ACE EngineeringCollege

Ankushapur(V), Ghatkesar(M), R.R.Dist - 501301

(Autonomous)

B.TECH IV YEAR COURSE STRUCTURE & SYLLABUS

(Common to CSE, EEE, IT, CSE(DS))

IV YEAR I SEMESTER

(ACE-R20)

S. No	Course Code	Course Title	L	T	P	Credits
1	CD701PC	Predictive Analytics	3	0	0	3
2	CD702PC	Web and Social Media Analytics	2	0	0	2
3	CD713PE	Natural Language Processing (PE-IV)	3	0	0	3
4	CD723PE	Data Science Applications (PE-V)	3	0	0	3
5	CE700OE	Remote Sensing & GIS (OE-II)	3	0	0	3
6	CD706PC	Web and Social Media Analytics Lab	0	0	2	1
7	CD707PC	Industrial Oriented Mini Project/Summer Internship	0	0	0	2*
8	CD708PC	Seminar	0	0	2	1
9	CD709PC	Project Stage–I	0	0	6	3
Total Credits			14	0	10	21

Professional Elective-IV

CD711PE	Quantum Computing
CD712PE	Database Security
CD713PE	Natural Language Processing
CD714PE	Information Storage Management
CD715PE	Internet of Things

Professional Elective-V

CD721PE	Privacy Preserving Data Mining
CD722PE	Cloud Computing
CD723PE	Data Science Applications
CD724PE	Mining Massive Datasets
CD725PE	Exploratory Data Analysis

Open Electives

S No	Branch	IV Yr I Sem Open Elective (OE – II)
1	Civil Engineering	Remote Sensing & GIS
2	Electronics and Communication Engineering	Electronic Sensors
3	Electrical and Electronics Engineering	1. Utilization of Electrical Energy
		2. Electric Drives and Control
4	Mechanical Engineering	Basic Mechanical Engineering

***Note:** Students should take Open Electives from the List of Open Electives Offered by Other Departments/Branches Only.

CD701PC: Predictive Analytics

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives: The course serves to advance and refine expertise on theories, approaches and techniques related to prediction and forecasting.

Course Outcomes

1. Understand prediction-related principles, theories and approaches.
2. Learn model assessment and validation.
3. Understand the basics of predictive techniques and statistical approaches.
4. Analyze supervised and unsupervised algorithms.

UNIT - I

Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection, Ridge regression, Lasso regression, Linear Discriminant Analysis, Logistic regression, Perceptron learning algorithm.

UNIT - II

Model Assessment and Selection: Bias, Variance, and model complexity, Bias-variance trade off, Optimism of the training error rate, Estimate of In-sample prediction error, Effective number ofparameters, Bayesian approach and BIC, Cross-validation, Boot strap methods, conditional or expected test error.

UNIT - III

Additive Models, Trees, and Boosting: Generalized additive models, Regression and classification trees, Boosting methods-exponential loss and AdaBoost, Numerical Optimization via gradient boosting,Examples (Spam data, California housing, New Zealand fish, Demographic data).

UNIT - IV

Neural Networks (NN), Support Vector Machines (SVM), and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, Reproducing Kernels, SVM for regression, K-nearest – Neighbour classifiers (Image Scene Classification).

UNIT - V

Unsupervised Learning and Random forests: Association rules, Cluster analysis, Principal Components, Random forests and analysis.

TEXT BOOK:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning-DataMining, Inference, and Prediction, Second Edition, Springer Verlag, 2009.

REFERENCE BOOKS:

1. C.M.Bishop –Pattern Recognition and Machine Learning, Springer, 2006.
2. L. Wasserman-All of statistics.
3. Gareth James. Daniela Witten. Trevor Hastie Robert Tibshirani. An Introduction to StatisticalLearning with Applications in R.

CD702PC: WEB AND SOCIAL MEDIA ANALYTICS

B.Tech. IV Year I Sem. **L T P C**
2 0 0 2

Course Objectives: Exposure to various web and social media analytic techniques.

Course Outcomes:

1. Knowledge on decision support systems.
2. Apply natural language processing concepts on text analytics.
3. Understand sentiment analysis.
4. Knowledge on search engine optimization and web analytics.

UNIT - I

An Overview of Business Intelligence, Analytics, and Decision Support: Analytics to Manage a Vaccine Supply Chain Effectively and Safely, Changing Business Environments and Computerized Decision Support, Information Systems Support for Decision Making, The Concept of Decision Support Systems (DSS), Business Analytics Overview, Brief Introduction to Big Data Analytics.

UNIT - II

Text Analytics and Text Mining: Machine Versus Men on Jeopardy!: The Story of Watson, Text Analytics and Text Mining Concepts and Definitions, Natural Language Processing, Text Mining Applications, Text Mining Process, Text Mining Tools.

UNIT - III

Sentiment Analysis: Sentiment Analysis Overview, Sentiment Analysis Applications, Sentiment Analysis Process, Sentiment Analysis and Speech Analytics.

UNIT - IV

Web Analytics, Web Mining: Security First Insurance Deepens Connection with Policyholders, Web Mining Overview, Web Content and Web Structure Mining, Search Engines, Search Engine Optimization, Web Usage Mining (Web Analytics), Web Analytics Maturity Model and Web Analytics Tools.

UNIT - V

Social Analytics and Social Network Analysis: Social Analytics and Social Network Analysis, SocialMedia Definitions and Concepts, Social Media Analytics.

Prescriptive Analytics - Optimization and Multi-Criteria Systems: Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking.

TEXT BOOK:

1. Ramesh Sharda, Dursun Delen, Efraim Turban, BUSINESS INTELLIGENCE ANDANALYTICS: SYSTEMS FOR DECISION SUPPORT, Pearson Education.

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra-Fernandez," Business Intelligence – Practice, Technologies andManagement", John Wiley 2011.
2. Lariss T. Moss, ShakuAtre, "Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting",SPD Shroff, 2012.

CD711PE: QUANTUM COMPUTING
(Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Course Objectives:

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

Course Outcomes:

1. Understand basics of quantum computing
2. Understand physical implementation of Qubit
3. Understand Quantum algorithms and their implementation
4. Understand the Impact of Quantum Computing on Cryptography

UNIT - I

Introduction to Essential Linear Algebra: Some Basic Algebra, Matrix Math, Vectors and Vector Spaces, Set Theory. **Complex Numbers:** Definition of Complex Numbers, Algebra of Complex Numbers, Complex Numbers Graphically, Vector Representations of Complex Numbers, Pauli Matrice,Transcendental Numbers.

UNIT - II

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

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

UNIT - III

Quantum Architecture: Further with Qubits, Quantum Gates, More with Gates, Quantum Circuits, TheD-Wave Quantum Architecture. **Quantum Hardware:** Qubits, How Many Qubits Are Needed? Addressing Decoherence, Topological Quantum Computing, Quantum Essentials.

UNIT - IV

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

UNIT - V

Current Asymmetric Algorithms: RSA, Diffie-Hellman, Elliptic Curve. **The Impact of Quantum Computing on Cryptography:** Asymmetric Cryptography, Specific Algorithms, Specific Applications.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CD712PE: DATABASE SECURITY
(Professional Elective – IV)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

- To learn the security of databases
- To learn the design techniques of database security
- To learn the secure software design

Course Outcomes:

- Ability to carry out a risk analysis for large database.
- Ability to set up, and maintain the accounts with privileges and roles.

UNIT - I

Introduction: Introduction to Databases Security Problems in Databases Security Controls Conclusions.

Security Models -1: Introduction Access Matrix Model Take-Grant Model Acten Model PN Model Hartson and Hsiao's Model Fernandez's Model Bussolati and Martella's Model for Distributed databases.

UNIT - II

Security Models -2: Bell and LaPadula's Model Biba's Model Dion's Model Sea View Model Jajodia and Sandhu's Model The Lattice Model for the Flow Control conclusion.

Security Mechanisms: Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria.

UNIT - III

Security Software Design: Introduction A Methodological Approach to Security Software Design, Secure Operating System Design, Secure DBMS Design Security Packages Database Security Design**Statistical Database Protection & Intrusion Detection Systems:** Introduction Statistics Concepts and Definitions, Types of Attacks, Inference Controls, Evaluation Criteria for Control Comparison. Introduction IDES System RETISS System ASES System Discovery.

UNIT - IV

Models for the Protection of New Generation Database Systems -1: Introduction A Model for the Protection of Frame Based Systems A Model for the Protection of Object-Oriented Systems SORION Model for the Protection of Object-Oriented Databases.

UNIT - V

Models for the Protection of New Generation Database Systems -2: A Model for the Protection of New Generation Database Systems: the Orion Model ajodia and Kogan's Model A Model for the Protection of Active Databases Conclusions.

TEXT BOOKS:

1. Database Security by Castano, Pearson Edition
2. Database Security and Auditing: Protecting Data Integrity and Accessibility, 1st Edition, HassanAfyouni, THOMSON Edition.

REFERENCE BOOK:

1. Database security by Alfred basta, melissazgola, CENGAGE learning.

CD713PE: NATURAL LANGUAGE PROCESSING
(Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**
3 0 0 3

Prerequisites: Data structures, finite automata and probability theory

Course Objectives:

- Introduce to some of the problems and solutions of NLP and their relation to linguistics andstatistics.

Course Outcomes:

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

UNIT - I

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

UNIT - II

Syntax Analysis: Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing,Multilingual Issues

UNIT - III

Semantic Parsing: Introduction, Semantic Interpretation, System Paradigms, Word SenseSystems, Software.

UNIT - IV

Predicate-Argument Structure, Meaning Representation Systems, Software.

UNIT - V

Discourse Processing: Cohension, Reference Resolution, Discourse Cohension and Structure **Language Modeling:** Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific ModelingProblems, Multilingual and Cross lingual Language Modeling

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M.Bikel and Imed Zitouni, Pearson Publication.
2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

REFERENCE BOOK:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, PearsonPublications.

CD714PE: INFORMATION STORAGE MANAGEMENT

(Professional Elective – IV)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Course Objectives:

1. To understand the basic components of Storage System Environment.
2. To understand the Storage Area Network Characteristics and Components.
3. To examine emerging technologies including IP-SAN.
4. To describe the different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities.
5. To understand the local and remote replication technologies.

Course Outcomes:

1. Understand the logical and physical components of a Storage infrastructure.
2. Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS.
3. Understand the various forms and types of Storage Virtualization.
4. Describe the different roles in providing disaster recovery and business continuity capabilities.
5. Distinguish different remote replication technologies.

UNIT - I

Introduction to Storage Technology: Data proliferation and the varying value of data with time & usage, Sources of data and states of data creation, Data center requirements and evolution to accommodate storage needs, Overview of basic storage management skills and activities, The five pillars of technology, Overview of storage infrastructure components, Evolution of storage, Information Lifecycle Management concept, Data categorization within an enterprise, Storage and Regulations.

UNIT - II

Storage Systems Architecture: Intelligent disk subsystems overview, Contrast of integrated vs. Modular arrays, Component architecture of intelligent disk subsystems, Disk physical structure- components, properties, performance, and specifications, Logical partitioning of disks, RAID & parity algorithms, hot sparing, Physical vs. logical disk organization, protection, and back end management, Array caching properties and algorithms, Front end connectivity and queuing properties, Front end to host storage provisioning, mapping, and operation, Interaction of file systems with storage, Storage system connectivity protocols.

UNIT - III

Introduction to Networked Storage: JBOD, DAS, SAN, NAS, & CAS evolution, Direct Attached Storage (DAS) environments: elements, connectivity, & management, Storage Area Networks (SAN): elements & connectivity, Fibre Channel principles, standards, & network management principles, SAN management principles, Network Attached Storage (NAS): elements, connectivity options, connectivity protocols (NFS, CIFS, ftp), & management principles, IP SAN elements, standards (iSCSI, FCIP, iFCP), connectivity principles, security, and management principles, Content Addressable Storage (CAS): elements, connectivity options, standards, and management principles, Hybrid Storage - solutions overview including technologies like virtualization & appliances.

UNIT - IV

Introductions to Information Availability: Business Continuity and Disaster Recovery Basics, Local business continuity techniques, Remote business continuity techniques, Disaster Recovery principles & techniques. **Managing & Monitoring:** Management philosophies (holistic vs. system & component), Industry management standards (SNMP, SMI-S, CIM), Standard framework applications, Key management metrics (thresholds, availability, capacity, security, performance), Metric analysis methodologies & trend analysis, Reactive and proactive management best practices, Provisioning & configuration change planning, Problem reporting, prioritization, and handling techniques, Management tools overview.

UNIT - V

Securing Storage and Storage Virtualization: Define storage security. List the critical security attributes for information systems, describe the elements of a shared storage model and security extensions, Define storage security domains, List and analyze the common threats in each domain, Identify different virtualization technologies, describe block-level and file level virtualization technologies and processes.

TEXT BOOKS:

1. Marc Farley Osborne, "Building Storage Networks'', Tata McGraw Hill, 2001.
2. Robert Spalding and Robert Spalding, "Storage Networks: The Complete Reference", TataMcGraw Hill, 2003.
3. Meeta Gupta, "Storage Area Network Fundamentals", Pearson Education Ltd., 2002.

REFERENCE BOOKS:

1. Gerald J Kowalski and Mark T Maybury," Information Storage Retrieval Systems theory &Implementation", BS Publications, 2000.
2. Thejendra BS, "Disaster Recovery & Business continuity", Shroff Publishers & Distributors,2006.

CD715PE: INTERNET OF THINGS
(Professional Elective – IV)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objectives:

1. To introduce the terminology, technology and its applications
2. To introduce the concept of M2M (machine to machine) with necessary protocols
3. To introduce the Python Scripting Language which is used in many IoT devices
4. To introduce the Raspberry PI platform, that is widely used in IoT applications
5. To introduce the implementation of web-based services on IoT devices

Course Outcomes:

1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
2. Compare and contrast the deployment of smart objects and the technologies to connect themto the network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Elaborate the need for Data Analytics and Security in IoT.
5. Illustrate different sensor technologies for sensing real world entities and identify theapplications of IoT in Industry.

UNIT - I

Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs IoT enabaled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle

UNIT - II

IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMPNETOPEER

UNIT - III

Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling Python packages - JSON, XML, HTTPLib, URLLib, SMTPLib

UNIT - IV

IoT Physical Devices and Endpoints - Introduction to Raspberry PI-Interfaces (serial, SPI, I2C) Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controllingoutput, reading input from pins.

UNIT - V

IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, UniversitiesPress, 2015, ISBN: 9788173719547.
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014,ISBN: 9789350239759.

CD721PE: PRIVACY PRESERVING IN DATA MINING
(Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**
3 0 0 3

Prerequisites: A course on "Data Mining".

Course Objectives:

1. The aim of the course is to introduce the fundamentals of Privacy Preserving Data MiningMethods
2. The course gives an overview of - Anonymity and its Measures, Multiplicative Perturbation forPrivacy-Preserving Data Mining, techniques for Utility-based Privacy Preserving Data

Course Outcomes:

1. Understand the concepts of Privacy Preserving Data Mining Models and Algorithms.
2. Demonstrate a comprehensive understanding of different tasks associated in Inference ControlMethods for Privacy-Preserving Data Mining.
3. Understand the concepts of Data Anonymization Methods and its Measures.
4. Evaluate and Appraise the solution designed for Multiplicative Perturbation.
5. Formulate, Design and Implement the solutions for Utility-based Privacy Preserving Data.

UNIT - I

Introduction, Privacy-Preserving Data Mining Algorithms, The Randomization Method, Group Based Anonymization, Distributed Privacy-Preserving Data Mining

UNIT - II

Interface Control Methods

Introduction, A Classification of Microdata Protection Methods, Perturbative Masking Methods, Non- Perturbative Masking Methods, Synthetic Microdata Generation, Trading off Information Loss and Disclosure Risk.

UNIT - III

Measure of Anonymity

Data Anonymization Methods, A Classification of Methods, Statistical Measure of Anonymous, Probabilistic Measure of Anonymity, Computational Measure of Anonymity, reconstruction Methods forRandomization, Application of Randomization

UNIT - IV

Multiplicative Perturbation

Definition of Multiplicative Perturbation, Transformation Invariant Data Mining Models, Privacy Evaluation for Multiplicative Perturbation, Attack Resilient Multiplicative Perturbation, Metrics for Quantifying Privacy Level, Metrics for Quantifying Hiding Failure, Metrics for Quantifying Data Quality.

UNIT - V

Utility-Based Privacy-Preserving Data

Types of Utility-Based Privacy Preserving Methods, Utility-Based Anonymization Using Local Recording, The Utility-Based Privacy Preserving Methods in Classification Problems, Anonymization Merginal: Injection Utility into Anonymization Data Sets.

TEXT BOOK:

1. Privacy – Preserving Data Mining: Models and Algorithms Edited by Charu C. Aggarwal and S.Yu, Springer.

REFERENCE BOOKS:

1. Charu C. Agarwal, Data Mining: The Textbook, 1st Edition, Springer.
2. J. Han and M. Kamber, Data Mining: Concepts and Techniques, 3rd Edition, Elsevier.
3. Privacy Preserving Data Mining by Jaideep Vaidya, Yu Michael Zhu and Chirstopher W. Clifton,Springer.

CD722PE: CLOUD COMPUTING

(Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**

3 0 0 3

Pre-requisites: Courses on Computer Networks, Operating Systems, Distributed Systems.

Course Objectives:

1. This course provides an insight into cloud computing.
2. Topics covered include- distributed system models, different cloud service models, service- oriented architectures, cloud programming and software environments, resource management.

Course Outcomes:

1. Ability to understand various service delivery models of a cloud computing architecture.
2. Ability to understand the ways in which the cloud can be programmed and deployed.
3. Understanding cloud service providers.

UNIT - I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.

UNIT - II

Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing,Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT - III

Cloud Computing Architecture and Management: Cloud architecture, Layer, Anatomy of the Cloud,Network Connectivity in Cloud Computing, Applications, on the Cloud, Managing the Cloud, Managingthe Cloud Infrastructure Managing the Cloud application, Migrating Application to Cloud, Phases of Cloud Migration Approaches for Cloud Migration.

UNIT - IV

Cloud Service Models: Infrastructure as a Service, Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers, Platform as a Service, Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers, Software as a Service, Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT V

Cloud Service Providers: EMC, EMC IT, Captiva Cloud Toolkit, Google, Cloud Platform, Cloud Storage, Google Cloud Connect, Google Cloud Print, Google App Engine, Amazon Web Services, Amazon Elastic Compute Cloud, Amazon Simple Storage Service, Amazon Simple Queue ,service, Microsoft, Windows Azure, Microsoft

Assessment and Planning Toolkit, SharePoint, IBM, CloudModels, IBM Smart Cloud, SAP Labs, SAP HANA Cloud Platform, Virtualization Services Provided by SAP, Sales force, Sales Cloud, Service Cloud: Knowledge as a Service, Rack space, VMware, Manjrasoft, Aneka Platform.

TEXT BOOK:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

REFERENCE BOOKS:

1. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej
   M. Goscinski, Wiley, 2011.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier,2012.
3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather,Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp 2011.

CD723PE: DATA SCIENCE APPLICATIONS
(Professional Elective – V)

B.Tech. IV Year I Sem.

L	T	P	C
3	0	0	3

Course Objective: To give deep knowledge of data science and how it can be applied in various fields to make life easy.

Course Outcomes: After completion of course, students would:

1. To correlate data science and solutions to modern problems.
2. To decide when to use which type of technique in data science.

UNIT - I

Data Science Applications in various domains, Challenges and opportunities, tools for data scientists, Recommender systems – Introduction, methods, application, challenges.

UNIT - II

Time series data – stock market index movement forecasting. Supply Chain Management – Real world case study in logistics.

UNIT – III

Data Science in Education, Social media.

UNIT - IV

Data Science in Healthcare, Bioinformatics.

UNIT - V

Case studies in data optimization using Python.

TEXT BOOKS:

1. Aakanksha Sharaff, G.K.Sinha , "Data Science and its applications ", CRC Press, 2021.
2. Q. A. Menon, S. A. Khoja, "Data Science: Theory, Analysis and Applications", CRC Press, 2020.

CD724PE: MINING MASSIVE DATASETS
(Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**
3 0 0 3

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

Course Objectives:

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

Course Outcomes:

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

UNIT - I

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

UNIT - II

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

UNIT - III

Link Analysis-PageRank, Efficient Computation of PageRank, Link Spam. **Frequent Itemsets -** Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream. **Clustering-**The CURE Algorithm, Clustering in Non-Euclidean Spaces, Clustering for Streamsand Parallelism.

UNIT - IV

Advertising on the Web-Issues in On-Line Advertising, On-Line Algorithms, The Matching Problem, The Adwords Problem, Adwords Implementation. **Recommendation Systems -** A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering, Dimensionality Reduction, The NetFlix Challenge.

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CD725PE: EXPLORATORY DATA ANALYSIS
(Professional Elective – V)

B.Tech. IV Year I Sem. **L T P C**
3 0 0 3

Course Objectives:

1. This course introduces the methods for data preparation and data understanding.
2. It covers essential exploratory techniques for understanding multivariate data by summarizingit through statistical methods and graphical methods.
3. Supports to Summarize the insurers use of predictive analytics, data science and DataVisualization.

Course Outcomes:

1. Handle missing data in the real-world data sets by choosing appropriate methods.
2. Summarize the data using basic statistics. Visualize the data using basic graphs and plots.
3. Identify the outliers if any in the data set.
4. Choose appropriate feature selection and dimensionality reduction.
5. Techniques for handling multi-dimensional data.

UNIT - I:

Introduction to Exploratory Data Analysis: Data Analytics lifecycle, Exploratory Data Analysis (EDA)– Definition, Motivation, Steps in data exploration, The basic data types Data Type Portability.

UNIT - II:

Preprocessing - Traditional Methods and Maximum Likelihood Estimation: Introduction to Missingdata, Traditional methods for dealing with missing data, Maximum Likelihood Estimation – Basics, Missing data handling, Improving the accuracy of analysis. **Preprocessing Bayesian Estimation:** Introduction to Bayesian Estimation, Multiple Imputation-Imputation Phase, Analysis and PoolingPhase, Practical Issues in Multiple Imputation, Models for Missing Notation Random Data.

UNIT - III:

Data Summarization & Visualization: Statistical data elaboration, 1-D Statistical data analysis, 2-D Statistical data Analysis, N-D Statistical data analysis.

UNIT - IV:

Outlier Analysis: Introduction, Extreme Value Analysis, Clustering based, Distance Based and Density Based outlier analysis, Outlier Detection in Categorical Data. **Feature Subset Selection:** Feature selection algorithms: filter methods, wrapper methods and embedded methods, Forward selection backward elimination, Relief, greedy selection, genetic algorithms for features selection.

UNIT - V

Dimensionality Reduction: Introduction, Principal Component Analysis (PCA), Kernel PCA, Canonical Correlation Analysis, Factor Analysis, Multidimensional scaling, Correspondence Analysis.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Charu C. Aggarwal, “Data Mining The Text book”, Springer, 2015.
2. Craig K. Enders, “Applied Missing Data Analysis”, The Guilford Press, 2010.
3. Inge Koch, “Analysis of Multivariate and High dimensional data”, Cambridge University Press, 2014.
4. Michael Jambu, “Exploratory and multivariate data analysis”, Academic Press Inc., 1990.
5. Charu C. Aggarwal, “Data Classification Algorithms and Applications”, CRC press, 2015.

CE700OE: REMOTE SENSING & GIS
(Open Elective - II)

B.Tech. Civil Engg. IV Year I Sem. **L T/P/D C**

3 0/0/0 3

Course Objectives: The objectives of the course are to

- Know the concepts of Remote Sensing, its interpreting Techniques and concepts of Digitalimages
- know the concept of Geographical Information System (GIS), coordinate system GIS Data andits types
- Understand the students managing the spatial Data Using GIS.
- Understand Implementation of GIS interface for practical usage.

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

- **Describe** different concepts and terms used in Remote Sensing and its data
- Understand the Data conversion and Process in different coordinate systems of GIS interface
- **Evaluate** the accuracy of Data and implementing a GIS
- **Understand the applicability** of RS and GIS for various applications

UNIT – I

Concepts of Remote Sensing Basics of remote sensing- elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology & units, energy resources, energy interactionswith earth surface features & atmosphere, atmospheric effects, satellite orbits, Sensor Resolution, typesof sensors. Remote Sensing Platforms and Sensors, IRS satellites.

Remote Sensing Data Interpretation Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation. Concepts of Digital image processing, image enhancements, qualitative & quantitative analysis and pattern recognition, classification techniques and accuracy estimation.

UNIT- II:

Introduction to GIS: Introduction, History of GIS, GIS Components, GIS Applications in Real life, TheNature of geographic data, Maps, Types of maps, Map scale, Types of scale, Map and Globe, Co- ordinate systems, Map projections, Map transformation, Geo-referencing,

UNIT- III:

Spatial Database Management System: Introduction: Spatial DBMS, Data storage, Database structure models, database management system, entity-relationship model, normalization

Data models and data structures: Introduction, GIS Data model, vector data structure, raster data structure, attribute data, geo-database and metadata,

UNIT- IV:

Spatial Data input and Editing: Data input methods – keyboard entry, digitization, scanning, conversion of existing data, remotely sensed data, errors in data input, Data accuracy, Micro and Macrocomponents of accuracy, sources of error in GIS.

Spatial Analysis: Introduction, topology, spatial analysis, vector data analysis, Network analysis, rasterdata analysis, Spatial data interpolation techniques

UNIT- V:

Implementing a GIS and Applications

Implementing a GIS: Awareness, developing system requirements, evaluation of alternative systems,decision making using GIS

Applications of GIS

GIS based road network planning, Mineral mapping using GIS, Shortest path detection using GIS, Hazard Zonation using remote sensing and GIS, GIS for solving multi criteria problems, GIS for business applications.

TEXT BOOKS

1. Remote Sensing and GIS by Basudeb Bhatta, Oxford University Press, 2nd Edition, 2011.
2. Introduction to Geographic Information systems by Kang-tsung Chang, McGraw HillEducation (Indian Edition), 7th Edition, 2015.
3. Fundamentals of Geographic Information systems by Michael N. Demers, 4th Edition, WileyPublishers, 2012.

REFERENCE BOOKS

1. Remote Sensing and Image Interpretation by Thomas M. Lillesand and Ralph W. Kiefer,Wiley Publishers, 7th Edition, 2015.\
2. Geographic Information systems – An Introduction by Tor Bernhardsen, Wiley IndiaPublication, 3rd Edition, 2010.
3. Advanced Surveying: Total Station, GIS and Remote Sensing by Satheesh Gopi, R. SathiKumar, N. Madhu, Pearson Education, 1st Edition, 2007.
4. Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy,

EC700OE: ELECTRONIC SENSORS
(Open Elective - II)

B.Tech. ECE IV Year I Semester **L T P C**

3 0 0 3

Course Objectives:

- Learn the characterization of sensors.
- Known the working of Electromechanical, Thermal, Magnetic and radiation sensors
- Understand the concepts of Electro analytic and smart sensors
- Able to use sensors in different applications

Course Outcomes: Upon completing this course, the student will be able to

- Learn about sensor Principle, Classification and Characterization.
- Explore the working of Electromechanical, Thermal, Magnetic, radiation and Electro analyticsensors
- Understand the basic concepts of Smart Sensors
- Design a system with sensors

UNIT - I

Sensors / Transducers: Principles, Classification, Parameters, Characteristics, Environmental Parameters (EP), Characterization

Electromechanical Sensors: Introduction, Resistive Potentiometer, Strain Gauge, Resistance Strain Gauge, Semiconductor Strain Gauges -Inductive Sensors: Sensitivity and Linearity of the Sensor – Types-Capacitive Sensors: Electrostatic Transducer, Force/Stress Sensors Using Quartz Resonators, Ultrasonic Sensors

UNIT - II

Thermal Sensors: Introduction ,Gas thermometric Sensors ,Thermal Expansion Type Thermometric Sensors ,Acoustic Temperature Sensor ,Dielectric Constant and Refractive Index thermo sensors

,Helium Low Temperature Thermometer ,Nuclear Thermometer ,Magnetic Thermometer ,Resistance Change Type Thermometric Sensors, Thermo emf Sensors, Junction Semiconductor Types, Thermal Radiation Sensors, Quartz Crystal Thermoelectric Sensors, NQR Thermometry, Spectroscopic Thermometry, Noise Thermometry, Heat Flux Sensors

UNIT- III

Magnetic sensors: Introduction, Sensors and the Principles Behind, Magneto-resistive Sensors, Anisotropic Magneto resistive Sensing, Semiconductor Magneto resistors, Hall Effect and Sensors, Inductance and Eddy Current Sensors, Angular/Rotary Movement Transducers, Synchros.

UNIT - IV

Radiation Sensors: Introduction, Basic Characteristics, Types of Photo resistors/ Photo detectors, X-ray and Nuclear Radiation Sensors, Fibre Optic Sensors

Electro analytical Sensors: The Electrochemical Cell, The Cell Potential - Standard Hydrogen Electrode (SHE), Liquid Junction and Other Potentials, Polarization, Concentration Polarization, Reference Electrodes, Sensor Electrodes, Electro ceramics in Gas Media.

UNIT - V

Smart Sensors: Introduction, Primary Sensors, Excitation, Amplification, Filters, Converters, Compensation, Information Coding/Processing - Data Communication, Standards for Smart Sensor Interface, the Automation

Sensors –Applications: Introduction, On-board Automobile Sensors (Automotive Sensors), Home Appliance Sensors, Aerospace Sensors, Sensors for Manufacturing – Sensors for environmentalMonitoring

TEXT BOOKS:

1. "Sensors and Transducers - D. Patranabis" –PHI Learning Private Limited., 2003.
2. Introduction to sensors- John veteline, aravind raghu, CRC press, 2011

REFERENCE BOOKS:

1. Sensors and Actuators, D. Patranabis, 2nd Ed., PHI, 2013.
2. Make sensors: Terokarvinen, kemo, karvinen and villey valtokari, 1st edition, maker media,2014.
3. Sensors handbook- Sabrie soloman, 2nd Ed. TMH, 2009

EE700OE: UTILIZATION OF ELECTRICAL ENERGY
(Open Elective - II)

B.Tech. EEE IV Year I Sem

L	T	P	C
3	0	0	3

Pre-requisites: Electrical Machines-I and Electrical Machines-II

Course Objectives: Objectives of this course are

- To understand the fundamentals of illumination and good lighting practices
- To understand the methods of electric heating and welding.
- To understand the concepts of electric drives and their application to electrical traction systems.

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

- Understand basic principles of electric heating and welding.
- Determine the lighting requirements for flood lighting, household and industrial needs.
- Calculate heat developed in induction furnace.
- Evaluate speed time curves for traction

UNIT - I

Electrical Heating: Advantages and methods of electric heating, resistance heating, induction heatingand dielectric heating.

UNIT - II

Electric Welding: Electric welding equipment, resistance welding and arc welding, comparison between AC and DC welding. Electrolysis process: principle of electrolysis, electroplating, metal extraction and metal processing, electromagnetic stirs.

UNIT - III

Illumination: Terminology, Laws of illumination, coefficient of Utilization and depreciation, Polar curves,Photometry, integrating sphere, sources of light, fluorescent lamps, compact fluorescent lamps, LED lamps discharge lamps, mercury vapor lamps, sodium vapor lamps and neon lamps, comparison between tungsten filament lamps and fluorescent tubes. Basic principles of light control, Types and design of lighting scheme, lighting calculations, factory lighting, street lighting and flood lighting.

UNIT - IV

Electric Traction: Systems of electric traction and track electrification- DC system, single phase and 3-phase low frequency and high frequency system, composite system, kando system, comparison between AC and DC systems, problems of single-phase traction with current unbalance and voltage unbalance. Mechanics of traction movement, speed – time curves for different services, trapezoidal andquadrilateral speed – time curves, tractive effort, power, specific energy consumption, effect of varyingacceleration and braking, retardation, adhesive weight and braking retardation, coefficient of adhesion.

UNIT - V

Systems of Train Lighting: special requirements of train lighting, methods of obtaining unidirectionalpolarity constant output- single battery system, Double battery parallel block system, coach wiring, lighting by making use of 25KV AC supply.

TEXT BOOKS:

1. H. Partab: Modern Electric Traction, Dhanpat Rai & Co, 2007.
2. E. Openshaw Taylor: Utilization of Electric Energy, Orient Longman, 2010.

REFERENCE BOOKS:

1. H. Partab: Art & Science of Utilization of Electric Energy, Dhanpat Rai & Sons, 1998.
2. N.V. Suryanarayana: Utilisation of Electrical power including Electric drives and ElectricTraction, New Age Publishers, 1997.

EE701OE: ELECTRIC DRIVES AND CONTROL
(Open Elective - II)

B.Tech. EEE IV Year I Sem

L	T	P	C
3	0	0	3

Pre-requisites: Electrical Machines-I, Electrical Machines-II, Power Electronics

Course Objectives:

- To understand basics of electric drives
- To know the dynamics and control of various drive mechanisms
- To know the principle of operations of DC and AC motor drives
- To understand the energy conversion in electric drives

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

- Understand the various drive mechanisms and methods for energy conservation.
- Apply power electronic converters to control the speed of DC motors and induction motors.
- Evaluate the motor and power converter for a specific application.
- Develop closed loop control strategies of drives

UNIT- I:

Introduction To Electric Drives: Electrical Drives, Advantages of Electric drives, Parts of Electrical Drives, Electric Motors, Power Modulators, Sources, Control unit, Choice of Electric Drives and Losses.

UNIT- II:

Dynamics Of Electrical Drives: Fundamental torque equation, components of load torque, load characteristics, modified torque equation, speed-torque convention & multi-quadrant operation. Equivalent values of drive parameters, load with rotational motion, loads with translational motion, measurement of moment of inertia, components of load torques, Nature and classification of load torque. Calculation of time and energy loss in transient operation, steady state stability, loads equalization.

Control Of Electrical Drives: Modes of operation, speed control and drive classifications, closed loopcontrol of drives.

UNIT- III:

DC Motor Drives: Starting, Braking, Speed control of DC motors using single phase fully controlled and half controlled rectifiers. Three phases fully controlled and half controlled converter fed DC motor drives. Chopper controlled DC drives.

UNIT- IV:

Induction Motor Drives: Speed control using pole changing, stator voltage control, AC voltage controllers. Variable frequency and variable voltage control from inverter. Different types of braking, dynamic, regenerative and plugging.

UNIT- V:

Energy Conservation in Electric Drives: Losses in Electric drive systems, measurement of Energy conservation in Electric drives. Use of efficient converters, energy efficient operation of drives, Improvement of p.f., improvement of quality of supply, maintenance of motors

TEXT BOOKS:

1. G.K. Dubey: Fundamentals of Electric Drives –Narosa Publishers, Second edition, 2007.
2. Vedam Subramanyam: Electric Drives Concepts & Applications –Tata McGraw Hill Edn. Pvt.Ltd, Second edition 2011.

REFERENCE BOOKS:

1. NisitK. De and Prashanta K. Sen: Electric Drives, PHI., 2001
2. V. Subrahmanyam: Thyristor Control of Electric Drives, Tata McGraw Hill Edn. Pvt. Ltd, 2010.
3. Werner Leonhard: Control of Electric Drives, Springer international edition 2001.
4. NisitK. De and Swapan K. Dutta: Electric Machines and Electric Drives, PHI learning Pvt. Ltd2011

ME700OE: BASIC MECHANICAL ENGINEERING

(Open Elective – II)

B.Tech. Mech. Engg. IV Year I Sem. **L T P C**

3 0 0 3

Course Objectives

- To gain an understanding of the basic concepts of various aspects of Mechanical Engineering,fields of application, their merits, demerits, and limitations and applications.

UNIT - I

Basic Concepts of Thermodynamics and Heat Transfer: Definitions – continuum concept – properties – point and path functions – systems – processes – thermodynamic equilibrium - laws of thermodynamic- First law applied to open and closed systems – steady and unsteady flow systems

- Second law – heat engines and heat pumps – efficiency and Coefficient of Performance (COP). Heat transfer – conduction – general conduction equation in Cartesian coordinates – conduction incomposite walls. Convection – free and forced convection – simple empirical correlations. Radiation –laws – black body and grey body radiation.

UNIT - II

IC Engines and Air Conditioning: I C engines – classification - construction and working - two and four stroke engines – S I and C.I. engines – powdered coal as an alternative to diesel fuel.

Air conditioning – air cycles, vapour compression cycle – vapour absorption cycle – psychrometric processes. Air cooling – methods and simple cooling load calculations. Systems applicable to mining environment.

UNIT - III

Power Transmission: Gears – nomenclature, laws of gearing, types of gears including rack and pinion, interference, gear trains, calculation of gear ratios, couplings - types, features and applications.

Basic concepts in hydraulic & pneumatic power and devices and their utilisation – simple calculations.

UNIT - IV

Kinematics of Machines: Mechanisms – basics – kinematic concepts and definitions – degree offreedom, mechanical advantage – transmission angle – description of common mechanisms – quickreturn mechanisms, straight line generators, dwell mechanisms, ratchets and escapements – universal joints.

Cams and followers – terminology and definitions, displacement diagrams – uniform velocity, parabolicand simple harmonic motions.

UNIT - V

Rotodynamic and Vibratory Machines: Fans and compressors – types, construction, working principle, characteristics and applications. Single stage and multistage air compressors – intercooling. Simple calculations for output and efficiency.

Vibration – Importance of free and forced vibration. Vibrators and shakers – construction, working principle, applications and limitations.

Note: HMT Data book to be permitted

TEXT BOOKS:

1. Elements of Mechanical Engineering/ S.N. Lal/ Cengage Learning
2. Theory of Machines and Mechanisms / Shigley J.E., Pennock G.R. and Uicker J. J./ Oxford University Press, 2003.

REFERENCE BOOKS:

1. Rajput, R.K. Thermal Engineering, 6th Edition, Laxmi Publications, 2007
2. Ballaney, P.L. Thermal Engineering, Khanna Publishers, 24th Edition, 2003

CD706PC: WEB AND SOCIAL MEDIA ANALYTICS LAB

B.Tech. IV Year I Sem.

L	T	P	C
0	0	2	1

Course Objectives: Exposure to various web and social media analytic techniques.

Course Outcomes:

1. Knowledge on decision support systems.
2. Apply natural language processing concepts on text analytics.
3. Understand sentiment analysis.
4. Knowledge on search engine optimization and web analytics.

List of Experiments

1. Preprocessing text document using NLTK of Python
    a. Stopword elimination
    b. Stemming
    c. Lemmatization
    d. POS tagging
    e. Lexical analysis
2. Sentiment analysis on customer review on products
3. Web analytics
    a. Web usage data (web server log data, clickstream analysis)
    b. Hyperlink data
4. Search engine optimization- implement spamdexing
5. Use Google analytics tools to implement the following
    a. Conversion Statistics
    b. Visitor Profiles
6. Use Google analytics tools to implement the Traffic Sources.

Resources:

1. Stanford core NLP package
2. GOOGLE.COM/ANALYTICS

TEXT BOOKS:

1. Ramesh Sharda, Dursun Delen, Efraim Turban, BUSINESS INTELLIGENCE ANDANALYTICS: SYSTEMS FOR DECISION SUPPORT, Pearson Education.

REFERENCE BOOKS:

1. Rajiv Sabherwal, Irma Becerra- Fernandez," Business Intelligence –Practice,Technologies and Management", John Wiley 2011.
2. Lariss T. Moss, Shaku Atre, "Business Intelligence Roadmap", Addison-Wesley It Service.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting",SPD Shroff, 2012.