

VIVEKANAND EDUCATION SOCIETY'S INSTITUTE OF TECHNOLOGY
DEPARTMENT OF COMPUTER ENGINEERING
ACADEMIC YEAR 2024-25 (ODD SEM)

SUBJECT	DIV	SUBJECT TEACHER	SYLLABUS
Discrete Structures And Graph Theory	A	Mannat D	Module1:Logic-Propositional Logic, Predicate Logic, Laws of Logic, Quantifiers, Normal Forms, Inference Theory of Predicate Calculus, Mathematical Induction. Module 2:Relations and Functions- 2.1:Sets:Basic concepts of Set Theory 2.2: Relations: Definition, Types of Relations, Representation of Relations, Closures of Relations, Warshall's algorithm, Equivalence relations and Equivalence Classes 2.3: Functions: Definition, Types of functions, Composition of functions, Identity and Inverse function Module 3:Partial Order Relations, Poset, Hasse Diagram, Chain and Anti chains,
	B	Sujata Khandaskar	
	C	Veena Trivedi	
Data Structures	A	Rupali Hande	Module 1: Introduction to Data Structures Introduction to Pointers and Structures in C; Single and Multidimensional arrays: Memory representation, Operations on Arrays.Introduction to Data Structures - Concept of ADT; Types of Data Structures - Primitive and Non-Primitive Data structures; Linear and Non-Linear Data structures; Operations on Data Structures. Module 2:Stack and Queues Introduction to Stack, Operations on Stack; Array Implementation of Stack; Applications of Stack: Well formed-ness of Parenthesis, Infix to Postfix Conversion, Postfix Evaluation, Recursion Introduction to Queue, Operations on Queue; Array Implementation of Queue; Types of Queue - Circular Queue, Priority Queue, Double Ended Queue; Applications of Queue Module 3: Linked List Introduction to Linked List, Representation of Linked List; Linked List v/s Array; Types of Linked List - Singly Linked List, Circular Linked List, Doubly Linked List; Operations on Singly Linked List and Doubly Linked List; Implementation of Stack and Queue using Singly Linked List; Singly Linked List Applications - Polynomial Representation and Addition, Multiplication
	B	Mannat D	
	C	Richard Joseph	
Digital Logic & Computer Architecture	A	Indu Dokare	Module1 : Basics of digital logic 1.1 Introduction to Binary, Decimal, Octal, and Hexadecimal number systems and conversion. 1.2 Boolean algebra, basic gates and universal gates 1.3 Sum of products and products of sum, minimization with Karnaugh Map (up to four variables) 1.4 Binary Arithmetic: Addition, subtraction, multiplication, and division, sign magnitude, 1's and 2's complement method of data representation, subtraction using 1's and 2's complement method Module 2 : Combinational circuits and sequential circuits 2.1 Introduction to combinational circuits and sequential circuits, half adder, full adder, multiplexer, demultiplexer, encoder, and decoder 2.2 Flip-Flops:SR, JK, D, T (Block diagram and truth table) 2.3 Basics of counters and registers (only concept with a diagram, design is not expected) Module 3 : Processor organization and architecture 3.1 Basic organization of computer and architecture, Von- Neumann model 3.2 Introduction to buses, types of buses- Address bus, data bus and control bus 3.3 Register organization, Instruction formats, addressing modes, instruction cycle
	B	Pallavi G	
	C	Nusrat A	
Database Management System	A	Yugchhaya Dhote	1. Introduction Database Concepts 1.1Introduction, Characteristics of databases, Data abstraction and data Independence, DBMS system architecture 2. Entity–Relationship Data Model 2.1The Entity-Relationship (ER) Model: Entity types: Weak and strong entity sets, Entity sets, Types of Attributes, Keys, Relationship constraints: Cardinality and Participation, Extended Entity-Relationship (EER) Model:Generalization, Specialization and Aggregation 3. Relational Model and relational Algebra 3.1 Relational Model: Relational schema and concept of keys. Mapping the ER and EER Model to the Relational Model Relational Algebra: Unary and Binary operators, Relational Algebra Queries. (Projection,Selection and Cartesian Product) 4. Structured Query Language (SQL) 4.1Overview of SQL: Data Definition Commands, Integrity constraints: key constraints, Domain Constraints, Referential integrity , check constraints, Data Manipulation commands, aggregate function-group by, having.
	B	Mathur Manisha	
	C	Pallavi Saindane	
	A	DATTATRAY G	Module1: Introduction to Probability 1.1 Definition and basics of Random experiment, Sample space, Events, Mutually exclusive and exhaustive events, Probability, Addition rule. 1.2 Conditional probability, Multiplication rule, Independent events, Total probability theorem, Bayes theorem. Module2: Random Variables and its distributions 2.1 Discrete random variable, probability mass function, continuous random variable, probability density
	B	DATTATRAY G	

Mathematics For AIML	C	RAVI S.	<p>2.1 Discrete random variables; probability mass function, continuous random variables; probability density function, cumulative distribution function.</p> <p>2.2 Joint probability distributions of two random variables: discrete and continuous, marginal and conditional distribution, independence of random variables.</p> <p>2.3 Probability distribution of functions of one and two random variables.</p> <p>2.4 Expectation, Variance, Covariance, Raw and Central Moments, Moment generating function.</p> <p>Module3: Special Probability Distributions</p> <p>3.1 Discrete Distributions: Binomial distribution, Poisson distribution.</p>
Financial Management For Engineers	A	Dr. Dashrath Mane	<p>1. Indian Financial System</p> <p>1.1 Characteristics, Components and Functions of Financial System. Financial Instruments: Meaning, Characteristics and Classification of Basic Financial Instruments — Equity Shares, Preference Shares, Bonds Debentures, Certificates of Deposit, Treasury Bills, Trade credit.</p> <p>1.2 Financial Markets: Meaning, Characteristics and Classification of Financial Markets — Capital Market, Money Market and Foreign Currency Market</p> <p>1.3 Financial Institutions: Meaning, Characteristics and Classification of Financial Institutions: Commercial Banks, Investment-Merchant Banks and Stock Exchanges</p> <p>2. Financial Risk and Returns</p> <p>2.1 Concepts of Returns and Risks: Measurement of Historical Returns and Expected Returns of a Single Security and a Two-security Portfolio</p> <p>2.2 Measurement of Historical Risk and Expected Risk of a Single Security and a Two-security Portfolio.</p> <p>2.3 Time Value of Money: Future Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Present Value of a Lump Sum, Ordinary Annuity, and Annuity Due; Continuous Compounding and Continuous Discounting.</p>
	B	Dr. M.D.Patil	
	C	Dr. M.D.Patil	

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Theory of Computer Science (TCS)	A	Sunita Suralkar	Basic Concepts and Finite Automata 1.1 Importance of TCS, Alphabets, Strings, Languages, Closure properties, Finite Automata (FA) and Finite State machine (FSM) 1.2 Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA): Definitions, transition diagrams and Language recognizers, Equivalence between NFA with and without ϵ -transitions, NFA to DFA Conversion, Minimization of DFA, FSM with output: Moore and Mealy machines, Applications and limitations of FA 2. Regular Expressions and Languages 2.1 Regular Expression (RE), Equivalence of RE and FA, Arden's Theorem, RE Applications 2.2 Regular Language (RL), Closure properties of RLs, Decision properties of 3 Grammars 3.1 Grammars and Chomsky hierarchy 3.2 Regular Grammar (RG) 3.3 Context Free Grammars (CFG): Definition, Sentential forms, Leftmost and Rightmost derivations, Parse tree, Ambiguity, Simplification and Applications, Normal Forms: Chomsky Normal Forms (CNF) and Greibach Normal Forms (GNF), Context Free language (CFL) - Pumping lemma, Closure properties.
	B	Vidya Zope	
	C	Yugchhaya Dhote	
Software Engineering	A	Priti Joshi	1.Introduction To Software Engineering and Process Models: 1.1 Software Engineering-process framework, the Capability Maturity Model (CMM), Advanced Trends in Software Engineering 1.2 Prescriptive Process Models: The Waterfall, Incremental Process Models, Evolutionary Process Models: Spiral 1.3 Agile process model 2Software Requirements Analysis and Modelling: 2.1 Introduction to requirement gathering :Requirement gathering techniques - Open ended and close ended questionnaires, Survey, Joint Application Design, Functional and non-functional requirements, user requirements, system requirements, interface specification 2.2 Structured Modeling : Data flow diagram, Behavioural Modeling - Sequence Diagram, Use case Diagram, Software Requirement Specification document format(IEEE). 3.Software Estimation Metrics 3.1 Software Metrics: LOC, FP, Introduction to Basic COCOMO model and COCOMO II Model. 4.Software Architecture and Design Patterns 4.1 Design Patterns (According to industry specifications) Software design – cohesion – coupling – types of coupling and cohesion
	B	Sujata Khandaskar	
	C	Veena Trivedi	
Computer Network	A	Priyanka Shah	Module 1 : Introduction to Networking 1.1 Introduction to computer network, Network application, Evolution of Computer Network , Interconnection networking devices, Client and server and Peer to Peer Networks. 1.2 Transmission media: Electromagnetic Spectrum, Ranges of Transmission media, Physical Layer: Introduction, Network topology, Wired and Wireless Communication, Principles of Cellular Communication, Introduction to 2G, 3G, 4G and 5G technologies 1.3 Communication Service Primitives, Design issues for Layers Reference models: ISO-OSI Layered Architecture, TCP/IP Reference Models, Packet and Circuit Switching. Module 2 : Data Link Layer 2.1 Data Link Layer: Elementary Data Link protocols Design Issues: Framing, Error Control: Error Detection and Correction (Hamming Code, CRC, Checksum), Flow Control: Stop and Wait, Sliding Window (Go Back N, Selective Repeat) 2.2 Medium Access Control Sublayer: Channel Allocation problem, Multiple Access Protocol (Aloha, Carrier Sense Multiple Access (CSMA/CA, CSMA/CD)), 1-persistent , n-persistent, p-persistent CSMA, Wired LANS: Ethernet, Ethernet Standards, Introduction to Wireless LAN, Bluetooth & ZigBee Module 3 : 3.1 Internet Protocol, IP header format, Network Addressing: IPV4 Addressing, Special Addresses, Various Classes of Network Addresses, Physical address, Mapping of Physical Address to Network Addresses, Classless Addressing: Subnet, Supernet, NAT 3.2 Network Layer design issues, Communication Primitives, Unicast, Multicast, Broadcast.
	B	Nusrat A	
	C	Pallavi G	
Data Warehousing and Mining	A	Priya .R.L	Module 1: Data Warehousing Fundamentals Introduction to Data Warehouse, Data warehouse architecture, Data warehouse versus Data Marts, Top-down versus Bottom-up approach, E-R Modeling versus Dimensional Modeling, Information Package Diagram, Data Warehouse Schemas; Star Schema, Snowflake Schema, Factless Fact Table, Fact Constellation Schema. Slowly Changing Dimension Module 2: ETL & OLAP Major steps in ETL process, Data extraction: Techniques, Data transformation: Basic tasks, Major transformation types. Data Loading: Apoolvina Data. OLTP Vs OLAP. OLAP definition. Dimensional
	B	Richard Joseph	

	C	Dr. Prashant Kanade	<p>transformation types, Data Loading, Applying Data, OLAP vs OLAP+, OLAP+ definition, Dimensional Analysis, Hypercubes, OLAP operations: Drill down, Roll up, Slice, Dice and Rotation, OLAP models: MOLAP, ROLAP.</p> <p>Module 3: Introduction to Data Mining, Data Exploration and Data Pre-processing Data Mining Task Primitives, Architecture, KDD process, Issues in Data Mining, Applications of Data Mining, Data Exploration: Types of Attributes, Statistical Description of Data, Data Visualization, Data Preprocessing: Descriptive data summarization, Cleaning, Integration & transformation, Data reduction, Data Discretization and Concept hierarchy generation</p>
Internet Programming (Elective)	A	Pallavi Saindane / Prerna S.	<p>Module No.: 01 Introduction to Web Essentials and UI Design Web Essentials: Clients, Servers and Communication, Web System Architecture, HTTP Request Message, HTTP Response Message</p>
	B	Pallavi Saindane / Prerna S.	<p>Module No.: 02 Front End Web Technologies HTML5 – Fundamental syntax and semantics, Tables, Lists, Image, HTML5 control elements, Semantic elements, Drag and Drop, Audio, Video controls.</p> <p>CSS3 – Inline, embedded and external style sheets – Rule cascading, Inheritance, Backgrounds, Border Images, Colors, Shadows, Text, Transformations, Transitions, Animation.</p>
	C	Pallavi Saindane / Prerna S.	<p>Java Script: An introduction to DHTML, JavaScript DOM Model, Built-in objects, Validation, Event Handling,</p> <p>Module No.: 03 Back End Development Introduction to PHP- Data types, control structures, built in functions</p>
Probabilistic Graphical Models	A	Sanjay Mirchandani	<p>Module 1: Introduction to Probabilistic Graphical Modeling 1.1 Introduction to Probability Theory: Probability Theory, Basic Concepts in Probability, Random Variables and Joint Distribution, Independence and Conditional Independence, Continuous Spaces, Expectation and Variances 1.2 Introduction to Graphs: Nodes and Edges, Subgraphs, Paths and Trails, Cycles and Loops 1.3 Introduction to Probabilistic Graph Models: Bayesian Network, Markov Model, Hidden Markov Model</p>
	B		<p>Module 2: Bayesian Network Model and Inference 2.1 Directed Graph Model: Bayesian Network-Exploiting Independence Properties, Naive Bayes Model, Bayesian Network Model, Reasoning Patterns, Basic Independencies in Bayesian Networks, Bayesian Network Semantics, Graphs and Distributions. Modeling: Picking variables, Picking Structure, Picking Probabilities, D- separation</p>
	C		<p>2.2 Local Probabilistic Models: Tabular CPDs, Deterministic CPDs, Context Specific CPDs, Generalized Linear Models.</p>
			<p>Module 3: Markov Network Model and Inference 3.1 Undirected Graph Model : Markov Model-Markov Network, Parameterization of Markov Network, Gibb's distribution, Reduced Markov Network, Markov Network Independencies, From Distributions to Graphs, Fine Grained Parameterization, Over Parameterization</p>

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Machine Learning	A	Dr. Gresha Bhatia	Module 1 Introduction to Machine Learning 1.1 Machine Learning, Types of Machine Learning Supervised, unsupervised and reinforcement, Issues in Machine Learning, Application of Machine Learning, Steps in developing a Machine Learning Application. 1.2 Training Error, Generalization error, Overfitting, Underfitting, Bias variance Trade off Module 2 : Learning with Regression 2.1 Learning with regression: Linear Regression, Multivariate Linear Regression, Logistic Regression 2.2 Performance Metrics: Performance Measures : Model evaluation and selection, Training, Testing and Validation Tests, Confusion Matrix & Basic Evaluation Metrics, Precision-recall. Module 4 : Learning with Classification 4.1 Introduction to classification, Learning with Trees: Decision Trees, Constructing Decision Trees using Gini Index (Regression), Classification and Regression Trees (CART) 4.2 Introduction to Support Vector Machine (SVM), Hyperplane, Optimal decision boundary, Margins and support vectors, linear SVM, Nonlinear SVM, Kernelized SVM
	B	Dr. Sharmila S	
	C	Indu Dokare	
Big Data Analytics	A	Dr. Sujata Khedekar	1 Introduction to Big Data and Hadoop 1.1 Introduction to Big Data - Big Data characteristics and Types of Big Data 1.2 Traditional vs. Big Data business approach 1.3 Case Study of Big Data Solutions 1.4 Concept of Hadoop, Core Hadoop Components; Hadoop Ecosystem 2 Hadoop HDFS and MapReduce 2.1 Distributed File Systems: Physical Organization of Compute Nodes, Large Scale File-System Organization. 2.2 MapReduce: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Coping With Node Failures. 2.3 Algorithms Using MapReduce: Matrix-Vector Multiplication by MapReduce, Relational-Algebra Operations, Computing Selections by MapReduce, Computing Projections by MapReduce, Union ,Intersection, and Difference by MapReduce 3 NoSQL 3.1 Introduction to NoSQL, NoSQL Business Drivers 3.2 NoSQL Data Architecture Patterns: Key-value stores, Graph stores, Column family (Bigtable)stores, Document stores, Variations of NoSQL architectural patterns, NoSQL Case Study 3.3 NoSQL solution for big data, Understanding the types of big data problems; Analyzing big data with a shared-nothing architecture; Choosing distribution models: master-slave versus peer-to-peer;
	B	Abha Tewari	
	C	Dr. Rohini Temkar	
Natural Language Processing (DLOC)	A	Dr. Sujata Khedekar	Module 1: Introduction Origin & History of NLP; Language, Knowledge, and Grammar in language processing; Stages in NLP; Ambiguities and its types in English and Indian Regional Languages; Challenges of NLP; Applications of NLP Module 2: Word Level Analysis 2.1 Basic Terms: Tokenization, Stemming, Lemmatization; Survey of English Morphology, Inflectional Morphology, Derivational Morphology; 2.2 Morphological Models: Dictionary lookup, finite state morphology; Morphological parsing with FST (Finite State Transducer); 2.3 Grams and its variation: Bigram, Trigram; Simple (Unsmoothed) N-grams; N-gram Sensitivity to the Training Corpus; Unknown Words: Open versus closed vocabulary tasks; Evaluating N-grams: Perplexity; Smoothing: Laplace Smoothing Module 3: Syntax Analysis 3.1 Part-Of-Speech tagging (POS); Tag set for English (Upenn Treebank); Difficulties /Challenges in POS tagging; Rule-based, Stochastic and Transformation-based tagging; 3.2 Generative Model: Hidden Markov Model /HMM Viterbi for POS tagging; Issues in HMM POS tagging; Discriminative Model: Maximum Entropy model, Conditional random Field (CRF); Parsers
	B	Vidya Zope	
	C	PRADNYA RAUT	
	A		Module - 1 : Introduction to Blockchain: What is a blockchain, Origin of blockchain (cryptographically secure hash functions), Foundation of blockchain: Merkle trees Components of blockchain Block in blockchain
	B		

Blockchain (DLOC)	C	Dr. Nupur Giri	<p>FOUNDATION OF BLOCKCHAIN, MERKLE TREES, COMPONENTS OF BLOCKCHAIN, BLOCK IN BLOCKCHAIN, Types: Public, Private, and Consortium, Consensus Protocol, Limitations and Challenges of blockchain</p> <p>Module - 2 : Cryptocurrency: Cryptocurrency: Bitcoin, Altcoin, and Tokens (Utility and Security), Cryptocurrency wallets: Hot and cold wallets, Cryptocurrency usage, Transactions in Blockchain, UTXO and double spending problem Bitcoin Blockchain, Consensus in Bitcoin, Proof of Work (PoW), Proof of Burn(PoB), Proof of Stake (PoS), Proof of Elapsed Time (PoET), Life of a miner, Mining Difficulty, Mining Pools and its methods</p> <p>Module - 3 : Programming for Blockchain: Introduction to Smart Contracts, Types of Smart Contracts, Structure of a Smart Contract, Smart Contract Approaches, Limitations of Smart Contracts Introduction to Programming: Solidity Programming – Basics, functions, Visibility and Activity Qualifiers, Address and Address Payable, Bytes and Enums, Arrays-Fixed and Dynamic Arrays, Special Arrays-Bytes and strings, Struct, Mapping, Inheritance, Error handling, Case Study – Voting Contract App, Preparing for smart contract development</p>
Management Information System (ILOC)	A	Dr. Gresha Bhatia/Dr. Prashant	<p>Module 1: Introduction to Information Systems (IS) Computer Based Information Systems, Impact of IT on organisations, 04 Importance of IS to Society. Organizational Strategy, Competitive Advantages and IS</p> <p>Module 2 : Database and Business Intelligence 08 Database Approach, Big Data, Data warehouse and Data Marts, Managing data resources: establishing an information policy, ensuring data quality Business intelligence (BI): Decision Making Process, BI for Data analytics and Presenting Results</p> <p>Module 3: Ethical and Social Issues in Information Systems: Ethical issues and Privacy, Information Security. Threat to IS, and Security Controls</p>
	B	Dr. Gresha Bhatia	
	C	Dr. Gresha Bhatia/Dr. Prashant	
Cyber Security & Law	A	Gauri Sahoo(GS)	MODULE - 1,2,3
	B	Gauri Sahoo(GS)	MODULE 1 :Introduction to Cybercrime
	C	Gauri Sahoo(GS)	Cybercrime definition, history and threats to security goals, Classifications of cybercrime, How
			The Need for an Indian Cyber Law, Introduction to Indian ITA 2000
			MODULE 2 : Cyber frauds and Security issues
			Social Engg. Cyber stalking, Online Drug Trafficking
			Cloud computing, Proliferation of Mobile and Wireless Devices, Trends in Mobility, work from
			Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations,
			MODULE 3 : Tools and Methods Used in Cybercrime
			Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Steganography
			DoS and DDoS Attacks, SQL Injection, Buffer Overflow,
			Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft)
Information Retrieval (DLOC)	A/B/C	Sunita Suralkar/ Mathur Manisha	<p>Module 1: Introduction to Information Retrieval Introduction to Information Retrieval, Basic Concepts, Information Versus Data, Trends and research issues in information retrieval The retrieval process, Information retrieval in the library, web and digital libraries.</p> <p>Module 2: Modeling in Information Retrieval Taxonomy of Information Retrieval models, Classic Information Retrieval, Alternate set: Theoretical model, Alternative Algebraic models, Alternative Probabilistic models Structured text Retrieval models, Models for browsing</p> <p>Module 4: Indexing and Scoring in Information Systems Introduction, Inverted Files, Other Indices for Text, Boolean queries and Introduction to Sequential searching Scoring, term weighting and the vector space model, Parametric and zone indexes, Weighted zone scoring, Learning weights, The optimal weight, Term frequency and weighting, Inverse document frequency, Tf-idf weighting. The vector space model for scoring, Queries as vectors, Computing vector scores, Efficient scoring and ranking,</p>