I M.TECH. II SEMESTER SYLLABUS

MACHINE LEARNING

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45812	3	1	-	4	25	75	100

COURSE OBJECTIVES:

- To learn the concept of how to learn patterns and concepts from data without being explicitly programmed in various IOT nodes.
- To design and analyse various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- Explore supervised and unsupervised learning paradigms of machine learning.
- To explore Deep learning technique and various feature extraction strategies.

COURSE OUTCOMES:

After completion of course, students would be able to:

- Extract features that can be used for a particular machine learning approach in various IOT applications.
- To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.
- Use decision trees and statistics models
- To mathematically analyse various machine learning approaches and paradigms.
- Use data analysis for machine learning

UNIT-I	INTRODUCTION

Machine Learning paradigms, Probability and Bayes Learning, Bayes Theorem, Inductive Learning, Deductive Learning, Applications of Machine learning, Working with Python for machine learning.

UNIT-II	SUPERVISED LEARNING (REGRESSION/CLASSIFICATION)

Basic methods: Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes.
Linear models: Linear Regression, Logistic Regression, Generalized Linear Models. Support Vector Machines, Nonlinearity and Kernel Methods.

UNIT-III	UNSUPERVISED LEARNING

Clustering: K-means, Kernel K-means, DBSCAN, CLARA, Fuzzy Clustering.
Dimensionality Reduction: PCA, LDA, IDA, Matrix Factorization and Matrix Completion.

UNIT-IV	ENSEMBLE METHODS

Evaluating Machine Learning algorithms and Model Selection, Introduction to Statistical Learning Theory, Ensemble Methods (Boosting, Bagging, Random Forest), Sparse Modelling and Estimation, Modelling Sequence/Time-Series Data.

UNIT-V	NEURAL NETWORKS AND ANN

Neural Networks - Introduction, Early Models, Perceptron Learning, Backpropagation, Initialization, Training & Validation, Parameter Estimation - MLE, MAP, Reinforcement Learning.
Artificial Neural Networks: Single-Layer Feed Forward Networks, Multi-Layer Feed-Forward Networks, Radial-

Basis Function Networks, Design Issues of Artificial Neural Networks, Recurrent Networks.

Text Books:

1.Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012
2. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer 2009 (freely available online)
3. Christopher Bishop, Pattern Recognition and Machine Learning, Springer, 2007
Machine Learning – Tom M. Mitchell, - MGH
4. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & SonsInc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Machine Learning by Peter Flach , Cambridge.

BIGDATA ENGINEERING

M.TECH I YEAR – II SEM:

COURSE CODE	HOURS/ WEEK			CREDITS	MAXIMUM MARKS		
	L	T	P	C	CIE	SEE	TOTAL
B45813	3	-	-	3	25	75	100

COURSE OBJECTIVES:

1. To familiarize students, about the concepts of Big Data and Big Data processing tools.
2. To facilitate students in learning HADOOP framework.
3. To teach and guide students in setting up cluster and help them in designing Big Data applications.
4. To improve students analytical skills by working on real time datasets.

COURSE OUTCOMES:

Upon completion of this course, the students should be able to:

1. Identify and list various Big Data concepts, tools and applications.
2. Develop programs using HADOOP framework.
3. Use Hadoop Cluster to deploy Map Reduce jobs, PIG and HIVE programs.
4. Analyze the given data set and identify deep insights from the data set.

UNIT-I	INTRODUCTION TO BIG DATA:

INTRODUCTION TO BIGDATA: Data and its importance, Big Data – definition, implications of Big Data, addressing implications using Hadoop, Hadoop Ecosystem.
HADOOP ARCHITECTURE Hadoop Storage : HDFS, Hadoop Processing : Map Reduce Framework, Hadoop Server Roles : Name Node, Secondary Name Node, and Data Node, Job Tracker, Task Tracker **HDFS – HADOOP DISTRIBUTED FILE SYSTEM :** Design of HDFS, HDFS Concepts, HDFS Daemons, HDFS High Availability, Block Abstraction, FUSE – File System in User Space. HDFS Command Line Interface (CLI), Concept of File Reading and Writing in HDFS.

UNIT-II	MAPREDUCE

Introduction to Map Reduce Programming model to process Big Data, key features of Map Reduce, Map Reduce Job skeleton, Introduction to Map Reduce API, Hadoop Data Types, develop Map Reduce Job using Eclipse, build a Map Reduce Job and export it as a java archive (.jar file), MAP REDUCE JOB LIFE CYCLE How Map Reduce Works? Developing Map Reduce Jobs based on the requirement using the given datasets like weather dataset, MAP REDUCE API Understanding new Map Reduce API from org.apache.hadoop.Map Reduce and its sub packages to develop Map Reduce applications.

UNIT-III	APACHE PIG

INTRODUCTION TO PIG:
Understanding Pig and Pig Platform, introduction to Pig Latin Language and Pig Execution engine, running pig in different modes, Pig Grunt Shell and its usage. PIG LATIN LANGUAGE – SEMANTICS - DATA TYPES IN PIG Pig Latin Basics, Key words, Pig Data Types, understanding Pig relation, bag, tuple and fields, writing pig relations or statements using Grunt Shell, expressions, Data processing operators, using Built in functions.
WRITING PIG SCRIPTS USING PIG LATIN Writing pig scripts and saving them using text editor, running pig scripts from command line

UNIT-IV	HIVE AND FLUME

INTRODUCTION TO HIVE:
Understanding Hive, Hive Shell, Running Hive, understanding hive execution engine, Understanding Schema on read and Schema on write, Hive QL.

FLUME:
Introduction to Flume agent, understanding Flume components Source, Channel and Sink, Writing flume configuration file, running flume configuration file to ingest the data into HDFS.

UNIT-V	SQOOP AND OOZIE

SQOOP:
Introduction to Sqoop tool, commands to connect databases and list databases and tables, command to import data from RDBMS into HDFS, Command to export data from HDFS into required table of RDBMS.

OOZIE:
Introduction to Oozie, Understand work flow and how to write Work flow using Work Flow definition language in XML, running a basic Oozie workflow to run a MapReduce job.

Text Books:

1. Tom White, Hadoop: The Definitive Guide, 3/e, O'Reilly Publications. (MODULE –III)
2. Michael Minelli, Michele Chambers, Big Data, Big Analytics, Wiley Publications, 2013
3. Big Data and Analytics, Seema Acharya and Subhashini Chellappan – Wiley India, 2015.

Reference Books:

1. Frank J Ohlhorst, “Big Data Analytics: Turning Big Data into Big Money”, Wiley and SAS BusinessSeries, 2012.
2. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007.
3. Paul Zikopoulos, Dirk deRoos, Krishnan Parasuraman, Thomas Deutsch , James Giles, DavidCorrigan, “Harness the Power of Big data – The big data platform”, McGraw Hill, 2012.

ADVANCED COMPUTER NETWORKS

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45814	3	-	-	3	25	75	100

COURSE OBJECTIVES:

1. To review the computer networking concepts
2. To impart concepts of advanced computer networking.
3. To introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
4. To facilitate students in gaining expertise in some specific areas of networking such as the design and maintenance of individual networks.

COURSE OUTCOMES:

After completing this course the student must demonstrate the knowledge and ability to:

1. Apply Data Communications System and its components.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. Identify the different types of network devices and their functions within a network

UNIT-I	COMPUTER NETWORKS AND THE INTERNET

Computer Networks and the Internet: History of Computer Networking and the Internet, Networking Devices, The Network edge, The Network core, Access Networks and Physical media, ISPs and Internet Backbones. Networking Models: 5-layer TCP/IP Model,
7-Layer OSI Model, Internet Protocols and Addressing, Equal- Sized Packets Model: ATM.

UNIT-II	NETWORK ROUTING ROUTING AND ITS CONCEPTS

Network Routing Routing and its concepts: Structure of a Router, Basic Router Configuration, Building a Routing Table, Static Routing, Dynamic Routing – Distance Vector Routing Protocol (RIPv1, RIPv2, EIGRP), Link State Routing Protocols (OSPF).

UNIT-III	LAN SWITCHING: SWITCHING AND ITS CONCEPTS

LAN Switching: Switching and its concepts: Structure of a Switch, Basic Switch Configuration, Virtual LANs (VLANs), VLAN Trunking Protocol (VTP), Spanning Tree Protocol (STP), Inter-VLAN Routing.

UNIT-IV	WIDE AREA NETWORKS (WANS)

Wide Area Networks (WANs): Introduction to WANs, Point-to-Point Protocol (PPP) concepts, Frame Relay concepts, Dynamic Host Configuration Protocol (DHCP), Network Address Translation (NAT), IPv6.

UNIT-V	NETWORK PROGRAMMING USING JAVA

Network Programming using Java: TCP sockets, UDP sockets (datagram sockets), Server programs that can handle one connection at a time and multiple connections (using multithreaded server), Remote Method Invocation (Java RMI) - Basic RMI Process, Implementation details - ClientServer Application.

Text Books:

1. Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, Keith W.Ross, Fifth Edition, Pearson Education, 2012.
2. Network Fundamentals, Mark Dye, Pearson Education.

Reference Books:

1. Computer Networks: A Systems approach, Larry L. Peterson & Bruce S. Davie, Fifth edition, Elsevier, rp2012.
2. Computer Networks: A Top-Down Approach, Behrouz A. Forouzan, Firoz Mosharaf, Tata McGraw Hill, 2012.
3. Java Network Programming,3rd edition, E.R. Harold, SPD, O"Reilly.(Unit V)

PROFESSIONAL ELECTIVE – III

SOFTWARE TESTING METHODOLOGIES

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45815	3	-	-	3	25	75	100

COURSE OBJECTIVES:

The course should enable the students to:

1. Understand the concepts of software testing objectives, process criteria, strategies and methods.
2. Learn various software testing issues and solutions in software unit testing, integration, regression and system testing.
3. Explore on advanced software testing topics such as object oriented software testing methods and component based software testing issues, challenges and solutions.
4. Identify the techniques and skills on how to use modern software testing tools to support software testing projects.

COURSE OUTCOMES:

1. Understand the importance and purpose of testing and its applications in software development life cycle
2. Understand domains and interface testing and their testability tips.
3. Compare and contrast the various terminologies used in dichotomies of testing.
4. Compare domain testing and path testing and explains various domain techniques.

UNIT-I	INTRODUCTION

Introduction: - Purpose of testing, Dichotomies, model for testing, consequences of bugs, Taxonomy of bugs. **Flow graphs and Path testing:-** Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II	TESTING

Transaction Flow Testing:- transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of data flow testing, strategies in data flow testing, application of dataflow testing.
Domain Testing:- domains and paths, nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-III	PATHS, PATH PRODUCTS AND REGULAR EXPRESSIONS

Paths, Path products and Regular expressions: - path products & path expression, reduction procedure, applications, regular expressions & flow anomaly detection. **Logic Based Testing:** - overview, decision tables, path expressions, kv charts, specifications.

UNIT-IV	STATE, STATE GRAPHS AND TRANSITION TESTING

State, State Graphs and Transition testing: - state graphs, good & bad state graphs, state testing, Testability tips.

UNIT-V	TESTING TOOLS

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm.
Testing tools: An overview ,WinRunner, Quick Test Professional(QTP), Selenium.

Text Books:

1. Software Testing techniques - Boris Beizer, Dreamtech, second edition.
2. Software Testing, Principles, techniques and Tools, M G Limaye,TMH.
3. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.
4. Selenium 1.0 Testing Tools Beginner's Guide- David Burns

Reference Books:

1. The craft of software testing - Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(o'reilly)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.
5. Art of Software Testing – Meyers, John Wiley.

PROFESSIONAL ELECTIVE – III

SOFT COMPUTING

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45816	3	-	-	3	25	75	100

COURSE OBJECTIVES:

The course should enable the students to:

The student should be made to

1. Learn the various soft computing frame works
2. Be familiar with design of various neural networks
3. Be exposed to fuzzy logic
4. Learn genetic programming.

COURSE OUTCOMES

Upon completion of the course, the student should be able to:

1. Apply various soft computing frame works.
2. Design of various neural networks.
3. Use fuzzy logic.
4. Apply genetic programming.
5. Discuss hybrid soft computing.

UNIT-I INTRODUCTION

Artificial neural network: Introduction, characteristics- learning methods – taxonomy – Evolution of neural networks-basic models – important technologies – applications. Fuzzy logic: Introduction – crisp sets- fuzzy sets – crisp relations and fuzzy relations: cartesian product of relation – classical relation, fuzzy relations, tolerance and equivalence relations, non-iterative fuzzy sets. Genetic algorithm- Introduction – biological background – traditional optimization and search techniques – Genetic basic concepts.

UNIT-II NEURAL NETWORKS

McCulloch-Pitts neuron – linear separability – hebb network – supervised learning network: perceptron networks – adaptive linear neuron, multiple adaptive linear neuron, BPN, RBF, TDNN- associative memory network: auto-associative memory network, hetero-associative memory network, BAM, hopfield networks, iterative auto associative memory network & iterative associative memory network –unsupervised learning networks: Kohonen self organizing feature maps, LVQ – CP networks, ART network.

UNIT-III FUZZY LOGIC

Membership functions: features, fuzzification, methods of membership value assignments-Defuzzification: lambda cuts – methods – fuzzy arithmetic and fuzzy measures: fuzzy arithmetic – extension principle – fuzzy measures – measures of fuzziness -fuzzy integrals – fuzzy rule base.

Approximate reasoning : truth values and tables, fuzzy propositions, formation of rules-decomposition of rules, aggregation of fuzzy rules, fuzzy reasoning-fuzzy inference systems-overview of fuzzy expert system-fuzzy decision making.

UNIT-IV GENETIC ALGORITHM

Genetic algorithm and search space – general genetic algorithm – operators – Generational cycle – stopping condition – constraints – classification – genetic programming – multilevel optimization – real life problem- advances in GA

UNIT-V	HYBRID SOFT COMPUTING TECHNIQUES&APPLICATIONS

Neuro-fuzzy hybrid systems – genetic neuro hybrid systems – genetic fuzzy hybrid and fuzzy genetic hybrid systems – simplified fuzzy ARTMAP – Applications: A fusion approach of multispectral images with SAR, optimization of traveling salesman problem using genetic algorithm approach, soft computing based hybrid fuzzy controllers.

Text Books:

1. J.S.R.Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI / Pearson Education 2004.
2. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011.

Reference Books:

1. S.Rajasekaran and G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis & Applications", Prentice-Hall of India Pvt. Ltd., 2006.
2. George J. Klir, Ute St. Clair, Bo Yuan, "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997.
3. David E. Goldberg, "Genetic Algorithm in Search Optimization and Machine Learning" Pearson Education India, 2013.
4. James A. Freeman, David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques, Pearson Education India, 1991.

Web References:

1. http://www.myreaders.info/html/soft_computing.html
2. https://en.wikipedia.org/wiki/Soft_computing

E-Text Books:

1. http://freecomputerbooks.com/Introduction-to-Soft-Computing.html
2. https://www.shroffpublishers.com/books/9789351106159/
3. https://bookboon.com/en/introduction-to-soft-computing-ebook

MOOC Course

1. *https://onlinecourses.nptel.ac.in/noc18_cs13/course*
2. *https://swayam.gov.in/course/4574-introduction-to-soft-computing*

Professional Elective – III
INFORMATION SECURITY

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45817	3	-	-	3	25	75	100

COURSE OBJECTIVES:

The course should enable the students to: The student should be made to

1. Explain the objectives of information security
2. Explain the importance and application of each of confidentiality, integrity, authentication and availability
3. Understand various cryptographic algorithms.
4. Understand the basic categories of threats to computers and networks
5. Describe public-key cryptosystem.
6. Describe the enhancements made to lPv4 by IPSec
7. Understand Intrusions and intrusion detection
8. Discuss the fundamental ideas of public-key cryptography.
9. Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
10. Discuss Web security and Firewalls

COURSE OUTCOMES:

Upon completion of the course, the student should be able to:

1. Understand basic cryptographic algorithms, message and web authentication and security issues.
2. Ability to identify information system requirements for both of them such as client and server.
3. Ability to understand the current legal issues towards information security.
4. Understand the basic categories of threats to computers and networks

UNIT-I ATTACKS ON COMPUTERS AND COMPUTER SECURITY

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

UNIT-II SYMMETRIC KEY CIPHERS

Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES,Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems1 Algorithms(RSA, Diffie-Hellman,ECC), Key Distribution.

UNIT-III MESSAGE AUTHENTICATION ALGORITHMS AND HASH FUNCTIONS

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm Authentication Applications: Kerberos, X.509 Authentication Service, Public

— Key Infrastructure, Biometric Authentication.

UNIT-IV	E-MAIL SECURITY

E-Mail Security: Pretty Good Privacy, S/MIME IP Security:lP Security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management.

UNIT-V	WEB SECURITY

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

Text Books:

1. Cryptography and Network Security : William Stallings, Pearson Education,4t" Edition.
2. Cryptography and Network Security : Atul Kahate, Mc Graw Hill, 2nd Edition.

Reference Books:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1' Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 2 Edition.
3. Information Security, Principles and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Sceurity: WM.Arthur Conklin, Greg White, TMH.
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning.
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

PROFESSIONAL ELECTIVE – IV
HUMAN COMPUTER INTERACTION

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45818	3	-	-	3	25	75	100

COURSE OBJECTIVES:

The course should enable the students to:

1. Understand the key areas, approaches and developments in the field of HCI.
2. Think constructively and analytically about how to design and evaluate interactive technologies.
3. Identify key areas, theoretical frameworks, approaches and major developments in HCI.

COURSE OUTCOMES:

Upon successful completion of this course, student will be able to:

1. Identify and describe various HCI methodologies, including input and interaction types
2. Articulate the co-dependency of the user and the technology in an HCI system
3. Learn and reflect on key concepts, theories, processes, and frameworks in interaction design, and apply this knowledge to an interactive design process.
4. Analyze how the study of interface / Interactivity / interaction influences the design of an HCI system

UNIT-I INTRODUCTION

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories.

UNIT-II MENU SELECTION, FORM FILL-IN AND DIALOG BOXES

Menu Selection, Form Fill-In and Dialog Boxes: Introduction, Task- Related Menu Organization, Single menus, Combinations of Multiple Menus, Content Organization, Fast Movement Through Menus, Data entry with Menus: Form Fill-in, dialog Boxes, and alternatives, Audio Menus and menus for Small Displays.

UNIT-III COMMAND AND NATURAL LANGUAGES

Command and Natural Languages: Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large.

UNIT-IV QUALITY OF SERVICE

Quality of Service: Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

UNIT-V USER DOCUMENTATION AND ONLINE HELP

User Documentation and Online Help: Introduction, Online Vs Paper Documentation, Reading from paper Vs from Displays, Shaping the content of the Documentation, Accessing the Documentation, Online tutorials and animated documentation, Online communities for User Assistance, The Development Process. **Information Search:** Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

Text Books:

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books:

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.

PROFESSIONAL ELECTIVE – IV
PARALLEL COMPUTING

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45819	3	-	-	3	25	75	100

COURSE OBJECTIVES:

The course should enable the students to:

The student should be made to

1. To familiarize the issues in parallel computing.
2. To guide students in learning distributed memory programming using MPI.
3. To teach shared memory paradigm with Pthreads and with OpenMP.
4. To facilitate student in learning the GPU based parallel programming using OpenCL.

COURSE OUTCOMES:

Upon completion of this course, the students should be able to:

1. Identify issues in parallel programming.
2. Develop distributed memory programs using MPI framework.
3. Design and develop shared memory parallel programs using Pthreads and using OpenMP. Implement Graphical Processing OpenCL programs. Analyze various parallel programming models with respect to performance and concurrency.

UNIT-I	INTRODUCTION

FOUNDATIONS OF PARALLEL PROGRAMMING: Motivation for parallel programming – Need-Concurrency in computing – Basics of processes, multitasking and threads – cache – cache mappings – caches and programs – virtual memory – Instruction level parallelism – hardware multi-threading – Parallel Hardware-SIMD – MIMD – Interconnection networks – cache coherence –Issues in shared memory model and distributed memory model – Parallel Software- Caveats- coordinating processes/ threads- hybrid model – shared memory model and distributed memory model - I/O – performance of parallel programs-– parallel program design.

UNIT-II	NEURAL NETWORKS

DISTRIBUTED MEMORY PROGRAMMING WITH MPI: Basic MPI programming – MPI_Init and MPI_Finalize – MPI communicators – SPMD programs– MPI_Send and MPI_Recv – message matching – MPI- I/O – parallel I/O – collective communication – Tree-structured communication -MPI_Reduce – MPI_Allreduce, broadcast, scatter, gather, allgather – MPI derived types – dynamic process management – performance evaluation of MPI programs- A Parallel Sorting Algorithm

UNIT-III	FUZZY LOGIC

SHARED MEMORY PARADIGM WITH PTHREADS:

Basics of threads, Pthreads – thread synchronization – critical sections – busy waiting – mutex – semaphores – barriers and condition variables – read write locks with examples - Caches, cache coherence and false sharing – Thread safety-Pthreads case study.

UNIT-IV	GENETIC ALGORITHM

SHARED MEMORY PARADIGM: OPENMP:

Basics OpenMP – Trapezoidal Rule-scope of variables – reduction clause – parallel for directive – loops in OpenMP – scheduling loops –Producer Consumer problem – cache issues – threads safety in OpenMP – Two- body solvers-Tree Search

UNIT-V	HYBRID SOFT COMPUTING TECHNIQUES&APPLICATIONS

GRAPHICAL PROCESSING PARADIGMS:

OPENCL AND INTRODUCTION TO CUDA 9 Introduction to OpenCL – Example-OpenCL Platforms- Devices-Contexts - OpenCL programming – Built-In Functions-Programs Object and Kernel Object – Memory Objects - Buffers and Images – Event model – Command-Queue - Event Object - case study. Introduction to CUDA programming.

Text Books:

1. A. Munshi, B. Gaster, T. G. Mattson, J. Fung, and D. Ginsburg, ―OpenCL programming guide‖, Addison Wesley
2. M. J. Quinn, ―Parallel programming in C with MPI and OpenMP‖, Tata McGraw Hill

Reference Books:

1. Peter S. Pacheco, ―An introduction to parallel programming‖, Morgan Kaufmann..
2. Rob Farber, ―CUDA application design and development‖, Morgan Haufman.
3. W. Gropp, E. Lusk, and A. Skjellum, ―Using MPI: Portable parallel programming with the message passing interface‖, Second Edition, MIT Press.

PROFESSIONAL ELECTIVE – IV
DIGITAL FORENSICS

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45820	3	-	-	3	25	75	100

COURSE OBJECTIVES:

The student should be made to:

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

COURSE OUTCOMES:

The students will be able to:

1. Understand and correlate the network concepts with various layered security protocols
2. Defining various stages of Digital Forensics
3. Perform evidence collection ensuring its legal validity
4. Build and analyse the forensic reports from various tools

UNIT-I	DIGITAL FORENSICS SCIENCE

Digital Forensics Science: Forensics science, computer forensics, and digital forensics. Computer Crime: Criminalities as it relates to the investigative process, analysis of cyber-criminalities area, holistic approach to cyber-forensics

UNIT-II	CYBER CRIME SCENE ANALYSIS

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

UNIT-III	EVIDENCE MANAGEMENT & PRESENTATION

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

UNIT-IV	COMPUTER FORENSICS

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

UNIT-V	COMPUTER FORENSICS

Computer Forensics: mobile forensics techniques, mobile forensics tools. Legal Aspects of Digital Forensics: IT Act 2000, amendment of IT Act 2008. Recent trends in mobile forensic technique and methods to search and seizure electronic evidence

Text Books:

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

MACHINE LEARNING LAB

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45821	-	-	3	1.5	25	75	100

COURSE OBJECTIVES:

The course should enable the students to:

The objective of this lab is to get an overview of the various machine learning techniques andcan able to demonstrate them using python.

COURSE OUTCOMES:

After the completion of the "Machine Learning" lab, the student can able to:

1. Understand complexity of Machine Learning algorithms and their limitations;
2. Understand modern notions in data analysis-oriented computing;
3. Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;
4. Be capable of performing experiments in Machine Learning using real-world data.

LIST OF EXPERIMENTS

Week-1	**BAYES RULE USING PYTHON**

The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student isabsent given that today is Friday? Apply Baye's rule in python to get the result. (Ans: 15%)

Week-2	**DATABASE**

Extract the data from database using python

Week-3	**LINEAR REGRESSION**

Implement linear regression using python

Week-4	**LOGISTIC REGRESSION**

Implement logistic regression using python

Week-5	**KNN**

Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Python ML library classes can be used for this problem

Week-6	**K MEANS**

Given the following data, which specify classifications for nine combinations of VAR1 and VAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k-means clustering with 3 eans (i.e., 3 centroids)

VAR1	VAR2	CLASS
1.713	1.586	0
0.180	1.786	1
0.353	1.240	1
0.940	1.566	0
1.486	0.759	1
1.266	1.106	0
1.540	0.419	1
0.459	1.799	1
0.773	0.186	1

Week-7 **NAIVE BAYES**

Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

Week-8 **DECISION TREE**

Write a program to demonstrate the working of the decision tree algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.

Week-9 **PCA**

Write a program to implement PCA

Week-10 **RANDOM FOREST**

Use Random Forest model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Python ML library classes/API.

Text books:

1. Machine Learning – Tom M. Mitchell, MGH
2. Fundamentals of Speech Recognition By Lawrence Rabiner and Biing – Hwang Juang.

Reference Books:

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

BIGDATA ENGINEERING LAB

M.TECH I YEAR – II SEM

Course Code	Hours / Week			Credits	Maximum Marks		
	L	T	P	C	CIE	SEE	Total
B45822	-	-	3	1.5	25	75	100

COURSE OBJECTIVES:

1. To familiarize students, about the concepts of Big Data and Big Data processing tools.
2. To facilitate students in learning HADOOP framework.
3. To teach and guide students in setting up cluster and help them in designing Big Data applications.

COURSE OUTCOMES:

Upon completion of this course, the students should be able to:

1. Identify and list various Big Data concepts, tools and applications.
2. Develop programs using HADOOP framework.
3. Use Hadoop Cluster to deploy Map Reduce jobs, PIG and HIVE programs.
4. Analyze the given data set and identify deep insights from the data set

LIST OF EXPERIMENTS

Week-1

Basic Linux Commands.

Understanding how to connect to remote Linux server using putty kind of tool.

Week-2

Understanding VMware Player setup and configuring Cloudera Bundle using player.Basic HDFS commands.

Week-3

HDFS commands in detail. Hadoop File System navigation and manipulation using commands. File Permission commands.

Week-4

Map Reduce Job submission to Hadoop Cluster from command line. Word Count Map Reduce Job Development using eclipse IDE, packing and testing.

Week-5

Understanding weather dataset. Map Reduce Job to process weather datasets of different years.

Week-6

Using pig grunt shells. Practicing pig commands from grunt shell. Working with pig in interactive mode. Writing pig scripts and running them.
Week-7
Processing different datasets using Pig. Working with Various data formats using inbuilt Jars.
Week-8
Hive shell. Writing basic Hive queries. Hive DDL and DML.
Week-9
Using Hive to perform CRUD operations – Databases, Tables, Views, functions and indexes
WEEK-10
Working with Sqoop commands to import and export data between HDFS and RDBMS. Working with Sqoop to import data directly into hive tables.
WEEK-11
Working with Flume to ingest data from webserver logs or Social Media site like twitter
Text Books:
1. Hadoop Definitive Guide – 4 th Edition , O'REILLY publications. 2. Big Data, Black Book: Dreamtech publications