaces and Raspberry Pi with Python Programming.
UNIT-IV (10 Hrs)	**DATA ANALYTICS AND SUPPORTING SERVICES:** Structured Vs Unstructured Data and Data in Motion Vs Data in Rest, Role of Machine Learning – No SQL Databases, Hadoop Ecosystem, Apache Kafka, Apache Spark, Edge Streaming Analytics and Network Analytics, Xively Cloud for IoT, Python Web Application Framework, Django, AWS for IoT, System Management with NETCONF-YANG.

UNIT-V (8 Hrs)	**CASE STUDIES/INDUSTRIAL APPLICATIONS:**Cisco IoT system, IBM Watson IoT platform, Manufacturing, Converged Plant wide Ethernet Model (CPwE), Power Utility Industry, Grid Blocks Reference Model, Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control.
Text Books:	
1.	IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017
Reference Books:	
1.	Internet of Things – A hands-on approach, Arshdeep Bahga, Vijay Madisetti, Universities Press, 2015.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1106	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

OPTIMIZATION TECHNIQUES

(Program Elective-1)

Course Objectives:

1.	To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.
2.	To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology.
3.	To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems

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

S.No	Outcome	Knowledge Level
1.	Students should able to **Apply** the dynamic programming to solve problems of discreet and continuous variables.	K3
2.	Students should able to **Apply** the concept of non-linear programming	K3
3.	Students should able to **Analyze** out sensitivity	K4
4.	Student should able to **Analyze** the real world problem and simulate it.	K4

SYLLABUS

UNIT-I (10 Hrs)	Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models
UNIT-II (10 Hrs)	Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming
UNIT-III (10 Hrs)	Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT
UNIT-IV (10 Hrs)	Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.
UNIT-V (10 Hrs)	Competitive Models,Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

Text Books:

1.	H.A. Taha, Operations Research, An Introduction, PHI, 2008
2.	H.M. Wagner, Principles of Operations Research, PHI, Delhi, 1982.

Reference Books:	
1.	J.C. Pant, Introduction to Optimisation: Operations Research, Jain Brothers, Delhi, 2008
2.	Hitler Libermann Operations Research: McGraw Hill Pub. 2009
3.	Pannerselvam, Operations Research: Prentice Hall of India 2010
4.	Harvey M Wagner, Principles of Operations Research: Prentice Hall of India 2010

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1107	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

PARALLEL COMPUTER ARCHITECTURE

(Program Elective-1)

Course Objectives:

1.	To understand the principles of parallel computer architecture
2.	To understand the design of parallel computer systems including modern parallel architectures
3.	To assess the communication and computing possibilities of parallel system architecture and to predict the performance of parallel applications

Course Outcomes

After completion of course, students would be able to:

S.No	Outcome	Knowledge Level
1.	**Assume** representation of data, addressing modes, and instructions sets.	K4
2.	**Identify** parallelism both in terms of a single processor and multiple processors	K3
3.	**Analyze** parallel hardware constructs to include instruction-level parallelism for multi core processor design	K4

SYLLABUS

UNIT-I (10 Hrs)	**Fundamentals of Computer Design:** Defining Computer Architecture – Trends in Technology – Trends in Power in Integrated Circuits– Trends in Cost – Dependability – Measuring, Reporting and Summarizing Performance – Quantitative Principles of Computer Design – Basic and Intermediate concepts of pipelining – Pipeline Hazards – Pipelining Implementation issues.
UNIT-II (10 Hrs)	**Instruction-Level Parallelism and Its Exploitation:** Instruction-Level Parallelism: Concepts and Challenges – Basic Compiler Techniques for Exposing ILP – Reducing Branch Costs with Prediction – Overcoming Data Hazards with Dynamic Scheduling – Dynamic Scheduling: Algorithm and Examples – Hardware-Based Speculation – Exploiting ILP Using Multiple Issue and Static Scheduling – Exploiting ILP Using Dynamic Scheduling, Multiple Issue and Speculation – Studies of the Limitations of ILP – Limitations on ILP for Realizable Processors – Hardware versus Software Speculation – Using ILP Support to Exploit Thread-Level Parallelism
UNIT-III (10 Hrs)	**Data-Level and Thread-Level Parallelism:** Vector Architecture – SIMD Instruction Set Extensions for Multimedia – Graphics Processing Units – Detecting and Enhancing Loop-Level Parallelism – Centralized Shared-Memory Architectures – Performance of Shared-Memory Multiprocessors – Distributed Shared Memory and Directory Based Coherence – Basics of Synchronization – Models of Memory Consistency – Programming Models and Workloads for Warehouse-Scale Computers – Computer Architecture of Warehouse-Scale Computers – Physical Infrastructure and Costs of Warehouse-Scale Computers

UNIT-IV (10 Hrs)	**Memory Hierarchy Design:** Cache Performance – Six Basic Cache Optimizations – Virtual Memory – Protection and Examples of Virtual Memory – Ten Advanced Optimizations of Cache Performance – Memory Technology and Optimizations – Protection: Virtual Memory and Virtual Machines – The Design of Memory Hierarchies
UNIT-V (10 Hrs)	**Storage Systems & Case Studies:** Advanced Topics in Disk Storage – Definition and Examples of Real Faults and Failures – I/O Performance, Reliability Measures and Benchmarks – Designing and Evaluating an I/O System – The Internet Archive Cluster Case Studies / Lab Exercises: INTEL i3, i5, i7 processor cores, NVIDIA GPUs, AMD, ARM processor cores – Simulators – GEM5, CACTI, SIMICS, Multi2sim and INTEL Software development tools.
Text Books:	
1.	David.A.Patterson, John L.Hennessy, "Computer Architecture: A Quantitative approach", Elsevier, 5 th Edition 2012.
2.	K.Hwang, Naresh Jotwani, “Advanced Computer Architecture, Parallelism, Scalability, Programmability”, Tata McGraw Hill, 2 nd Edition 2010
Reference Books:	
1	David E. Culler & Jaswinder Pal Singh, “Parallel Computing Architecture: A Hardware / Software Approach”, Morgan Kaufman Publishers, 1999.
2	Michael J. Quinn, “Parallel Programming in C with MPI & OpenMP”, Tata McGraw-Hill, New Delhi, 2003.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1108	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

BIG DATA ANALYTICS

(Program Elective-2)

Course Objectives:

1.	To Provide an overview of an exciting growing field of Big Data analytics.
2.	To Introduce the tools required to manage and analyze big data like Hadoop, MapReduce etc.,

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Identify the programming requirements viz., generic types and methods to perform data analysis	K3
2.	Apply the existing technologies in distributed files systems to analyze the big data	K3
3.	To analyze the Map-Reduce programming model for better optimization	K4
4.	Collect, manage, store, query, and analyze big data; and identify the need of interfaces to perform I/O operations in Hadoop	K3

SYLLABUS

UNIT-I (10 Hrs)	**Data structures in Java:** Linked List, Stacks, Queues, Sets, Maps; **Generics:** Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization
UNIT-II (10 Hrs)	**Working with Big Data:** Google File System, Hadoop Distributed File System (HDFS), Building blocks of Hadoop (Name node, Data node, Secondary Name node, Job Tracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.
UNIT-III (10 Hrs)	**Writing Map Reduce Programs:** A Weather Dataset, Understanding Hadoop API for Map Reduce Framework (Old and New), **Basic programs of Hadoop Map Reduce:** Driver code, Mapper code, Reducer code, Record Reader, Combiner, Partitioner
UNIT-IV (10 Hrs)	**Hadoop I/O:** The Writable Interface, Writable Comparable and comparators, **Writable Classes:** Writable wrappers for Java primitives, Text, Bytes Writable, Null Writable, Object Writable and Generic Writable, Writable collections, Implementing a Custom Writable: Implementing a Raw Comparator for speed, Custom comparators
UNIT-V (10 Hrs)	**Pig:** Hadoop Programming Made Easier, Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin, **Applying Structure to Hadoop Data with Hive:** Saying Hello to Hive, Seeing How

	the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation Language Works, Querying and Analyzing Data
Text Books:	
1.	Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2.	Hadoop: The Definitive Guide by Tom White, 3rd Edition, O"Reilly
3.	Hadoop in Action by Chuck Lam, MANNING Publ
4.	Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown and Rafael Coss
Reference Books:	
1.	Hadoop in Practice by Alex Holmes, MANNING Publ
2.	Hadoop MapReduce Cookbook, Srinath Perera, Thilina Gunarathne
Web Resources:	
1.	Hadoop: https://hadoop.apache.org/
2.	Hive: https://cwiki.apache.org/confluence/display/Hive/Home/
3.	Piglatin: https://pig.apache.org/docs/r0.7.0/tutorial.html

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1109	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

PRINCIPLES OF CRYPTOGRAPHY

(Program Elective-2)

Course Objectives:

1.	To gain knowledge about the mathematics of the cryptographic algorithms.
2.	To get an insight into the working of different existing cryptographic algorithms.
3.	Analyzing and application of cryptography for secure eCommerce and other secret transactions

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Identify** classical cryptosystems to security problems	K3
2.	**Apply** the existing cryptographic algorithms with the existing communication protocols	K3
3.	**Analyzing** the application of cryptography for secure eCommerce and other secret transactions	K4

SYLLABUS

UNIT-I (10 Hrs)	**Algebra:** Group, cyclic group, cyclic subgroup, field, probability. Number Theory: Fermat's theorem , Cauchy 's theorem, Chinese remainder theorem, primality testing algorithm, Euclid's algorithm for integers, quadratic residues, Legendre symbol, Jacobi symbol etc..
UNIT-II (10 Hrs)	**Cryptography and cryptanalysis, Classical Cryptography, substitution cipher, different type of attack:** CMA,CPA,CCA etc, Shannon perfect secrecy, OTP, Pseudo random bit generators, stream ciphers and RC4.
UNIT-III (10 Hrs)	**Block ciphers:** Modes of operation, DES and its variants, AES, linear and differential cryptanalysis.
UNIT-IV (10 Hrs)	One-way function , trapdoor one-way function, Public key cryptography, RSA cryptosystem, DiffieHellman key exchange algorithm, Elgamal Cryptosystem.
UNIT-V (10 Hrs)	**Cryptographic hash functions**, secure hash algorithm, Message authentication, digital signature, RSA digital signature, Elgamal digital signature.

Text Books:

1.	Stinson. D. Cryptography: Theory and Practice, third edition, Chapman & Hall/CRC, 2010.

Reference Books:

1.	W. Stallings, Cryptography and Network Security Principles and practice, 5/e, Pearson Education Asia, 2012.
2.	Behrouz A. Forouzan and Debdeep Mukhopadhyay, Cryptography and Network Security, second edition, Tata McGraw Hill, 2011
3.	Thomas Koshy, Elementary Number Theory with applications, Elsevier India, 2005.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1110	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

CLUSTER AND GRID COMPUTING

(Program Elective-2)

Course Objectives:

1.	To provide an insight for achieving cost efficient high performance system.
2.	To deal with design and architecture of grid and cluster computing.
3.	To able to setup various clustering techniques in parallel computing and applying various process scheduling policies.

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

S.No	Outcome	Knowledge Level
1.	Identify the Functionalities & Applications of Grid Computing, Web Services, and Service-oriented architecture.	K3
2	Apply and Analyze Resource management and Scheduling in Grid computing & Cluster Computing.	K4
3	Develop how to setup a cluster, Apply various Process Scheduling Algorithms and load balancing.	K3

SYLLABUS

UNIT-I (10 Hrs)	**Introduction:** Cluster and Grid computing, Meta-computing, Web services and Grid Computing, e-Governance and the Grid Technologies and Architectures for Grid Computing: Issues in Data Grids, Functional requirements in Grid Computing, Standards for Grid Computing, Recent technology trends in Large Data Grids. Web Services and the Service Oriented Architecture: Service Oriented Architecture, SOAP and WSDL, Creating Web Services, Server Side.
UNIT-II (10 Hrs)	**OGSA and WSRF:** OGSA for Resource Distribution, Stateful Web Services in OGSA, WSRF, WSRF Specification, Globus Toolkit: History, version, Applications, Approaches and Benefits, Infrastructure Management, Monitoring and Discovery, Security, Data Choreography and Coordination, GT4 Architecture, GT4 Containers. The Grid and Databases: Requirements, Storage Request Broker, Integration of Databases with the Grid, Architecture of OGSADAI for offering Grid Database services.
UNIT-III (10 Hrs)	**Cluster Computing:** Approaches to Parallel Computing, Definition and Architecture of a Cluster, Categories of clusters. Cluster Middleware: Levels and Layers of Single System Image, Design objectives, Resource Management and Scheduling, Cluster programming Environment and Tools. Networking, Protocols & I/O for clusters: Networking and Interconnection/Switching Devices, Design Issues, Design Architecture, HiPPI, ATM, Myrinet, Memory Channel
UNIT-IV (10 Hrs)	**Setting Up and Administering a Cluster:** Setup of simple cluster, setting up nodes, clusters of clusters, System monitoring, Global Clocks Sync. Cluster Technology for High Availability: High availability clusters, high availability parallel computing, types of

	failures and errors, cluster architectures and configurations for high availability, Failure/Recovery clusters.
UNIT-V (10 Hrs)	**Process Scheduling:** Job management System, Resource management system, policies of resource utilization, Scheduling policies. Load Sharing and Load Balancing: Introduction, Strategies for load balancing, Modelling parameters. Recent trends: technologies and attributes in Cluster and Grid computing. Case study of various cluster architectures, load balancing and scheduling policies.
Text Books:	
1.	Grid and Cluster Computing , CSR Prabhu, PHI
Reference Books:	
1.	Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, K. Hwang, G. Fox and J. Dongarra, MK Publishers

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1111	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

IMAGING AND MULTIMEDIA SYSTEMS

(Program Elective-2)

Course Objectives:

1.	To understand the basics of image processing and image security techniques
2.	To study various compression and file formats used in imaging and multimedia systems
3.	To analyze different media and design issues related to multimedia systems

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Able to design the models for new compression standards	K3
2.	Acquire skill set to handle all multimedia components & able to save the images in various formats	K2
3.	Able to develop Integrated and Collaborative multimedia systems	K3
4.	Able to apply various information security methods like stenography	K3
5.	Able to design an effective user interface using HTML & XML	K4

SYLLABUS

UNIT-I (10 Hrs)	**Introduction to Image Processing:** Steps in Image Processing Systems –Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models. Introduction to Multimedia: Multimedia Elements – Multimedia applications – Multimedia System Architecture – Evolving technologies for Multimedia – Defining objects for Multimedia systems – Multimedia Data interface standards – Multimedia Databases.
UNIT-II (10 Hrs)	**Compression and Decompression:** Need for Data Compression – Types of Compression – Binary Image Compression Schemes – Image Compression – Video Compression – Audio Compression. Data and File Format Standards: Rich Text Format – TIFF File Format – Resource Interface File Format – MIDI File Format - JPEG DIB File Format – AVI Indeo File Format – MPEG Standards
UNIT-III (10 Hrs)	**Image computing:** The basics of processing 2D images- Thresholding -Convolution-Edge detection-Mathematical Morphology and Shape Descriptors-Noise Reduction- Image Fusion. Image Security: Image Forensics - Steganography -Image Cryptography Techniques-Chaos based and Non-Chaos based methods.
UNIT-IV (10 Hrs)	**Input and Output Technologies:** Multimedia I/O Technologies: Image Scanners – Digital Voice and Audio – Digital Camera – Video Images and Animation – Full Motion Video - Video Motion Analysis.

UNIT-V (10 Hrs)	Multimedia Application Classes – Types of Multimedia Systems – Virtual Reality – Components of Multimedia Systems -Multimedia Authoring Systems – Multimedia Authoring Tools - User Interface Design- Mobile Messaging – Hypermedia Message Components -Hypermedia Linking and embedding.
Text Books:	
1.	Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education, 2011.
2.	Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications & Applications", Pearson education, 2009.
Reference Books:	
1.	A.K. Jain, Fundamentals of Digital Image Processing ,PHI, New Delhi, 2001.
2.	William K Pratt, Digital Image Processing, John Willey , 2012.
3.	Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", Prentice Hall India, 2007,New Delhi.
4.	Tay Vaughan, "Multimedia Making It Work", McGraw Hill, 2011. 5. Parekh R "Principles of Multimedia" Tata McGraw-Hill, 2006.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19 IT 1112	**PE**	**3**	**0**	**0**	**3**	**25**	**75**	**3 Hrs.**

ADVANCED GRAPH THEORY

(Program Elective-2)

Course Objectives:

1.	All elementary concepts such as coloring, covering, hamiltonicity, planarity, connectivity and so on, it will also introduce the students to some advanced concepts.
2.	The student will know the definitions of relevant vocabulary and various algorithms from graph theory.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	**Evaluate** precise and accurate mathematical definitions of objects in graph theory.	K5
2.	**Analyze** and solve some real time problems using concepts of graph theory (e.g., scheduling problems).	K4
3.	**Develop** some classical graph algorithms in order to find sub graphs with desirable properties.	K3

SYLLABUS

UNIT-I (10 Hrs)	**Basic Concepts-** Graphs and digraphs, incidence and adjacency matrices, isomorphism, the automorphism group, **Trees-** Equivalent definitions of trees and forests, Cayley's formula, the Matrix-Tree theorem
UNIT-II (10 Hrs)	**Connectivity-** Cut vertices, cut edges, bonds, the cycle space and the bond space, blocks, Menger's theorem, **Paths and Cycles-** Euler tours, Hamilton paths and cycles, theorems of Dirac, Ore, Bondy and Chvatal, circumference, the Chinese Postman Problem, the Travelling Salesman problem, diameter and maximum degree.
UNIT-III (10 Hrs)	**Matchings-** Berge's Theorem, perfect matchings, Hall's theorem, Tutte's theorem, Konig's theorem, Petersen's theorem, algorithms for matching and weighted matching (in both bipartitie and general graphs), factors of graphs (decompositions of the complete graph), Tutte's f- factor theorem, **Extremal problems-** Independent sets and covering numbers
UNIT-IV (10 Hrs)	**Colorings-** Brooks theorem, the greedy algorithm, the Welsh-Powell bound, critical graphs, chromatic polynomials, girth and chromatic number, Vizing's theorem, **Graphs on surfaces-** Planar graphs, duality, Euler's formula, Kuratowski's theorem, toroidal graphs, 2-cell embeddings, graphs on other surfaces.
UNIT-V (10 Hrs)	Directed graphs- Tournaments, directed paths and cycles, connectivity and strongly connected digraphs, Networks and flows- Flow cuts, max flow min cut theorem, Selected topics- Dominating sets, the reconstruction problem.

Text Books:	
1.	Introduction to Graph Theory, Douglas B. West, Prentice Hall of India
2.	Graph Theory with Applications to Engineering and Computer Science, Narsingh Deo, Prentice-Hall
Reference Books:	
1.	Graph Theory, Frank Harary, Narosa
2.	Network Flows: Theory, Algorithms, and Applications, R.Ahuja, T. Magnanti, and J. Orlin, Prentice-Hall

Code	Category	L	T	P	C	I.M	E.M	Exam
M19RD1101	**RD**	**2**	**0**	**0**	**2**	**25**	**75**	**3 Hrs.**

RESEARCH METHODOLOGY AND IPR
(Common to CST,CS,PSA, IT & CAD)

Course Objectives:

1.	To bring awareness on Research Methodology and research ethics.
2.	Familiarize the concepts of IPR.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Analyze research related information	K4
2.	Formulate a Research Proposals and Publish papers with research ethics	K6
3.	Award for Intellectual Property Rights like Patents, Trade and Copyrights	K5
4.	Analyze Various Intellectual Property Rights	K4
5.	AssessNew Developments of IPRs in National and International level	K5

SYLLABUS

UNIT-I (6 Hrs)	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 (6 Hrs)	Effective literature studies approaches, analysis Plagiarism, Research ethics, 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-III (6 Hrs)	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-IV (4 Hrs)	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.
UNIT-V (6 Hrs)	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‖
3.	Ranjit Kumar, 2nd Edition, ―Research Methodology: A Step by Step Guide for beginners‖

Reference Books:	
1.	Halbert, ―Resisting Intellectual Property‖, Taylor & Francis Ltd, 2007.
2.	Mayall, ―Industrial Design‖, McGraw Hill, 1992.
3.	Niebel, ―Product Design‖, McGraw Hill, 1974.
4.	Asimov, ―Introduction to Design‖, Prentice Hall, 1962.
5.	Robert P. Merges, Peter S. Menell, Mark A. Lemley, ― Intellectual Property in New Technological Age‖, 2016.
6.	T. Ramappa, ―Intellectual Property Rights Under WTO‖, S. Chand, 2008

Code	Category	L	T	P	C	I.M	E.M	Exam
MTIT1113	**PC**	**0**	**0**	**4**	**2**	**25**	**75**	**3 Hrs.**

ADVANCED DATA STRUCTURES LAB

Course Objectives:

1.	The course is designed to develop skills to design and analyze different Algorithms
2.	It enables them to gain knowledge in practical applications of data structures .

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Be capable to **Develop** solutions for a range of problems using object oriented programming.	K6
2.	Be capable to **Identity** the appropriate data structure for given problem	K3
3.	Be capable to **Analyze** performance of algorithms.	K4

LIST OF EXPERIMENTS

1.	Perform various operations on AVL Trees
2.	Perform various operations on BST
3.	Implementation of Static Hashing
4.	Implementation of Huffman coding
5.	Implementation of B Tree.
6.	Consider telephone book database of N clients. Make use of a hash table implementation to quickly look up client,,s telephone number.
7	Implement all the functions of a dictionary (ADT) using hashing. Data: Set of (key, value) pairs, Keys are mapped to values, Keys must be comparable, Keys must be unique Standard Operations: Insert(key, value), Find(key), Delete(key)
8	For given set of elements create skip list. Find the element in the set that is closest to some given value.
9	Implement KMP algorithm for Pattern Matching
10	Implement Boyer-Moore algorithm for Pattern Matching
11	Implement Naïve string matching algorithm.
12	Implement insertion, deletion, display and search operation in m-way B tree (i.e. a nonleaf node can have atmost m children) for the given data as integers (Test the program for m=3, 5, 7).
13	Implementation of Skiplists

Reference Books:

1.	Algorithms, Data Structures, and Problem Solving with C++ by Mark Allen Weiss
2.	Data Structures and Algorithms in C++ by Brijendra Kumar Joshi

Code	Category	L	T	P	C	I.M	E.M	Exam
M19IT1114	**PC**	**0**	**0**	**4**	**2**	**25**	**75**	**3 Hrs.**

COMPUTING LAB

Course Objectives:

1.	To introduce Python programming language through its core language basics and program design techniques suitable for modern applications.
2.	To understand the wide range of programming facilities available in Python covering graphics, GUI, data visualization and Databases.
3.	To utilize high-performance programming constructs available in Python to develop solutions in real life scenarios using AI.

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Design real life situational problems and think creatively about solutions of them.	K6
2.	Formulate a solution clearly and accurately in a program using Python.	K6
3.	Inspect the best features of Python to program real life problems using AI.	K4

Artificial Intelligence Specialization :

1.	Write a python program to print the multiplication table forthe given number.?
2.	Write a python program to check whether the given number is prime or not.
3.	Write a python program to find factorial of the given number.
4.	Write a python program to implement simple Chatbot.
5.	Write a python program to implement List operations (Nested List, Length, Concatenation, Membership, Iteration, Indexing and Slicing).
6.	Write a python program to implement List methods (Add, Append, Extend & Delete).
7	Write a python program to Illustrate Different Set Operations.
8	Write a python program to generate Calendar for the given month andyear.
9	Write a python program to implement Simple Calculator program.
10	Write a python program to Add TwoMatrices.
11	Write a python program to Transpose a Matrix.
12	Write a python program to remove punctuations from the givenstring?
13	Implementation Write a python program to sort the sentence in alphabetical order.
14	Write a python program to implement Breadth First Search Traversal.
15	Write a python program to implement Water Jug Problem.
16	Write a program to implement Hangman game using python.
17	Write a program to implement Tic-Tac-Toe game using python.
18	Write a python program to remove stop words for a given passage from a text file using NLTK.
19	Write a python program to implement stemming for a given sentence using NLTK.
20	Write a python program to POS (Parts of Speech) tagging for the give sentence using NLTK?

Reference Books:

1. Let us Python, YashavantKanetkar BPB publications
2. Artificial Intelligence with Python: A Comprehensive Guide to Building Intelligent Apps for Python Beginners and Developers, Prateek Joshi Packt Publishing

Big Data Specialization :	
S.No	**Details**
1	(i)Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed, Fully distributed (ii)Use web based tools to monitor your Hadoop setup.
2	Implement the following file management tasks in Hadoop: • Adding files and directories • Retrieving files • Deleting files
3	Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
4	Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.
5	Implement Matrix Multiplication with Hadoop Map Reduce
6	Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter Your data.
7	Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

Reference Books:

1. Hadoop Map Reduce Cookbook, Srinath Perera&ThilinaGunarathne, 2013, PACKT PUBLISHING

Cryptography Specialization :	
Exercise	**Exercise Details**
1	Write a Java program to perform encryption and decryption using the following algorithms: a) Ceaser Cipher b) Substitution Cipher c) Hill Cipher
2	Write a Java program to implement the 3 DES and AES algorithms.
3	Write a JAVA program to implement the BlowFish algorithm
4	Implement MD-5 using Java
5	Write a Java program to implement RSA (2048 Key Length) Algorithm.
6	Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript. Consider the end user as one of the parties (Alice) and the JavaScript application as other party (bob).
7	Calculate the message digest of a text using the SHA-2 algorithm in JAVA.

Reference Books:

1. Beginning Cryptography with Java, David Hook Wiley India PrivateLimited

Code	Category	L	T	P	C	I.M	E.M	Exam
M19AC0001	**AC**	**2**	**0**	**0**	**0**	**0**	**0**	**--**

ENGLISH FOR RESEARCH PAPER WRITING

Course Objectives:

1.	Understand 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.	Ensure the good quality of paper at very first-time submission

Course Outcomes

S.No	Outcome	Knowledge Level
1.	Understand that how to improve your writing skills and level of readability	K2
2.	Learn about what to write in each section	K2
3.	Understand the skills needed when writing a Title Ensure the good quality of paper at very first time submission	K2

SYLLABUS

UNIT-I (4Hrs)	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness
UNIT-II (4Hrs)	Clarifying Who Did What, Highlighting Your Findings, Hedging And Criticizing, Paraphrasing and Plagiarism, Sections of a Paper.
UNIT-III (4Hrs)	Abstracts, Introduction, Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.
UNIT-IV (4Hrs)	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, skills are needed when writing the Methods.
UNIT-V (4Hrs)	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:

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

Reference Books:

1.	Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book.
2.	Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

Code	Category	L	T	P	C	I.M	E.M	Exam
M19AC0002	**AC**	**2**	**0**	**0**	**0**	**0**	**0**	**--**

DISASTER MANAGEMENT

Course Objectives:

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 & programming in different countries, particularly their home country or the countries they work in.

SYLLABUS

UNIT-I (4Hrs)	**Disaster:** Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.
UNIT-II (4Hrs)	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 (4Hrs)	**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-IV (4Hrs)	**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-V (4Hrs)	**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. **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:

1. R. Nishith, Singh AK, Disaster Management in India: Perspectives, issues and strategies New Royal Book Company.

2.	Sahni, PardeepEt.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.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19AC0003	**AC**	**2**	**0**	**0**	**0**	**0**	**0**	**--**

SANSKRIT FOR TECHNICAL KNOWLEDGE

Course Objectives:

1.	To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2.	Learning of Sanskrit to improve brain functioning
3.	Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
4.	The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Course Outcomes

S.No	Outcome	Knowledge Level
1	Understanding basic Sanskrit language.	K2
2	Ancient Sanskrit literature about science & technology can be understood.	K2
3	Being a logical language will help to develop logic in students.	K6

SYLLABUS

UNIT-I (7Hrs)	Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences
UNIT-II (7Hrs)	Order, Introduction of roots, Technical information about Sanskrit Literature
UNIT-III (7Hrs)	Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

Text Books:

1.	“AbhyasaPustakam” – Dr.Vishwas, Samskrita-Bharati Publication, New Delhi
2.	“Teach Yourself Sanskrit” PrathamaDiksha-VempatiKutumbasastry, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3.	“India’s Glorious Scientific Tradition” Suresh Soni, Ocean books (P) Ltd., New Delhi

Code	Category	L	T	P	C	I.M	E.M	Exam
M19AC0004	**AC**	**2**	**0**	**0**	**0**	**0**	**0**	**--**

VALUE EDUCATION

Course Objectives:

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

Course Outcomes

S.No	Outcome	Knowledge Level
1	Knowledge of self-development	K1
2	Learn the importance of Human values	K2
3	Developing the overall personality	K3

SYLLABUS

UNIT-I (4Hrs)	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 (4Hrs)	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 (4Hrs)	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. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation, Doing best for saving nature
UNIT-IV (4Hrs)	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:

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

Code	Category	L	T	P	C	I.M	E.M	Exam
M19AC0005	**AC**	**2**	**0**	**0**	**0**	**0**	**0**	**--**

CONSTITUTION OF INDIA

Course Objectives:

1.	Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2.	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
3.	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

Course Outcomes

S.No	Outcome	Knowledge Level
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.	K2
2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.	K2
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.	K2
4	Discuss the passage of the Hindu Code Bill of 1956.	K2

SYLLABUS

UNIT-I (4Hrs)	**History of Making of the Indian Constitution:** History , Drafting Committee, (Composition & Working)
UNIT-II (4Hrs)	Philosophy of the Indian Constitution: Preamble ,Salient Features
UNIT-III (4Hrs)	Fundamental Rights,Right to Equality, Right to Freedom,Right against Exploitation, Right to Freedom of Religion,Cultural and Educational Rights,Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties
UNIT-IV (4Hrs)	**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 **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: Zilla Panchayat. Elected officials and their roles, CEO Zilla Panchayat:

	Position and role. Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials, Importance of grass root democracy
UNIT-V (4Hrs)	**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.
Text Books:	
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., LexisNexis, 2014.
4.	D.D. Basu, Introduction to the Constitution of India, LexisNexis, 2015.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19AC0006	**AC**	**2**	**0**	**0**	**0**	**0**	**0**	**--**

PEDAGOGY STUDIES

SYLLABUS

UNIT-I (4Hrs)	**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 (4Hrs)	Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries, Curriculum, Teacher education.
UNIT-III (4Hrs)	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.
UNIT-IV (4Hrs)	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. Professional development: alignment with classroom practices andfollow-up support
UNIT-V (4Hrs)	**Research gaps and future directions:** Research design, Contexts,Pedagogy,Teachereducation,Curriculum and assessment,Dissemination and research impact.

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 basicmaths and reading in Africa: Does teacher preparation count? International Journal of 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.

Code	Category	L	T	P	C	I.M	E.M	Exam
M19AC0007	**AC**	**2**	**0**	**0**	**0**	**0**	**0**	**--**

STRESS MANAGEMENT BY YOGA

Course Objectives:

1.	To achieve overall health of body and mind
2.	To overcome stress

Course Outcomes

S.No	Outcome	Knowledge Level
1	Develop a healthy mind in a healthy body thus improving social health also.	K2
2	Improve efficiency	K2

SYLLABUS

UNIT-I (7Hrs)	Definitions of Eight parts of yoga (Ashtanga)
UNIT-II (7Hrs)	Yam and Niyam. Do's and Don'ts in life. i) Ahinsa, satya, astheya, brahmacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishvarapranidhana
UNIT-III (7Hrs)	Asan and Pranayam i) Various yog poses and their benefits for mind & body ii)Regularization of breathing techniques and its effects-Types pranayama

Text Books:

1.	‘Yogic Asanas for Group Training-Part-I” : Janardan Swami YogabhyasiMandal, Nagpur
2.	“Raja Yoga or conquering the Internal Nature” by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

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M19AC0008	**AC**	**2**	**0**	**0**	**0**	**0**	**0**	**--**

PERSONALITY DEVELOPMENT THROUGH LIFEENLIGHTENMENT SKILLS

Course Objectives:

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

Course Outcomes

S.No	Outcome	Knowledge Level
1	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life.	K2
2	The person who has studied Geeta will lead the nation and mankind to peace and prosperity.	K2
3	Study of Neetishatakam will help in developing versatile personality of students.	K2

SYLLABUS

UNIT-I (7Hrs)	Neetisatakam-Holistic development of personality Verses- 19,20,21,22 (wisdom), Verses- 29,31,32 (pride & heroism) Verses- 26,28,63,65 (virtue),Verses- 52,53,59 (don'ts),Verses- 71,73,75,78 (do's)
UNIT-II (7Hrs)	Approach to day to day work and duties. ShrimadBhagwadGeeta : 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-III (7Hrs)	Statements of basic knowledge, ShrimadBhagwadGeeta: Chapter2-Verses 56, 62, 68, Chapter 12 -Verses 13, 14, 15, 16,17, 18, Personality of Role model. ShrimadBhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39, Chapter18 – Verses 37,38,63

Text Books:

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.