CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B.Tech. IV Year Syllabus

CSE(ARTIFICIAL INTELLIGENCE & MACHINE LEARNING)

VII SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20MB701PC	Business Economics & Financial Analysis	2	0	0	2
2	20CS702PC	Machine Learning	3	0	0	3
3		Professional Elective – IV	3	0	0	3
4		Professional Elective – V	3	0	0	3
5		Open Elective – II	3	0	0	3
6	20CS703PC	Machine Learning Lab			2	1
7	20AI704PC	Industry Oriented Mini Project				2
8	20AI705PC	Seminar			2	1
9	20AI706PC	Project Stage – I			4	2
		Total Credits	**14**	**0**	**8**	**20**

VIII SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20MB801PC	Organizational Behaviour	4	0	0	4
2		Professional Elective –VI	3	0	0	3
3		Open Elective – III	3	0	0	3
4	20AI802PC	Project Stage – II			20	10
5						
6						
7						
8						
9						
		Total Credits	**10**	**0**	**20**	**20**

Professional Elective-IV

20CS741PE	Cloud Computing
20CS742PE	Soft Computing
20CS743PE	Mobile Computing
20DS744PE	Data Science
20AI745PE	Social Network Analysis

Professional Elective - V

20CS751PE	Deep Learning
20CS752PE	Internet of Things
20CS753PE	Software Process and Project Management
20CS754PE	Design Patterns
20CS755PE	Advanced Algorithms

Professional Elective - VI

20CS861PE	Human Computer Interaction
20CS862PE	Cyber Forensics
20AI863PE	Computer Vision
20CS864PE	Cryptography & Network Security
20DS865PE	NoSQL Databases

20MB701PC: BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

B.TECH CSE (AI & ML) IV Year I Sem.

L	T	P	C
2	0	0	2

Prerequisites: None

Course Objectives:

1. Understand the basic Business types, the impact of the Economy Businesses and Firms specifically.
2. Learn the market demand and supply.
3. Analyze the Business from the Financial Perspective.
4. Preparing account statements and balance sheets.
5. Analyze the fund flow and cash flows.

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

1. Understand the various Forms of Business and the impact of economic variables on the Business.
2. Comprehend the demand and supply analysis.
3. Explore the usage of marketing and pricing of a product.
4. Maintaining the financial accounts of a firm or company.
5. Monitoring the accounts through ratios.

UNIT – I

Introduction to Business and Economics:

Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT - II

Demand and Supply Analysis:

Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT - III

Production, Cost, Market Structures & Pricing:

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

UNIT -IV

Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

UNIT - V

Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Introduction to Fund Flow and Cash Flow Analysis (simple problems).

TEXT BOOKS:

1. D.D. Chaturvedi, S.L. Gupta, Business Economics - Theory and Applications, International Book House Pvt. Ltd.2013.
2. Dhanesh K Khatri, Financial Accounting, Tata McGraw Hill,2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata Mc Graw Hill Education Pvt. Ltd.2012.

REFERENCE BOOKS:

1. Paresh Shah, Financial Accounting for Management 2e, Oxford Press,2015.
2. S.N. Maheshwari, Sunil K Maheshwari, Sharad K Maheshwari, FinancialAccounting,5e, Vikas Publications,2013.

20CS702PC: MACHINE LEARNING

IV Year B.Tech CSE(AI&ML) I-Sem

L	T	P	C
3	1	0	4

Prerequisites:

1. Data Structures
2. Knowledge on statistical methods

Course Objectives:

1. Introducing the concepts of decision learning and machine learning.
2. Understand the decision tree learning and ANN architectures.
3. Learn Machine learning techniques such as Bayesian learning and computational learning.
4. Understand instant based learning theory.
5. Study analytical and reinforced learning techniques.

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

1. Understand the concept of computational intelligence.
2. Description of artificial neural networks and their usage.
3. Implement basic machine learning algorithms.
4. Implement instant based learning by set rules.
5. Introduces analysis by reinforcement learning algorithms

UNIT - I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the general to specific ordering – introduction, a concept learning task, concept learning as search, find-S: finding a maximally specific hypothesis, version spaces and the candidate elimination algorithm, remarks on version spaces and candidate elimination, inductive bias**.**

Decision Tree Learning–Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT - II

Artificial Neural Networks-1– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.

Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

Evaluation Hypotheses – Motivation, estimation hypothesis accuracy, basics of sampling theory, a general approach for deriving confidence intervals, difference in error of two hypotheses, comparing learning algorithms.

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibs

algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM algorithm.

Computational learning theory–Introduction, probably learning an approximately correct hypothesis, sample complexity for finite hypothesis space, sample complexity for infinite hypothesis spaces, the mistake bound model of learning.

Instance-Based Learning- Introduction, *k*-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT- IV

Genetic Algorithms – Motivation, Genetic algorithms, an illustrative example, hypothesis space search, genetic programming, models of evolution and learning, parallelizing genetic algorithms.

Learning Sets of Rules – Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

Reinforcement Learning–Introduction, the learning task,*Q*–learning, non-deterministic ,rewards and actions, temporal difference learning, generalizing from examples, relationship to dynamic programming.

UNIT - V

Analytical Learning-1- Introduction, learning with perfect domain theories: PROLOG-EBG, remarks on explanation-based learning, explanation-based learning of search control knowledge.

Analytical Learning-2-Using prior knowledge to alter the search objective, using prior knowledge to augment search operators.

Combining Inductive and Analytical Learning – Motivation, inductive-analytical approaches to learning, using prior knowledge to initialize the hypothesis.

TEXT BOOKS:

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

REFERENCES:

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

20CS741PE: CLOUD COMPUTING (Professional Elective - IV)

IV Year B.Tech. CSE(AI&ML) I-Sem **L T P C**
3 0 0 3

Pre-requisites:

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

Course Objectives:

1. Comprehend distributed system models.
2. Outline Cloud characteristics and its services.
3. Explore the knowledge of cloud computing and migration tools.
4. Illustrate the computing service models.
5. Describing the cloud programming and software environments, resource management.

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

1. Ability to understand the cloud computing paradigms.
2. Understand various service delivery models of a cloud computing architecture.
3. Identify the cloud infrastructure management and migration tools.
4. Understand the cloud service ways in which the cloud can be programmed.
5. 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, 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, Manjra soft, 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, rp2011.

20CS742PE: SOFT COMPUTING (Professional Elective - IV)

IV Year B.Tech CSE(AI&ML) I-Sem

L	T	P	C
3	0	0	3

Prerequisites

1. Knowledge of Algorithms.
2. A course on “Database Management Systems”.
3. A course on “Mathematical Computations”.

Course Objectives:

1. Familiarize with soft computing concepts.
2. Introduce and use the idea of fuzzy logic and use of heuristics based on humanexperience.
3. Familiarize the Neuro-Fuzzy modeling using Classification and Clustering techniques.
4. Learn the concepts of Genetic algorithm and its applications.
5. Acquire the knowledge of Rough Sets.

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

1. Understand the concepts of soft computing.
2. Introduce fuzzy logic and reasoning.
3. Apply Particle Swarm optimization algorithms.
4. Perform genetic algorithms for classification.
5. Comprehend Soft computing techniques.

UNIT - I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT-II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT-III

Fuzzy Decision Making, Particle Swarm Optimization

UNIT-IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT-V

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXT BOOK:

1.Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

REFERENCE BOOKS:

1. S. N. Sivanandam & S. N. Deepa, “Principles of Soft Computing”, 2nd edition, Wiley India, 2008.
2. David E. Goldberg, “Genetic Algorithms-In Search, optimization and Machine learning”, Pearson Education.
3. J. S. R. Jang, C.T. Sun and E. Mizutani, “Neuro-Fuzzy and Soft Computing”, Pearson Education, 2004.
4. G.J. Klir & B. Yuan, “Fuzzy Sets & Fuzzy Logic”, PHI, 1995.
5. Melanie Mitchell, “An Introduction to Genetic Algorithm”, PHI, 1998.
6. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, McGraw- Hill International editions, 1995

20CS743PE: MOBILE COMPUTING (PROFESSIONAL ELECTIVE - IV)

IV Year B.Tech. CSE(AI&ML) I-Sem **L T P C**
3 0 0 3

Course Objectives:

1. Understand the concept of the mobile computing paradigm, the limitations andinfrastructure of its novel application of GSM protocol.
2. Understand the issues and solutions of various layers of mobile networks MAC layer.
3. Understand the platforms and protocols used in a mobile environment Network Layer &Transport Layer.
4. Understand the database issues in mobile environments & data delivery models.
5. Understand the ad hoc networks and related concepts.

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

1. Explore the knowledge of mobile communication and GSM protocols.
2. Describe the mobile network MAC layer protocols.
3. Use of protocols TCP and IP in the mobile transport layer.
4. Design data dissemination and synchronization.
5. Develop ad-hoc network applications and/or algorithms/protocols.

UNIT - I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT – II

(Wireless) Medium Access Control (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

Mobile Network Layer: IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT – III

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing &Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT - IV

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols

UNIT - V

Mobile Adhoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices, Android.

TEXT BOOKS:

1.Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2009.
2. Raj Kamal, “Mobile Computing”, Oxford University Press, 2007, ISBN: 0195686772.

REFERENCE BOOKS:

1.Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, “Handbook of Wireless Networks and Mobile Computing”, Wiley, 2002,
ISBN 0471419028.
3. Reza Behravanfar, “Mobile Computing Principles: Designing and Developing Mobile Applications
with UML and XML”, ISBN: 0521817331, Cambridge University Press, Oct 2004.

20DS744PE: DATA SCIENCE (PROFESSIONAL ELECTIVE - IV)

IV Year B.Tech. CSE(AI&ML) I-Sem

L	T	P	C
3	0	0	3

Course Objectives:

1. Understand the insights about the roles of a data scientist
2. To provide a comprehensive knowledge of data science using Python.
3. To study how the data is loaded and different formats of data
4. To learn the essential concepts of data analytics and data visualization.
5. Learn Techniques and Tools for Transformation of Data

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

1. Apply principles of NumPy and Pandas to the analysis of data.
2. Make use of various file formats in loading and storage of data.
3. Identify and apply the need and importance of pre-processing techniques.
4. Apply various techniques to improve data usability for the end system.
5. Show the results and present them in a pictorial format.

UNIT I

Data science: Definition, Datafication, Exploratory Data Analysis, The Data science process, A data scientist role in this process.

NumPy Basics: The NumPy ndarray: A Multidimensional Array Object, Creating ndarrays ,Data Types for ndarrays, Operations between Arrays and Scalars, Basic Indexing and Slicing, Boolean Indexing, Fancy Indexing, Data Processing Using Arrays, Expressing Conditional Logic as Array Operations, Methods for Boolean Arrays , Sorting , Unique.

UNIT II

Getting Started with pandas: Introduction to pandas, Library Architecture, Features, Applications, Data
Structures, Series, DataFrame, Index Objects, Essential Functionality Reindexing, dropping entries from an axis, Indexing, selection, and filtering), Sorting and ranking, Summarizing and Computing Descriptive Statistics, Unique Values, Value Counts, Handling Missing Data, filtering out missing data.

UNIT III

Data Loading, Storage, and File Formats: Reading and Writing Data in Text Format, Reading Text Files in Pieces, Writing Data Out to Text Format, Manually Working with Delimited Formats, JSON Data, XML and HTML: Web Scraping, Binary Data Formats, using HDF5 Format, Reading Microsoft Excel Files, interacting with Databases, Storing and Loading Data in MongoDB.

UNIT IV

Data Wrangling: Combining and Merging Data Sets, Database style Data Frame Merges, merging on Index, Concatenating Along an Axis, Combining Data with Overlap, Reshaping and Pivoting, reshaping with Hierarchical Indexing, Data Transformation, Removing Duplicates, Replacing Values.

UNIT V

Plotting and Visualization: A Brief matplotlib API Primer, Figures and Subplots, Colors, Markers, and Line Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File, Plotting Functions in pandas, Line Plots, Bar Plots, Histograms and Density Plots, Scatter Plots.

Text Books:

1) Wes McKinney, “Python for Data Analysis”, O’REILLY, ISBN:978-1-449-31979-3, 1st edition, October 2012.
2) Rachel Schutt & O’neil, “Doing Data Science”, O’REILLY, ISBN:978-1-449-35865-5, 1st edition, October 2013.

Reference Books:

1) Joel Grus, “Data Science from Scratch: First Principles with Python”, O’Reilly Media, 2015
2) Matt Harrison, “Learning the Pandas Library: Python Tools for Data Munging, Analysis, and Visualization, O'Reilly, 2016.

20AI745PE: SOCIAL NETWORK ANALYSIS (PROFESSIONAL ELECTIVE - IV)

IV Year B.Tech. CSE(AI&ML) I-Sem

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the basic concepts of social networks
2. To understand community discovery in social networks
3. To understand different link prediction models in social networks
4. To understand the basic concepts of social influence analysis
5. To understand problem of opinion mining and concepts of sentiment analysis

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

1. Compare different centrality measures in social networks
2. Analyze different community detection algorithms
3. Analyze various link prediction models
4. Summarize the concepts of Social influence analysis
5. Apply opinion mining and sentimental analysis techniques for real world problems

Unit - I: Introduction

Social Networks: Preliminaries and properties, Homophily, Triadic Closure and Clustering Coefficient, Dynamics of Network Formation, Power-Law Degree Distributions, Measures of Centrality and Prestige, Degree Centrality, Closeness Centrality, Betweenness Centrality, Rank Centrality

Text book: Data mining The Text book Charu C Aggarwal Chapter 19 , Springer Publications.

Unit - II: Community Discovery in Social Networks

Introduction, Communities in Context, Core Methods, Quality Functions. The Kernighan-Lin(KL) algorithm, Agglomerative/Divisive Algorithms, Spectral Algorithms, Multi-level Graph Partitioning, Markov Clustering

Unit – III: Link Prediction in Social Networks

Introduction, Feature based Link Prediction, Feature Set Construction, Classification Models, Bayesian Probabilistic Models, Link Prediction by Local Probabilistic Models, Network Evolution based Probabilistic Model, Hierarchical Probabilistic Model, Probabilistic Relational Models, Relational Bayesian Network, Relational Markov Network, Linear Algebraic Methods

UNIT- IV: Social Influence Analysis

Introduction, Influence Related Statistics, Edge Measures, Node Measures, Social Similarity and Influence, Homophily, Existential Test for Social Influence, Influence and Actions, Influence and Interaction, Influence Maximization in Viral Marketing, Influence Maximization

Text book: Social Network Data Analytics, Charu C Aggarwal Chapter 7, Springer Publications.

Unit – V: Opinion mining and Sentiment Analysis

The Problem of Opinion Mining, Document Sentiment Classification, Sentence Subjectivity and Sentiment Classification, Opinion Lexicon Expansion, Aspect-Based Sentiment Analysis, Mining Comparative Opinions

Text Books:

1) Social Network Data Analytics, Charu C. Aggarwal, Springer
2) Data mining The Text book Charu C Aggarwal , Springer Publications
3) Mining Text Data, Charu C Aggarwal , Springer Publications

Reference Books:

1) Networks, Crowds, and Markets: Reasoning about a Highly Connected World, David Easley, Jon Kleinberg, Cambridge University Press, 2010.
2) Stanley Wasserman, Katherine Faust. Social network analysis: methods and applications. Cambridge University Press, 1994
3) Networks: An Introduction, M. E. J. Newman, Oxford University Press, March 2010

20CS751PE: DEEP LEARNING (Professional Elective - V)

IV Year B.Tech CSE(AI&ML) I-Sem

L	T	P	C
3	0	0	3

Pre-requisites:

1. A course on Python Programming"

Course Objectives:

1. To introduce the foundations of Artificial Neural Networks
2. To acquire the knowledge on Deep Learning Concepts
3. To gain knowledge to apply optimization strategies
4. To learn various types of Artificial Neural Networks
5. To learn various applications of Deep Learning methods.

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

1. Understand the concepts of Neural Networks
2. Select the Learning Networks in modeling real-world systems
3. Apply optimization strategies for large scale applications
4. Use an efficient algorithm for Deep Models
5. Implement Deep learning models in various domains.

UNIT - I

Deep Feedforward Networks: Example: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and Other Differentiation Algorithms, Historical Notes.

UNIT - II

Regularization for Deep Learning:

Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, TangentProp, and Manifold Tangent Classifier.

UNIT - III

Optimization for Training Deep Models, How Learning Differs from Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms

UNIT - IV

Convolutional Networks:

The Convolution Operation, Motivation, Pooling, Convolution and Pooling as an Infinitely Strong Prior, Variants of the Basic Convolution Function, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, The Neuro-scientific Basis for Convolutional Networks, Convolutional Networks and the History of Deep Learning

UNIT - V

Applications:

Large-Scale Deep Learning, Computer Vision, Speech Recognition, Natural Language Processing, Other Applications

TEXT BOOK:

1. Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning series), MIT Press.

REFERENCE BOOKS:

1. Li Deng and Dong Yu, Deep Learning Methods and Applications, Foundations and Trends® in Signal Processing Volume 7 Issues 3-4, ISSN: 1932-8346.
2. Dr. N.D. Lewis, Deep Learning Made Easy with R A Gentle Introduction for Data Science. Create Space Independent Publishing Platform (January 10, 2016).
3. François Chollet, JJ Allaire, MEAP Edition Manning Early Access Program Deep Learning with R Version 1, Copyright 2017 Manning Publications.

20CS752PE: INTERNET OF THINGS (Professional Elective - V)

IV Year B.Tech. CSE(AI&ML) I-Sem

L	T	P	C
3	0	0	3

Prerequisites

1. A course on "Operating Systems"
2. A course on "Computer Networks"
3. A course on "Network Security and Cryptography"

Course Objectives:

1. Introduce the methodologies and framework of ethical hacking for enhancing security.
2. Security Program; Business Perspective; Planning a Controlled Attack; Framework ofSteps
3. Impacts of Hacking; Types of Hackers; Information Security Models; InformationReconnaissance.
4. Introducing exploitation.
5. Design document deliverables and integration of results.

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

1. Understand the role of politics, inherent and imposed limitations and metrics for theplanning of a test.
2. Comprehend the dangers associated with penetration testing.
3. The use and availability of tools to support an ethical hack
4. The knowledge of interpreting the results of a controlled attack.
5. Generation of test results and management of documents.

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 enabled 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, SNMP NETOPEER.

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, controlling output, 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, Universities Press, 2015, ISBN:9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson &Shawn Wallace, O'Reilly (SPD), 2014, ISBN:9789350239759

20CS753PE: SOFTWARE PROCESS & PROJECT MANAGEMENT
(Professional Elective - V)

IV Year B.Tech. CSE(AI&ML) I-Sem

L	T	P	C
3	0	0	3

Course Objectives:

1. Acquire knowledge on software process management and models.
2. Understand the process production stages.
3. Learn the process plan and its checkpoints.
4. To acquire managerial skills for software project development
5. To understand software project policies and its next level adoption.

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

1. Gain knowledge of software requirements, economics and CMM.
2. Develop the life cycle of software development, project organization.
3. Design project structural plan and scheduling cost.
4. Gain the project process management skills.
5. Develop software product using conventional and modern principles of softwareproject management

UNIT - I

Software Process Maturity

Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The Optimizing Process.

Process Reference Models

Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP).

UNIT - II

Software Project Management Renaissance

Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way.

Life-Cycle Phases and Process artifacts

Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model-based software architectures.

UNIT - III

Workflows and Checkpoints of process

Software process workflows, Iteration workflows, Major milestones, minor milestones, periodic status assessments.

Process Planning

Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.

UNIT - IV

Project Organizations

Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation

The seven-core metrics, management indicators, quality indicators, life-cycle expectations, Pragmatic software metrics, metrics automation.

UNIT - V

CCPDS-R Case Study and Future Software Project Management Practices

Modern Project Profiles, Next-Generation Software Economics, Modern Process Transitions.

TEXT BOOKS:

1. Managing the Software Process, Watts S. Humphrey, Pearson Education
2. Software Project Management, Walker Royce, Pearson Education

REFERENCE BOOKS:

1. An Introduction to the Team Software Process, Watts S. Humphrey, Pearson Education,2000
2. Process Improvement essentials, James R. Persse, O'Reilly,2006
3. Software Project Management, Bob Hughes & Mike Cotterell, fourth edition, TMH,2006
4. Applied Software Project Management, Andrew Stellman & Jennifer Greene, O'Reilly,2006.
5. Head First PMP, Jennifer Greene & Andrew Stellman, O'Reilly,2007
6. Software Engineering Project Management, Richard H. Thayer & Edward Yourdon, 2nd edition, Wiley India,2004.
7. Agile Project Management, Jim Highsmith, Pearson education,2004.

20CS754PE: DESIGN PATTERNS (PROFESSIONAL ELECTIVE - V)

IV Year B.Tech. CSE(AI&ML)I-Sem **L T P C**
3 0 0 3

Prerequisites

1. A Course on Software Engineering"
2. A Course on "Object Oriented Programming Through Java"

Course Objectives:

1. Use creational design patterns in software design for class instantiation
2. Use structural design patterns for better class and object composition
3. Use behavioural patterns for better organization and communication between the objects
4. Use refactoring to compose the methods for proper code packaging
5. Use refactoring to better organize the class responsibilities of current code

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

1. Design Patterns in handling common problems faced during building an application.
2. Designing of structure of document editor.
3. Designing the documental pattern.
4. Designing the structural patter for document handling.
5. Strategize the behavioural pattern

UNIT - I

Introduction: What is a design pattern? design patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT - II

Designing a Document Editor: Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary

UNIT - III

Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

UNIT - IV

Structural Pattern: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

UNIT - V

Behavioral Patterns: Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template Method, Visitor.

TEXT BOOK:

1. Design Patterns, Erich Gamma, Pearson Education

REFERENCE BOOKS:

1. Pattern's in Java, Vol –I, Mark Grand, Wiley Dream Tech.
2. Patterns in Java, Vol-II, Mark Grand, Wiley Dream Tech.
3. Java Enterprise Design Patterns Vol-III, Mark Grand, Wiley Dream Tech.
4. Head First Design Patterns, Eric Freeman, O'reily publications

20CS755PE: ADVANCED ALGORITHMS (Professional Elective - V)

IV Year B.Tech. CSE(AI&ML) I-Sem

L	T	P	C
3	0	0	3

Pre-requisites:

1. A course on "Computer Programming & Data Structures"
2. A course on "Data Structures & Algorithms"

Course Objectives:

1. Introduces the recurrence relations for analyzing various algorithmic techniques.
2. Introduces the graphs and their traversals.
3. Describe sorting networks and applications of networks.
4. Introduces string matching algorithms
5. Explore the knowledge of non-linear programming techniques.

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

1. Choose appropriate data structures and algorithm design methods for a specifiedapplication.
2. Describe the graph algorithms.
3. Apply the sorting networks.
4. Design the string matching algorithms.
5. Understand non-linear programming.

UNIT - I

Introduction: Role of Algorithms in computing, Order Notation, Recurrences, Probabilistic Analysis and Randomized Algorithms. Sorting and Order Statistics: Heap sort, Quick sort and Sorting in Linear Time.

Advanced Design and Analysis Techniques: Dynamic Programming- Matrix chain Multiplication, Longest common Subsequence and optimal binary Search trees.

UNIT - II

Greedy Algorithms - Huffman Codes, Activity Selection Problem. Amortized Analysis.

Graph Algorithms: Topological Sorting, Minimum Spanning trees, Single Source Shortest Paths, Maximum Flow algorithms.

UNIT - III

Sorting Networks: Comparison Networks, Zero-one principle, bitonic Sorting Networks, Merging Network, Sorting Network.

Matrix Operations- Strassen's Matrix Multiplication, Inverting matrices, Solving system of linear Equations

UNIT - IV

String Matching: Naive String Matching, Rabin-Karp algorithm, matching with finite Automata, Knuth- Morris - Pratt algorithm.

UNIT- V

NP-Completeness and Approximation Algorithms: Polynomial time, polynomial time verification, NP-Completeness and reducibility, NP-Complete problems. Approximation Algorithms- Vertex cover Problem, Travelling Sales person problem

TEXT BOOK:

1. Introduction to Algorithms," T.H. Cormen, C.E. Leiserson, R.L. Rivest, and C. Stein, Third Edition, PHI.

REFERENCE BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia publications pvt. Ltd.
2. Design and Analysis Algorithms - Parag Himanshu Dave, Himanshu Bhalchandra Dave Publisher**:** Pearson
3. Algorithm Design: Foundations, Analysis and Internet examples, M.T. Goodrich and R. Tomassia, John Wiley and sons.
4. Data structures and Algorithm Analysis in C++, Allen Weiss, Second edition, Pearson education.

20CS703PC: MACHINE LEARNING LAB

IV Year B.Tech CSE(AI&ML) I-Sem

L	T	P	C
0	0	3	1.5

Course Objective:

1. Overview of the various machine learning techniques using python.
2. Understand the data analysis using ML techniques.

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

1. Performing experiments in Machine Learning using real-world data.
2. Apply the modern notions in data analysis-oriented computing;

List of Experiments

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

2. Extract the data from database using python

3. Implement k-nearest neighbours classification using python

4. Given the following data, which specify classifications for nine combinations of VAR1andVAR2 predict a classification for a case where VAR1=0.906 and VAR2=0.606, using the result of k- means clustering with 3 means (i.e., 3centroids)

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

5. The following training examples map descriptions of individuals onto high, medium and low credit-worthiness.

medium skiing design single twenties no -> high Risk high golf trading married forties yes ->low Risk
low speedway transport married thirties yes -> med Risk medium footballbanking single thirties yes -> low Risk
high flying media married fifties yes ->high Risk
low footballsecurity single twenties no -> med Risk
medium golf media single thirties yes -> med Risk medium golf transport married forties yes -> low Risk high skiing banking

single thirties yes -> high Risk low golf
unemployed married forties yes ->high Risk

Input attributes are (from left to right) income, recreation, job, status, age-group, home-owner. Find the unconditional probability of `golf' and the conditional probability of `single' given `med Risk' in the dataset?

6. Implement linear regression using python.
7. Implement Naïve Bayes theorem to classify the English text
8. Implement an algorithm to demonstrate the significance of genetic algorithm
9. Implement the finite words classification system using Back-propagation algorithm

20MB801PC: ORGANIZATIONAL BEHAVIOUR

IV Year B.Tech. CSE(AI&ML) II-Sem

L	T	P	C
4	0	0	4

Course Objectives:

1. The conceptual framework and theories underlying Organizational Behavior.
2. Understand the cognitive processes and their attributes.
3. Explore the knowledge of decision making effective communication.
4. Empowerment of nature in groups and teams.
5. Analyzing the leading performance.

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

1. Introducing environmental and organizational behavior.
2. Describing the personality and process attributes at a cognitive level.
3. Usage of decision making at individual and team levels.
4. Comprehend power and politics.
5. Analyzing the leading performance.

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 behavior: 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 – teams in 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 &DavisKeith,OrganisationalBehaviour--HumanBehaviouratWork,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, New Delhi,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

20CS861PE: HUMAN COMPUTER INTERACTION (Professional Elective - VI)

IV Year B.Tech. CSE(AI&ML) II-Sem

L	T	P	C
3	0	0	3

Course Objectives:

1. Importance of HCI and its characteristics.
2. Understand the design principles for the user interface.
3. Explore the concepts of multimedia interfaces.
4. Understand the basics of software tools.
5. Importance of cognitive levels of the user interface.

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

1. Apply HCI and principles to interaction design.
2. Design process of human-computer interaction.
3. Design principles of GUI.
4. Design certain tools for blind or PH people.
5. Applications of virtual and augmented reality interfaces.

UNIT - I

Introduction: Importance of user Interface, definition, importance of good design. Benefits of good design. A brief history of Screen design.

The graphical user interface: popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user Interface popularity, characteristics, Principles of user interface.

UNIT - II

Design process: Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

Screen Designing: Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT- III

Windows: New and Navigation schemes selection of window, selection of devices based and screen based controls. Components, text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors.

UNIT- IV

HCI in the software process: The software life cycle Usability Engineering Iterative design and prototyping Design Focus: Prototyping in practice Design Rationale Design Rules Principles to support usability Standards Golden rules and heuristics HCI patterns Evaluation techniques, Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. Universal design, Universal design principles Multi-modal interaction

UNIT- V

Cognitive models Goal and task hierarchies Design Focus: GOMS saves money, Linguistic models, The challenge of display-based systems Physical and device models Cognitive Architectures Ubiquitous computing and augmented realities, Ubiquitous computing applications research.

Design Focus: Ambient Wood – augmenting the physical Virtual and augmented reality Design Focus: Shared experience Design Focus: Applications of augmented reality Information and data visualization Design Focus: Getting the size right.

TEXT BOOKS:

1. The essential guide to user interface design, Wilbert O Galitz, Wiley Dream Tech. Units 1, 2,3
2. Human – Computer Interaction. Alan Dix, Janet Fincay, GreGoryd, Abowd, Russell Bealg, Pearson Education Units4,5

REFERENCE BOOKS:

1. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Interaction Design Prece, Rogers, Sharps. Wiley Dream tech.
3. User Interface Design, Soren Lauesen, Pearson Education.
4. Human –Computer Interaction, D. R. Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

20CS862PE: CYBER FORENSICS (Professional Elective - VI)

IV Year B.Tech. CSE(AI&ML) II-Sem

L	T	P	C
3	0	0	3

Prerequisites:

1. A course on "Network Security"

Course Objectives:

1. Understand the types of crimes and response methodology.
2. Learn the objectives to provide digital evidence which is obtained from digitalmedia.
3. Describe the data analysis and validation methods.
4. Explore the modern tools used in an investigation.
5. Retrieving of the data stored in various storage places.

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

1. Describe the crime types and incident response procedures.
2. Understand the usage of computers in forensic laboratories.
3. Explore the data analysis and visualization techniques.
4. Use various forensic tools for a wide variety of investigations.
5. Design principles of data management methods.

UNIT- I

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident - Incident Response Methodology – Steps - Activities in Initial Response, Phase after detection of an incident

UNIT-II

Initial Response and forensic duplication, Initial Response & Volatile Data Collection from Windows system -Initial Response & Volatile Data Collection from Unix system – Forensic Duplication: Forensic duplication: Forensic Duplicates as Admissible Evidence, Forensic Duplication Tool Requirements, Creating a Forensic. Duplicate/Qualified Forensic Duplicate of a Hard Drive

UNIT - III

Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions **Network Forensics:** Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT -IV

Current Forensic tools: evaluating computer forensic tool needs, computer forensics software tools, computer forensics hardware tools, validating and testing forensics software E-Mail Investigations: Exploring the role of e-mail in investigation, exploring the roles of the client and server in e-mail, investigating e-mail crimes and violations, understanding e-mail servers, using specialized e-mail forensic tools.

Cell phone and mobile device forensics: Understanding mobile device forensics, understanding acquisition procedures for cell phones and mobile devices.

UNIT- V

Working with Windows and DOS Systems: understanding file systems, exploring Microsoft File Structures, Examining NTFS disks, Understanding whole disk encryption, windows registry, Microsoft startup tasks, MS-DOS startup tasks, virtual machines.

TEXT BOOKS:

1. Kevin Mandia, Chris Prosise, “Incident Response and computer forensics”, Tata McGraw Hill, 2006.
2. Computer Forensics, Computer Crime Investigation by John R. Vacca, Firewall Media, New Delhi.
3. Computer Forensics and Investigations by Nelson, Phillips Enfinger, Steuart, CENGAGE Learning

REFERENCE BOOKS:

1. Real Digital Forensics by Keith J. Jones, Richard Bejtiich, Curtis W. Rose, Addison- Wesley Pearson Education
2. Forensic Compiling, A Tractitioneris Guide by Tony Sammes and Brian Jenkinson, Springer International edition.

20AI863PE: COMPUTER VISION (Professional Elective - VI)

IV Year B.Tech. CSE(AI&ML) II-Sem

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the basic concepts of Computer Vision
2. To understand about feature detection and matching
3. To understand image segmentation techniques
4. To understand feature based alignments and their applications
5. To understand various detection techniques

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

1. Enumerate the fundamentals of computer vision
2. Apply different feature detection and matching techniques for a real world problem
3. Apply Image Segmentation Techniques on an image
4. Summarize the applications of Feature based alignment
5. Compare different recognition techniques.

UNIT-I

Introduction: What is computer vision, A brief history, Image Formation, Geometric primitives and transformations, Photometric image formation, The digital camera.

UNIT-II

Feature detection and matching: Points and patches, Feature detectors, Feature descriptors, Feature matching, Feature tracking, Application: Performance-driven animation, Edges, Application: Edge editing and enhancement, Lines, Application: Rectangle detection.

UNIT-III

Segmentation: Active contours, Split and merge, Mean shift and mode finding, Normalized cuts, Graph cuts and energy-based methods, Application: Medical image segmentation.

UNIT-IV

Feature-based alignment: 2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration, Calibration patterns, Vanishing points, Application: Single view metrology, Rotational motion, Radial distortion.

UNIT-V

Recognition: Object detection, Face detection, Pedestrian detection, Face recognition, Eigen faces, Active appearance and 3D shape models, Application: Personal photo collections, Instance recognition, Category recognition, Context and scene understanding.

TEXT BOOKS:

1. Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer,2010.

REFERENCES:

1. Forsyth/Ponce, "Computer Vision: A Modern Approach", Pearson Education India;2 edition (2015)
2. S. Nagabhushana,"Computer Vision and Image Processing" ,New Age International Pvt Ltd; First edition(2005)
3. Rafael C. GonzaLez"'Digital Image Processing" Pearson Education; Fourth edition (2018)

20CS864PE: CRYPTOGRAPHY AND NETWORK SECURITY

(Professional Elective - VI)

IV Year B.Tech. CSE(AI&ML) II-Sem **L T P C**
3 0 0 3

Course Objectives:

1. Understand various cryptographic algorithms and their characteristics.
2. Describe the private and public-key cryptosystems.
3. Discussion of key management scenarios.
4. Describe the enhancements of Web security and Firewalls made to IPv4 by IPSec.
5. Generate and distribute a PGP key pair and use the PGP package to send anencrypted e-mail message.

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

1. Understand the key concepts of cryptography and security.
2. Comprehend the private and public key cryptographic algorithms.
3. Defining the key distribution and management methods.
4. Use of transporting data by Web security and Firewalls protocols.
5. Distribute the PGP to send a secured e-mail message.

UNIT - I

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

UNIT - II

Symmetric key Ciphers: Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

Asymmetric key Ciphers: Principles of public key cryptosystems, RSA algorithm, Elgamal Cryptography, Diffie-Hellman Key Exchange, Knapsack Algorithm.

UNIT - III

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), **Message authentication codes:** Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme.

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure

UNIT - IV

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security

UNIT - V

E-Mail Security: Pretty Good Privacy, S/MIME **IP Security:** IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, Combining security associations, Internet Key Exchange

Case Studies on Cryptography and security: Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-Branch Payment Transactions, Cross site Scripting Vulnerability.

TEXT BOOKS:

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill, 3rdEdition

REFERENCE BOOKS:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1stEdition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rdEdition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning

20DS865PE: NOSQL DATABASES (Professional Elective - VI)

IV Year B.Tech. CSE(AI&ML) II-Sem **L T P C**
3 0 0 3

Pre-requisites: Basic Knowledge about DBMS

Course Objective:
1. Understand the database management system concepts
2. Learn the concept of NoSQL using MongoDB
3. Learn how to perform basic database administration tasks.
4. Understand the performance tune of Key-Value Pair NoSQL databases.
5. Learn how to apply Nosql development tools on different types of NoSQL Databases.

Course Outcomes: At the end of the course, student will be able to
1. Understand about Database Management System.
2. Understand the concept of NoSQL using MongoDB
3. Analyze various Query features on NoSQL
4. Understand and examine the relationship among data and its operations using MongoDB
5. Develop Web applications with NoSQL and its administration

UNIT-I

Introduction to Management: History of Database Systems. Database System Applications, database System VS file System. Data Models: ER Model, Relational Model and Other Models. Database Languages: DDL, DML. Introduction to the Relational Model – Integrity Constraint Over relations – Enforcing Integrity constraints – Querying relational data – Logical database Design – Introduction to Views – Destroying /altering Tables and Views. Introduction of Object Database Systems, Structured Data types, operations on structured data, Encapsulation and ADTS, Inheritance.

UNIT-II

Introduction To NoSQL: Overview and History of NoSQL, Types of NoSQL Database, The Value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The Emergence of NoSQL, Key Points .Comparison of relational databases to new NoSQL stores.

Introduction to MongoDB: MongoDB, Cassandra use and deployment, Application, RDBMS approach, Challenges NoSQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregate-Oriented Databases.

UNIT-III

Data And Distribution Models: Replication and Sharding, Map-Reduce on databases. Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication. NoSQL Key/Value databases using MongoDB, Document Databases, Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Web Analytics or Real-Time Analytics, Queries against Varying Aggregate Structure.

UNIT-IV

Key-value Databases: NoSQL Key/Value databases using Riak, Key-Value Databases, Key-Value Store Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets.

UNIT-V

Developing Web Application with NOSQL and NOSQL Administration: PHP and MongoDB, Python and MongoDB, Creating Blog Application with PHP, NOSQL Database Administration. Graph NoSQL databases using Neo4, NoSQL database development tools and programming languages, Introduction to Graph Databases, features.

Text Books:

1. Raghu ramakrishnan and Johannes Gehrke, *"Database Management Systems"*, 3rd Edition, TMH, 2006.
2. Sadalage, P. & Fowler, M., *NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence*. (1st Ed.). Upper Saddle River, NJ: Pearson Education, In, 2012.

Reference Books:

1. Gauravvaish, *Getting started with NoSQL* , PACKT publishing, ISBN: 978184969488
2. Redmond, E. & Wilson, J., *Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement* (1st Ed.), 2012
3. Raleigh, *NC: The Pragmatic Programmers*, LLC. ISBN-13: 978- 1934356920 ISBN-10: 1934356921