COMPUTER SCIENCE AND ENGINEERING

(DATA SCIENCE)
R19-COURSE STRUCTURE & SYLLABUS

IV YEAR I SEMESTER

S.No	Course Code	Course Title	Category	L	T	P	C
1	19DS4111	Predictive Analytics	PC	3	1	-	4
2	19DS4112	Web and Social Media Analytics	PC	2	-	-	2
3		**Professional Elective – IV**		3	-	-	3
	19AM4171	Quantum Computing	PE				
	19DS4171	Database Security	PE				
	19DS4172	Natural Language Processing	PE				
	19BU4174	Information Storage Management	PE				
	19DS4173	Internet of Things	PE				
4		**Professional Elective – V**		3	-	-	3
	19DS4174	Privacy Preserving in Data Mining	PE				
	19BU4175	Cloud Computing	PE				
	19DS4176	Data Science Applications	PE				
	19DS4177	Mining Massive Datasets	PE				
	19DS4178	Exploratory Data Analysis	PE				
		Open Elective II	OE	3	-	-	3
		PRACTICAL					
5	19DS4152	Web and Social Media Analytics Lab	PC	-	-	3	1.5
6	19DS4182	Mini Project	PW	-	-	-	2
7	19DS4181	Major Project Stage – I	PW	-	-	6	3
		Total Credits		**22**	**14**	**1**	**9**	**21.5**

IV YEAR II SEMESTER

S.No	Course Code	Course Title	Category	L	T	P	C
1	19MB4211	Organizational Behavior	HS	3	-	-	3
2		**Professional Elective – VI**		3	-	-	3
	19DS4271	Data Stream Mining	PE				
	19DS4272	Web Security	PE				
	19DS4273	Video Analytics	PE				
	19DS4274	Blockchain Technology	PE				
	19DS4275	Parallel and Distributed Computing	PE				
		Open Elective III	OE	3	-	-	3
		PRACTICAL					
3	19DS4281	Major Project Stage – II	PW	-	-	14	7
		Total Credits		**23** **9**	**0**	**14**	**16**

*Note: Industrial Oriented Mini Project/ Summer Internship is to be carried out during the summer vacation between 6th and 7th semesters. Students should submit report of Industrial Oriented Mini Project/ Summer Internship for evaluation.

19DS4111   PREDICTIVE ANALYTICS

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

                                                             3 1 - 4

Course Objectives:
1 Exposure to various linear methods for Regression and Classification
2 Mostly used for classification and regression analysis.
3 Analyze historical data with the goal of identifying trends or patterns
4 The course serves to advance and refine expertise on theories, approaches and techniques related to prediction and forecasting.
5 To advice on when and how to use each model. Also learn how to combine two or more models to improve prediction

Course Outcomes
1. Understand the process of formulating business objectives, data selection/collection, preparation and process to successfully design, build, evaluate and implement predictive models for a various business application.
2. Compare the underlying predictive modeling techniques.
3. Select appropriate predictive modeling approaches to identify cases to progress with.
4. Learn model assessment and validation.
5. Understand the basics of statistical approaches for predictive analytics.

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 of parameters, 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.

19DS4112 WEB AND SOCIAL MEDIA ANALYTICS

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

                                                                                          2 - - 2

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

2. To provide an overview of common text mining and social media data analytic activities.

3. To understand the complexities of processing text and network data from different data sources.

4. To provide an overview of web mining and web analytics tools.

5. To enable students to solve complex real-world problems for sentiment analysis and Recommendation systems.

Course Outcomes:
1. Be able to understand social media, web and social media analytics, and their potential impact

2. Be able to understand usability, user experience, and customer experience

3. Be able to understand usability metrics, web and social media metrics

4. Be able to use ready-made web analytics tools (Google Analytics)

5. The experiment design and web analytics skills may also apply to other projects.

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 AND ANALYTICS: 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.

19AM4171   QUANTUM COMPUTING
(Professional Elective – IV)

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

                                                                          3 - - 3

Pre-requisites:

1. Courses on Mathematics fundamentals such as linear algebra, differential calculus, Discrete Mathematics, Computational Number Theory.

2. Course on Design and Analysis of Algorithms

3. Course on Applied Physics

4. Design and Analysis of Algorithms

Course Objectives:

1. To introduce the fundamentals of quantum computing
2. To introduce problem-solving approach using finite dimensional mathematics
3. To learn the basic quantum logical operations and algorithms for processing quantum information.
4. To learn the basic knowledge about the practical use of quantum algorithms and quantum programming skills.
5. To learn the basic quantum logical operations and algorithms for processing quantum information.

Course Outcomes:

1. To Understand basics of quantum computing
2. To Understand physical implementation of Qubit
3. To Understand Quantum algorithms and their implementation
4. To Understand the Impact of Quantum Computing on Cryptography
5. To Understand simple quantum algorithms and information channels in the quantum circuit model

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.

19DS4171   DATABASE SECURITY
(Professional Elective – IV)

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

3 - - 3

Course Objectives:

1. To learn the security of databases

2. To learn the design techniques of database security

3. To learn the secure software design

4. To learn different Intrusion detection systems

5. To learn new generation database systems

Course Outcomes:
1. Ability to carry out a risk analysis for large database.

2. Ability to set up, and maintain the accounts with privileges and roles.

3. Make students aware and experiment with database security analysis tools.

4. Analyze information in a database to identify information security incidents

5. Ability to understand concepts of new generation database systems.

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 Jajodiaand 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.

19DS4172   NATURAL LANGUAGE PROCESSING
(Professional Elective – IV)

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

                                                                    3 - - 3

Prerequisites:

1. Data structures, finite automata and probability theory .

2. Knowledge on basics of Machine Learning.

Course Objectives:

1. Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.
2. Introduce to NLP problems and solutions relation to linguistics and statistics.
3. Introduce to Regular expression and probabilistic model with n-grams.
4. Introduce to Recognizing Speech and parsing with grammar.
5. To learn basis of semantic analysis and discourse analysis.

Course Outcomes:

1. Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.
2. Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems
3. Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
4. Able to design, implement, and analyze NLP algorithms
5. 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,
ParameterEstimation, 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, Pearson Publications.
2. Foundations of Statistical Natural Language Processing by Christopher D.Manning and Hinrich Schuetze,MIT press, 1999

19BU4174   INFORMATION STORAGE MANAGEMENT
(Professional Elective – IV)

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

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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 disasterrecovery 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, InformationLifecycle 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, Localbusiness 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, Managementtools 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 technologiesand 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.

19DS4173   INTERNET OF THINGS
(Professional Elective – IV)

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

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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 Pythonpackages - 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 communicationAPIs 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.

19DS4174   PRIVACY PRESERVING IN DATA MINING
(Professional Elective – V)

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

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Prerequisites: A course on "Data Mining".

Course Objectives:
1. The aim of the course is to introduce the fundamentals of Privacy Preserving Data Mining modes
2. The course gives an overview of Anonymity and its Measures.
3. The course gives an overview of Multiplicative Perturbation for Privacy-Preserving Data Mining techniques for Utility-based Privacy Preserving Data.
4. This course also discusses privacy preservation methods for real time applications.
5. This course also gives the overview on utility based privacy preservation methods.

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 Control Methods 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 for Randomization, 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.

(Professional Elective – V)

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

                                                                     3 - - 3

Pre-requisites:

1. A course on "Computer Networks"
2. A course on "Operating Systems"
3. A course on "Distributed Systems"

Course Objectives: The objective of this course is to
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.
3. The fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges
4. Cloud storage technologies and relevant distributed file systems
5. The basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations

Course Outcomes: At the end of this course the students will be able to
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.
4. Ability to understand network and storage virtualization and outline their role in enabling the cloud computing system model.
5. Analyze various cloud programming models and apply them to solve problems on the cloud.

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, Managing the 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, Cloud Models, 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
2. Cloud Computing: Concepts, Technology, and Architecture – By Zaigham Mahmood, Ricardo Puttini, and Thomas Erl.

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.

19DS4176   DATA SCIENCE APPLICATIONS
(Professional Elective – V)

B.Tech IV Year I Sem.

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		3	-	-	3

Course Objective:
1. To give deep knowledge of data science and how it can be applied in various fieldsto make life easy.
2. To demonstrate Time series data
3. To learn Data science in Education and social media
4. To learn Data science in Education, Social media
5. To implement the case studies in data optimization using python

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.
3. Understand Data Science Applications in Education, Social Media
4. Understand Data Science Application in Healthcare, Bioinformatics
5. Complete the case studies in data optimization using Python.

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 worldcase 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.

19DS4177   MINING MASSIVE DATASETS
(Professional Elective – V)

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

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Prerequisites:

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

Course Objectives:
1. This course will discuss the cluster computing based programming environment.
2. This course will cover practical algorithms for solving key problems in mining of massive datasets.
3. This course focuses on parallel algorithmic techniques that are used for large datasets.
4. This course will discuss the various recommendation systems.
5. 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. Able to handle massive data using Map-Reduce.
2. Develop and implement algorithms for massive data sets and methodologies in the context ofdata mining.
3. Build Large-scale Machine Learning algorithms for classification and clustering of the data
4. Design models for 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, DimensionalityReduction, 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.

<div align="center">

19DS4178   EXPLORATORY DATA ANALYSIS

(Professional Elective – V)

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

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PREREQUISITES:

   1. Introduction to Information Systems

   2. Applied Statistics

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 Data Visualization.
   4. To Introduce cluster analysis techniques to locate patterns in data
   5. To summarizing and visualizing the important characteristics of a data set.

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 Missing data, 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 Pooling Phase, 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, byGlenn 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.

19DS4152   WEB AND SOCIAL MEDIA ANALYTICS LAB

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

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Course Objectives:
1. To provide exposure on various analytics tools and python.
2. To serve as a business metric for promoting specific products to customers.
3. To provide knowledge on various analytics tools.
4. To provide knowledge on optimizing web usage.
5. To learn decision making by analyzing web and social media data.

Course Outcomes:
1. To implement search engine optimization
2. To analyze customer reviews on products.
3. To implement data preprocessing and create datasets.
4. Identify high-value features for a product or service.
5. To analyze data gathered from social channels to support business decisions.

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 AND ANALYTICS: 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 ItService.
3. Yuli Vasiliev, "Oracle Business Intelligence: The Condensed Guide to Analysis and Reporting",SPD Shroff, 2012

19MB4211   ORGANIZATIONAL BEHAVIOUR

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

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Course Objectives:
   The objective of the course is to provide the students with the conceptual framework and the theories underlying Organizational Behavior.

Course Outcomes:
1. Demonstrate the applicability of analyzing the complexities associated with management ofindividual behavior in the organization.
2. Analyze the complexities associated with management of the group behavior in theorganization.
3. Demonstrate how the organizational behavior can integrate in understanding the motivation(why) behind behavior of people in the organization.

UNIT - I:
Introduction to OB -Definition, Nature and Scope – Environmental and organizational context – Impact of IT, globalization, Diversity, Ethics, culture, reward systems and organizational design on Organizational Behaviour.
Cognitive Processes-I: Perception and Attribution: Nature and importance of Perception – Perceptual selectivity and organization – Social perception – Attribution Theories – Locus of control –Attribution Errors –Impression Management.

UNIT- II:
Cognitive Processes-II: Personality and Attitudes – Personality as a continuum – Meaning of personality- Johari Window and Transactional Analysis - Nature and Dimension of Attitudes – Job satisfaction and organizational commitment-Motivational needs and processes- Work-Motivation Approaches Theories of Motivation- Motivation across cultures - Positive organizational behaviour: Optimism – Emotional intelligence – Self-Efficacy.

UNIT - III:
Dynamics of OB-I: Communication – types – interactive communication in organizations – barriers to communication and strategies to improve the follow of communication - Decision Making: Participative decision-making techniques – creativity and group decision making.
Dynamics of OB –II Stress and Conflict: Meaning and types of stress –Meaning and types of conflict - Effect of stress and intra- individual conflict - strategies to cope with stress and conflict.

UNIT - IV:
Dynamics of OB –III Power and Politics: Meaning and types of power – empowerment - Groups Vs. Teams – Nature of groups – dynamics of informal groups – dysfunctions of groups and teams – teamsin modern work place.

UNIT - V:

Leading High performance: Job design and Goal setting for High performance- Quality of Work Life- Socio technical Design and High-performance work practices - Behavioural performance management: reinforcement and punishment as principles of Learning –Process of Behavioural modification - Leadership theories - Styles, Activities and skills of Great leaders.

REFERENCE BOOKS:

1. Luthans, Fred: Organizational Behaviour 10/e, McGraw-Hill, 2009
2. McShane: Organizational Behaviour, 3e, TMH, 2008
3. Nelson: Organizational Behaviour, 3/e, Thomson, 2008.
4. Newstrom W. John & Davis Keith, Organisational Behaviour-- Human Behaviour at Work, 12/e,TMH, New Delhi, 2009.
5. Pierce and Gardner: Management and Organisational Behaviour: An Integrated perspective,Thomson, 2009.
6. Robbins, P. Stephen, Timothy A. Judge: Organisational Behaviour, 12/e, PHI/Pearson, NewDelhi, 2009.
7. Pareek Udai: Behavioural Process at Work: Oxford & IBH, New Delhi, 2009.
8. Schermerhorn: Organizational Behaviour 9/e, Wiley, 2008.
9. Hitt: Organizational Behaviour, Wiley, 2008
10. Aswathappa: Organisational Behaviour, 7/e, Himalaya, 2009
11. Mullins: Management and Organisational Behaviour, Pearson, 2008.
12. McShane, Glinow: Organisational Behaviour--Essentials, TMH, 2009.
13. Ivancevich: Organisational Behaviour and Management, 7/e, TMH, 2008.

19DS4271   DATA STREAM MINING
(Professional Elective – VI)

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

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Prerequisites

1. A basic knowledge of "Data Mining"

Course Objectives:
1. Passing on knowledge about advanced data mining algorithms and working with complex data representations at various stages of the knowledge discovery process.

2. Developing problem solving skills related to complex data preprocessing.

3. Developing practical skills through laboratories involving supervised classification tasks, unsupervised learning, time series analysis, or exploring social network data.

4. Acquiring knowledge about techniques and algorithms of knowledge discovery and pattern recognition, with special focus on relational and text data.

5. Promoting reproducible research related to the above-mentioned topics by using the R and python programming languages.

Course Outcomes:
1. Ability to learn advanced knowledge regarding data mining, especially with respect to complex data representations.
2. Ability to learn organized theoretically-grounded knowledge of data mining.
3. Ability to learn, visual data analysis, natural language processing, distributed data mining, classification methods for evolving and streaming data.
4. Ability to learn data preprocessing techniques, continuous target predictions (regression methods, neural networks), classifier selection, parameter tuning, evaluation methods and metrics for classification and clustering.
5. Ability to learn the basic methods, techniques, and tools that can be used to solve complex data mining problems, natural language processing and text mining, and they know how to deploy the developed data mining models as part of an IT system.

UNIT - I
MOA Stream Mining, Assumptions, Requirements, Mining Strategies, Change Detection Strategies, MOA Experimental Settings, Previous Evaluation Practices, Evaluation Procedures for Data Streams, Testing Framework, Environments, Data Sources, Generation Speed and Data Size, Evolving StreamExperimental Setting.

UNIT - II
Hoeffding Trees, The Hoeffding Bound for Tree Induction, The Basic Algorithm, Memory

Management,Numeric Attributes, Batch Setting Approaches, Data Stream Approaches.

UNIT - III
Prediction Strategies, Majority Class, Naïve Bayes Leaves, Adaptive Hybrid, Hoeffding Tree Ensembles, Data Stream Setting, Realistic Ensemble Sizes.

UNIT - IV
Evolving Data Streams, Algorithms for Mining with Change, A Methodology for Adaptive Stream Mining, Optimal Change Detector and Predictor, Adaptive Sliding Windows, Introduction, Maintaining UpdatedWindows of Varying Length.

UNIT - V
Adaptive Hoeffding Trees, Introduction, Decision Trees on Sliding Windows, Hoeffding Adaptive Trees, Adaptive Ensemble Methods, New methods of Bagging using trees of different size, New method of bagging using ADWIN, Adaptive Hoeffding Option Trees, Method performance.

TEXT BOOK:
1. DATA STREAM MINING: A Practical Approach by Albert Bifet and Richard Kirkby.
2. Data Streams Mining, by Kapil Wankhade (Author), Snehlata Dongre (Author), LAP Lambert Academic Publishing
3. Data Stream Mining & Processing, by Springer, 1st ed. 2020
   1.

REFERENCE BOOKS:
1. Knowledge discovery from data streams by Gama João. ISBN: 978-1-4398-2611-9.
2. Machine Learning for Data Streams by Albert Bifet, Ricard Gavalda; MIT Press, 2017.
3. Streaming Systems, by Shroff/O'Reilly, First, 2018
4. Stream Data Mining: Algorithms and Their Probabilistic Properties by Leszek Rutkowski, Piotr Duda, Maciej Jaworski, Springer Cham.

19DS4272   WEB SECURITY
(Professional Elective – VI)

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

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Course Objectives:

1. To Give an Overview of information security
2. To Give an view of Access control of relational databases
3. To learn the Recent Advances in Database Security
4. To learn concepts and techniques of Security Re-engineering for Databases
5. To learn Privacy-enhanced Location-based Access Control and privacy policies in Mobile environment.

Course Outcomes: Students should be able to

1. Understand the Web architecture and applications
2. Understand client side and service side programming
3. Understand how common mistakes can be bypassed and exploit the application
4. Identify common application vulnerabilities
5. Understand how to Privacy in Database Publishing.

UNIT - I
The Web Security, The Web Security Problem, Risk Analysis and Best Practices.
Cryptography and the Web: Cryptography and Web Security, Working Cryptographic Systems and Protocols, Legal Restrictions on Cryptography, Digital Identification.

UNIT - II
The Web's War on Your Privacy, Privacy-Protecting Techniques, Backups and Antitheft, Web Server Security, Physical Security for Servers, Host Security for Servers, Securing Web Applications.

UNIT - III
Database Security: Recent Advances in Access Control, Access Control Models for XML, Database Issues in Trust Management and Trust Negotiation, Security in Data Warehouses and OLAP Systems.

UNIT - IV
Security Re-engineering for Databases: Concepts and Techniques, Database Watermarking for Copyright Protection, Trustworthy Records Retention, Damage Quarantine and Recovery in Data Processing Systems, Hippocratic Databases: Current Capabilities and Future Trends.

UNIT - V

Privacy in Database Publishing: A Bayesian Perspective, Privacy-enhanced Location-based Access Control, Efficiently Enforcing the Security and Privacy Policies in a Mobile Environment.

TEXT BOOKS:
1. Web Security, Privacy and Commerce Simson G Arfinkel, Gene Spafford, O'Reilly.
2. Handbook on Database security applications and trends Michael Gertz, Sushil Jajodia.
3. Web Application Security, Andrew Hoffman, O'Reilly Media.

<center>**19DS4273   VIDEO ANALYTICS**</center>

<center>**(Professional Elective – VI)**</center>

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

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Course Objectives:

1. To Teach The Fundamentals Of And Video Analysis
2. To Understand The Real Time Use Of Image And Video Analytics.
3. To Understand Models Used To Recognition Of Objects
4. To Demonstrate Real Time Video Analytics Applications And Others.
5. To Acquire Knowledge To Perform Gait Analysis

Course Outcomes:
1. Understand the basics of video- signals and systems.
2. Able to estimate motion in a video.
3. Able to detect the objects and track them.
4. Recognize activity and analyze behaviour.
5. Evaluate face recognition technologies.

UNIT - I
Introduction: Multidimensional signals and systems: signals, transforms, systems, sampling theorem. Digital Images and Video: human visual system and color, digital video, 3D video, digital-videoapplications, image and video quality.

UNIT - II
Motion Estimation: Image formation, motion models, 2D apparent motion estimation, differential methods, matching methods, non-linear optimization methods, transform domain methods, 3D motion and structure estimation.

UNIT - III
Video Analytics: Introduction- Video Basics - Fundamentals for Video Surveillance- Scene Artifacts- Object Detection and Tracking: Adaptive Background Modelling and Subtraction- Pedestrian Detection and Tracking Vehicle Detection and Tracking- Articulated Human Motion Tracking in Low- Dimensional Latent Spaces.

UNIT - IV
Behavioral Analysis & Activity Recognition: Event Modelling- Behavioral Analysis-Human Activity Recognition-Complex Activity Recognition Activity modelling using 3D shape, Video summarization, shape-based activity models- Suspicious Activity Detection.

UNIT - V
Human Face Recognition & Gait Analysis: Introduction: Overview of Recognition algorithms – Human Recognition using Face: Face Recognition from still images, Face Recognition from video, Evaluation of Face Recognition Technologies- Human Recognition using gait: HMM Framework for GaitRecognition, View Invariant Gait Recognition, Role of Shape and Dynamics in Gait Recognition.

TEXT BOOKS:

1. Murat Tekalp, "Digital Video Processing", second edition, Pearson, 2015
2. Rama Chellappa, Amit K. Roy-Chowdhury, Kevin Zhou. S, "Recognition of Humans and their Activities using Video", Morgan & Claypool Publishers, 2005.
3. Yunqian Ma, Gang Qian, "Intelligent Video Surveillance: Systems and Technology", CRC Press (Taylor and Francis Group), 2009.

REFERENCE BOOKS:

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer, 2011.
2. Yao Wang, JornOstermann and Ya-Qin Zhang, "Video Processing and Communications", Prentice Hall, 2001.
3. Thierry Bouwmans, FatihPorikli, Benjamin Höferlin and Antoine Vacavant, "Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation", CRC Press, Taylor and FrancisGroup, 2014.
4. Md. Atiqur Rahman Ahad, "Computer Vision and Action Recognition-A Guide for Image Processing and Computer Vision Community for Action Understanding", Atlantis Press, 2011.

19DS4274   BLOCKCHAIN TECHNOLOGY (Professional Elective – VI)

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

3 - - 3

Prerequisites:

1. Knowledge in security and applied cryptography.
2. Knowledge in distributed databases.

Course Objectives:

1. To Introduce block chain technology.
2. Understand how Cryptocurrency Regulation works
3. Understand how blockchain systems (mainly Bitcoin and Ethereum) work.

Course Outcomes:

1. Learn about research advances related to one of the most popular technological areas today.
2. Understand Extensibility of Blockchain concepts.
3. Understand and Analyze Blockchain Science.
4. Understand Technical challenges, Business model challenges.

UNIT - I
Introduction: Block chain or distributed trust, Protocol, Currency, Cryptocurrency, How a Cryptocurrencyworks, Crowdfunding.

UNIT - II
Extensibility of Blockchain concepts, Digital Identity verification, Block chain Neutrality, Digital art,Blockchain Environment.

UNIT - III
Blockchain Science: Gridcoin, Folding coin, Blockchain Genomics, Bitcoin MOOCs.

UNIT - IV
Currency, Token, Tokenizing, Campuscoin, Coindrop as a strategy for Public adoption, CurrencyMultiplicity, Demurrage currency.

UNIT - V
Technical challenges, Business model challenges, Scandals and Public perception, GovernmentRegulations.

TEXT BOOK:

1. Melanie Swan, Blockchain Blueprint for Economy, O'reilly.

REFERENCE BOOKS:
1. Building Blockchain Apps, Michael Juntao Yuan, Pearson Education
2. Daniel Drescher, Blockchain Basics: A Non-Technical Introduction in 25 Steps 1st Edition
3. Bradley Lakeman, Blockchain Revolution: Understanding the Crypto Economy of the Future. ANon-Technical Guide to the Basics of Cryptocurrency Trading and Investing, ISBN: 1393889158.

19DS4275   PARALLEL AND DISTRIBUTED COMPUTING
(Professional Elective – VI)

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

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Course Objectives:

1. To learn core ideas behind parallel and distributed computing.
2. To explore the methodologies adopted for parallel and distributed environments.
3. To understand the networking aspects of parallel and distributed computing.
4. To provide an overview of the computational aspects of parallel and distributed computing.
5. To learn parallel and distributed computing models.

Course Outcomes:
1. Explore the methodologies adopted for parallel and distributed environments.
2. Analyze the networking aspects of Distributed and Parallel Computing.
3. Explore the different performance issues and tasks in parallel and distributed computing.
4. Tools usage for parallel and distributed computing.
5. Understanding high performance computing techniques.

UNIT - I
Parallel and Distributed Computing— Introduction- Benefits and Needs- Parallel and Distributed Systems- Programming Environment- Theoretical Foundations - Parallel Algorithms— Introduction- Parallel Models and Algorithms- Sorting - Matrix Multiplication- Convex Hull- Pointer Based Data Structures.

UNIT - II
Synchronization- Process Parallel Languages- Architecture of Parallel and Distributed Systems- Consistency and Replication- Security- Parallel Operating Systems.

UNIT - III
Management of Resources in Parallel Systems- Tools for Parallel Computing- Parallel Database Systems and Multimedia Object Servers.

UNIT - IV
Networking Aspects of Distributed and Parallel Computing- Process- Parallel and Distributed ScientificComputing.

UNIT - V

High-Performance Computing in Molecular Sciences- Communication Multimedia Applications for Parallel and Distributed Systems- Distributed File Systems.

TEXT BOOKS:

1. Jacek Błażewicz, et al., "Handbook on parallel and distributed processing", Springer Science &
   Business Media, 2013.
2. Andrew S. Tanenbaum, and Maarten Van Steen, "Distributed Systems: Principles andParadigms". Prentice-Hall, 2007.

REFERENCE BOOKS:

1. George F.Coulouris, Jean Dollimore, and Tim Kindberg, "Distributed systems: concepts anddesign", Pearson Education, 2005.
2. Gregor Kosec and Roman Trobec, "Parallel Scientific Computing: Theory, Algorithms, andApplications of Mesh Based and Meshless Methods", Springer, 2015.