Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering

(An Autonomous Institute)

NBA Accredited, Accredited by NAAC 'A' Grade, ISO 9001:2015 Certified

Department: Computer Science Engineering Rev: Course Structure/01/NEP/2023-24

Class: S.Y. B.Tech **Semester:** IV

Sr No	Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
				L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
1	23CS2401	PCC	Database Systems	3	-	-	3	10	10	30	50	100	3
2	23CS2402	PCC	Operating System	2	-	-	2	10	10	30	50	100	2
3	23CS2403	PCC	Java Programming	3	-	-	3	10	10	30	50	100	3
4	23CS2404	VSEC	Data Science and Visualization Laboratory	-	-	4	4	15	12	-	20	50	2
5	23CS2405	PCC	Database System Laboratory	-	-	2	2	15	15	-	20	50	1
6	23CS2406	PCC	Java Programming Laboratory	-	-	2	2	15	15	-	20	50	1
7	23OMDXX	MDM	Multidisciplinary Minor	3	-	-	3	10	10	30	50	100	3
8	23OECS22	OE	Open Elective II	3	-	-	3	10	10	30	50	100	3
9	23MCLEXX	AEC	Modern Indian Language	2	-	-	2	25	25	-	-	50	2
10	23HMSS10	VEC	Aptitude Skills-II	1	-	-	1	25	25	-	-	50	1
11	23HMSS04	VEC	Language Skills-II	-	-	2	2	25	25	-	-	50	1
12	23CS2407	CEP	Mini Project – III	-	-	2	2	25	25	-	-	50	1
Total				17	-	12	29	195	195	150	310	850	23

*Open Elective II: Operating System

Note- Open Elective courses will be offered to students of other programs and will not be offered to students of the same program.

Multidisciplinary Minor-

Basket	Agriculture	Management	Healthcare
Course Code, Name	Machine Application for Agriculture (23CSMDA2)	Leadership & Team Effectiveness (23CSMDB2)	Health Data Analysis & Machine Learning (23CSMDC2)

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23CS2401	PCC	Database Systems	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

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

CO1	Explain the basic database concepts of DBMS, applications, data models, schemas and instances.
CO2	Demonstrate the use of constraints and relational algebra operations for building applications
CO3	Make use of the basics of SQL and construct queries using SQL in database creation and interaction.
CO4	Construct different normalization techniques in databases.
CO5	Illustrate concepts of indexing and hashing
CO6	Choose different strategies for providing security, privacy, control, backup and recovery of data.

Course Contents:

1.Introduction Concept & Overview of DBMS, Database Languages, Database Users, Database Administrator, Three Schema architecture of DBMS ,Data Abstraction levels, database architecture, Data Models, The Entity-Relationship Model-Constraints, keys, E-R Diagrams, Weak Entity Sets, Extended E-R features.	[6]
2.Relational Model Structure of relational Databases, Database Schemas, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Calculus vs Algebra.	[6]

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3.Introduction to SQL Introduction to SQL, Data types in SQL, Basic Structure of SQL Queries, Components of SQL, SQL Operators – Arithmetic operators, Comparison Operators, Logical Operators, Set Operators, pattern Matching operator like, Range searching operator between, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database, Join Expressions, Views, Integrity Constraints.	[6]
4.Relational Database Design The purposes of Normalization, Data Redundancies and Update Anomalies, Functional Dependencies- types of functional dependency, The Process of Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.	[6]
5.File Organization Indexing and Hashing Overview of File Organization, Organization of Records in Files, Data-Dictionary Storage, Database Buffer, Basic Concepts of Indexing and Hashing, Ordered Indices, B+-Tree Index Files, B-Tree Index Files, Multiple-Key Access, Static Hashing, Query Processing-Overview, and Measures of Query cost, Evaluation of relational algebra operations, Query optimization.	[6]
6.Transaction management and Concurrency control Transaction concept, A simple transaction model, ACID properties, serializability and, concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping model, Recovery systems-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, checkpoint, Shadow paging.	[6]

Textbooks:

1. "Database System Concepts", Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 6th edition, McGraw- Hill.
2. "Database Systems - A Practical Approach to Design, Implementation and Management", Thomas Connolly, Carolyn Begg, 4th Edition, Addison Wesley.
3. "MySQL Cookbook", Paul DuBois, 2nd edition, O'REILLY.

References:

1. "Fundamentals of Database Systems", Ramez, Elmasri, Shamkant B. Navathe, 6th edition, Addison Wesley.
2. "Database Systems – Design, Implementation and Management", Rob & Coronel, 5th Edition, Thomson Course Technology.

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23CS2402	PCC	Operating System	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

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

CO1	Explain the basic concept of operating system.
CO2	Illustrate the flow of process with its states and different process scheduling policies.
CO3	Solve process synchronization problem in IPC.
CO4	Make use of the concept of deadlocks.
CO5	Distinguish various memory management techniques.
CO6	Examine the Disk and File structure.

Course Contents:

Unit 1:- Introduction Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel Operating system.	[6]
Unit 2:Process Management Process: Definition, Process Relationship, Process states, Process State transitions, Process Control Block, Context switching – Threads – Concept of multithreads, Benefits of threads. Process Scheduling: Definition , Scheduling objectives ,Types of schedulers, Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) Scheduling algorithms : Preemptive and Non-	[6]

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preemptive , FCFS , SJF, RR, Priority Algorithm.	
Unit 3: Deadlocks Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance banker's algorithm, Deadlock detection and Recovery.	[4]
Unit 4:Interprocess Communication Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, The Producer Consumer Problem, Semaphores, IPC Modeling -Message Passing and Shared Memory region, Classical IPC Problems: Reader's & Writer Problem, Dining Philosopher Problem.	[4]
Unit 5:Memory Management Basic Memory Management: Definition, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition – Internal and External fragmentation and Compaction, Paging and Segmentation. Virtual Memory: Basics of Virtual Memory, Page fault, Dirty page/Dirty bit – Demand paging (Concepts only) – Page Replacement policies: Optimal (OPT), First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	[4]
Unit 6: Storage Management Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Management, RAID Level. File System: file Concept, File Operation, File Attribute, File Type, File Structure, Access Methods, and Directory.	[4]
Textbooks:- 1. Operating System –Concepts VIII[th] Edition Silberschatz Galvin John Wiley and Sons 2. Operating System -William Stallings Pearson 3. Operating Systems – concepts and design –Milan Milenkovic (TMGH)	
Reference Books:- 1. Operating System -Achyut S. Godbole Tata McGraw Hill 03 2. Modern Operating systems Andrew tanenbaum-3rd edition PHI	

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23CS2403	PCC	: Java Programming	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basics of Programming

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

CO1	Outline basic concepts of object oriented programming
CO2	Illustrate the concept of packages, classes and objects.
CO3	Elaborate the concept of strings, arrays and vectors
CO4	Implement the concept of inheritance and interfaces.
CO5	Implement the notion of exception handling and multithreading.
CO6	Develop Collection framework and GUI based application

Course Contents:

Unit 1: Fundamental Programming in Java Java features and java programming environment define class, create object and accessing members, java tokens, data types, constants. Variables dynamic initialization array string type casting etc. Operators, expression Operator precedence, evaluation of expression, mathematical functions. Decision making and looping – If, If-Else, nested If-Else. Switch case Conditional operator, While loop, do-while loop, for loop, Continue, return keywords, nesting loops.	[6]
Unit 2: Constructor and String Programming in Java Constructors and Methods, Types of constructors, Nesting of Methods, This keyword, command line argument. Garbage collection, finalize () method, object Class Visibility control –private, public and protected. Friendly private protected access, default, Examples of visibility control, Arrays and Strings – types of arrays, String	[6]

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classes and string buffers. Vectors, Wrapper classes and enumerated types	
Unit 3: Inheritance and Package level Programming in Java Inheritance and its types, Types of inheritance Operator overloading and operator overriding Dynamic method dispatch. Final variable and method Using super abstract methods and classes, static members Interfaces –define, implement, and access. Nested interfaces and examples Define package types of package naming and creating packages, accessing packages. Import statement, static import, adding class and interface to package.	[6]
Unit 4: Exception Handling Multithreading Programming in Java Errors and Exception, types of errors Try, catch, nested try catch Throws, finally statement, build in exception , creating own exception Examples of exception handling ,Multithreaded programming – Creating threads – using extending thread class and runnable interface, Thread life cycle – wait(),notify(),sleep(),suspend(),stop(). Thread exceptions, thread priority, methods Thread synchronization, thread communication, deadlock	[6]
Unit 5: Input Output Files Programming in Java Introduction and concept of stream, stream classes, Byte stream classes, input stream classes, output stream classes. Examples of file handling using stream classes Character stream classes Using File IO Class IO exceptions, creation of files, reading and writing files Handling primitive data types Examples of handling primitive data types	[6]
Unit 6: Collection and Applet Programming in Java Collections: Collection Interfaces, Concrete Collections- List, Queue, Set, Map, the Collections Framework. Introduction to applet-Applet, Applet Life Cycle, Example of Applet life cycle, html parameters and embedding Applet Graphics Programming – Classes, Line, Examples of graphic programming using Rectangles, circles, Examples of graphic programming using , arcs, polygons	[6]
Textbooks:- 1. Herbert Schildt, JAVA: The Complete Reference", Ninth Edition, Oracle Press.	
Reference Books:- 1. Ivor Horton, Beginning JAVA, Wiley India. 2. "Java: The Complete Reference" by Herbert Schildt 3. JAVA Programming, Black Book, Dreamtech Press	

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23CS2404	VSEC	Data Science & Visualization Laboratory	0-4-0	2 Credits

Teaching Scheme	Examination Scheme
Practical4 hrs/week	CA I: 15 Marks CA II: 15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Basics of Programming

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

CO1	Demonstrate the ability to perform statistical analysis
CO2	Experiment comprehensive exploratory data analysis.
CO3	Demonstrate the capability to integrate data science and visualization techniques
CO4	Develop interactive data dashboards using tools like Dash

Course Contents:

List of Experiment:

1. To study basics of data science. Load a dataset (e.g., CSV, Excel) and perform basic data exploration (head, tail, info, describe).
2. Handle missing data by applying different strategies (mean/mode/median imputation, dropping rows/columns).
3. Perform data normalization/standardization.
4. Perform data transformation (log transformation, one-hot encoding, etc.).
5. Compute basic statistical measures (mean, median, mode, standard deviation, and variance) for a given dataset.
6. Perform hypothesis testing (t-test, chi-square test) on a sample dataset.
7. Explore correlations between different features using a correlation matrix.
8. Create basic plots (line plot, bar chart, histogram) using Matplotlib/Seaborn.
9. Visualize distributions using box plots, violin plots, and pair plots.
10. Create a heatmap to visualize correlations between variables.

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11. Use Plotly or Bokeh to create interactive visualizations.
12. Perform a complete EDA on a real-world dataset (e.g., Titanic, Iris) using Pandas, Seaborn, and Matplotlib.
13. Perform Statistical Analysis and Matrix Operations Using NumPy.
14. Identify and visualize outliers using box plots and scatter plots.
15. Create a time-series plot and perform time-series decomposition.
16. Use Geopandas/Folium to create geographical visualizations.
17. Create a dashboard using Dash or Streamlit to visualize multiple aspects of a dataset.
18. Choose a real-world dataset and perform end-to-end data analysis, from data cleaning to visualization.
19. Analyze sentiment in text data (e.g., tweets, reviews) and visualize the sentiment distribution.
20. Develop a complete data science project using a dataset of your choice, including data preprocessing, exploratory data analysis, and final visualization. Present your findings in a detailed report or presentation.

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23CS2405	PCC	Database Systems Laboratory	0-2-0	1 Credits

Teaching Scheme	Examination Scheme
Practical2 hrs/week	CA I: 15 Marks CA II: 15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Nil

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

CO1	Explain the basic database concepts of DBMS, applications, data models, schemas and instances.
CO2	Demonstrate the use of constraints and relational algebra operations for building applications
CO3	Make use of the basics of SQL and construct queries using SQL in database creation and interaction.
CO4	Construct different normalization techniques in databases.
CO5	Illustrate concepts of indexing and hashing
CO6	Choose different strategies for providing security, privacy, control, backup and recovery of data.

Course Contents:

List of Experiment:

1. Study the basic concept of Database System and ER Model
2. Installation of MySQL/Oracle and practice DDL commands
   a. Create table • Alter table • Drop Table
3. Practice DML commands
   a. Insert • Update • Delete
4. Implement Structured Query Language
   a. Creating Database • Creating a Table •Specifying Constraints

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5. Implement Aggregate Functions, Sub queries.
6. Perform Set operations, Join; Queries.
7. Implement the concept of Normalization.
8. Implement views and index.
9. Study & Implementation of Database Backup & Recovery command by using concurrency control protocols
10. Perform DCL Commands.

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23CS2406	PCC	Java Programming Laboratory	0-2-0	1 Credits

Teaching Scheme	Examination Scheme
Practical2 hrs/week	CA I: 15 Marks CA II: 15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Basics of Programming

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

CO1	Outline basic concepts of object oriented programming
CO2	Illustrate the concept of packages, classes and objects.
CO3	Elaborate the concept of strings, arrays and vectors
CO4	Implement the concept of inheritance and interfaces.
CO5	Implement the notion of exception handling and multithreading.
CO6	Develop Collection framework and GUI based application

Course Contents:

List of Experiment:

1. Program on various ways to accept data through keyboard and unsigned right shift operator.
2. Program on branching, looping, labelled break and labelled continue.
3. Program to create class with members and methods, accept and display details for single object.
4. Program on constructor and constructor overloading.
5. Program on method overloading.
6. Program on passing object as argument and returning object.
7. Program on creating user defined package.

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8. Program on 1D array.

9. Program on 2D array.

10. Program on String.

11. Program on String Buffer.

12. Program on Vector.

13. Program on single and multilevel inheritance (Use super keyword).

14. Program on abstract class.

15. Program on interface demonstrating concept of multiple inheritance.

16. Program on dynamic method dispatch using base class and interface refrence.

17. Program to demonstrate try, catch, throw, throws and finally.

18. Program to demonstrate user defined exception.

19. Program on multithreading.

20. Program on concept of synchronization.

21. Program on passing parameters to applets.

22. Program to create GUI application without event handling using AWT controls.

23. Program to create GUI application with event handling using AWT controls.

24 Create a simple program to demonstrate the use of different collection interfaces (List, Set, Queue, and Map).

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23CSMDA2	MDM	Mobile Application for Agriculture	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Agriculture Informatics

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

CO1	Illustrate basic principles of mobile application development.
CO2	Develop user interfaces by using layouts and controls.
CO3	Make use of user interface components for android application development.
CO4	Construct android application with database.
CO5	Outline various mobile applications for development.
CO6	Design, develop, and deploy mobile applications tailored to agricultural needs.

Course Contents:

1.Android & its Tools Introduction of Android, Need of Android, Features of Android, Tools and software requires for developing an android applications, Operating system, Android SDK, Java SDK, Android development tools, android virtual devices, Steps to install and configure Android studio and SDK.	[6]
2.Components and Layouts Control flow, directory structure, components of screen, fundamental UI design, linear layout, absolute layout, frame layout, table layout, relative layout, text view, button, image button, toggle button, radio button, radio group, check box, and progress bar.	[6]

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3.Designing Interface with View List view, grid view, Image view, scroll view, custom toast alert, Time & date picker, Intent, intent filter, Android system architecture, Multimedia framework, Play audio and video, Text to speech, sensors, Audio capture, Camera, Bluetooth.	[6]
4.Multimedia with Database Animation, SQLite database, Necessity of SQLite, Creation and connection of the database, Extraction of values from cursor, transactions, SMS telephony, Location based services- displaying maps, getting location.	[6]
5.Security and Application Deployment Android security model, Declaring and using permissions, Creating small application, Signing of application, Deploying app on google play store, Become a publisher, Developer console.	[6]
6. Mobile App Development for Agriculture Data collection in agriculture, Managing and analyzing agricultural data on mobile devices, Principles of user interface (UI) design, Usability considerations for rural and low-tech environments, Designing for multilingual and low-literacy users, databases and local storage in mobile apps.	[6]
Textbooks:- 1. "Android Programming: The Big Nerd Ranch Guide" by Bill Phillips and Chris Stewart. 2. "Head First Android Development" by Dawn Griffiths and David Griffiths.	
Reference Books:- 1. "Professional Android" by Reto Meier. 2. "Android Cookbook" by Ian F. Darwin.	

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23CSMDH2	MDM	Leadership and Team Effectiveness	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Entrepreneurship

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

CO1	Summarize leadership theories and their application in different context.
CO2	Develop skills for building and maintaining effective teams.
CO3	Outline various insights into leadership challenges and opportunities in the IT sector.
CO4	Identify technological enhancement in leadership and decision making.
CO5	Develop technology for efficient team collaboration and productivity.
CO6	Demonstrate leadership and team work concepts to real world scenarios.

Course Contents:

Unit 1: Foundations of Leadership Introduction to Leadership - Defining leadership, Leadership styles (autocratic, democratic, laissez-faire), Leadership theories (Great Man, Trait, Behavioral, Situational), Leadership Ethics- Ethical dilemmas in leadership, Ethical decision-making frameworks, Corporate social responsibility, Leadership Skills- Communication and interpersonal skills, Problem-solving and decision-making, Time management and prioritization, Leadership Development - Self-awareness and reflection, Emotional intelligence, Building relationships and networks.	[6]

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Unit 2: Team Dynamics and Collaboration Team Formation and Development- Stages of team development (forming, storming, norming, performing, adjourning), Team roles and responsibilities, Team building activities, Effective Communication - Verbal and nonverbal communication, Active listening, Feedback techniques, Conflict resolution styles, Collaboration and Teamwork - Building trust and cooperation, Collaborative problem-solving, Team decision-making processes, Virtual teamwork.	[6]
Unit 3: Leadership in the IT Industry Leadership Challenges in IT - Rapid technological change, Global teams, Ethical considerations in IT, Agile Leadership - Agile values and principles, Leadership roles in agile teams (Scrum Master, Product Owner), Servant leadership, Leadership and Innovation - Fostering a culture of innovation, Leadership for digital transformation, Innovation techniques (brainstorming, design thinking).	[6]
Unit 4: Leading with Technology Technology and Leadership Development - Online learning platforms, Leadership simulations, Data-driven decision making, Leadership in Virtual Teams - Challenges of virtual teams, Building trust and relationships remotely, Effective communication in virtual environments.	[6]
Unit 5: Team Effectiveness and Tools High-Performing Teams - Characteristics of high-performing teams, Building trust and collaboration, Team norms and values, Team Collaboration Tools - Overview of collaboration tools (Git, Jira, Slack, etc.), Effective use of collaboration tools, Version control basics, Diversity and Inclusion - Importance of diversity in teams, Overcoming biases, Creating an inclusive environment.	[6]
Unit 6: Practical Application and Case Studies Case Studies - Analysis of leadership and team success/failure, Identifying leadership lessons, Team Projects - Collaborative project to apply learned concepts, Project management and teamwork.	[6]

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Textbooks:-

1. "Team Building: Proven Strategies for Improving Team Performance" by William G. Dyer, W. Gibb Dyer Jr., and Jeffrey H. Dyer.
2. "The Five Dysfunctions of a Team: A Leadership Fable" by Patrick Lencioni.
3. Crucial Conversations: Tools for Talking When Stakes Are High" by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler.
4. "The Wisdom of Teams: Creating the High-Performance Organization" by Jon R. Katzenbach and Douglas K. Smith.

Reference Books:-

1. "Emotional Intelligence 2.0" by Travis Bradberry and Jean Greaves.
2. "Communication in Small Groups: Theory, Process, and Skills" by John F. Cragan, David W. Wright, and Chris R. Kasch.
3. "Group Dynamics for Teams" by Daniel Levi.

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23CSMDC2	MDM	Health Data Analysis and Machine Learning	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Medical Imaging and Image Processing

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

CO1	Outline fundamentals of health data and its sources.
CO2	Illustrate application of machine learning techniques in the healthcare domain.
CO3	Develop skills in building unsupervised learning models for health-related outcomes.
CO4	Develop time series models for health-related problems.
CO5	Illustrate application of deep learning techniques in the healthcare domain.
CO6	Summarize ethical considerations and challenges in health data analysis with case studies.

Course Contents:

1.Introduction to Health Data Overview of health data types: Electronic Health Records (EHRs), genomic data, imaging data, Sources of health data: hospitals, research databases, public health data, Introduction to the importance of health data in machine learning, Handling missing data in health dataset, Dealing with imbalanced datasets, Data normalization and standardization, Feature engineering specific to health data.	[6]
2. Supervised Learning for Health Data Visualizing health data, Identifying patterns and anomalies, Understanding correlation and causation in health datasets, Application of classification algorithms (Logistic Regression, Decision Trees, and Random Forests), Introduction to regression models for predicting health outcomes, Evaluation metrics: accuracy, precision, recall, F1-score, ROC curves.	[6]

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3. Unsupervised Learning for Health Data Clustering techniques: K-means, hierarchical clustering, DBSCAN, Dimensionality reduction techniques: PCA, Application in patient segmentation and disease classification.	[6]
4. Time Series Analysis in Healthcare Basics of time series data, Application in monitoring patient vitals and disease progression, Introduction to forecasting methods (ARIMA, Prophet).	[6]
5. Deep Learning in Healthcare Overview of neural networks, Application of Convolutional Neural Networks (CNNs) in medical imaging, Introduction to Recurrent Neural Networks (RNNs) for health data, Sentiment analysis in patient feedback.	[6]
6.Case Studies and Applications Privacy and confidentiality of health data, Bias and fairness in machine learning models, Legal and ethical implications of predictive analytics in healthcare, Predictive analytics in chronic disease management, AI in diagnostic systems,Personalized medicine and genomics.	[6]

Textbooks:-

1. "Health Data Science" by Ewen Harrison, Riinu Pius, and others.
2. "Machine Learning for Health Informatics" edited by Andreas Holzinger.

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23MILE01	AEC	Marathi	2-0-0	2 Credits

Teaching Scheme	Examination Scheme
Lecture:2 hrs/week	CA I: 25 Marks CA II: 25 Marks

Pre-Requisites: Nil

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

CO1	Develop the knowledge of local language/mother tongue and relate the same to daily life and social media.
CO2	Make use of rhetoric and verb to form sentences in Marathi Language
CO3	Identify Infinitive compounds in the given Marathi sentence.
CO4	Make use of Phrases and proverbs and form a sentence and Solve Prose Assessment/Summary Writing
CO5	Model a letter to appropriate end user in Marathi Language
CO6	Identify writing type of Marathi stanza and write appropriate writing

Course Contents:

अध्याय 01: भाषा परीचय भाषा आणि व्यक्तिमत्व सहसंबंध, भाषा, जीवनव्यवहार आणि नवमाध्यमे व समाजमाध्यमे, भिन्न व्यवस्था-विषमचिन्हे, संवाद कौशल्य (तोंडी परीक्षा), सर्वनाम-पुरुषात्मक, दर्शक, संबंधी, प्रश्नार्थक, सामान्य व आत्मवाचक सर्वनाम, विशेषण-गुण विशेषण, संख्या विशेषण, सार्वनामीक विशेषण	[4]
अध्याय 02: मराठी व्याकरण नाम, सर्वनाम, विशेषणे, क्रियापद, क्रियाविशेषण अव्यय, शब्दयोगी अव्यय, उभयान्वयी अव्यय, केवलप्रयोगी अव्यय, विकारी व स्वाचे प्रकार, काळ व प्रकार	[4]

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अध्याय 03: अलंकार व क्रियापदे अलंकार-शब्दालंकार- अनुप्रास, यमक, श्लेष उदाहरणे, अर्थालंकार-उपमा, उत्प्रेक्षा, व्यतिरेक, अपन्हुती, रूपक, व्यतिरेक, अनन्वय, अतिशयोक्ती उदाहरणे प्रयोग-कर्तरी, कर्मणी, भावे वाक्यप्रकार-केवल वाक्य, मिश्रवाक्य, संयुक्तवाक्य समास-अव्ययीभाव, तत्पुरुष, द्वंद्व, बहुव्रीही **क्रियापदे**- कर्ता व कर्म, क्रियापदाचे प्रकार- अकर्मक, सकर्मक, उभयविध, संयुक्त, क्रियाविशेषण- कालवाचक, स्थळवाचक, रितीवाचक, संख्यावाचक, प्रश्नार्थक, निषेधार्थक	[4]
अध्याय 04: वाक्प्रचार व म्हणी व गद्य आकलन/सारांश लेखन अर्थ संपृक्त वाक्यात उपयोग करणे (कमीत कमी ३० वाक्य प्रचार व म्हणी), गद्य आकलन - अपठित गद्य उतारा व त्यावरील प्रश्न उत्तरे (कमीत कमी ०५ उतारे व त्यावरील प्रश्न उत्तरे), सारांश आकलन	[5]
अध्याय 05: लेखन प्रकार पत्रलेखन व त्याचे प्रकार-निमंत्रण, आभार, अभिनंदन, मागणी, कौटुंबिक, विनंती, तक्रार वार्ता-स्वरूपाची, जाहिरातीची, विज्ञप्तीची, वृत्त लेखन, जाहिरात लेखन, कथा लेखन, अहवाल लेखन, आवेदन पत्र, अभिप्रायलेखन	[5]
अध्याय 06: कल्पनाविस्तार व मुलखत कल्पना विस्तार, मुलाखत कौशल्ये, मुलाखतीचे वैशिष्ट्ये, मुलाखतीचे स्वरूप, मुलाखत घेताना घ्यावयाची काळजी, मुलाखत देताना आवश्यक बाबी उदा.आत्मविश्वास, व्यक्तिमत्व विकास, भाषा कौशल्ये इ.	[4]

Text Books:

1. व्यावहारिक मराठी, डॉ.त.सा.नसिराबादकर, पाटके प्रकाशन, कोल्हापूर.
2. व्यावहारिक मराठी, डॉ.लीला गोविलकर, डॉ.अक्षदा पाटकर, सेहवर्धन प्रकाशन, पुणे
3. सुगम मराठी व्याकरण लेखन, मो.रा. वाळंबे, नितीन प्रकाशन पुणे

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Reference Books:

1. अनिवार्य मराठी व्याकरण, लेखन व आकलन, डॉ. प्रल्हाद लुलेकर, केदार काळवणे, Pearson पब्लिकेशन्स
2. मराठी व इंग्रजी अत्यावश्यक निबंध, प्रा.विजयकुमार वैद्यपाठक, K'Sagar पब्लिकेशन
3. उपयोजित लेखन, मराठी, प्राची रोडे, सावली म्हात्रे, टार्गेट पब्लिकेशन्स

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23MILE02	AEC	Hindi	2-0-0	2 Credits

Teaching Scheme	Examination Scheme
Lecture2 hrs/week	CA I: 25 Marks CA II: 25 Marks

Pre-Requisites: Nil

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

CO1	Develop the awareness of Hindi language and relate the same to daily life and social media.
CO2	Identify Infinitive compounds in the given Marathi sentence.
CO3	Make use of Phrases and proverbs and form a sentence in Hindi language.
CO4	Identify the mistakes in grammar of Hindi language and corrections in it
CO5	Make use of rhetoric to form sentences in Hindi Language
CO6	Illustrate the prose and verse in the given literature

Course Contents:

अध्याय 01: हिंदी भाषा परीचय हिन्दी भाषा और उसका विकास, हिन्दी साहित्य का इतिहास, भाषा के विभिन्न मौखिक भाषा, लिखित भाषा, रूप-वर्णमाला, विराम चिन्ह, शब्द रचना, अर्थ, वाक्य रचना, वर्णों का उच्चारण और वर्गीकरण	[5]
अध्याय 02: समास समास, क्रियाएँ, अनेकार्थी शब्द, विलोम शब्द, पर्यायवाची शब्द,	[5]
अध्याय 03: मुहावरे एवं लोकोक्ति मुहावरे एवं लोकोक्ति, तत्सम एवं तद्भव, देशज, विदेशी, क्रांति, अर्थबोध	[4]

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अध्याय 04: हिन्दी भाषा में प्रयोग होने वाली अशुद्धियाँ हिन्दी भाषा में प्रयोग होने वाली अशुद्धियाँ, अनेक शब्दों के लिए एक शब्द, रस	[5]
अध्याय 05: अलंकार अलंकार, छन्द, विशेषण और विशेष्य, भाषा-विज्ञान	[4]
अध्याय 06: भाषा-विज्ञान भाषा-विज्ञान, हिन्दी पद्य/गद्य रचना व रचनाकार, संज्ञा से अवयव तक, रिक्त स्थानों की पूर्ति, क्रमबद्धता	[4]

Text Books:

1. हिंदी व्याकरण- पं कमताप्रसाद गुरु, प्रकाशन संस्था, नई दिल्ली
2. हिंदी साहित्यिक का विद्युल्लानिक इतिहास-डॉ गणपतिचंद्र गुप्त, लोकभारती प्रकाशन, नई दिल्ली

Reference Books:

1. हिंदी भाषा शिक्षण - संपा हिंदी अध्यापन मंडल, सावित्रीबाई फुले पुणे विश्विद्यालय पुणे, राजकमल प्रकाशन

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23HSSM03	VEC	Aptitude Skills- II	1-0-0	1 Credit

Teaching Scheme	Examination Scheme
Lecture:1 hr/week	CA I: 25 Marks CA II: 25 Marks

Pre-Requisites: Basic Mathematics

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

CO1	Apply sentence formation rules to spot the error
CO2	Solve the questions based on the types of tenses
CO3	Solve the questions based on Direct/Indirect Speech and Passive/active voice and Substitution and Elimination
CO4	Make use of Proverbs, Idioms and phrases in sentence construction and the vocabulary

Course Contents:

Unit 1: Structure and Types of Sentences, Conditional Sentences	[3]
Unit 2: Present tense, Past tense, Future tense, Use of Tenses in Sentence forming	[3]
Unit 3: Direct and Indirect Speech, Active and Passive Voice, Use of Modal verbs in Sentence Forming, Substitution and Elimination	[3]
Unit 4: Use of Proverbs, Idioms and Phrases in Sentence Construction, Judgment and Inference Sentence, Vocabulary Building in Various Situations	[3]

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Text Books :

1. Raymond Murphy, Essential English Grammar with Answers, Murphy.
2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)

Reference Books:

1. Rao and D.V.Prasada, Wren & Martin High School English Grammar and Composition
2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press;Second edition

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23HSSM04	HSMC	Language Skill- II	0-0-2	1 Credit

Teaching Scheme	Examination Scheme
Practical2 hr/week	CA I: 25 Marks CA II: 25 Marks

Pre-Requisites: Language Skill I

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

CO1	Develop programs using Functions.
CO2	Make use of Structures & Union to develop programs in C language
CO3	Make use of Pointers to develop programs in C language
CO4	Develop programs to perform various operations on files using File Handling.

Course Contents:

Experiment No.	Name of Experiment	
1	Develop programs on using different built-in functions.	[2]
2	Develop programs on using function without argument and without return category.	[2]
3.	Develop programs on using function with argument and without return category.	[2]
4	Develop programs on using function without argument and with return category.	[2]
5	Develop programs on using function with argument and with return category.	[2]
6	Develop programs using more than one user defined functions.	[2]

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7	Develop programs on recursion.	[2]
8	Develop programs on Structure using various entities and size of structure.	[2]
9	Develop programs on array of structure.	[2]
10	Develop programs on structures and functions and compare structure and union.	[2]
11	Develop programs to display different data type of data and their addresses using pointer.	[2]
12	Develop programs on pointer to array, pointer to structure, pointer to functions and pointer expressions.	[2]
13	Develop program to read, write and append data from a file.	[2]

Text Books :

1. C Programming Absolute Beginner's Guide, Que Publishing, 3rd edition (22 August 2013)
2. C Programming Language 2nd Edition, Pearson Publication

Reference Books:

1. Programming in C Practical Approach by Ajay Mittal, Pearson
2. Let Us C, By Yashwat Kanetkar

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23CS2407	CEP	Mini Project III	0-0-2	01 Credit

Teaching Scheme	Examination Scheme
Practical: 2 hr/week	Continuous Assessment-I: - 25 Marks Continuous Assessment-II: -25 Marks

Pre-Requisites: Mini Project, Mini Project II

About Hackathon

The project is a part of addressing societal and industrial needs. Hackathon is one of the platforms where students will solve real world challenges. This Course focuses on the selection of methods/engineering tools/analytical techniques for problem solving.

Through this course, students will gain the understanding of engineering basics and ideas, gain practical experience, have the opportunity to display their skills and learn about teamwork, financial management, communication skills and responsibility

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

CO1	Select the appropriate method for solving the problem
CO2	Make use of various engineering techniques and tools to give a solution
CO3	Justify the methods /tools used to develop the solution
CO4	Design / simulate the model/ project work
CO5	Describe the solution with help of a project report and presentation
CO6	Conclude the outcomes of project

Course Contents:

Week 1: Survey Design-I • Ensure case study group students have made necessary communication and done a preparatory visit. • Watch the lecture on survey design and study the notes. • Prepare a questionnaire and try it out with your group members as mock.	[2]

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Week 2: Survey Design-2 • Review survey questionnaire prepared by case study groups. • Decide sampling strategy. • Prepare a detailed schedule for fieldwork.	[2]
Week 3: Fieldwork • Data Collection: Collect quantitative data (e.g., statistics, usage metrics) and qualitative data (e.g., user stories, testimonials). • Use data collection tools like questionnaires, observation checklists, and digital analytics. • Ensure data accuracy and reliability through proper sampling and recording methods.	[2]
Week 4: Trails and Experimentation-1 • Initial Setup and Configuration • Concept Validation • Feasibility Testing	[2]
Week 5: Trails and Experimentation-2 • Prototyping • Functionality Testing	[2]
Week 6: Trails and Experimentation-3 • Bug Identification and Fixing • Integration Testing • Security Testing • 75% Presentation has to be conducted by mentor/guide based on above activity.	[2]
Week 7 : Results • Coordinator has to check and verify below points in term of result: • Functional Performance • Accuracy and Precision • Efficiency • Safety	[2]
Week 8: Validation • Coordinator has to check and verify below points in term of validation: • Testing and Verification	[2]

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• Compliance with Standards	
Week 9: Integration Testing • Validate that the hardware integrates seamlessly with other systems or components as intended • Perform compatibility tests with software, other hardware, and network systems.	[2]
Week 10: Documentation and Reporting • Maintain comprehensive documentation of design, development, testing, and validation processes • Provide detailed reports on test results, issues found, and corrective actions taken.	[2]
Week 11: Final Presentation • 100% Presentation has to be conducted by mentor/guide based on above activity. • Prototype/Final Software solution is mandatory at the time of final presentation along with report	[2]
Week 12: Exhibition • Mini project exhibition will be schedule with interdepartmental evaluation.	[2]

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Shri Shamrao Patil (Yadravkar) Educational & Charitable Trust's

Sharad Institute of Technology College of Engineering

(An Autonomous Institute)

NBA Accredited, Accredited by NAAC 'A' Grade, ISO 9001:2015 Certified

Department: Computer Science Engineering **Rev:** Course Structure/01/NEP/2023-24

Class: S.Y. B.Tech. **Semester:** IV

Sr No	Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credi
				L	T	P	Total Hrs.	CA1	CA2	MSE	ESE	Total	
1	23CS2401	PCC	Database Systems	3	-	-	3	10	10	30	50	100	3
2	23CS2402	PCC	Operating System	2	-	-	2	10	10	30	50	100	2
3	23CS2403	PCC	Java Programming	3	-	-	3	10	10	30	50	100	3
4	23CS2404	VSEC	Data Science and Visualization Laboratory	-	-	4	4	15	15	-	20	50	2
5	23CS2405	PCC	Database System Laboratory	-	-	2	2	15	15	-	20	50	1
6	23CS2406	PCC	Java Programming Laboratory	-	-	2	2	15	15	-	20	50	1
7	23CSMD3X	MDM	Multidisciplinary Minor	3	-	-	3	10	10	30	50	100	3
8	23OECS22	OE	Open Elective II	3	-	-	3	10	10	30	50	100	3
9	23MLIXXX	AEC	Modern Indian Language	2	-	-	2	25	25	-	-	50	2
10	23IHMSS03	VEC	Aptitude Skills-II	1	-	-	1	25	25	-	-	50	1
11	23IHMSS04	VEC	Language Skills-II	-	-	2	2	25	25	-	-	50	1
12	23CS2407	CEP	Mini Project – III	-	-	2	2	25	25	-	-	50	1
Total				17	-	12	29	195	195	150	310	850	23

***Open Elective II**: Operating System

Note- Open Elective course will be offered to students of other programs and will not be offered to students of the same program.

Multidisciplinary Minor-

Basket	Agriculture	Management	Healthcare
Course Code, Name	Mobile Application for Agriculture (23CSMDA2)	Leadership & Team Effectiveness (23CSMDB2)	Health Data Analysis & Machine Learning (23CSMDC2)

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23CS2401	PCC	Database Systems	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

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

CO1	Explain the basic database concepts of DBMS, applications, data models, schemas and instances.
CO2	Demonstrate the use of constraints and relational algebra operations for building applications
CO3	Make use of the basics of SQL and construct queries using SQL in database creation and interaction.
CO4	Construct different normalization techniques in databases.
CO5	Illustrate concepts of indexing and hashing
CO6	Choose different strategies for providing security, privacy, control, backup and recovery of data.

Course Contents:

1.Introduction Concept & Overview of DBMS, Database Languages, Database Users, Database Administrator, Three Schema architecture of DBMS ,Data Abstraction levels, database architecture, Data Models, The Entity-Relationship Model-Constraints, keys, E-R Diagrams. Weak Entity Sets, Extended E-R features.	[6]
2.Relational Model Structure of relational Databases, Database Schemas, Relational Algebra, Relational Calculus, Extended Relational Algebra Operations, Calculus vs Algebra.	[6]

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3.Introduction to SQL Introduction to SQL, Data types in SQL, Basic Structure of SQL Queries, Components of SQL, SQL Operators – Arithmetic operators, Comparison Operators, Logical Operators, Set Operators, pattern Matching operator like, Range searching operator between, Null Values, Aggregate Functions, Nested Sub queries, Modification of the Database, Join Expressions, Views, Integrity Constraints.	[6]
4.Relational Database Design The purposes of Normalization, Data Redundancies and Update Anomalies, Functional Dependencies- types of functional dependency, The Process of Normalization, First Normal Form, Second Normal Form, Third Normal Form, Boyce-Codd Normal Form, Fourth Normal Form, Fifth Normal Form.	[6]
5.File Organization Indexing and Hashing Overview of File Organization, Organization of Records in Files, Data-Dictionary Storage, Database Buffer. Basic Concepts of Indexing and Hashing, Ordered Indices, B+-Tree Index Files, B-Tree Index Files, Multiple-Key Access, Static Hashing, Query Processing-Overview, and Measures of Query cost, Evaluation of relational algebra operations, Query optimization.	[6]
6.Transaction management and Concurrency control Transaction concept, A simple transaction model, ACID properties, serializability and, concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping model, Recovery systems-Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, checkpoint, Shadow paging.	[6]

Textbooks:-

1. "Database System Concepts", Abraham Silberschatz, Henry F. Korth, S. Sudarshan, 6thedition, McGraw- Hill.
2. "Database Systems - A Practical Approach to Design, Implementation and Management", Thomas Connolly, Carolyn Begg, 4th Edition,Addison Wesley.
3. "MySQL Cookbook", PaulDuBois, 3rd edition, O'REILLY.

Reference Books:-

1. "Fundamentals of Database Systems", Ramez, Elmasri, Shamkant B. Navathe, 6thEdition, Addison Wesley.
2. "Database Systems – Design, Implementation and Management", Rob & Coronel, 5thEdition, ThomsonCourse Technology.

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23CS2402	PCC	Operating System	2-0-0	2 Credits

Teaching Scheme	Examination Scheme
Lecture:2 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Nil

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

CO1	Explain the basic concept of operating system.
CO2	Illustrate the flow of process with its states and IPC Models
CO3	Apply Scheduling algorithms to calculate turnaround time and average waiting time .
CO4	Make use of the concept of deadlocks.
CO5	Distinguish various memory management techniques.
CO6	Examine the Disk and File structure.

Course Contents:

Unit 1:- Introduction to Operating System Basics of Operating Systems: Definition – Generations of Operating systems – Types of Operating Systems, OS Service, System Calls, OS structure: Layered, Monolithic, Microkernel Operating system.	[4]
Unit 2:Process Management Process: Definition, Process Relationship, Process states, Process Control Block, Context switching, Inter-process Communication-Introduction, Shared memory system and message passing system, Dinning Philosopher Problem , Threads – Concept of multithreads, Benefits of threads.	[4]
Unit 3:CPU Scheduling and Algorithm Process Scheduling: Definition , Scheduling objectives ,Types of schedulers,	

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Scheduling criteria : CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time (Definition only) Scheduling algorithms : Preemptive and Non-preemptive , FCFS , SJF, RR, Priority Algorithm.	
Unit 4: Deadlocks Definition, Deadlock characteristics, Deadlock Prevention, Deadlock Avoidance: banker's algorithm, Deadlock detection and Recovery.	[4]
Unit 6:Memory Management Basic Memory Management: Partitioning-Fixed and variable partition, Memory allocation: Contiguous Memory allocation, Internal and External fragmentation and Compaction, Paging and Segmentation. Virtual Memory: Basics of Virtual Memory, Page fault, Demand paging, Page Replacement policies: Optimal Page Replacement (OPT), First in First Out (FIFO), Least Recently Used(LRU)	[4]
Unit 6: Storage Management Overview of Mass-Storage Structure, Disk Structure, Disk Attachment, Disk Management, RAID Level. File System: file Concept, File Operation, File Attribute, File Type, File Structure, Access Methods, and Directory.	[4]
Textbooks:- 1. Operating System –Concepts VIII[th] Edition Silberschatz Galvin John Wiley and Sons 2. Operating System -William Stallings Pearson 3. Operating Systems – concepts and design –Milan Milenkovic (TMGH)	
Reference Books:- 1. Operating System -Achyut S. Godbole Tata McGraw Hill 03 2. Modern Operating systems Andrew tanenbaum-3rd edition PHI	

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23CS2403	PCC	Java Programming	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Basics of Programming

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

CO1	Outline basic concepts of object oriented programming
CO2	Illustrate the concept of packages, classes and objects.
CO3	Elaborate the concept of strings, arrays and vectors
CO4	Implement the concept of inheritance and interfaces.
CO5	Implement the notion of exception handling and multithreading.
CO6	Develop Collection framework and GUI based application

Course Contents:

Unit 1: Fundamental Programming in Java Java features and java programming environment define class; create object and accessing members, java tokens, data types, constants. Variables dynamic initialization array string type casting etc. Operators, expression Operator precedence, evaluation of expression, mathematical functions. Decision making and looping – If, If-Else, nested If-Else, Switch case Conditional operator, While loop, do-while loop, for loop, Continue, return keywords, nesting loops.	[6]
Unit 2: Constructor and String Programming in Java Constructors and Methods, Types of constructors, Nesting of Methods, This keyword, command line argument. Garbage collection, finalize () method, object Class Visibility control –private, public and protected Friendly private protected access, default, Examples of visibility control, Arrays and Strings – types of arrays, String	[6]

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classes and string buffers. Vectors, Wrapper classes and enumerated types	
Unit 3: Inheritance and Package level Programming in Java Inheritance and its types, Types of inheritance Operator overloading and operator overriding Dynamic method dispatch. Final variable and method Using super abstract methods and classes, static members Interfaces –define, implement, and access. Nested interfaces and examples Define package types of package naming and creating packages, accessing packages. Import statement, static import, adding class and interface to package.	[6]
Unit 4: Exception Handling Multithreading Programming in Java Errors and Exception, types of errors Try, catch, nested try catch Throws, finally statement, build in exception , creating own exception Examples of exception handling ,Multithreaded programming – Creating threads – using extending thread class and runnable interface, Thread life cycle – wait(),notify(),sleep(),suspend(),stop(). Thread exceptions, thread priority, methods Thread synchronization, thread communication, deadlock	[6]
Unit 5: Input Output Files Programming in Java Introduction and concept of stream, stream classes, Byte stream classes, input stream classes, output stream classes. Examples of file handling using stream classes Character stream classes Using File IO Class: IO exceptions, creation of files, reading and writing files Handling primitive data types Examples of handling primitive data types	[6]
Unit 6: Collection and Applet Programming in Java Collections: Collection Interfaces, Concrete Collections- List, Queue, Set, Map, the Collections Framework. Introduction to applet-Applet, Applet Life Cycle. Example of Applet life cycle, html parameters and embedding Applet Graphics Programming – Classes, Line, Examples of graphic programming using Rectangles, circles, Examples of graphic programming using , arcs, polygons	[6]

Textbooks:-

1. Herbert Schildt, JAVA: The Complete Reference", Ninth Edition, Oracle Press.

Reference Books:-

1. Ivor Horton, Beginning JAVA, Wiley India.
2. "Java: The Complete Reference" by Herbert Schildt
3. JAVA Programming, Black Book, Dreamtech Press

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23CS2404	VSEC	Data Science & Visualization Laboratory	0-4-0	2 Credits

Teaching Scheme	Examination Scheme
Practical:4 hrs/week	CA I: 15 Marks CA II: 15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Basics of Programming

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

CO1	Demonstrate the ability to perform statistical analysis
CO2	Experiment comprehensive exploratory data analysis,
CO3	Demonstrate the capability to integrate data science and visualization techniques
CO4	Develop interactive data dashboards using tools like Dash

Course Contents:

List of Experiment:

1. To study basics of data science. Load a dataset (e.g., CSV, Excel) and perform basic data exploration (head, tail, info, describe).
2. Handle missing data by applying different strategies (mean/mode/median imputation, dropping rows/columns).
3. Perform data normalization/standardization.
4. Perform data transformation (log transformation, one-hot encoding, etc.).
5. Compute basic statistical measures (mean, median, mode, standard deviation, and variance) for a given dataset.
6. Perform hypothesis testing (t-test, chi-square test) on a sample dataset.
7. Explore correlations between different features using a correlation matrix.
8. Create basic plots (line plot, bar chart, histogram) using Matplotlib/Seaborn.
9. Visualize distributions using box plots, violin plots, and pair plots.
10. Create a heatmap to visualize correlations between variables.

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11. Use Plotly or Bokeh to create interactive visualizations.
12. Perform a complete EDA on a real-world dataset (e.g., Titanic, Iris) using Pandas, Seaborn, and Matplotlib.
13. Perform Statistical Analysis and Matrix Operations Using NumPy.
14. Identify and visualize outliers using box plots and scatter plots.
15. Create a time-series plot and perform time-series decomposition.
16. Use Geopandas/Folium to create geographical visualizations.
17. Create a dashboard using Dash or Streamlit to visualize multiple aspects of a dataset.
18. Choose a real-world dataset and perform end-to-end data analysis, from data cleaning to visualization.
19. Analyze sentiment in text data (e.g., tweets, reviews) and visualize the sentiment distribution.
20. Develop a complete data science project using a dataset of your choice, including data preprocessing, exploratory data analysis, and final visualization. Present your findings in a detailed report or presentation.

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23CS2405	PCC	Database Systems Laboratory	0-2-0	1 Credits

Teaching Scheme	Examination Scheme
Practical:2 hrs/week	CA I: 15 Marks CA II: 15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Nil

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

CO1	Explain the basic database concepts of DBMS, applications, data models, schemas andinstances.
CO2	Demonstrate the use of constraints and relational algebra operations for building applications
CO3	Make use of the basics of SQL and construct queries using SQL in database creation andinteraction.
CO4	Construct different normalization techniques in databases.
CO5	Illustrate concepts of indexing and hashing
CO6	Choose different strategies for providing security, privacy, control, backup and recovery of data.

Course Contents:

List of Experiment:

1. Study the basic concept of Database System and ER Model
2. Installation of MySQL/Oracle and practice DDL commands
   a. Create table • Alter table • Drop Table
3. Practice DML commands
   a. Insert • Update • Delete
4. Implement Structured Query Language
   a. Creating Database • Creating a Table •Specifying Constraints

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5. Implement Aggregate Functions, Sub queries.
6. Perform Set operations, Join Queries,
7. Implement the concept of Normalization.
8. Implement views and index.
9. Study & Implementation of Database Backup & Recovery command by usingconcurrency control protocols
10. Perform DCL Commands.

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23CS2406	PCC	Java Programming Laboratory	0-2-0	1 Credits

Teaching Scheme	Examination Scheme
Practical:2 hrs/week	CA I: 15 Marks CA II: 15 Marks End Semester Exam: 20 Marks

Pre-Requisites: Basics of Programming

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

CO1	Outline basic concepts of object oriented programming
CO2	Illustrate the concept of packages, classes and objects.
CO3	Elaborate the concept of strings, arrays and vectors
CO4	Implement the concept of inheritance and interfaces.
CO5	Implement the notion of exception handling and multithreading.
CO6	Develop Collection framework and GUI based application

Course Contents:

List of Experiment:

1. Program on various ways to accept data through keyboard and unsigned right shift operator.
2. Program on branching, looping, labelled break and labelled continue.
3. Program to create class with members and methods, accept and display details for single object.
4. Program on constructor and constructor overloading.
5. Program on method overloading.
6. Program on passing object as argument and returning object.
7. Program on creating user defined package.

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8. Program on 1D array.

9. Program on 2D array.

10. Program on String.

11. Program on String Buffer.

12. Program on Vector.

13. Program on single and multilevel inheritance (Use super keyword).

14. Program on abstract class.

15. Program on interface demonstrating concept of multiple inheritance.

16. Program on dynamic method dispatch using base class and interface reference.

17. Program to demonstrate try, catch, throw, throws and finally.

18. Program to demonstrate user defined exception.

19. Program on multithreading.

20. Program on concept of synchronization.

21. Program on passing parameters to applets.

22. Program to create GUI application without event handling using AWT controls.

23. Program to create GUI application with event handling using AWT controls.

24 Create a simple program to demonstrate the use of different collection interfaces (List, Set, Queue, and Map).

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23CSMDA2	MDM	Mobile Application for Agriculture	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Agriculture Informatics

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

CO1	Illustrate basic principles of mobile application development.
CO2	Develop user interfaces by using layouts and controls.
CO3	Make use of user interface components for android application development.
CO4	Construct android application with database.
CO5	Outline various mobile applications for development.
CO6	Design, develop, and deploy mobile applications tailored to agricultural needs.

Course Contents:

1.Android & its Tools Introduction of Android, Need of Android, Features of Android, Tools and software requires for developing an android applications, Operating system, Android SDK, Java SDK, Android development tools, android virtual devices, Steps to install and configure Android studio and SDK.	[6]
2.Components and Layouts Control flow, directory structure, components of screen, fundamental UI design, linear layout, absolute layout, frame layout, table layout, relative layout, text view, button, image button, toggle button, radio button, radio group, check box, and progress bar.	[6]

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3.Designing Interface with View List view, grid view, Image view, scroll view, custom toast alert, Time & date picker, Intent, intent filter, Android system architecture, Multimedia framework, Play audio and video, Text to speech, sensors, Audio capture, Camera, Bluetooth.	[6]
4.Multimedia with Database Animation, SQLite database, Necessity of SQLite, Creation and connection of the database, Extraction of values from cursor, transactions, SMS telephony, Location based services- displaying maps, getting location.	[6]
5.Security and Application Deployment Android security model, Declaring and using permissions, Creating small application, Signing of application, Deploying app on google play store, Become a publisher, Developer console.	[6]
6. Mobile App Development for Agriculture Data collection in agriculture, Managing and analyzing agricultural data on mobile devices, Principles of user interface (UI) design, Usability considerations for rural and low-tech environments, Designing for multilingual and low-literacy users, databases and local storage in mobile apps.	[6]
Textbooks:- 1. "Android Programming: The Big Nerd Ranch Guide" by Bill Phillips and Chris Stewart. 2. "Head First Android Development" by Dawn Griffiths and David Griffiths.	
Reference Books:- 1. "Professional Android" by Reto Meier. 2. "Android Cookbook" by Ian F. Darwin.	

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23CSMDB2	MDM	Leadership and Team Effectiveness	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Entrepreneurship

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

CO1	Summarize leadership theories and their application in different context.
CO2	Develop skills for building and maintaining effective teams.
CO3	Outline various insights into leadership challenges and opportunities in the IT sector.
CO4	Identify technological enhancement in leadership and decision making.
CO5	Develop technology for efficient team collaboration and productivity.
CO6	Demonstrate leadership and team work concepts to real world scenarios.

Course Contents:

Unit I: Foundations of Leadership	
Introduction to Leadership - Defining leadership, Leadership styles (autocratic, democratic, laissez-faire), Leadership theories (Great Man, Trait, Behavioral, Situational), Leadership Ethics- Ethical dilemmas in leadership, Ethical decision-making frameworks, Corporate social responsibility, Leadership Skills- Communication and interpersonal skills, Problem-solving and decision-making, Time management and prioritization, Leadership Development - Self-awareness and reflection, Emotional intelligence, Building relationships and networks.	[6]

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Unit 2: Team Dynamics and Collaboration Team Formation and Development- Stages of team development (forming, storming, norming, performing, adjourning), Team roles and responsibilities, Team building activities, Effective Communication - Verbal and nonverbal communication, Active listening, Feedback techniques, Conflict resolution styles, Collaboration and Teamwork - Building trust and cooperation, Collaborative problem-solving, Team decision-making processes, Virtual teamwork.	[6]
Unit 3: Leadership in the IT Industry Leadership Challenges in IT - Rapid technological change, Global teams, Ethical considerations in IT, Agile Leadership - Agile values and principles, Leadership roles in agile teams (Scrum Master, Product Owner), Servant leadership, Leadership and Innovation - Fostering a culture of innovation, Leadership for digital transformation, Innovation techniques (brainstorming, design thinking).	[6]
Unit 4: Leading with Technology Technology and Leadership Development - Online learning platforms, Leadership simulations, Data-driven decision making, Leadership in Virtual Teams - Challenges of virtual teams, Building trust and relationships remotely, Effective communication in virtual environments.	[6]
Unit 5: Team Effectiveness and Tools High-Performing Teams - Characteristics of high-performing teams, Building trust and collaboration, Team norms and values, Team Collaboration Tools - Overview of collaboration tools (Git, Jira, Slack, etc.), Effective use of collaboration tools, Version control basics, Diversity and Inclusion - Importance of diversity in teams, Overcoming biases, Creating an inclusive environment.	[6]
Unit 6: Practical Application and Case Studies Case Studies - Analysis of leadership and team success/failure, Identifying leadership lessons, Team Projects - Collaborative project to apply learned concepts, Project management and teamwork.	[6]

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Textbooks:-

1. "Team Building: Proven Strategies for Improving Team Performance" by William G. Dyer, W. Gibb Dyer Jr., and Jeffrey H. Dyer.
2. "The Five Dysfunctions of a Team: A Leadership Fable" by Patrick Lencioni.
3. Crucial Conversations: Tools for Talking When Stakes Are High" by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler.
4. "The Wisdom of Teams: Creating the High-Performance Organization" by Jon R. Katzenbach and Douglas K. Smith.

Reference Books:-

1. "Emotional Intelligence 2.0" by Travis Bradberry and Jean Greaves.
2. "Communication in Small Groups: Theory, Process, and Skills" by John F. Cragan, David W. Wright, and Chris R. Kasch.
3. "Group Dynamics for Teams" by Daniel Levi.

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23CSMDC2	MDM	Health Data Analysis and Machine Learning	3-0-0	3 Credits

Teaching Scheme	Examination Scheme
Lecture:3 hrs/week	CA I: 10 Marks CA II: 10 Marks Mid Semester Exam: 30 Marks End Semester Exam: 50 Marks

Pre-Requisites: Medical Imaging and Image Processing

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

CO1	Outline fundamentals of health data and its sources.
CO2	Illustrate application of machine learning techniques in the healthcare domain.
CO3	Develop skills in building unsupervised learning models for health-related outcomes.
CO4	Develop time series models for health-related problems.
CO5	Illustrate application of deep learning techniques in the healthcare domain.
CO6	Summarize ethical considerations and challenges in health data analysis with case studies.

Course Contents:

1.Introduction to Health Data Overview of health data types: Electronic Health Records (EHRs), genomic data, imaging data, Sources of health data: hospitals, research databases, public health data, Introduction to the importance of health data in machine learning, Handling missing data in health dataset, Dealing with imbalanced datasets. Data normalization and standardization, Feature engineering specific to health data.	[6]
2. Supervised Learning for Health Data Visualizing health data, Identifying patterns and anomalies, Understanding correlation and causation in health datasets, Application of classification algorithms (Logistic Regression, Decision Trees, and Random Forests), Introduction to regression models for predicting health outcomes, Evaluation metrics: accuracy, precision, recall, F1-score, ROC curves.	[6]

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3. Unsupervised Learning for Health Data Clustering techniques: K-means, hierarchical clustering, DBSCAN, Dimensionality reduction techniques: PCA, Application in patient segmentation and disease classification.	[6]
4. Time Series Analysis in Healthcare Basics of time series data, Application in monitoring patient vitals and disease progression, Introduction to forecasting methods (ARIMA, Prophet).	[6]
5. Deep Learning in Healthcare Overview of neural networks, Application of Convolutional Neural Networks (CNNs) in medical imaging, Introduction to Recurrent Neural Networks (RNNs) for health data, Sentiment analysis in patient feedback.	[6]
6.Case Studies and Applications Privacy and confidentiality of health data, Bias and fairness in machine learning models, Legal and ethical implications of predictive analytics in healthcare, Predictive analytics in chronic disease management, AI in diagnostic systems,Personalized medicine and genomics.	[6]

Textbooks:-

1. "Health Data Science" by Ewen Harrison, Riinu Pius, and others.
2. "Machine Learning for Health Informatics" edited by Andreas Holzinger.

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23MILE01	AEC	Marathi	2-0-0	2 Credits

Teaching Scheme	Examination Scheme
Lecture:2 hrs/week	CA I: 25 Marks CA II: 25 Marks

Pre-Requisites: Nil

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

CO1	Develop the knowledge of local language/mother tongue and relate the same to daily life and social media.
CO2	Make use of rhetoric and verb to form sentences in Marathi Language
CO3	Identify Infinitive compounds in the given Marathi sentence.
CO4	Make use of Phrases and proverbs and form a sentence and Solve Prose Assessment/Summary Writing
CO5	Model a letter to appropriate end user in Marathi Language
CO6	Identify writing type of Marathi stanza and write appropriate writing.

Course Contents:

अध्याय 01: भाषा परीचय भाषा आणि व्यक्तिमत्व सहसंबंध, भाषा, जीवनव्यवहार आणि नवमाध्यमे व समाजमाध्यमे, चिन्ह व्यवस्था-विरामचिन्हे, संवाद कौशल्य (तोंडी परीक्षा), सर्वनाम-पुरुषात्मक, दर्शक, संबंधी, प्रश्नार्थक, सामान्य व आत्मवाचक सर्वनाम, विशेषण-गुण विशेषण, संख्या विशेषण, सार्वनामीक विशेषण	[4]
अध्याय 02: मराठी व्याकरण नाम, सर्वनाम, विशेषणे, क्रियापद, क्रियाविशेषण अव्यय, शब्दयोगी अव्यय, उभयान्वयी अव्यय, केवलप्रयोगी अव्यय, विभक्ती व त्याचे प्रकार, काळ व प्रकार	[4]

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अध्याय 03: अलंकार व क्रियापदे **अलंकार**-शब्दालंकार- अनुप्रास, यमक, श्लेष उदाहरणे, अर्थालंकार-उपमा, उत्प्रेक्षा, व्यतिरेक, अपन्हुती, रूपक, व्यतिरेक, अनन्वय, अतिशयोक्ती उदाहरणे **प्रयोग**-कर्तरी, कर्मणी, भावे **वाक्यप्रकार**-केवल वाक्य, मिश्रवाक्य, संयुक्तवाक्य **समास**-अव्ययीभाव, तत्पुरुष, द्वंद्व, बहुव्रही **क्रियापदे**- कर्ता व कर्म, क्रियापदाचे प्रकार- अकर्मक, सकर्मक, उभयविध, संयुक्त, क्रियाविशेषण- कालवाचक, स्थळवाचक, रितीवाचक, संख्यावाचक, प्रश्नार्थक, निषेधार्थक	[4]
अध्याय 04: वाक्प्रचार व म्हणी व गद्य आकलन/सारांश लेखन अर्थ सांगून वाक्यात उपयोग करणे (कमीत कमी ३० वाक्य प्रचार व म्हणी), गद्य आकलन - अपठित गद्य उतारा व त्यावरील प्रश्न उत्तरे (कमीत कमी ०५ उतारे व त्यावरील प्रश्न उत्तरे), सारांश आकलन	[5]
अध्याय 05: लेखन प्रकार पत्रलेखन व त्याचे प्रकार-निमंत्रण, आभार, अभिनंदन, मागणी, कौटुंबिक, विनंती, तक्रार संधी -स्वरसंधी, व्यंजनसंधी, विसर्गसंधी, वृत्त लेखन, जाहिरात लेखन, कथा लेखन, अहवाल लेखन, आवेदन पत्र, अभिप्रायलेखन	[5]
अध्याय 06: कल्पनाविस्तार व मुलखात कल्पना विस्तार, मुलाखत कौशल्ये, मुलाखतीचे वैशिष्ट्ये, मुलाखतीचे स्वरूप, मुलाखत घेताना घ्यावयाची काळजी, मुलाखत देताना आवश्यक बाबी उदा.आत्मविश्वास, व्यक्तिमत्व विकास, भाषा कौशल्ये इ.	[4]
Text Books: 1. व्यावहारिक मराठी, डॉ.ल.रा.नसिराबादकर, फडके प्रकाशन, कोल्हापूर. 2. व्यावहारिक मराठी, डॉ.लीला गोविलकर, डॉ.जयश्री पाटणकर, सेहवर्धन प्रकाशन, पुणे 3. सुगम मराठी व्याकरण लेखन, मो.रा. वाळंबे, नितीन प्रकाशन पुणे	

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Reference Books:

1. अनिवार्य मराठी व्याकरण, लेखन व आकलन, डॉ. प्रल्हाद लुलेकर, केदार काकवणे, Pearson पब्लिकेशन्स
2. मराठी व इंग्रजी अत्यावश्यक निबंध, प्रा.विजयकुमार वैद्यपाठक, K'Sagar पब्लिकेशन
3. उपयोजित लेखन, मराठी, प्राची शेंडे, सायली म्हात्रे, टार्गेट पब्लिकेशन्स

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23MILE02	AEC	Hindi	2-0-0	2 Credits

Teaching Scheme	Examination Scheme
Lecture:2 hrs/week	CA I: 25 Marks CA II: 25 Marks

Pre-Requisites: Nil

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

CO1	Develop the awareness of Hindi language and relate the same to daily life and social media.
CO2	Identity Infinitive compounds in the given Marathi sentence.
CO3	Make use of Phrases and proverbs and form a sentence in Hindi language.
CO4	Identity the mistakes in grammar of Hindi language and corrections in it
CO5	Make use of rhetoric to form sentences in Hindi Language
CO6	Illustrate the prose and verse in the given literature

Course Contents:

अध्याय 01: हिंदी भाषा परीचय हिन्दी भाषा और उसका विकास, हिन्दी साहित्य का इतिहास, भाषा के विभिन्न मौखिक भाषा, लिखित भाषा, रूप-वर्णमाला, विराम चिन्ह, शब्द रचना, अर्थ, वाक्य रचना, वर्णो का उच्चारण और वर्गीकरण	[5]
अध्याय 02: समास समास, क्रियाएँ, अनेकार्थी शब्द, विलोम शब्द, पर्यायवाची शब्द,	[5]
अध्याय 03: मुहावरे एवं लोकोक्ति मुहावरे एवं लोकोक्ति, तत्सम एवं तद्भव, देशज, विदेशी, वर्तनी, अर्थबोध	[4]

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अध्याय 04: हिन्दी भाषा में प्रयोग होने वाली अशुद्धियाँ हिन्दी भाषा में प्रयोग होने वाली अशुद्धियाँ, अनेक शब्दों के लिए एक शब्द, रस	[5]
अध्याय 05: अलंकार अलंकार, छन्द, विशेषण और विशेष्य, भाषा-विज्ञान	[4]
अध्याय 06: भाषा-विज्ञान भाषा-विज्ञान, हिन्दी पद्य/गद्य रचना व रचनाकार, संज्ञा से अव्यय तक, रिक्त स्थानों की पूर्ति, क्रमबद्धता	[4]

Text Books:

1. हिंदी व्याकरण- पं कमताप्रसद गुरु, प्रकाशन संस्था, नई दिल्ली
2. हिंदी साहित्यिक का विद्यनात्मिक इतिहास-डॉ गणपतीचंद्र गुप्त, लोकभारती प्रकाशन, नई दिल्ली.

Reference Books:

1. हिंदी भाषा शिक्षण - संपा हिंदी अध्ययन मंडल, सावित्रीबाई फुले पुणे विश्विद्यालय पुणे, राजकमल प्रकाशन

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23HSSM03	VEC	Aptitude Skills- II	1-0-0	1 Credit

Teaching Scheme	Examination Scheme
Lecture:1 hr/week	CA I: 25 Marks CA II: 25 Marks

Pre-Requisites: Basic Mathematics

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

CO1	Apply sentence formation rules to spot the error
CO2	Solve the questions based on the types of tenses
CO3	Solve the questions based on Direct/Indirect Speech and Passive/active voice and Substitution and Elimination
CO4	Make use of Proverbs, Idioms and phrases in sentence construction and the vocabulary

Course Contents:

Unit 1: Structure and Types of Sentences, Conditional Sentences	[3]
Unit 2: Present tense, Past tense, Future tense, Use of Tenses in Sentence forming	[3]
Unit 3: Direct and Indirect Speech, Active and Passive Voice, Use of Modal verbs in Sentence Forming, Substitution and Elimination	[3]
Unit 4: Use of Proverbs, Idioms and Phrases in Sentence Construction, Judgment and Inference Sentence, Vocabulary Building in Various Situations	[3]

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Test Books :

1. Raymond Murphy, Essential English Grammar with Answers, Murphy.
2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)

Reference Books:

1. Rao and D.V,Prasada, Wren & Martin High School English Grammar and Composition
2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press;Second edition

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23HSSM04	HSMC	Language Skill- II	0-0-2	1 Credit

Teaching Scheme	Examination Scheme
Practical:2 hrs/week	CA I: 25 Marks CA II: 25 Marks

Pre-Requisites: Language Skill I

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

CO1	Develop programs using Functions.
CO2	Make use of Structures & Union to develop programs in C language
CO3	Make use of Pointers to develop programs in C language
CO4	Develop programs to perform various operations on files using File Handling

Course Contents:

Experiment No.	Name of Experiment	
1	Develop programs on using different built-in functions.	[2]
2	Develop programs on using function without argument and without return category.	[2]
3.	Develop programs on using function with argument and without return category.	[2]
4	Develop programs on using function without argument and with return category.	[2]
5	Develop programs on using function with argument and with return category.	[2]
6	Develop programs using more than one used defined functions.	[2]

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7	Develop programs on recursion.	[2]
8	Develop programs on Structure using various entities and size of structure.	[2]
9	Develop programs on array of structure.	[2]
10	Develop programs on structures and functions and compare structure and union.	[2]
11	Develop programs to display different data type of data and their addresses using pointer	[2]
12	Develop programs on pointer to array, pointer to structure, pointer to functions and pointer expressions.	[2]
13	Develop program to read, write and append data from a file.	[2]

Text Books :

1. C Programming Absolute Beginner's Guide, Que Publishing; 3rd edition (22 August 2013)
2. C Programming Language 2nd Edition, Pearson Publication

Reference Books:

1. Programming in C Practical Approach by Ajay Mittal, Pearson
2. Let Us C, By Yashwat Kanetkar

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23CS2407	CEP	Mini Project III	0-0-2	01 Credit

Teaching Scheme	Examination Scheme
Practical: 2 hrs/week	Continuous Assessment-I: - 25 Marks Continuous Assessment-II: -25 Marks

Pre-Requisites: Mini Project, Mini Project II

About Hackathon

The project is a part of addressing societal and industrial needs. Hackathon is one of the platforms where students will solve real world challenges. This Course focuses on the selection of methods/engineering tools/analytical techniques for problem solving.

Through this course, students will gain the understanding of engineering basics and ideas, gain practical experience, have the opportunity to display their skills and learn about teamwork, financial management, communication skills and responsibility

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

CO1	Select the appropriate method for solving the problem
CO2	Make use of various engineering techniques and tools to give a solution
CO3	Justify the methods /tools used to develop the solution
CO4	Design / simulate the model/ project work
CO5	Describe the solution with help of a project report and presentation
CO6	Conclude the outcomes of project.

Course Contents:

Week 1: Survey Design-1 • Ensure case study group students have made necessary communication and done a preparatory visit. • Watch the lecture on survey design and study the notes. • Prepare a questionnaire and try it out with your group members as mock.	[2]

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Week 2: Survey Design-2 • Review survey questionnaire prepared by case study groups. • Decide sampling strategy. • Prepare a detailed schedule for fieldwork	[2]
Week 3: Fieldwork • Data Collection: Collect quantitative data (e.g., statistics, usage metrics) and qualitative data (e.g., user stories, testimonials). • Use data collection tools like questionnaires, observation checklists, and digital analytics. • Ensure data accuracy and reliability through proper sampling and recording methods.	[2]
Week 4: Trails and Experimentation-1 • Initial Setup and Configuration • Concept Validation • Feasibility Testing	[2]
Week 5: Trails and Experimentation-2 • Prototyping • Functionality Testing	[2]
Week 6: Trails and Experimentation-3 • Bug Identification and Fixing • Integration Testing • Security Testing • 75% Presentation has to be conducted by mentor/guide based on above activity.	[2]
Week 7 : Results • Coordinator has to check and verify below points in term of result: • Functional Performance • Accuracy and Precision • Efficiency • Safety	[2]
Week 8: Validation • Coordinator has to check and verify below points in term of validation: • Testing and Verification	[2]

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• Compliance with Standards	
Week 9: Integration Testing • Validate that the hardware integrates seamlessly with other systems or components as intended • Perform compatibility tests with software, other hardware, and network systems.	[2]
Week 10: Documentation and Reporting • Maintain comprehensive documentation of design, development, testing, and validation processes • Provide detailed reports on test results, issues found, and corrective actions taken.	[2]
Week 11: Final Presentation • 100% Presentation has to be conducted by mentor/guide based on above activity. • Prototype/Final Software solution is mandatory at the time of final presentation along with report	[2]
Week 12: Exhibition • Mini project exhibition will be schedule with interdepartmental evaluation.	[2]

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