Vivekanand College, Kolhapur
Department of M.C.A.

Annual Teaching Plan

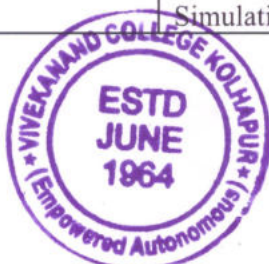**Academic Year: 2025-2026**   **Term: I**   **Department: MCA**

Course Title: Data Structures Using C++ (MCA-I SEM-I)

Name of the teacher: Mr. Vijay Bapuso Pujari

Month : August-September			Module1:	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	**Introduction to Data structures**	Introduction and meaning of data structure, Linked list-concept of singly, doubly and circular linked list, operations on linked list -Adding and removing nodes, Array implementation of lists, Limitation of the Array.

Month : September-October			Module2:	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	**Stacks & Queues**	STACKS -Definition and Example of stack, Implementation Of Stacks As An Array And Linked List, Operations on stacks, stack stored as a linked list arithmetic expression, converting an expression from Infix To Postfix. QUEUES - Definition And Examples Of Queues, Queues As An Abstract Data Type, Queues Stored As A Linked List, Circular Queue, Implementation Of Queues As An Array And Linked List, Operations On Queues, Priority Queue & Dequeue.

Month : October-November			Module3:	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	**Trees & Graphs**	Trees, General tree, Binary tree, binary search tree, operations on binary search tree, AVL Trees, Single rotation, Double rotation, Red-Black Trees, B-Trees: Definition of B-trees, Basic operations on B-trees, deleting a key from a B-tree. Graphs: Representations of graph, Traversing Graphs, Breadth-first search, Depth-First Search, topological sort, Minimum Spanning trees, Single source shortest path, All pairs shortest path.

Month : Nov - Dec.			Module4:	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	**Recursion**	Recursive Definition and Process, Factorial Function, Multiplication of Natural Numbers, Fibonacci Sequence, Properties of Recursive Definitions, Writing Recursive Programs (The Tower of Hanoi Problem, Converting Prefix to Postfix Using Recursion), Simulating Recursion (Return from A Function, Implementing Recursive Function, Simulation of Factorial)

Name and Signature of HoD   **Name and Signature of Teacher**

Annual Teaching Plan

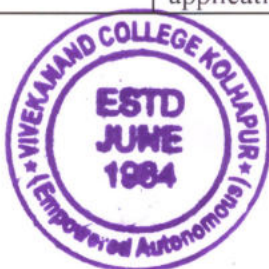**Academic Year:** 2025-2026   **Term : I**   **Department:** MCA

Course Title: Computer Networks (MCA-I SEM-I)

Name of the teacher: Mr. Sumedrao Manikrao Gaikwad

Month : August-September			Module1:	Sub-Units Planned
Lecture	Practical	Total		
15	0	15	**Introduction to Computer Networks and Physical Layer**	Networking Devices, Classification of Computer Networks, Network Protocol Stack (TCP/IP and ISO-OSI), Network Standardization and Examples of Networks. Data Transmission Concepts, Analog and Digital Data Transmission, Communication media, Digital modulation techniques (FDMA, TDMA, CDMA), components of computer networks-files server, workstation, network interface unit, transmission media, hub, repeater, bridge, router, gateway, mode. Case study- Prepare/ present report on network components used in any selected organization/Institute/Company.

Month : September-October			Module2:	Sub-Units Planned
Lecture	Practical	Total		
15	0	15	**Data Link layer**	Data link layer design issues, Error Detection and Correction Codes, Data Link Protocols (Simplex Stop-and-wait protocol for Error free and noisy channel) and Sliding window protocols. The Transport Layer The Transport Service, Elements of Transport Protocols, Congestion Control, The Internet Transport Protocol: UDP, The Internet Transport Protocols – TCP.

Month : October-November			Module3:	Sub-Units Planned
Lecture	Practical	Total		
15	0	15	**Network Layer**	Network Layer Design issues, Routing algorithms, Congestion Control Algorithms, Quality of Service, Internetworking and The Network Layer in the Internet, Store-and-forward packet switching, Services Provided to the Transport Layer, Implementation of Connectionless and Connection Oriented

Month : Nov - Dec.t			Module4:	Sub-Units Planned
Lecture	Practical	Total		
15	0	15	**The Application Layer**	DNS: Domain Name Space, Domain Resource Records, Domain Name Servers. Electronic mail: SMTP, The World Wide Web: Static and dynamic web pages, web applications, HTTP, mobile

Name and Signature of HoD   **Name and Signature of Teacher**

Annual Teaching Plan
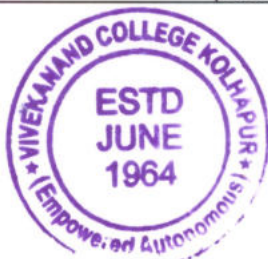
Academic Year: 2024-2025   Term : I   Department: MCA

Course Title: Database Management Systems (Part-I) (MCA-I SEM-I)

Name of the teacher: Mrs. Poonam Krantikumar Deore

Month : August-September			Module1:	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	Database Concept	Introduction, Data, Information Metadata, Terminology Of File, Association Between Fields, Entities And Their Attributes, Relationship Record And Files, Abstraction And Data Integration, Association Between Files (Record Types), Conventional File Processing System, Database System, Components Of Database Management System – (Classification Of DBMS Users, The Tree-Level Architecture, Mapping Between View, Data Independence.)
Month : September-October			Module2:	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	Data Models	Introduction, Data Association-(Entities, Attributes And Associations, Relationship Among Entities, Representation Of Association And Relationship), Concept Of File Organization – Sequential Files, Index-Sequential Files, Direct Files. Relational Algebra: Basic Operations, Relational Algebra Queries, And Relational Calculus: Tuple Calculus, Domain Calculus.
Month : October-November			Module3:	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	Introduction to RDBMS	Entity introduction, characteristics, Comparison between DBMS, RDBMS, Generalization and Aggregation Normalization- Functional dependency, types of normalization (1NF,2NF,3NF, BCNF), Data constraint- primary key, foreign key, unique key, null, not null, default key etc.
Month : Nov - Dec.			Module4:	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	Concurrency Control and Transaction Management	Transaction processing Concurrency - Concept of transaction processing, ACID properties, States of transaction, Serializability, Concurrency control, schemes , Locking techniques , Timestamp based protocols , Granularity of data items ,Deadlocks. Database recovery and Backup.

Name and Signature of HoD   Name and Signature of Teacher
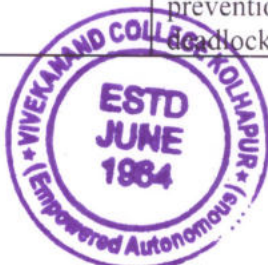
Annual Teaching Plan

Academic Year: 2025-2026　　　　**Term : I**　　　　**Department: MCA**

Course Title: Advanced Operating System (MCA-I SEM-I)

Name of the teacher: Mr. Mehul Arun Jadhav

Month : August-September			Module1:	Sub-Units Planned
Lecture	Practical	Total		
15	0	15	**Design Of Operating System**	System Structure, User Perspective, Operating System Services Assumption about Hardware, the Kernel and Buffer Cache Architecture of UNIX Operating System, System Concepts, Buffer Headers, Structure of the Buffer Pool, Scenarios for Retrieval of the Buffer, Reading and Writing Disk Blocks, Advantages and Disadvantages of Buffer Cache, Operating system services and systems calls, system programs, operating system structure, operating systems generations..

Month : September-October			Module2:	Sub-Units Planned
Lecture	Practical	Total		
15	0	15	**File System**	Concept of a file, access methods, directory structure, file system mounting, file sharing, protection. File system implementation: file system structure, file system implementation, directory implementation, allocation methods, free-space management, efficiency and performance, comparison of UNIX and windows..

Month : October-November			Module3:	Sub-Units Planned
Lecture	Practical	Total		
15	0	15	**Structures Of Processes And Process Control**	Process States and Transitions Layout of System Memory, The Context of a Process, Manipulation of the Process Address Space, Sleep Process Creation/Termination, The User ID of a Process, Changing the Size of a Process. **CONCURRENCY AND SYNCHRONIZATION:** Process synchronization, critical section problem, Peterson's solution, synchronization hardware, semaphores, classic problems of synchronization, readers and writers problem, dining philosophers problem, monitors, synchronization examples(Solaris), atomic

Month : Nov - Dec.			Module4:	Sub-Units Planned
Lecture	Practical	Total		
15	0	15	**Distributed Operating System**	Design of distributed OS, Resource sharing, Distributed OS architectures, software layers, Architectural Model, The Operating System Layer, Protection, Processes and Threads, Communication and invocation, Distributed File System: File Service Architecture, Sun Network File System, the Andrew File System, and Recent Advances. System model, deadlock characterization, deadlock prevention, detection and avoidance, recovery from deadlock banker's algorithm

Name and Signature of HoD　　　　　　　　　　　　**Name and Signature of Teacher**

Annual Teaching Plan

Academic Year: 2025-2026   **Term : I**   **Department: MCA**

Course Title: Cyber Security (MCA-I SEM-I)

Name of the teacher: Mr. Vaishnav Vasant Shegale

Month : August-September			Module1:	Sub-Units Planned
Lecture	Practical	Total		
7	0	7	Introduction to Cyber Security	Introduction to Cyber security, Defining Cyberspace and Overview of Computer and Web- technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

Month : September-October			Module1:	Sub-Units Planned
Lecture	Practical	Total		
8	0	8	Introduction to Cyber Security	Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security

Month : October-November			Module 2:	Sub-Units Planned
Lecture	Practical	Total		
7	0	7	Cybercrime and Cyber law	Cybercrime and Cyber law, Classification of cybercrimes, Common cybercrimes- cybercrime targeting computers and mobiles, cybercrime against women and children, financial frauds, social engineering attacks, malware and ransom ware attacks, zero day and zero click attacks,

Month : November-December			Module 2:	Sub-Units Planned
Lecture	Practical	Total		
8	0	8	Cybercrime and Cyber law	Cybercriminals modus-operandi , Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cybercrime, IT Act 2000 and its amendments, Cybercrime and offences, Organisations dealing with Cybercrime and Cyber security in India, Case studies : Demonstration of email phishing attack and preventive measures.

Name and Signature of HoD   **Name and Signature of Teacher**

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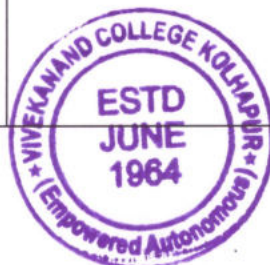| Annual Teaching plan				
Academic Year :2025-26		**Term**:I	**Department:MCA**	
Course Title: Blockchain Technology (MCA-II Sem-III)				
Name of the Teacher: Mr Vijay Bapuso Pujari				
Month :June-July			**Module 1**	**Sub-Units Planned**
Lecture	**Practical**	**Total**		
8	0	8	Blockchain Foundations, Cryptography & Architecture	**Introduction to Blockchain:**Evolution: From Web1.0 to Web3.0 What is blockchain? The need for blockchain Centralized vs Decentralized vs Distributed Systems **Blockchain Architecture:** Blocks, Headers, Timestamps, Nonce, Hash Structure of a blockchain transaction Chain validation and consensus Roles: Miners, Full nodes, Light nodes **Cryptography in Blockchain:** Hash Functions: SHA-256, RIPEMD Digital Signature (ECDSA) Public and Private Key Cryptography Merkle Trees and Proof of Inclusion
Month :July-August			**Module 1**	**Sub-Units Planned**
Lecture	**Practical**	**Total**		
7	0	7	Blockchain Foundations, Cryptography & Architecture	**Consensus Mechanisms:**Proof of Work (PoW), Proof of Stake (PoS), Delegated PoS Proof of Authority, Proof of History (Solana), BFT models Energy efficiency and alternatives **Types of Blockchain:** Public, Private, Consortium, Hybrid Permissioned vs Permissionless Networks Blockchain Trilemma: Security, Scalability, Decentralization

Month : August-September			Module 2	Sub-Units Planned
Lecture	Practical	Total		
8	0	8	Smart Contracts, Blockchain Use Cases & Industry Trends	**Blockchain Ecosystem Platforms:**Overview of Ethereum, Hyperledger Fabric Introduction to Solana, Polygon, Avalanche Wallets: MetaMask, Trust Wallet – Setup and Demo **Smart Contracts & Solidity Basics:**What is a Smart Contract? Use Cases Structure of Solidity Program: Data Types, Functions Remix IDE – Write, Deploy & Interact with a sample contract **Decentralized Applications (DApps):**What are DApps? Architecture of DApps Frontend + Smart Contract Demo Gas Fees & Ethereum Gas Mechanism

Month : September- October			Module 2	Sub-Units Planned
Lecture	Practical	Total		
7	0	7	Smart Contracts, Blockchain Use Cases & Industry Trends	**Popular Blockchain Use Cases:**DeFi (Decentralized Finance): Lending, Staking, DEX NFTs: Creation, Minting, Marketplace (OpenSea overview) Blockchain in: Supply Chain (Provenance, IBM Food Trust) Digital Identity Land Records Health Records Voting systems **Emerging Trends & Challenges:**Web3, Metaverse & DAO Interoperability & Layer 2 Scaling (Optimism, Arbitrum) Regulatory and Legal challenges in Blockchain Security threats: Sybil attacks, 51% attack, Smart contract bugs

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Annual Teaching plan				
Academic Year :2025-26		**Term:**I	**Department:**MCA	
Course Title: Ethical Hacking (MCA-II Sem-III)				
Name of the Teacher: Mr. Vaishnav Vasant Shegale				
Month :June-July			**Module 1**	**Sub-Units Planned**
Lecture	Practical	Total		
15	5	20	Introduction to Ethical Hacking	What is ethical Hacking? Types of ethical hacking, advantages ,disadvantages and purpose of hacking, types of hackers, code of ethics, Types of attacks and attack vector types, prevention from hackers, The Indian IT Act 2000 and Amendments to the Indian IT Act(2008),phases of hacking.
Month :July-August			**Module 2**	**Sub-Units Planned**
Lecture	Practical	Total		
15	5	20	Footprinting and Reconnaissance	What is footprinting? Active and passive footprinting, purpose of footprinting objectives of footprinting, footprinting threats, Types of footprinting, footprinting countenneasures. Self-Learning Topics: footprinting tools-Learning Topics: footprinting tools.
Month : August-September			**Module 3**	**Sub-Units Planned**
Lecture	Practical	Total		
15	5	20	Scanning networks, Enumeration and sniffing	Scanning networks: Network scanning and its types, objectives of network scanning, scanning live systems, scanning techniques-TCP Connect Full Open Scan, Types of Stealth scans,Port scanning countermeasures, IDS evasion techniques, Banner grabbing and its tools, vulnerability scanning, proxy servers, anonymizes, IP spoofing and its countenneasures.

				Enumeration and Sniffing: What is Enumeration? Enumeration techniques, Enumeration types, Enumeration countenneasures, what is sniffing? Wiretapping and its types, packet sniffing, sniffing threats, how sniffers work?, sniffing methods-ARP spoofing and MAC flooding, active and passive sniffing, types of sniffing attacks, sniffing countermeasures, sniffing detection techniques.

Month : September- October

Lecture	Practical	Total	Module 4	Sub-Units Planned
15	5	20	Trojans and other Attacks	Worms, viruses, Trojans, Types of worms, viruses and worms, Preventing malware attacks, types of attacks: (DOS /DDoS), Waterhole attack, brute force, phishing and fake WAP, Eavesdropping, Man- in-the-Middle, buffer overflow, DNS poisoning, ARP poisoning, Identity Theft, 10T Attacks, BOTs and BOTNETs, Steganography - text, image and audio and video, types of Social Engineering: Physical social engineering, Remote social engineering and hybrid social engineering.

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Annual Teaching plan				
Academic Year :2025-26		**Term:**I		**Department:MCA**
Course Title: User Interface (MCA-II Sem-III)				
Name of the Teacher: Mr. Vaishnav Vasant Shegale				
Month :June-July			**Module 1**	**Sub-Units Planned**
Lecture	Practical	Total		
7	0	7	Introduction To Interface	Introduction: Usability of Interactive Systems: Introduction, Usability Goals and Measures, Usability Motivation, Universal Usability, Goals for our profession. Guideline, principles, and theories: Introduction, Guidelines, principles, Theory
Month :July-August			**Module 1**	**Sub-Units Planned**
Lecture	Practical	Total		
8	0	8	Introduction To Interface	Development Processes: Managing Design Processes: Introduction, Organizational Design to support Usability, The Four Pillars of Design, Development methodologies: Ethnographic Observation, Participatory Design, Scenario Development, Social Impact statement for Early Design Review, Legal Issues
Month : August-September			**Module 2**	**Sub-Units Planned**
Lecture	Practical	Total		
7	0	7	Evaluating Interface	Evaluating Interface: Design Introduction, Expert Reviews, Usability Testing and Laboratories, Survey Instruments, Acceptance tests, Evaluation during Active Use, Controlled Psychologically Oriented Experiments.
Month : September- October			**Module 2**	**Sub-Units Planned**
Lecture	Practical	Total		
8	0	8	Evaluating Interface	Direct Manipulation and Virtual Environments: Introduction, Examples of Direct Manipulation, Discussion of direct

				manipulation, 3D Interfaces, Tele-operation, Virtual and Augmented Reality Menu Selection, Form Filling and Dialog Boxes: Introduction, Task-Related Menu Organization, Single Menus, Combination of Multiple Menus, Content Organization, Fast Movement Through Menus, Data Entry With Menus, Form Filling, Dialog Boxes and Alternatives, Audio Menus and Menus for Small Displays

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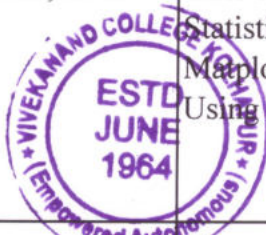| Annual Teaching plan				
Academic Year:2025-26		**Term**:I	**Department:MCA**	
Course Title: Data Analytics Using python (MCA-II Sem-III)				
Name of the Teacher: Mr. Sumedrao Manikrao Gaikwad				
Month :June-July			**Module 1**	**Sub-Units Planned**
Lecture	Practical	Total		
15	5	20	PACKAGES AND MODULES IN PYTHON FOR DATA ANALYSIS AND VISUALIZATION	Understanding Modules in Python, Working with Python Modules, Built-in Python Modules, Concept of Libraries and Packages, What is a Library and How Does It Work? , Essential Python Libraries for Data Science: NumPy, Pandas, Matplotlib, Seaborn, OpenCV
Month :July-August			**Module 2**	**Sub-Units Planned**
Lecture	Practica	Total		
15	5	20	NUMPY FOR DATAANALYTICS	Introduction to NumPy, NumPy Array Object, Creating a Multidimensional Array, NumPy Numerical Types and Data Type Objects, One-Dimensional Slicing and Indexing, Manipulating Array Shapes, NumPy Array Attributes, Broadcasting NumPy Arrays
Month : August-Septeml			**Module 3**	**Sub-Units Planned**
Lecture	Practica	Total		
15	5	20	DATAANALYSIS AND VISUALIZATION WITH PANDAS, MATPLOTLIB, AND SEABORN	Introduction to Pandas DataFrames, Introduction to Pandas DataFrames, Creating DataFrames from Lists of Tuples, Data Aggregation in Pandas: Statistical functions, Data Visualization: Using Matplotlib, Using Pandas' Built-in Plotting, Using Seaborn for Advanced Visualizations.
Month : September- Oct			**Module 4**	**Sub-Units Planned**
Lecture	Practica	Total		
15	5	20	IMAGE PROCESSING	Introduction to Computer Vision, OpenCV

				FUNDAMENTALS USING OPENCV IN PYTHON	Library in Python, Working with Images Getting Started with Images, Basic Operations on Images, Arithmetic Operations on Images, Image Pre-processing Techniques, Edge Detection and Segmentation, Feature Detection and Recognition: Feature Detection and Description, Image Detection and Recognition Examples

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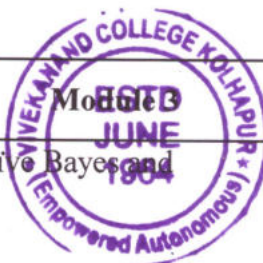| Annual Teaching plan				
Academic Year :2025-26			**Term:**I	**Department:**MCA
Course Title: Artificial Intelligence & Machine Learning (MCA-II Sem-III)				
Name of the Teacher: Mr. Mehul Arun Jadhav				
Month :June-July			**Module 1**	**Sub-Units Planned**
Lecture	**Practical**	**Total**		
15	5	20	Introduction to Artificial Intelligence and Machine learning	Definition and Scope of AI and ML, Types of Machine Learning: Supervised, Unsupervised, Reinforcement Learning, Applications of AI in real-world domains, Key concepts in ML: Features, Labels, Model, Training, Testing, Understanding Overfitting, Underfitting, Generalization Steps to build a Machine Learning model: Data Collection → Pre-processing → Model Building → Evaluation → Deployment, Algorithms: Linear Regression, Logistic Regression, Perceptron (introductory NN)
Month :July-August			**Module 2**	**Sub-Units Planned**
Lecture	**Practical**	**Total**		
15	5	20	Supervised Learning Algorithms	Classification and Regression tasks, k-Nearest Neighbours (k-NN), Decision Trees – ID3, Gini, Entropy, Random Forest – Bagging and Ensemble Concept, Support Vector Machines (SVM),Model persistence: Saving and loading models, Data scaling and normalization Algorithms: k-NN, Decision Tree (ID3, CART),Random Forest, Support Vector Machine (SVM)
Month : August-September			**Module 3**	**Sub-Units Planned**
Lecture	**Practical**	**Total**		
15	5	20	Naïve Bayes and	Naïve Bayes: Gaussian, Multinomial,

			Unsupervised Learning	Bernoulli models, Bayes' Theorem and conditional
				independence, Text pre-processing: Tokenization, Stop words, TF-IDF, Clustering: K-Means,
				Algorithm, Evaluation with inertia and silhouette score .Dimensionality Reduction:
				PCA concepts and projection, Hierarchical Clustering overview Algorithms: Naïve Bayes, K-Means Clustering, Principal Component Analysis (PCA),Hierarchical Clustering

Month : September- October			Module 4	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	Advanced Learning and Ensemble Techniques	Ensemble Learning: AdaBoost, Gradient Boosting, XGBoost (intro),Neural Networks: Perceptron, MLP, DBSCAN clustering algorithm, Dimensionality reduction using t-SNE, Model Evaluation: Accuracy, Precision, Recall, F1-score, ROC-AUC Algorithms: AdaBoost, Gradient Boosting, DBSCAN, Multilayer Perceptron (MLP),t-SNE

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Annual Teaching plan				
Academic Year :2025-26		**Term:**I	**Department:MCA**	
Course Title: Natural Language processing (MCA-II Sem-III)				
Name of the Teacher: Mrs. Poonam Krantikumar Deore				

Month :June-July			**Module 1**	**Sub-Units Planned**
Lecture	Practical	Total		
15	0	15	Introduction to NLP and Word Level Analysis	Introduction : History of NLP, Generic NLP system, levels of NLP , Knowledge in language processing , Ambiguity in Natural language , stages in NLP, challenges of NLP ,Applications of NLP Self-learning topics: Empirical laws Morphology analysis – survey of English morphology, Inflectional morphology & Derivational Morphology, Lemmatization, Regular expression, finite automata, finite state transducers (FST), Morphological parsing with FST, Lexicon free FST Porter stemmer. N –Grams- N-gram language model, Self-learning topics: N-gram for spelling
Month :July-August			**Module 2**	**Sub-Units Planned**
Lecture	Practical	Total		
15	0	15	Syntax and Semantic Analysis	Syntax analysis : Part-Of-Speech tagging(POS)- Tag set for English (Penn Treebank) , Rule based POS tagging, Stochastic POS tagging, Issues –Multiple tags & words, Unknown words. Introduction to CFG, Sequence

				Unsupervised Learning	Bernoulli models, Bayes' Theorem and conditional independence, Text pre-processing: Tokenization, Stop words, TF-IDF, Clustering: K-Means, Algorithm, Evaluation with inertia and silhouette score .Dimensionality Reduction: PCA concepts and projection, Hierarchical Clustering overview Algorithms: Naïve Bayes, K-Means Clustering, Principal Component Analysis (PCA),Hierarchical Clustering

Month : September- October			Module 4	Sub-Units Planned
Lecture	Practical	Total		
15	5	20	Advanced Learning and Ensemble Techniques	Ensemble Learning: AdaBoost, Gradient Boosting, XGBoost (intro),Neural Networks: Perceptron, MLP, DBSCAN clustering algorithm, Dimensionality reduction using t-SNE, Model Evaluation: Accuracy, Precision, Recall, F1-score, ROC-AUC Algorithms: AdaBoost, Gradient Boosting, DBSCAN, Multilayer Perceptron (MLP),t-SNE

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