Vivekanand College, Kolhapur

(An Empowered Autonomous Institute)

Department of Computer Science

Annual Teaching Plan for Academic Year: 2026-27

Name of the Teacher: Dr. V. B. Waghmare

UG		PG	
Course Code	**Course Title**	**Course Code**	**Course Title**
2DSC03CSC31	Operating System-I	RMD19CSC11	Research Methodology
2DSC03CSC41	Operating System-II	-	-
2DSC03CSC51	Computer Network	-	-
2DSC03CSC61	Advanced Computer Network	-	-

Month: June 2026				**Module / Unit:**	**Sub-units planned**
Class	**Lectures**	**Practicals**	**Total**		
B.Sc. II (Sem-III)	10	5	15	**Unit -1: Introduction to Operating System**	What Operating Systems Do, Computer-System Organization, Computer-System Architecture, Operating-System Structure, Operating-System Operations (Process, Memory, Storage Management, Protection and Security), Distributed Systems, Special-Purpose Systems, Computing Environments, Operating-System Services, User Operating-System Interface, System Calls and Types, System Programs, Virtual Machines, Operating-System Generation, System Boot.
B.Sc. III (Sem-V)	10	5	15	**Unit -1: Introduction to Computer Networks**	Components of Data Communication, Standards and Organizations (IEEE, IETF, ISO, ITU), Network Classifications (LAN, MAN, WAN, PAN), Network Topologies (Bus, Star, Ring, Mesh, Hybrid), Layered Network Architecture, OSI Reference Model & TCP/IP Suite, Introduction to Network Security - Firewalls, VPN.
M.Sc. I (Sem-I)	20	0	20	**Unit -I: Fundamentals of Research Methodology**	Meaning, Objectives, Motivation and Types of Research, Research Approaches, Significance of Research, Research Methods vs. Methodology, Research and Scientific Method, Criteria of Good Research, Research Process; Hypothesis - meaning, function, types; Literature Survey and sources; Ethical Issues and IPR; Publication Process, Citation Index, Impact Factor, h-index, i10 index, Google Scholar, ResearchGate, Academia.
Month: July 2026				**Module / Unit:**	**Sub-units planned**
Class	**Lectures**	**Practicals**	**Total**		
B.Sc. II (Sem-III)	10	5	15	**Unit -2: Process Management**	Process Concept, Process Scheduling, Operations on Processes, Interprocess Communication, Examples of IPC Systems; Threads; CPU Scheduling - Scheduling Criteria, Scheduling

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					Algorithms (FCFS, SJF, Priority, Round-Robin, Multilevel Queue Scheduling).
B.Sc. III (Sem-V)	15	5	20	**Unit -2: OSI Model and Network Devices**	Physical Layer (cabling, NIC, Repeater, Hub, Bridge, Switch, Router, Gateway); Data Link Layer (framing, error detection/correction, flow control, CSMA/CD, CSMA/CA); Network Layer (virtual circuits, IPv4/IPv6, subnetting, CIDR, routing algorithms); Transport Layer (TCP & UDP, connection establishment, flow & congestion control); Application Layer (DNS, HTTP, HTTPS, FTP, SMTP, POP3, IMAP, TLS/SSL).
M.Sc. I (Sem-I)	20	0	20	**Unit -II: Interpretation and Report Writing**	Meaning and Technique of Interpretation, Precautions; Significance and Steps of Report Writing, Layout and Types of Reports; Mechanics of Writing a Research Report - preliminaries, main body, references and bibliography; Workshops, Seminars, Conferences, Symposia; Plagiarism; Writing Tools (Grammarly, Quillbot, Notion, ChatGPT); Referencing Tools (EndNote, Mendeley, JabRef, Zotero).
Month: August 2026				**Module / Unit:**	**Sub-units planned**
Class	**Lectures**	**Practicals**	**Total**		
B.Sc. II (Sem-III)	10	5	15	**Unit -3: Introduction to Linux**	Linux history and architecture, Shell and its types, Kernel, Kernel-Shell relationship, Login/Logout, Remote login, GPU (General Purpose Utilities), inodes, file structure, file manipulation commands, chmod, directory management commands (cd, mkdir, rmdir), simple filters (cut, paste, sort, tr), advanced filters (sed, grep, gawk).
B.Sc. III (Sem-V)	5	5	10	**Unit -3: Network Security & Emerging Trends**	Overview of Cybersecurity & Cryptography, Firewalls & IDS/IPS, Wireless & Mobile Networks (Wi-Fi, Bluetooth, 5G), Cloud Networking & IoT Security, Software-Defined Networking (SDN).
M.Sc. I (Sem-I)	20	0	20	**Unit -III: Computer Applications and Research Methods**	Database Search Engines (Google Scholar, ResearchGate, Science Direct, SciFinder, Scopus, INFLIBNET, Web of Science); Publishers in Computer Science (IEEE, Elsevier, Springer, Wiley); Statistics and Data Interpretation; Software for Computer Science (Python, NumPy, Pandas, Google Colab, MATLAB, SPSS, LaTeX); Emerging Areas - Quantum Computing, Blockchain; Data Collection, Data Analysis, Data Visualization Techniques.
Month: September 2026				**Module / Unit:**	**Sub-units planned**
Class	**Lectures**	**Practicals**	**Total**		
B.Sc. II (Sem-III)	-	-	-	**Revision & Internal Assessment - Operating System-I**	

B.Sc. III (Sem-V)	-	-	-	Revision & Internal Assessment - Computer Network	
M.Sc. I (Sem-I)	-	-	-	Revision & Internal Assessment - Research Methodology	
Month: October 2026				Module / Unit:	Sub-units planned
Class	Lectures	Practicals	Total		
B.Sc. II (Sem-III)	-	-	-	End Semester Examination	
B.Sc. III (Sem-V)	-	-	-	End Semester Examination	
M.Sc. I (Sem-I)	-	-	-	End Semester Examination	
Month: November 2026				Module / Unit:	Sub-units planned
Class	Lectures	Practicals	Total		
B.Sc. II (Sem-IV)	10	5	15	Unit -1: Memory Management	Main Memory - Contiguous Memory Allocation, Swapping, Paging, Page Table Structure, Segmentation (Intel Pentium example); Virtual Memory - Demand Paging, Copy-on-Write, Page Replacement (FIFO, Optimal, LRU, MFU, LFU), Allocation of Frames, Thrashing, Memory-Mapped Files.
B.Sc. III (Sem-VI)	10	5	15	Unit -1: Advanced Networking & Security	TCP/IP for System Administrators, Basic Network Configuration (IP, Subnet, Routing), Linux Firewall (Netfilter, iptables, firewalld), VPN & Secure Network Access, Network Authentication - Kerberos, OpenLDAP, System and Network Security Essentials.
Month: December 2026				Module / Unit:	Sub-units planned
Class	Lectures	Practicals	Total		
B.Sc. II (Sem-IV)	10	5	15	Unit -2: Storage Management	File-System Interface - File Concept, Access Methods, Directory Structure, File-System Mounting, File Sharing, Protection, File-System Structure and Implementation, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance; I/O Systems - I/O Hardware, Application I/O Interface, Kernel I/O Subsystem.
B.Sc. III (Sem-VI)	10	5	15	Unit -2: Internet Services & Protocols	DNS structure & configuration, Web Hosting & Apache Configuration, Email Services (SMTP, POP, IMAP) & Security, Secure Communication (SSH, TLS, SSL), File Transfer Services (FTP, SFTP, NFS), Authentication & Directory Services (OpenLDAP, Samba, LDAP).
Month: January 2027				Module / Unit:	Sub-units planned
Class	Lectures	Practicals	Total		
B.Sc. II (Sem-IV)	10	5		Unit -3: Linux Scripting	Writing and running shell scripts, read, echo, decision and loop control structures, file tests, exit, command line arguments, exporting shell variables, arrays, shell

					functions, data entry scripts with validations before storing on hard disk.
B.Sc. III (Sem-VI)	10	5	15	**Unit -3: Intranet Services & Cloud Networking**	Network File Systems (NFS, DFS, Samba), DHCP, Database Servers & Web Technologies (MySQL, LAMP), Virtualization & Cloud Computing Basics, Container Networking (Docker, Kubernetes), Network Automation & Monitoring Tools (Wireshark, Nagios, Zabbix).
Month: February 2027				**Module / Unit:**	**Sub-units planned**
Class	**Lectures**	**Practicals**	**Total**		
B.Sc. II (Sem-IV)	-	-	-	**Revision & Internal Assessment - Operating System-II**	
B.Sc. III (Sem-VI)	-	-	-	**Revision & Internal Assessment - Advanced Computer Network**	
Month: March 2027				**Module / Unit:**	**Sub-units planned**
Class	**Lectures**	**Practicals**	**Total**		
B.Sc. II (Sem-IV)	-	-	-	**Preparatory Leave / Revision**	
B.Sc. III (Sem-VI)	-	-	-	**Preparatory Leave / Revision**	
Month: April 2027				**Module / Unit:**	**Sub-units planned**
Class	**Lectures**	**Practicals**	**Total**		
B.Sc. II (Sem-IV)	-	-	-	**End Semester Examination**	
B.Sc. III (Sem-VI)	-	-	-	**End Semester Examination**	

Dr. V. B. Waghmare

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Dr. V. B. Waghmare
Head of Department
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DEPARTMENT OF COMPUTER SCIENCE,
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(An Empowered Autonomous)

Department of Computer Science

Annual Teaching Plan for Academic Year: 2026-27

Name of the teacher: Dr. R. Y. Patil

UG	
Course Code	**Course Title**
3DSC03CSC11	Problem Solving using Computers-I
3DSC03CSC21	Problem Solving using Computers-II
2DSC03CSC53	Internet Technologies-I
2DSC03CSC63	Internet Technologies-II

Month: June 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	5	0	5	3DSC03CSC11: Problem Solving using Computers-I Unit-1: Introduction to Programming Languages	Programming languages, their classification and characteristics, language translators and language translation activities, planning the computer program, what is program and programming paradigms, concept of problem solving, problem definition.
B.Sc. Part-III (Sem-V)	5	0	5	2DSC03CSC53: Internet Technologies-I Unit-1: Introduction to Flask	Characteristics of Flask: lightweight, modular, flexible, extensible; who uses Flask, setup tools and pip, installing Python & Flask, working with virtual environments (venv/virtualenv) - creating, activating/deactivating virtualenv, adding & removing packages.
Month: July 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	8	4	12	3DSC03CSC11: Problem Solving using Computers-I Unit-1 (contd.) & Unit-2: Building Blocks of Program	Program design, debugging, types of errors in programming, documentation techniques (algorithms, flowcharting), structured programming concepts, top-down & bottom-up programming methodologies. Unit-2 start: Data, Data Types, Data Binding, Variables, Constants, Declaration, Operations on Data (assignment, arithmetic, relational, logical/boolean, ternary, bitwise, increment/decrement operators).
B.Sc. Part-III (Sem-V)	8	4	12	2DSC03CSC53: Internet Technologies-I Unit-1 (contd.) & Unit-2: Jinja2 Templating & Frontend Integration	Application structure (initialization of Flask app, routes & view functions, server startup & running Flask applications), request-response cycle, application & request contexts, request dispatching, handling responses, command-line options with Flask-Script, building the first simple Flask application. Unit-2 start: Introduction to the Jinja2 template engine, rendering templates in Flask.
Month: August 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	10	4	14	3DSC03CSC11: Problem Solving using Computers-I Unit-2 (contd.) & Unit-3: Logics	Introduction to Python Programming: features, structure of a Python program (shell, indentations, comments), Python interpreter, writing & executing simple program, basic data types (int, long, float, complex, strings), declaring variables, performing assignments, arithmetic operations, sequence control - precedence of operators, type conversion, simple input-output (print(), raw_input(), input()).

					Unit-3 start: Conditional statements (if, if-else, nested if-else).
B.Sc. Part-III (Sem-V)	10	4	14	2DSC03CSC53: Internet Technologies-I Unit-2 (contd.) & Unit-3: Handling Forms & User Interaction	Jinja2 fundamentals (variables, expressions, output), comments & escaping, control structures (loops, conditionals), using filters for data formatting, template inheritance & includes, using Twitter Bootstrap with Flask, custom error pages (404, 500), managing static files (CSS, JS, images), linking static assets in templates. Unit-3 start: CSRF protection in forms, creating & managing form classes in Flask.
Month: September 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	7	4	11	3DSC03CSC11: Problem Solving using Computers-I Unit-3 (contd. & completed): Logics	Looping: for, while, nested loops, else clause with while and for loop; control statements (break, continue, pass); numeric functions (abs(), ceil(), floor(), max(), min(), pow(), sqrt()); string manipulation (declaring strings, immutability, unicode string, escape sequences, concatenation, repetition, slicing, range slicing, membership operator); string functions (capitalize(), len(), lower(), swapcase(), upper()). Revision of Units 1-3 / Semester Practical Examination of allied courses (as per College time-table)
B.Sc. Part-III (Sem-V)	7	4	11	2DSC03CSC53: Internet Technologies-I Unit-3 (contd. & completed): Handling Forms & User Interaction	HTML rendering of forms, form handling in view functions (retrieving & processing user input), redirects & user sessions, Flask flash messages for user notifications, server-side form validation, custom validation methods, creating custom fields & validation rules. Revision of Units 1-3 / Semester Practical Examination of allied courses (as per College time-table)
Month: October 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	-	-	-	End Semester Examination (Theory) - 3DSC03CSC11	
B.Sc. Part-III (Sem-V)	-	-	-	End Semester Examination (Theory) - 2DSC03CSC53	
Month: November 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-II)	5	2	7	3DSC03CSC21: Problem Solving using Computers-II Unit-1: List and Tuples	Lists: creating a list, displaying list (print()), basic operations (length, concatenation, repetition, membership, iteration), slicing, updating and deleting an element of a list.
B.Sc. Part-III (Sem-VI)	5	2	7	2DSC03CSC63: Internet Technologies-II Unit-1: Database Integration & Management	Overview of SQL & MySQL databases, introduction to Python database frameworks, working with Flask-MySQL: database configuration in Flask.
Month: December 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-II)	8	4	12	3DSC03CSC21: Problem Solving using Computers-II Unit-1 (contd.) & Unit-2: Dictionaries, Functions	Compare (cmp()), maximum(max()) and minimum(min()), list methods (append, count, insert, remove, pop, reverse). Tuples: creating tuples, deleting tuple (del), empty tuple, displaying, basic operations (length, concatenation, repetition, membership, iteration, slicing, updating & deleting), compare, maximum & minimum. Unit-2 start: Dictionaries - concept, creating dictionary ({Key:Value,...}).
B.Sc. Part-III (Sem-VI)	8	4	12	2DSC03CSC63: Internet Technologies-II Unit-1 (contd.) & Unit-2: User Authentication & Security	Connecting Flask with MySQL, model definition & relationships, performing database operations (creating tables, inserting, updating, deleting records),

					querying data using Flask, using databases in view functions, interacting with databases from the Python shell. Unit-2 start: Authentication extensions for Flask, building an authentication system - creating an authentication blueprint.
Month: January 2027				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-II)	10	4	14	3DSC03CSC21: Problem Solving using Computers-II Unit-2 (contd.) & Unit-3: Module and File Handling	Dictionary keys are immutable while values are mutable, properties of dictionary keys, basic operations (length, compare), dictionary methods (clear, has_key, items, keys, update, values). Functions: defining functions (def, name, arguments, function suite, return statement), calling a function, passing arguments by value/reference (using list), advantages & types of functions, function parameters (required, keyword, default), anonymous functions/lambda, scope of a variable (global & local). Unit-3 start: Modules - importing module, creating & exploring modules, Math module.
B.Sc. Part-III (Sem-VI)	10	4	14	2DSC03CSC63: Internet Technologies-II Unit-2 (contd.) & Unit-3: Application Deployment & Production	User authentication using Flask-Login, handling user logins & sessions (preparing the user model for logins, protecting routes & restricting access), adding login & logout functionality, implementing user registration (new user registration flow, adding a registration form, storing & validating user data). Unit-3 start: Understanding deployment workflow, logging & debugging errors in production.
Month: February 2027				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-II)	7	3	10	3DSC03CSC21: Problem Solving using Computers-II Unit-3 (contd. & completed): Module and File Handling	Random module, Time module, rules of locating module, namespace & scope (local and global), functions for modules (list of elements dir(), list of local elements locals(), list of global elements globals()). Python File Input-Output: opening & closing file, various types of file modes, reading & writing to files. Revision of Units 1-3 / Semester Practical Examination of allied courses (as per College time-table)
B.Sc. Part-III (Sem-VI)	7	0	10	2DSC03CSC63: Internet Technologies-II Unit-3 (contd. & completed): Application Deployment & Production	Cloud deployment strategies: deploying Flask on cloud platforms (Heroku, PythonAnywhere), deploying Flask apps with hosting services, handling production vs development environments, deploying application updates & maintenance. Revision of Units 1-3 / Semester Practical Examination of allied courses (as per College time-table)
Month: March 2027				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-II)	-	-	-	End Semester Examination (Theory) - 3DSC03CSC21	
B.Sc. Part-III (Sem-VI)	-	-	-	End Semester Examination (Theory) - 2DSC03CSC63	

Dr. R. Y. Patil
Teacher Name

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Annual Teaching Plan for Academic Year: 2026-27

Name of the teacher: **Dr. I. K. Mujawar**

UG		PG	
Course Code	**Course Title**	**Course Code**	**Course Title**
3DSC03CSC12	Introduction to DBMS-I	DSE19CSC11	Design and Analysis of Algorithms
3DSC03CSC22	Introduction to DBMS-II	DSC19CSC22	Digital Image Processing
2DSE03CSC51	Introduction to Java Programming	-	-
2DSE03CSC61	Advanced Java Programming	-	-

Month: June 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	5	0	5	3DSC03CSC12: Introduction to DBMS-I Unit-1: Introduction to DBMS	Database, DBMS - definition and overview, file processing system vs DBMS, limitations of file processing, advantages of DBMS, levels of abstraction, data independence, DBMS architecture, users of DBMS, data models - object based logical model, record based logical model (relational, hierarchical, network).
B.Sc. Part-III (Sem-V)	5	0	5	2DSE03CSC51: Intro. to Java Programming Unit-1: Introduction to Java Programming Language	History & features of Java, Java vs C++, Java environment & tools (jdb, javap, javadoc), IDEs, program structure, comments, data types, variables, operators, keywords, 1D/2D arrays, decision making (if, switch), looping (for, while), type casting, command-line & console input.
M.Sc. Part-I (Sem-I)	5	0	5	DSE19CSC11: Design and Analysis of Algorithms Unit-1: Introduction	Role of algorithm in computing, algorithms, performance analysis and design, characterization (average/best/worst case), asymptotic notations (Big-O, Omega, Theta), space complexity, divide and conquer (matrix multiplication, Strassen's algorithm), solving recurrences (substitution, recursion-tree, master method), sorting (heap, quick, radix, bucket sort), hash tables, linear & binary search, medians and order statistics.
Month: July 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	8	4	12	3DSC03CSC12: Introduction to DBMS-I Unit-2: Entity Relationship Model	Entities, attributes, entity sets, relations, relationship sets, additional constraints (key, participation, weak entities), aggregation/generalization, conceptual design using ER (entities vs attributes, entity vs relationship, binary vs ternary, constraints beyond ER), Entity Relationship Diagram (ERD).
B.Sc. Part-III (Sem-V)	8	4	12	2DSE03CSC51: Intro. to Java Programming Unit-2: Object Oriented Concepts in Java	Defining classes, access specifiers, array of objects, constructors & overloading, 'this' keyword, static block/fields/methods, Object class methods, String class, inner classes, packages, wrapper classes, garbage collection, inheritance, polymorphism, method overloading/overriding, abstract classes & methods, interfaces, object cloning.
M.Sc. Part-I (Sem-I)	18	0	18	DSE19CSC11: Design and Analysis of Algorithms	Greedy algorithms (activity-selection, elements of greedy strategy, Knapsack, job sequencing with deadlines, optimal storage on tapes, Huffman codes,

				Unit-2: Advanced Design and Analysis Techniques	offline caching), Dynamic programming (rod cutting, matrix-chain multiplication, elements of DP, longest common subsequence, optimal binary search trees, TSP, 0/1 Knapsack), Augmenting data structures (dynamic order statistics, interval trees), B-Trees (definition, basic operations, deletion).
Month: August 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	10	4	12	3DSC03CSC12: Introduction to DBMS-I Unit-3: MySQL	DDL statements (create/use database, datatypes, create/alter/rename/drop/truncate table, backup & restore), DML statements (insert, update, delete, select with conditions/in/between/limit,
B.Sc. Part-III (Sem-V)	8	4	12	2DSE03CSC51: Intro. to Java Programming Unit-3: Exception Handling, GUI components using AWT and Swing	Exception types, try-catch, multiple/nested catch, throw/throws/finally, user-defined exceptions, assertions,
M.Sc. Part-I (Sem-I)	18	0	18	DSE19CSC11: Design and Analysis of Algorithms Unit-3: Graph Algorithms	Elementary graph algorithms (representations, BFS, DFS, topological sort, strongly connected components), Minimum spanning trees (Kruskal's & Prim's algorithms), Single-source shortest paths (Bellman-Ford, DAG shortest paths,
Month: September 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	10	4	12	3DSC03CSC12: Introduction to DBMS-I Unit-3: MySQL	Aggregate functions, group by, having), String/Math/Date functions, DCL statements (create/drop users, privileges).
B.Sc. Part-III (Sem-V)	8	4	12	2DSE03CSC51: Intro. to Java Programming Unit-3: Exception Handling, GUI components using AWT and Swing	AWT & Swing basics, layout managers, components (JButton, JLabel, JTextArea, JCheckBox, JList, JComboBox, JMenu etc.), dialogs, event handling (listeners, mouse/keyboard events, adapters).
M.Sc. Part-I (Sem-I)	18	0	18	DSE19CSC11: Design and Analysis of Algorithms Unit-3: Graph Algorithms.	Dijkstra's algorithm), All-pairs shortest paths (matrix multiplication, Floyd-Warshall, Johnson's algorithm), Maximum flow (Ford-Fulkerson, maximum bipartite matching), Matchings in bipartite graphs (stable-marriage problem, Hungarian algorithm)
Month: October 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-I)	-	-	-	**End Semester Examination (Theory) - 3DSC03CSC12**	
B.Sc. Part-III (Sem-V)	-	-	-	**End Semester Examination (Theory) - 2DSE03CSC51**	
M.Sc. Part-I (Sem-I)	-	-	-	**End Semester Examination (Theory) - DSE19CSC11**	
Month: November 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-II)	4	2	6	3DSC03CSC22: Introduction to DBMS-II Unit-1: Relational data model	Domains, attributes, tuples and relations, relational model notation, characteristics of relations, relational constraints - primary key, referential integrity, unique constraint, null constraint, check constraint.
B.Sc. Part-III (Sem-VI)	5	2	7	2DSE03CSC61: Advanced Java Programming	Introduction to multithreading, creating & managing threads, thread priorities, thread synchronization &

				Unit-3: Java Server Pages (JSP) and Java Servlets.	management, servlet filters & listeners, JDBC connectivity in servlets
M.Sc. Part-I (Sem-II)	16	0	16	DSC19CSC22: Digital Image Processing Unit-3: Image Restoration	Medical image processing (basics, applications in diagnosis, challenges & advancements), deep learning for image processing (CNNs for image analysis, transfer learning & fine-tuning, applications).

Month: March 2027				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. Part-I (Sem-II)	-	-	-	**End Semester Examination (Theory) - 3DSC03CSC22**	
B.Sc. Part-III (Sem-VI)	-	-	-	**End Semester Examination (Theory) - 2DSE03CSC61**	
M.Sc. Part-I (Sem-II)	-	-	-	**End Semester Examination (Theory) - DSC19CSC22**	

Dr. I. K. Mujawar
Teacher Name

Dr. V. B. Waghmare
Head of Department

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Department of Computer Science

Annual Teaching Plan for Academic Year: 2026-27

Name of the teacher: Ms. M. P. Dinde

UG		PG	
Course Code	**Course Title**	**Course Code**	**Course Title**
DSC03CSC52	Software Engineering	DSC19CSC11	Python Programming with Applied Libraries
DSC03CSC62	Object Oriented Software Engineering		

Month: June 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Fundamentals of Software Engineering & System Analysis:**	Definition, Importance, and Characteristics of Software, System Development Life Cycle (SDLC). Classical Models: Waterfall, Spiral V-Model, Agile. Modern Software Development Trends (DevOps, CI/CD). Definition of a System, Elements & Characteristics, Types of Systems (Open, Closed, Static, Dynamic, etc.). Functional & Non-functional Requirements, Requirement Gathering Techniques (Interviews, Surveys, Prototyping), Software Design & Architecture. Top-down, Bottom-up.
B.Sc. III	7	16	23		
M.Sc. I	10		10	**Python Programming Fundamentals, Graphics Programming with Turtle, GUI Programming with Tkinter, Event Handling, GUI Frameworks**	Python Introduction, Turtle Module, Drawing Different Shapes, Moving Turtle to any Direction and Location, The color, bgcolor and Speed Method of Turtle, Drawing with Colors, Drawing Basic Shapes using Iterations, Changing Color Dynamically, Turtles to Create Charts, Tkinter Module, Tkinter Widgets- Lable, Button, Checkbutton, ListBox, Menubutton, Menu, Radiobutton, Scrollbar, Frame, Canvas, Text, Scale, Message, MessageBox, Dialog Boxes, Geometry- Grid, Pack, Place, Geometry Manager, Layout Manager, (pyQt, wxPython)
Month: July 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Software Project Management & Quality Assurance:**	Project Planning & Scheduling (Gantt Chart, PERT, CPM), Estimation Techniques (COCOMO, Function Point Analysis), Risk Management in Software Projects. Version Control & Change Management (Git, GitHub). Software Quality Assurance (SQA): Software Quality Factors (Reliability, Maintainability, Usability), Software Testing & Debugging: Testing Levels: Unit, Integration, System, Acceptance, Testing Types: White Box, Black Box, Regression, Security Testing. Manual vs. Automated Testing (Selenium, JUnit, PyTest), Alpha & Beta Testing.
B.Sc. III	10	16	26		

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M.Sc. I	10		10	**Python Libraries: Numpy, Pandas, Matplotlib, Scipy, Network Programming Introduction, Threads Essential**	Creating Arrays, Indexing, Slicing, Shape, Reshape, Iteration, Sorting. Series, Attributes and Methods of Series, DataFrame, Attributes and Methods of DataFrames, Reading CSV, JSON. Pyplot, plot, SubPlot, plotting types of plot, 2D-3D plotting. Introduction, subpackages- stats, interpolate, ndimage. A Daytime Server, Clients and Servers, The Client Program, The Server Program. Class and threads, Multi-threading, Synchronization, Treads Life cycle, use cases.
Month: August 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Software Deployment, Maintenance & Case Studies**	Change Over Strategies (Direct, Parallel, Phased, Pilot), Software Maintenance (Corrective, Adaptive, Perfective, Preventive), Reverse Engineering & Reengineering. Emerging Trends in Software Engineering: Agile Methodologies (Scrum, Kanban, XP), Cloud-Based Software Development, DevOps & Continuous Integration/Continuous Deployment (CI/CD), Security in Software Development (OWASP, Secure SDLC) Case Studies & Industry Applications: College Admission System, Library Management System, Bank Management System, E-commerce System (Amazon-like Platforms), Cloud-based Applications (Google Drive, Microsoft Azure, AWS).
B.Sc. III	12	16	28		
M.Sc. I	10		10	**Introduction to Django, Templates and Template Language, Django Models, Building Forms, Admin Interface, Django Middleware, User Authentication**	Installation, structure of Django app and understanding file module. HTTP response and understanding URLS, namespace of URLs, request parameters, Dynamic URLs, Class-based and Function-based views, template language, template inheritance. Connecting with MySQL, MongoDB, models and fields, parameter in fields, model relationships. HTML forms, Model forms, validations.
Month: September 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	Semester Practical Examination	
B.Sc. III					
Month: October 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	End Semester Examination	
B.Sc. III					
M.Sc. I				Semester Practical Examination & End Semester Examination	
Month: November 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Fundamentals of Object-Oriented Analysis & UML:**	Introduction to Object-Oriented Concepts: Class & Object, Encapsulation, Inheritance, and Polymorphism, Aggregation and Composition. Introduction to Object-Oriented Analysis & Design (OOAD), Need for OOAD, Object-Oriented vs. Traditional Software
B.Sc. III	10	16	26		

					Development, Advantages of Object-Oriented Modeling, Unified Modeling Language (UML) Basics, Overview of UML & Conceptual Model, UML Architecture and Diagrams, UML Notations and Elements.
Month: December 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Object-Oriented Modeling & Design Patterns:**	Unified Process & UML Diagrams: Unified Process Model & Phases (Inception, Elaboration, Construction, Transition), UML Structural Diagrams: Class Diagram, Object Diagram, Package Diagram, Component Diagram, Deployment Diagram. UML Behavioral Diagrams: Use Case Diagram, Activity Diagram, Sequence Diagram, Statechart Diagram, Advanced Object-Oriented Design Concepts. System Design Process & Model Partitioning: Concurrency & Subsystem Allocation, Task, Data, and Resource Management, Design Patterns & Best Practices.
B.Sc. III	10	16	26		
Month: January 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Object-Oriented Implementation:**	Mapping Object Model to Database Schema: Object-Relational Mapping (ORM), Relational vs. NoSQL Database Design for OO Applications, Popular ORM Tools (Hibernate, Django ORM, SQLAlchemy), Object-Oriented Software Testing: Testing Strategies for OO Systems Unit Testing, Integration Testing, System Testing, Object-Oriented Test Case Design, Emerging Trends in OO Software Development. Agile & DevOps in OOAD, Microservices and Distributed Object-Oriented Systems, Cloud-Native Object-Oriented Applications, AI and Automation in OO Software Engineering.
B.Sc. III	10	16	26		
Month: February 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	Semester Practical Examination	
B.Sc. III					
Month: March 2026				**Module/Unit:**	**Sub-units planned**
B.Sc. III	**Lectures**	**Practicals**	**Total**	End Semester Examination	

Ms. M. P. Dinde

Dr. V. B. Waghmare
Head of Department

VIVEKANAND COLLEGE KOLHAPUR (Empowered Autonomous) ESTD JUNE 1964

HEAD,
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Vivekanand College, Kolhapur

(An Empowered Autonomous Institute)

Department of Computer Science

Annual Teaching Plan for Academic Year: 2026-27

Name of the teacher: S. V. Aundhakar

UG		PG	
Course Code	**Course Title**	**Course Code**	**Course Title**
2DSC03CSC32	Object Oriented Programming	DSC19CSC32	Artificial Intelligence
2DSC03CSC42	Algorithm Analysis and Data Structures		

Month: June 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. II	7	16	23	**Unit -I: Introduction to Object Oriented Programming**	Programming Paradigms, What Is Object-Oriented Programming?, Features of OOP, Advantages and disadvantage of OOP, Function Overloading, Operator Overloading, Static and Dynamic Binding, Constructors and Destructors, Techniques of Object-Oriented Programming, When to use OOP?, Applications of OOP.
M.Sc. II	10		10	**Unit -I: Introduction to Artificial Intelligence**	Definitions, History, Goals of AI, AI approaches, AI Techniques, Branches and Applications of AI, Intelligent Agents- Characteristics, Structures, Types, Problem Solving methods, Search and Control Strategies, Search Techniques- Blind (-BFS, DFS, DLS, Iterative Deepening, Search, Bidirectional Search, Uniform cost Search), Heuristics (Generate and test, Hill Climbing, Best First search, Constraint Satisfaction, Mean-End Analysis, A*, AO*)
Month: July 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. II	10	16	26	**Unit -2: Classes and Objects:**	Python Classes, Objects, Specifying attributes and behaviors, instance methods, instance attributes, static methods, constructor, types of constructors(default, parameterized), class methods as alternative constructor, constructor overloading, method overloading.
M.Sc. II	10		10	**Unit-I: Knowledge Representation, Reasoning, Planning and Game Theory**	KR introduction, approaches, methods, Logic, Propositional Logic, Predicate Logic, KR using rules, KR and Reasoning, Approaches to reasoning, Symbolic reasoning, Statistical Reasoning, Semantic Nets, Frames, Classical Planning, Automated Planning, Algorithms for Classical Planning, Heuristics for Planning, Hierarchical Planning, Overview of

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					Game Theory, Mini-max theorem, Taxonomy of Games, Tic-tac-toe game, evaluation, Alpha-Beta pruning
Month: August 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. II	12	16	28	**Unit -3: Inheritance and Polymorphism**	Inheritance in Python (Syntax, Advantages,), Access Modifiers in Python, Types of Inheritance (single, multiple, multilevel, hierarchical and hybrid), Polymorphism-Method Overriding, magic methods and Operator Overloading
M.Sc. II	10		10	**Unit- III: Trends in Artificial Intelligence**	**Artificial Neural Network** Introduction, biological neuron model, Model of artificial neuron, Artificial neuron – basic, elements, activation functions, Neural network architectures, Learning Methods in Neural Networks, Classification of learning algorithms, Single-Layer NN System, Learning algorithms for training, Applications of ANN.
Month: September 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. II				Semester Practical Examination	
M.Sc. II	10		10	**Unit- III: Trends in Artificial Intelligence**	**Fuzzy Set Theory and Fuzzy Systems** Introduction to Fuzzy Sets, Fuzzy Set Theory, Fuzzy Memberships, Fuzzy Operations, Fuzzy Properties, Fuzzy Relations, Fuzzy Systems, Fuzzy System elements, Fuzzification, Fuzzy Inference, Fuzzy rule based systems
Month: October 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. II				End Semester Examination	
M.Sc. II				Semester Practical Examination	
Month: November 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. II				Diwali Vacations	
M.Sc. II				End Semester Examination	
Month: December 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Unit -1: Abstract Data Type:**	Introduction: Abstractions, Abstract Data Types, Data Structures, General Definitions; The Date Abstract Data Type: Defining the ADT, Using the ADT, Preconditions and Postconditions, Implementing the ADT; Bags: The Bag Abstract Data Type, Selecting a Data Structure, List-Based Implementation; Iterates: Designing an Iterator, Using Iterators; Application: Student Records, Designing a Solution, Implementation Algorithm Analysis: Complexity Analysis: Big-O Notation, Evaluating
B.Sc. II	10	16	26		

					Python Code; Evaluating the Python List; Amortized Cost; Application: The Sparse Matrix, List-Based Implementation, Efficiency Analysis.
Month: January 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. II	10	16	26	**Unit -2: Linked Structure:**	The singly Linked List: Traversing the node, Searching for a node, Prepending Nodes, Removing Nodes;The Bag ADT Revisited: A linked List Implementation, Comparing Implementations, Linked list iterators; More Ways to Build a Linked List:Using a Tail Reference, The sorted linked list; The Sparse Matrix Revisited: An array of Lined list implementation, Comparing the Implementations; Applications: Polynomials, Polynomial Operations, The Polynomial ADT, Implementation. Advanced Linked List: The Doubly Linked List: Organization, List Operations; Circular Linked List: Organization, List Operation Multi-Linked Lists: Multiple Chains, The sparse Matrix; Complex Iterators; Application: Text Editor, Typical Editor Operations, The EDIT Buffer ADT, Implementation.
Month: February 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
B.Sc. II	7	16	23	**Unit -3: Stacks and Queues**	The Stack ADT: Implementing the stack, using a python list, using a linked list, Stack Appliactions: Balanced Delimiters, Evaluating Postfix Expression; Applicactions: Solving a Maze: Backtracking, Designing a solution, The Maze ADT, Implementation The Queue ADT;Implementing the Queue:Using a Python List, Using a Circular Array, Using a Linked List Priority Queues: The priority Queue ADT, Implementation: Unbounded Priority Queue, Implementation :Bounded Priority Queue ;Application : Computer Simulation : Airline Ticket Counter, Implementation.
Month: March 2026				**Module/Unit:**	**Sub-units planned**
B.Sc. II	**Lectures**	**Practicals**	**Total**	Semester Practical Examination	
Month: April 2026				**Module/Unit:**	**Sub-units planned**
B.Sc. II	**Lectures**	**Practicals**	**Total**	End Semester Examination	

Ms. S. V. Aundhakar

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Department of Computer Science

Annual Teaching Plan for Academic Year: 2026-27

Name of the teacher: S. B. Bais

PG	
Course Code	**Course Title**
DSC19CSC31	Mobile Application Development with Flutter

Month: June 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Introduction to Flutter**	Features of Flutter, Advantages and Disadvantages of Flutter, Flutter Benefits, how flutter works? Flutter Installation, Architecture of Flutter Application, Introduction to Dart Programming: Basic Programming, OOP Concepts, Exception Handling, Debugging, Asynchronous Programming
M.Sc. II	**10**		**10**		
Month: July 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Introduction to Layouts**	Widgets-Types, Gestures, Statement Management, State management, Scoped Model, Navigation and Routing, UI Design-Styles and Assets, Fonts, Model API, Lists and Grids, Drawing and Painting, Animation on Flutter.
M.Sc. II	**10**		**10**		
Month: August 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Database Concepts**	SQLite-Cloud Fire store, Internalization of Flutter-Using intl Package, Flutter
M.Sc. II	**10**		**10**		
Month: September 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	**Firebase**	Firebase: Firebase and its features, integrating firebase, User Authentication, Testing, Debugging and Deployment
M.Sc. II	**10**		**10**		
Month: October 2026				**Module/Unit:**	**Sub-units planned**
M.Sc. II				Semester Practical Examination	
Month: November 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	End Semester Examination	
M.Sc.II					

S.B.Bais

Ms. S. B. Bais

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Annual Teaching Plan for Academic Year: 2026-27

Name of the teacher: **Miss. Pawar M. J.**

PG		
	Course Code	**Course Title**
	DSE19CSC12	Advanced Database Techniques
	DSE19CSC31	Cyber Security
	DSE19CSC21	Data Mining and Data Warehousing
	DSC19CSC43	Cryptography and Network Security

Month: June 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
M.Sc. I	20	-	20	**Unit I- Query Processing and Optimization**	Translating SQL Queries into Relational Algebra and Other Operators, Algorithms for External Sorting Algorithms for SELECT Operation, Implementing the JOIN Operation, Algorithms for PROJECT and Set Operations, Implementing Aggregate Operations and Different, Types of JOINs, Combining Operations Using Pipelining, Parallel Algorithms for Query Processing, Query Trees and Heuristics for Query Optimization, Choice of Query Execution Plans, Use of Selectivities in Cost-Based Optimization, Cost Functions for SELECT Operation, Cost Functions for the JOIN Operation, Overview of Query Optimization in MySQL
M.Sc. II	20	-	20	**Unit –I- Introduction of Cyber Security**	Introduction of Cyber Security, Computer Security, Threats, Harm. Vulnerabilities Controls Authentication, Access Control and Cryptography, network Vulnerabilities: Overview of vulnerability scanning. Open Port Identification. Service identification, Banner/ Version Check, Traffic Probe. Vulnerability Probe, Vulnerability Examples, Open VAS, Metasploit. Networks Vulnerability Scanning (Netcat, Socal), Network Sniffers and Injection tools.
Month: July 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
M.Sc. I	20	-	20	**Unit –II- Transaction Management, Concurrency Control, and Recovery Techniques**	The Concept of a Transaction, Transactions and Schedules, Concurrent Execution of Transactions, Two-Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency Control Techniques, Validation (Optimistic) Techniques and Snapshot Isolation Concurrency Control, Granularity of Data Items and Multiple Granularity Locking, Deadlock and Deadlock Handling-Deadlock Avoidance (wait-die, wound-wait), Deadlock Avoidance (Wound-Wait, Wait-die), Deadlock Detection and Recovery (Wait For Graph) Recovery Concepts, NO-UNDO/REDO Recovery Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging, The ARIES Recovery Algorithm, Recovery in Multidatabase Systems, Database Backup and Recovery from

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					Catastrophic Failures
M.Sc. II	20	-	20	Unit –II- Cyber Attack	Cyber Security Tools- Cyber Security Goals, Tools for Confidentiality Encryption, Access control, Authentication, Authorization, Physical Security, Tools for Integrity - Backups, Checksums, Data Correcting Codes, Tools for Availability Physical Protections, Computational redundancies.
Month: August 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
M.Sc. I	20	-	20	Unit –III- Introduction of Distributed Databases & Introduction to NoSQL	Definition of Distributed databases and Distributed Database Management System (DDBMS),Promises of DDBMS, Complicating Factors, Problem Areas, DDBMS Architecture: DBMS standardization, Architectural models for DDBMS, Distributed database design: Design problem of distributed systems, Design, strategies (top-down, bottom-up), Fragmentation, Allocation and replication of fragments. **Introduction to NoSQL-** Introduction to NoSQL Systems, Features of NoSQL, Advantage and Disadvantage of NOSQL, The CAP Theorem, Document-Based NoSQL Systems and MongoDB, NoSQL Key-Value Stores, Column-Based or Wide Column NoSQL Systems, NoSQL Graph Databases and Neo4j
M.Sc. II	20	-	20	**Unit-III- Cyber Security Principles, Technologies, Challenges and Risk Awareness**	Cyber Security Principles, Data Security Consideration, Firewalls, Types of Firewalls, Basics of Virtual Private Network, Basics of Intrusion Detection, Digital Signature and Types of Digital Signature, Importance of Security Standards, ISO/IEC 27001 and 27002, NIST Cyber Security Framework, Common Criteria, Cyber Security Challenges, Challenges associated with the evolution of ransom ware, block chain, Internet of Things (IoT), Artificial Intelligence, Server less Apps, Security Analysis Benefits and Steps, Quantitative and Qualitative Security Risk Analysis,
Month: September 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
M.Sc. I				Semester Practical Examination	
M.Sc. II				Semester Practical Examination	
Month: October 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
M.Sc. I				End Semester Examination	
M.Sc. II					
Month: November 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
M.Sc. I			20	**Unit I- Introduction to Data Mining**	Overview of data mining concepts, Applications and challenges in data mining, Data mining process and methodologies **Introduction to data warehousing:** Architecture of data warehouses, ETL (Extract, Transform, Load) processes, Data Warehouse Design and Implementation

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					Dimensional modeling: Star and snowflake schemas, Data warehouse implementation best practices, Data Preprocessing in Data Mining **Data cleaning, integration, and transformation:** Handling missing values and outliers, Data reduction and discretization
M.Sc. II			20	**Unit-I 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, Cryptanalysis- The Affine Cipher, The Substitution Cipher, The Vigenere Cipher, The Hill Cipher, The Stream Cipher
Month: December 2026				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
M.Sc. I			20	**Unit-II Data Mining Techniques and Algorithms**	Classification and Regression, Decision trees and rule-based classifiers, Naive Bayes and k-Nearest Neighbors (k-NN), Regression analysis in data mining, Clustering and Association Rule Mining **K-means clustering and hierarchical clustering:** Apriori algorithm for association rule mining, Evaluating clustering and association results, Text and Web Mining, Techniques for mining unstructured data, Sentiment analysis and opinion mining, Mining data from the web, Data Mining Tools, and Applications, **Overview of popular data mining tools (e.g., Weka, RapidMiner):** Case studies and applications of data mining in different domains
M.Sc. II			20	**Unit-II Symmetric and Asymmetric Key Algorithms**	Linear Cryptanalysis- Piling-up Lemma, Linear Approximation of S-boxes , Differential Cryptanalysis, Symmetric Key Cryptography, Data Encryption Standards (DES), International Data Encryption Algorithm (IDEA), RC4, RC5, Blowfish, Advanced Encryption Standard (AES) Hash Functions-Birthday and Hashing, MD4, MD5 Asymmetric Key Algorithms Asymmetric Key Algorithms, RSA algorithm, Symmetric Asymmetric Key Cryptography Together, Digital Signatures, ElGamal Signature Scheme, Variants of ElGamal Signature, Scheme, Knapsack Algorithm
Month: January 2027				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**		
M.Sc. I			20	**Unit-III Advanced Topics in Data Mining and Emerging Trends**	Advanced Data Mining Techniques, Ensemble methods (bagging, boosting), Support Vector Machines (SVM), Deep learning for data mining, Spatial and Temporal Data Mining, Mining spatial data patterns, Time series analysis and temporal data mining Applications of spatial and temporal data mining **Data Warehousing and Big Data:** Integrating data warehousing with big data technologies, Challenges and opportunities in big data analytics, Real-time data warehousing, Ethical and Privacy Issues in Data Mining, Ethical considerations in data mining, Privacy-preserving data mining techniques, Regulatory compliance, and data governance

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M.Sc. II			20	Unit-III Digital Certificates and Public Key Infrastructure	Digital Certificates, Private Key Management, Challenges and Response in Secret Key Setting, The PKIX model, Public Key Cryptography Standards, Challenges and Response in Public Key Setting, The ElGamal Cryptosystem, The Diffie-Hellman Problem, PKI and Security User Authentication and Kerberos Authentication Basics, Passwords, Authentication Tokens, Certificate-based Authentication, Biometric Authentication, Key Distribution Center - Key Pre-distribution, Session Key Distribution Schemes- Kerberos, Re-keying and Logical Key Hierarchy, Security Handshake Pitfalls
Month: February 2027				**Module/Unit:**	**Sub-units planned**
Course	**Lectures**	**Practicals**	**Total**	Semester Practical Examination	
M.Sc. I					
M.Sc. II					
Month: March 2027				**Module/Unit:**	**Sub-units planned**
M.Sc. I M.Sc. II	**Lectures**	**Practicals**	**Total**	End Semester Examination	

Miss. M. J. Pawar

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