HSNC Board's
Smt. Chandibai Himathmal Mansukhani College
(Autonomous)
(Affiliated to the University of Mumbai)
University College Code : 217-JD Office : T14

HYDERABAD (SIND) NATIONAL COLLEGIATE BOARD

Estd. 1965

Principal : Dr. Manju Lalwani Pathak

Ref. No: CHM (A) AC/02/2026-27
Date: 27th June, 2026

CIRCULAR

The immediate attention of all concerned is invited to this Office Circular No. CHM (A) AC 11/2026 dated 19th June, 2026 regarding Choice Based and Credit Based Syllabus (CBCS), of Smt. CHM College (Autonomous), under the guidelines of University of Mumbai, as per Academic Framework of NEP 2020, for all subjects of T.Y. B.Sc in Information Technology SEM-V and SEM-VI.

This is in continuation with curriculum approved by Academic Council for all the subjects of F.Y.B.Sc in Information Technology (SEM-I), S.Y.B.Sc in Information Technology (SEM-III) and F.Y.B.Sc in Information Technology (SEM-II) & S.Y.B.Sc in Information Technology (SEM – IV) vide Circular Reference Numbers CHM (A) AC/C/01/2025 dated 18th June, 2025, CHM (A) AC/C/01A/2025 dated 21st July 2025 and CHM (A) AC/C/02/2025 dated 20th November, 2025 respectively.

It is hereby communicated that the recommendations of the curriculum designed by the Ad-hoc Board of studies in Information Technology coordinated by the Dean, Faculty of Applied Sciences in the meeting of Academic Council held on 20th June, 2026 have been approved.

In accordance, therewith, the syllabus as per the CBCS, has been brought into force with effect from the Academic Year 2026-27 for T.Y.B.Sc in Information Technology, in continuation with syllabus of F.Y.B.Sc in Information Technology and S.Y.B.Sc in Information Technology of 2025-2026 (updated), and accordingly the same is attached for reference and is available on the College's website www.chmcollege.in

Ulhasnagar – 421003
27th June 2026

Dr. Manju Lalwani Pathak
Principal & Chairperson, Academic Council

Copy forwarded for information to:

1. The Office of Chairperson, Academic Council
2. The Dean, Faculty of Applied Sciences
3. The Chairperson, Ad-hoc Board of Studies
4. The Controller of Examination
5. The Registrar

PREAMBLE

Information Technology (IT) is a dynamic and rapidly evolving field that plays a crucial role in today's digital world. With technology becoming central to daily life and work, the demand for skilled IT professionals is growing across industries. The National Education Policy (NEP) supports this growth by offering a modern, flexible, and multidisciplinary approach to learning. It allows students to tailor their education—ranging from short-term certifications to a full B.Sc. (Honours) with Research—based on their interests and goals.

The B.Sc. in Information Technology program is designed to build a strong foundation in IT concepts and practical skills. It prepares students to design, develop, and manage IT systems effectively. Graduates gain expertise in programming, data structures, system design, and emerging technologies such as AI, machine learning, cloud computing, and IoT. They also develop analytical thinking, problem-solving, and communication skills, enabling them to meet industry demands and pursue advanced research or innovation-driven careers.

PROGRAMME OUTCOMES (POs)

Upon completion of Bachler of Science in Information Technology, learner will be able to:

PO1: Disciplinary Knowledge

Demonstrate a strong foundation in Information Technology and computing principles, including programming, systems, databases, and software development concepts.

PO2: Critical Thinking and Analytical Reasoning

Apply logical and analytical approaches to evaluate information, identify patterns, and derive valid conclusions for computing and real-world problems.

PO3: Problem Solving and Scientific Skills

Analyse unfamiliar and complex problems systematically and develop effective, innovative, and feasible IT-based solutions.

PO4: Research Competence

Design and conduct investigations by formulating relevant questions, gathering information, and following structured methods to solve computing-related queries.

PO5: Digital Literacy

Demonstrate proficiency in using digital tools, software platforms, and information systems for learning, problem-solving, and professional tasks.

PO6: Communication Skills

Communicate effectively through written reports, oral presentations, scientific publications, visual media, and interpersonal interactions with diverse audiences.

PO7: Environmental Sustainability and Community Engagement

Demonstrate empathy, appreciate cultural diversity, engage in community service, and promote environmental sustainability.

PO8: Ethics and Professional Values

Demonstrate ethical and responsible use of information technology by maintaining data privacy, cybersecurity practices, academic integrity, respect for intellectual property rights, and professional standards in computing practices.

PO9: Leadership and Teamwork

Work collaboratively in diverse teams, demonstrate leadership qualities, and contribute effectively to achieving common goals.

PO10: Lifelong Education

Engage in self-directed lifelong education for continuous personal and professional development.

PO11: Employability and Entrepreneurship

Apply information technology knowledge, programming skills, and innovative thinking to develop industry-ready solutions and support career growth and entrepreneurial

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College, Ulhasnagar

(Autonomous)

Affiliated to the University of Mumbai

Bachelor of Science
(Information Technology)
(Self-Financing Course)

Semester – I

Choice Based and Credit Based syllabus as per NEP 2020 with effect from the Academic Year 2025-2026

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- I

Title: Programming with C

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Programming with C
Course Code: CHMITI1

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course allows the students to understand the fundamental concepts of programming which will allow them to program applications in C.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To understand the concepts of computer programming. **CO(A) 2:** To understand syntax and semantics of the C language **CO(A) 3:** To understand loops and decision making in programming. **CO(A) 4:** To understand the use of arrays, structures, and pointers. **CO(A) 5:** To understand functions for modular code and handle errors.	
8	**Course Outcomes**: Student will be able to: **CO 1**: Build flowcharts, pseudocode for C programs. **CO 2**: Use C language syntax and semantics in their programs. **CO 3**: Implement loops and decision making. **CO 4**: Use different types of data structures in their programs. **CO 5**: Write well-structured, readable, and maintainable C code and debug programs if there are any errors.	

9

Syllabus

UNIT I

- **Introduction:** algorithms, flowcharts, pseudo code, history of C language, structure of a C program, understanding C syntax, character set, identifiers and keywords, data types, constants and its types, symbolic constants, variable declaration, variable initialization, input and output using printf and scanf, character and character strings, typedef, C preprocessor, Arrays: declaration, initialization, and access of one-dimensional and two-dimensional arrays.
- **Operators:** arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, compound assignment operators, conditional operator, operator precedence, order of evaluation in expressions

UNIT II

- **Control Structures in C:** code blocks, simple if, if-else, if-else-if ladder, nested if, switch, while loop, for loop, do-while loop, break, continue, and nesting of loops.
- **Functions and Pointers:** user defined and library functions, definition of pointers, declaration and initialization of pointers, address-of operator (&), dereferencing operator (*), pointer arithmetic, pointers and arrays, pointer and function arguments
- **Introduction to structure type:** definition, syntax and declaration, structure variable declaration, accessing members using dot operator, structure initialization.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		Marks
1	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11	**REFERENCES:** 1. C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, 2017 2. Let Us C, Yashvant Kanetkar, BPB Publications, 2008. 3. Mastering in C, K. R. Venugopal and Sudeep R. Prasad, Tata McGraw-Hill Publications. 4. A Computer Science –Structure Programming Approaches using C, Behrouz Forouzan, Cengage Learning. 5. Schaum's outlines Programming with C, Byron S. Gottfried, Tata McGraw-Hill Publications. 6. Basics of Computer Science, by Behrouz Forouzan, Cengage Learning. 7. Programming Techniques through C, by M. G. Venkateshmurthy, Pearson Publication. 8. https://www.educative.io/courses/advanced-programming-techniques-in-c 9. https://www.learnvern.com/c-programming-tutorial

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- I

Title: Database Management System

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Database Management System
Course Code: CHMITI2

Sr. No.	Heading	Particulars
1	**Description of the Course:**	The objective of the course is to present an introduction to fundamentals of database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively -information from a DBMS.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To make students aware fundamentals of database system. **CO(A) 2:** To give idea how ERD components helpful in database design and implementation. **CO(A) 3:** To experience the students working with database using MySQL. **CO(A) 4:** To familiarize the student with normalization, SQL for querying, manipulating, and managing database data. **CO(A) 5:** To make students aware transaction management, concurrency control, and database recovery techniques.	
8	**Course Outcomes**: Student will be able to: **CO 1**: Define and describe the fundamental elements of relational DBMS. **CO 2**: Relate the basic concepts of relational data model, entity-relationship model, relational database. **CO 3**: Design ER-models to represent simple database application scenarios. **CO 4**: Understand the normalization and its role in the database design process. **CO 5**: Transform the ER-model to relational tables, populate relational database and formulate SQL.	

9

Syllabus

UNIT I

- **Introduction to Databases and transactions:** What is database system, purpose of database system, view of data, relational databases, database architecture
- **Data Models:** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction
- **Database Design, ER-Diagram:** Database design and ER Model: overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, Codd's rules, The enhanced entity relationship model. Relational database design by ER- and EER-to-Relational-Mapping.
- **Relational database model:** Logical view of data, keys, integrity rules

UNIT II

- **Database Design theory and normalization:** Basics of functional dependencies, Normalization, Normal forms based on primary key, Second and Third Normal Forms, Boyce-Codd Normal Form.
- **Structured Query Language:** SQL Data Definition and Data Types, Specifying Constraints in SQL (Primary Key, Foreign Key, Unique, Not Null, Check),, Select queries (Where, Order By, Distinct), Data Manipulation Commands, Joining Database Tables, SQL Join Operators, Aggregate Function, Group by clauses, Subqueries, Schema Modification, Views: Creating and updating view.
- **Transaction management and concurrency control and recovery:** Introduction to transaction processing concepts and theory. Concurrency control technique. Database recovery technique.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		Marks
1	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10

		Total	**20**

11 REFERENCES:

1. "Fundamentals of Database System", Elmasri Ramez, Navathe Shamkant, Pearson Education, Seventh edition, 2017
2. Database Management Systems", Raghu Ramakrishnan and Johannes Gehrke, 3rd Edition, 2014
3. Database Systems: Design implementation and management by Carlos Coronel, Steven Morris, Peter Rob
4. "Database System Concepts", Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw Hill, 2017
5. "MySQL: The Complete Reference", Vikram Vaswani, McGraw Hill, 2017
6. "Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease", Ashwin Pajankar, BPB Publications, 2020
7. https://www.tutorialspoint.com/dbms/index.htm

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- I

Title: Major Practical 1

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Major Practical 1
Course Code: CHMITI3

Sr. No.	Heading	Particulars
1	**Description of the Course:**	**Programming with C-Practical** This course is stepping stone to learn other languages. This course provides students hands on experiences of coding exercises and projects. **Database Management System-Practical** DBMS practical approach is useful to gain the knowledge for software backend development. It benefits to user by providing data definition, data access, reduced data redundancy, data integrity, data sharing, data organizing, data consistency, data accuracy, and security.
2	**Vertical 1**	Major
3	**Type**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To learn how to develop algorithms, draw flowcharts, and write efficient code using loops and decision-making techniques. **CO(A) 2:** To understand the use of arrays, structures, functions, and pointers in programming. **CO(A) 3:** Identify entities, their relationships, and design relational database structures using appropriate models and constraints. **CO(A) 4:** Apply SQL to create, manipulate, and retrieve data from relational databases, including DML operations, built-in functions, joins, and nested queries. **CO(A) 5:** Demonstrate advanced data retrieval techniques, implement access control, and understand concepts like virtual tables and user privileges.	

8	**Course Outcomes**: Student will be able to: **CO 1**: Demonstrate and implement the use of data types, variables, operators, control statements, and loops in C programming. **CO 2**: Effectively use arrays, strings, structures, functions, and pointers to write C programs. **CO 3**: Perform core database operations such as inserting, updating, deleting, altering tables, and managing backups using SQL. **CO 4**: Retrieve and manipulate data using SQL queries involving aggregate functions, joins, nested queries, and virtual tables. **CO 5**: Implement data security measures including user access control and attribute-level data abstraction.
9	**Unit 1: Programming with C** **Practical 1** a. Write a program to print your name enclosed in double quotes. b. Write a C program to convert Indian rupee to: US Dollar, Euro, British Pound, Bahrain Dinar and Swiss Franc. c. Write a program to swap two numbers with using a third variable. d. Write a program to swap two numbers without using a third variable. e. Write a program to find area of rectangle, square and circle. **Practical 2** a. Write a program to print the ASCII value of a given character. b. Write a program to accept your full name from the user and display the message: 'Hello [full name], have a good day.' c. Write a program to print the adjacent even n umbers of a given odd number. d. Write a program to convert a two-digit number to word (using switch statement). e. Write a program to print rollno and names of 5 students using array. **Practical 3** a. To calculate simple interest taking principal, rate of interest and number of years as input from user. Write algorithm & draw flowchart for the same. b. Write a program to find greatest of three numbers using conditional operator. Write algorithm & draw flowchart for the same. c. Write a program to check if the year entered is leap year or not. Write algorithm & draw flowchart for the same. **Practical 4** a. Write a program to calculate roots of a quadratic equation. b. Write a menu driven program using switch case to perform add / subtract / multiply / divide based on the user's choice. c. Write a program to print the pattern the following pattern 1 1 2 1 1 2 3 2 1 1 2 3 4 3 2 1

d. Write a program to print the pattern the following pattern

```
1
2  3
4  5  6
7  8  9  10
```

e. Write a program to print the pattern the following pattern

Practical 5

a. Write a program to print the pattern the following pattern

```
5 4 3 2 1 2 3 4 5
4 3 2 1   1 2 3 4
3 2 1       1 2 3
2 1           1 2
1               1
```

b. Write a program using while loop to reverse the digits of a number.

c. Write a program to calculate the factorial of a given number.

d. Write a program to print the Fibonacci series.

Practical 6

a. Write a program to square root, abs() value using function.

b. Write a program to print area of square using function.

c. Write a program to convert a given number into words. For example, if the input is 567, the output should be: "Five Six Seven" using function.

d. Write a program to sort the elements of array in ascending or descending order using function.

Practical 7

a. Write a program to extract the portion of a character string and print the extracted part.

b. Write a program to find the given string is palindrome or not.

c. Write a program to using strlen(), strcmp() function.

d. Write a program to swap two numbers using a function. Pass the values to be swapped to this function using call-by-value method and call-by- reference method.

Practical 8

a. Write a program to read a matrix of size m*n.

b. Write a program to multiply two matrices using a function.

c. Write a program to interchange any two rows of a given 3×3 matrix.

d. A one-dimensional array of size 15 containing the market quotations of the share prices of a company for the month of January 2002 is tabulated below. Write a program to read this array and print the 5-day moving average data between the days 3 and 12. The 5-day moving average corresponding to a particular day d is the average of the prices on days d-2, d-1, d, d+1, d+2

Day Price Day Price Day Price Day Price

1	222	5	226	9	245	13	300	
2	222	6	229	10	252	14	311	
3	223	7	235	11	251	15	311	
4	228	8	241	12	270			

Practical 9

a. Write a program to perform multiplication and division of two numbers using pointer variables.
b. Write a program using pointers to compute the sum of all elements stored in an array.
c. Write a program that swaps two numbers passed to a function by reference
d. Write a program to print the structure using Title
   Author Subject Book ID
   Print the details of two students.

Practical 10

Create a mini project on "Bank management system". The program should be menu driven.

Unit 2: Database Management System

1. **Perform the following:**
   - Viewing all databases
   - Viewing all Tables in a Database
   - Creating Tables (Without Constraints)
   - Creating Tables (With Constraints (Domain, Key constraints (Primary/Foreign keys), not null, unique, default, Check)) inserting/Updating/Deleting Records in a Table
2. **Perform the following:**
   - Altering a Table
   - Dropping/Truncating/Renaming Tables
   - Backing up / Restoring a Database
3. **Perform the following:**
   - Select Queries
   - Simple Queries with Aggregate functions
   - Queries involving
   - Order by Clause
   - Group By and Having clause
4. **Queries involving**
   - Date Functions
   - String Functions
   - Math Functions
5. **Queries involving**
   - Logical Operators

- Special Operator (Between, Is Null, Like)
- Set Operation (Union, Intersect, Except)

6. Join Queries

- Inner Join
- Outer Join

7. Subqueries

- Single-row and Multi-row
- With IN clause
- With EXISTS clause

8. Views

- Creating Views (with and without check option)
- Dropping views
- Selecting from a view

9. DCL and TCL statements

Granting and revoking permissions

10. Saving (Commit) and Undoing (rollback)

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
	Total: 30	

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total:	**20**

11	**REFERENCES:** 1. "Fundamentals of Database System", Elmasri Ramez, Navathe Shamkant, 2. Pearson Education, Seventh edition, 2017. 3. Database Management Systems", Raghu Ramakrishnan and Johannes Gehrke, 4. 3rd Edition, 2014 5. MASTERING C, K. R. Venugopal and Sudeep R. Prasad, Tata McGraw-Hill Publications. 6. "A Computer Science –Structure Programming Approaches using C", Behrouz Forouzan, Cengage Learning. 7. Schaum's outlines "Programming with C", Byron S. Gottfried, Tata McGraw-Hill Publications. 8. "Basics of Computer Science", Behrouz Forouzan , Cengage Learning. 9. "MySQL: The Complete Reference", Vikram Vaswani , McGraw Hill, 2017. 10. "Learn SQL with MySQL: Retrieve and Manipulate Data Using SQL Commands with Ease", Ashwin Pajankar, BPB Publications, 2020. 11. https://www.educative.io/courses/advanced-programming-techniques-in-c 12. https://www.tutorialspoint.com/dbms/index.htm

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- I

Vertical - 2
Minor Course

Not Applicable

with effect from
Academic Year 2025-2026

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- I

Vertical - 3
Open Elective Course - 2+2 Credits

with effect from
Academic Year 2025-2026

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College

(Autonomous)

(Affiliated to the University of Mumbai)

University College Code: 217 | JD Office: T14

Faculty of Interdisciplinary

Vertical 3: List of Open Elective Skill Based Courses for First Year: Semester - I

Sr. No.	Nomenclature of the Paper
1	Basic Computer Skills for Digital Age
2	Visual Design and Digital Tools : A Foundation For Animation
3	Basic Tools of AI for Economics and Education
4	Communicative English
5	Urbanization and Real Estate: Concepts and Contemporary Scenarios
6	Business of Travel and Tours
7	Managing Family Wealth Through Family Office
8	Web Designing Essentials: HTMLI and CSS Styling Techniques
9	Basics of Nutrition
10	Lessons of Reel Making
11	Performing Arts
12	Data Analysis with Excel
13	Political Communication and Media Skills
14	Stress Management-I
15	Social Media and Communication
16	Mushroom Cultivation: Training and Trading
17	Yoga and Fitness
18	Basic Perfumeries Course (Level-I)
19	Soft Skills for Corporate Readiness
20	Beautician : Strategic Business Planning
21	Current Trends of Fashion Design: Financial Perspective
22	Basics of Accounting-I
23	Digital Marketing
24	Online Trading in Stock Market
25	Event Management Course in Sindhi

P.B. No 17, Opp. Railway Station, Smt. Chandibai Himathmal Mansukhani Road, Ulhasnagar- 421003, Dist. Thane, (MAHARASHTRA)
Tel. : +91 251 273 4940 • Telefax + 91 251 273 1869 • E-mail: principal.cbmc@gmail.com • Website: www.cbmcollege.in

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- I

Title: Combinational and Sequential Design

Vertical - 4
Vocational Skill Course (VSC) - 2 Credits

with effect from
Academic Year 2025-2026

Title: Combinational and Sequential Design
Course Code: CHMITI5

Sr. No.	Heading	Particulars
1	**Description of the Course:**	Combinational and Sequential Design is a course that offers students a comprehensive understanding of digital circuits' design principles and techniques. The knowledge and skills gained from this course are highly useful and applicable in various industries, with promising career prospects.
2	**Vertical 4**	Vocational Skill Course (VSC)
3	**Type**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To provide students with a comprehensive understanding of combinational and sequential circuit design principles and techniques. **CO(A) 2:** To enable students to apply Boolean algebra, K-map simplification, and other design techniques to create optimized digital circuits. **CO(A) 3:** To equip students with the necessary tools and skills to implement arithmetic circuits, data path circuits, and memory circuits. **CO(A) 4:** To enable students to analyze and troubleshoot digital circuits to ensure optimal performance. **CO(A) 5:** To provide students with hands-on practical experience in designing and implementing digital circuits using simulation software and real-world hardware.	
8	**Course Outcomes**: Student will be able to: **CO 1**: Explain the differences between combinational and sequential circuits and recognize their various applications. **CO 2**: Define Boolean algebra and understand its role in designing digital circuits. **CO 3**: Apply K-map simplification and other techniques to design efficient combinational	

	circuits. **CO 4**: Design and implement arithmetic circuits (like adders, subtractors, and multipliers) and data path components (such as registers, multiplexers, and decoders). **CO 5**: Build, test, and troubleshoot digital circuits using breadboards, logic probes, oscilloscopes, and performance measurement tools.
9	**Unit 1:** **1. Study of Logic gates and their ICs and universal gates:** a. Study of Number Systems: Binary, Octal, Hexadecimal, BCD and Excess 3 b. Study of Binary and BCD addition and subtraction c. Study of AND, OR, NOT, XOR, XNOR, NAND and NOR gates d. Study of IC 7400, 7402, 7404, 7408, 7432, 7486, 74266 e. Implement AND, OR, NOT, XOR, XNOR using NAND gates. f. Implement AND, OR, NOT, XOR, XNOR using NOR gates. **2. Implement the given Boolean expressions using minimum number of gates.** a. Verifying De Morgan's laws. b. Implement other given expressions using minimum number of gates. c. Implement other given expressions using minimum number of ICs. **3. Implement combinational circuits.** Design and implement combinational circuit based on the problem given and minimizing using K-maps. (Various Equations, SOP, POS forms can be given) **4. Implement code converters.** a. Design and implement Binary – to – Gray code converter. b. Design and implement Gray – to – Binary code converter. c. Design and implement Binary – to – BCD code converter. d. Design and implement One bit comparator. e. Design and implement 2-bit Comparator. **5. Implement Adder and Subtractor Arithmetic circuits.** a. Design and implement Half adder and Full adder. b. Design and implement BCD adder. c. Design and implement XS – 3 adders. d. Design and implement binary subtractor. e. Design and implement BCD subtractor f. Design and implement XS – 3 subtractor. **Unit 2:** **6. Multiplexer and Demultiplexers.** a. Design and implement 4:1 multiplexer. Study of IC 74153, 74157 b. Design and implement 1:4 demultiplexer. Study of IC 74139 c. Implement the given expression using IC 74151 8:1 multiplexer. **7. Encoders and Decoders.** a. Design and implement 8:3 encoder.

b. Design and implement 3:8 decoder.
c. Design and implement BCD to Decimal Encoder
d. Implementation of digits using seven segment displays using decoder IC 7447/7448

8. Study of flip-flops.

a. Study of flip-flops and counters.
b. Study of IC 7473.
c. Study of IC 7474.
d. Study of IC 7476.
e. Conversion of Flip-flops.

9. **Sequential Logic Circuit: Counters.**

a. Study of Serial, Parallel and combinational counters.
b. Study of IC 7490, 7492, 7493 and designing mod-n counters using these.

10. Design of shift registers and shift register counters.

a. Design serial – in serial – out, serial – in parallel – out, parallel – in serial – out, parallel – in parallel – out
b. Study of ID 7495.
c. Implementation of digits using seven segment displays. (Included in Practical 7 d.)
d. Design and Implement 3 stage Johnson Counter
e. Design and implement 3 stage Ring Counter.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	Marks
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11

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1. Digital Electronics and Logic Design, N. G. Palan, Technova
2. Digital Principles and Applications, Malvino and Leach, Tata McGrawHill
3. Modern Digital Electronics, R. P. Jain, Tata McGrawHill
4. Digital Design, M. Morris R. Mano, Michael D. Ciletti, Pearson Education, 2012
5. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- I

Title: Office Tools for Data Management

Vertical - 4
Skill Enhancement Course (SEC) - 2 Credits

with effect from
Academic Year 2025-2026

Title: Office Tools for Data Management
Course Code: CHMITI6

Sr. No.	Heading	Particulars
1	**Description of the Course:**	**Introduction:** The MS Access course offers a comprehensive understanding of Microsoft's relational database management system, making it a valuable skill in today's data-driven environment. This course is designed to empower individuals with the tools needed to efficiently organize, manage, and analyse data. **Relevance and Usefulness:** It provides practical insights into leveraging a relational database system for enhanced efficiency and organization. The MS Access course is useful for individuals seeking to enhance their data management skills. **Applications:** With applications in various sectors, from business to research and project management, MS Access is versatile. It facilitates the creation of databases for tasks ranging from contact management to complex systems for inventory and financial analysis.
2	**Vertical 1**	Skill Enhancement Course (SEC)
3	**Type**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Students will grasp essential database concepts, including tables, relationships, and normalization principles. **CO(A) 2:** Students will design and construct well-organized databases in MS Access, showcasing proficiency in table design and data validation. **CO(A) 3:** Students will master the creation of complex queries in MS Access, enabling them to extract specific information efficiently. **CO(A) 4:** Students will develop expertise in crafting user-friendly forms and interfaces in MS Access, optimizing data entry processes. **CO(A) 5:** Students will generate comprehensive reports in MS Access, demonstrating skills in grouping, sorting, and presenting data for meaningful analysis.	

8	**Course Outcomes**: Student will be able to: **CO 1**: Explain normalization importance, identify table relationships, and justify database design choices. **CO 2**: Create well-structured MS Access databases with proper relationships, data types, and normalization. **CO 3**: Execute advanced queries in MS Access, retrieving specific information based on diverse criteria. **CO 4**: Design intuitive MS Access forms, incorporating controls for an efficient and user-friendly data entry experience. **CO 5**: Produce insightful MS Access reports, organizing and presenting data effectively for analysis.
9	**Unit 1:** **Practical 1:** **Scenario:** You are tasked with creating a student management system using MS Access. A. Explore the Access Ribbon and summarize the role of each major tab (Home, Create, External Data, etc.) B. Create a new database named StudentSystem.accdb. Add two tables Student and Courses. Each should have five fields with various data types. Add 10-10 entries in each table. Add constraints and relationships to maintain data integrity. C. Using the Table Wizard, create an additional table called Instructors. Modify the structure of this table, add an input mask to a phone number field, and create a validation rule for years of experience. **Practical 2:** A. Create and use an Input Mask to enter the data in sample table. B. Adding records in table by using Datasheet View, using a Form and using SQL. C. Create the Employee Database with necessary table and data and then implement the following transitions: • Delete the record for Kelly Marder. • Change Pamela Milgrom's salary to $59,500. • Use the Replace command to change all occurrences of "Manager" to "Supervisor". **Practical 3:** A. Create the Bookstore database with necessary table and data and modify the database to accommodate the following: • Add the book Exploring Microsoft Office 2000 Vol II (ISBN: 013-011100-7) by Grauer/Barber, published in 1999 by Prentice Hall, selling for $45.00. • Change the price of Memory Management for All of Us to $29.95. • Delete The Presentation Design Book.

B. Create a table employ with (idno, name, job, age, salary). Insert 10 records. Create a query to display the information of all managers. Create a query to display the names of employs who‟s salary is >15000.

C. Use the Form Wizard to create a form, Move and size controls within a form. Use the completed form to enter data into the associated table.

Practical 4:

A. Add fields to an existing table. Use the Lookup Wizard to create a combo box. Add controls to an existing form to demonstrate inheritance. Add command buttons to a form.

B. Generate and use various the queries using Query Wizards.

C. Generate and use various the Query with User Input.

D. Demonstrate use of Expression Builder.

Practical 5:

A. Use the report wizard to create a new report. Modify an existing report by adding, deleting, and/or modifying its controls.

B. Create a query containing a calculated control. Then, create report based on that query. Use the Sorting and Grouping command to add a group header and group footer to a report.

C. Use action queries to modify a database. Create a crosstab query to display summarized values from a table.

Practical 6:

Scenario: You are designing a database for a company that manages employees and departments. Each department can have multiple employees, but each employee belongs to only one department.

1. Create the following database tables:
    - Departments table with columns: DepartmentID, DepartmentName.
    - Employees table with columns: EmployeeID, FirstName, LastName, and DepartmentID (foreign key referring to the Departments table).
2. Add at least 2 departments and 5 employees. Make sure the employees are assigned to different departments.
3. Write a query to produce a report that lists all employees along with the department they belong to.

Scenario: You are tasked with creating a user profile system for an application where each user has a unique profile. Each profile is associated with exactly one user.

4. Create the following database tables:
5. Users table with columns: UserID, Username, Email.
6. Profiles table with columns: ProfileID, UserID (foreign key referring to the Users table), Bio.
7. Add at least 3 users, each with a corresponding profile.
8. Write a query to produce a report that lists each user’s username, email, and bio

(from their profile).

Scenario: You are building a database for a university where students can enroll in multiple courses, and each course can have many students.

9. Create the following database tables:
    - Students table with columns: StudentID, StudentName.
    - Courses table with columns: CourseID, CourseName.
    - Enrollments table (junction table) to manage the many-to-many relationship between students and courses, with columns: StudentID, CourseID.
10. Add at least 3 students, 3 courses, and create enrollment records for students enrolled in courses.
11. Write a query to produce a report that lists each student along with the courses they are enrolled in.

Practical 7:

A. Demonstrate use of look up tables.

B. Use the Report Wizard to create a report having the following requirements:
    1. Select the LastName field from the Author table.
    2. Select the Title and Price fields from the Book table.
    3. Select the PubName field from the Publisher table.
    4. View the data by Publisher.
    5. Add a grouping level using LastName.
    6. Sort the report by the Title field in ascending order.
    7. Choose Stepped layout and Portrait orientation.
    8. Type Book List as the report's title.

C. Define the relationship between two tables and add a subform to a form.

Practical 8:

A. Import an Access table from an Excel workbook. Create a one- to-many relationship between tables in a database. Create a multiple-table query.

B. Import external data from the Excel spreadsheet file Bookstore.
    1. Make sure Import the source data into a new table in the current database is selected.
    2. Select the Author worksheet.
    3. Make sure that First Row Contains Column Headings is selected.
    4. For the AuthorID field, set the Data Type option to Long Integer and set the Indexed option to Yes (No Duplicates).
    5. Select Choose my own primary key and make sure the AuthorID field is selected.
    6. Save the table with the name Author.

C. Export data from access to various formats.

Practical 9:

A. Relationships: Create and Use Author and Book Table.
   1. Create a relationship between the AuthorID field in the Author table and the AuthorCode field in the Book table. Put a checkmark in the box labeled Enforce Referential Integrity.
   2. Create a relationship between the PubID field in the Publisher table and the PubID field in the Book table. Put a checkmark in the box labeled Enforce Referential Integrity.

B. Create a switchboard; Use the Link Tables command to associate tables in one database with the objects in a different database.

C. Create an AutoExec and a Close Database macro and demonstrate the use.

Practical 10:

A. Create the Hospital Management database and perform the following tasks:
   1. Retrieve the total number of patients treated by each department.
   2. Generate a report that displays all doctors grouped by their specialization.
   3. Generate a report that displays all patients grouped by their admission date.
   4. Generate a report that displays all patients grouped by their assigned department.

B. Demonstrate the use of Database Splitter Wizard by splitting database.

C. Design a form to register a new patient with department and doctor assignment.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	Marks
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11 REFERENCES:

1. Access 2016 in easy steps, by Mike McGrath, In Easy Steps, 1st Edition, 2017
2. Relational Databases and Microsoft Access, by Ron McFadyen, 1st Edition
3. MICROSOFT ACCESS 2019 by David Murray, Kendall Hunt Publishing, 1st Edition, 2020.
4. Step by Step Microsoft Access 2013, by Joyce Cox and Joan Lambert, 1st Edition, Microsoft Press, 2013
5. Access 2019 Bible, by Michael Alexander, Richard Kusleika, Wiley, 1st Edition, 2018
6. Access 2019 For Dummies, by Laurie A. Ulrich, Ken Cook, Wiley, 1st Edition, 2018
7. https://www.quackit.com/microsoft_access/tutorial/
8. https://www.tutorialspoint.com/ms_access/index.htm

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B.Sc.

Semester- I

Vertical – 5

Ability Enhancement Course (English)

2 Credits

with effect from
Academic Year 2025-2026

Title: Introduction to Communication Skills in English
Course Code: CHMBSCAECI

Sr. No.	Heading	Particulars
1	**Description the Course:**	Effective communication is the cornerstone of academic and professional success. This course introduces learners to foundational skills in English communication, with a focus on both oral and written competencies essential in academic, social, and workplace contexts. It aims to equip learners with the ability to read critically, write precisely, speak confidently, and listen actively. Emphasis is placed on building clarity, coherence, and conciseness in communication, along with an understanding of audience, purpose, and tone. The course integrates grammar reinforcement, vocabulary building, reading comprehension, and practice-oriented modules such as email etiquette, group discussion, and formal writing. Through dynamic classroom interactions and practical assessments, learners will gain confidence in using English effectively and purposefully**.**
2	**Vertical 4**	Ability Enhancement Course
3	**Type** Teaching Methods:	Theory+ Practicum (Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: CO(A)1: To introduce learners to the fundamentals of effective communication and its components. CO(A)2: To enhance learners' reading comprehension through exposure to multiple genres and contexts. CO(A)3: To develop grammatical accuracy and lexical resourcefulness for academic and professional communication. CO(A)4: To strengthen verbal and non-verbal presentation skills and promote interactive speaking abilities.	

	CO(A)5: To build competence in real-world writing tasks such as email drafting, bio-data preparation, and descriptive writing.
8	**Course Outcomes**: Student will be able to CO-1: Understand and apply key principles of effective communication in varied contexts. CO-2: Comprehend and analyze written texts using appropriate reading strategies. CO-3: Recognize and correct common grammatical and lexical errors. CO-4: Engage in clear, confident, and context-appropriate spoken interactions. CO-5: Produce structured, coherent, and grammatically correct written content for academic and workplace use.

9	**Syllabus**

UNIT I: Foundations of English Communication

A) Core Concepts of Communication

- Principles of Effective Communication: The 7 Cs
- Verbal and Non-verbal Communication with Examples
- Cross-cultural Communication in the Globalized World
- Technology in Communication: Email, Messaging, Video Conferencing
- Listening for Detail and Intent: Barriers to Listening and Strategies

B) Reading Comprehension

- Understanding the Main Idea and Supporting Details
- Interpreting Tone, Purpose, and Bias
- Using Context Clues for Vocabulary Building
- Reading Visual Texts: Graphs, Charts, and Infographics
  Sample readings will include excerpts from news articles, reports, editorials, and educational essays (200–250 words).

C) Grammar and Vocabulary

- Subject-Verb Agreement
- Sentence Structures
- Punctuation and Capitalization
- Commonly Confused Words
- Editing and Proofreading Practice

A remedial and functional approach will be followed with contextual exercises.

UNIT II: Applied Communication Skills

A) Speaking and Listening Skills

- Introducing Oneself in Academic/Professional Settings
- Participating in Group Discussions and Expressing Opinions
- Delivering a Short Speech (2–3 minutes) on Familiar Topics
- Understanding and Responding to Instructions
- Listening Comprehension Practice through Audio/Video Clips

B) Functional Writing Skills

- Formal Email Writing with Subject and Tone Sensitivity
- Descriptive Paragraph Writing (People, Places, Processes)
- Bio-data and Resume Writing
- Drafting Job Applications (Solicited and Unsolicited)
- Writing a Statement of Purpose

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question No	Nature of Questions	Marks
Q. 1	**Short Notes** (Attempt any 3 out of 5) - **Unit 1** **OR** **Essay-Type Question** (Attempt any 1 out of 2)- **Unit 1**	15
Q. 2	**Short Notes** (Attempt any 3 out of 5) - **Unit 2** **OR** **Essay-Type Question** (Attempt any 1 out of 2)- **Unit 2**	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Students are required to draft a job application letter along with a resume using the following AI assistance: Canva Resume Builder, Resume.oi, Zety, Novopresume, Rezi etc **OR** Draft an SoP with the help of the following AI assistance: Quillbot, Yocket, Writesonic, Jasper AI	15
2.		05
	Total	**20**

11

REFERENCES:

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5. Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. Pocket Books, 2006.
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7. Cullen, Pauline, et al. *English Grammar in Use Supplementary Exercises*. Cambridge UP, 2019.
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12. Kumar, Sanjay, and Pushp Lata. *Communication Skills*. 2nd ed., Oxford UP, 2018.
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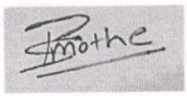
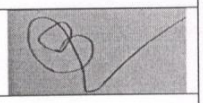
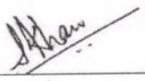
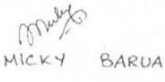
19. Wallace, Catherine. *Reading*. Oxford UP, 1992.
20. Zinsser, William. *On Writing Well: The Classic Guide to Writing Nonfiction*. Harper Perennial, 2016.

Syllabus Committee:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Kailas Aute	Professor & Head, Dept. of English, Smt. CHM College	
2.	Prof. (Dr.) B. R. Hiramani,	(VC Nominee, University of Mumbai) Pancham Khemraj College, Sawantwadi	
3.	Prof. (Dr.) Vikas Raskar	(Subject Expert outside University) Hutatma Rajguru Mahavidyalay, Rajguru Nagar, Khed, (Affiliated to Savitribai Phule University)	
4.	Prof. (Dr.) Prashant Mothe	(Subject Expert outside University) Aadarsh Mahavidyalay, Umerga, Dharashiv, (Affiliated to Dr. Baba Saheb Ambedkar Marathwada University	
5.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	
6.	Ms. Sana Khan	Asst. Professor, Dept. of English, Smt. CHM College	
7.	Dr. Micky Barua	Faculty Vidyalankar Institute of technology, Alumni Member	 MICKY BARUA
8.	Ms. Sofy Verghese	Accenture, Industry Representative	

Name & Signature of the Ad-hoc BoS Chairperson: Prof. (Dr). Kailas Aute 

Name & Signature of the Dean: Prof. (Dr). Nitin Arekar 

Smt

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester- I

Title: Communication Skills in Sindhi

Vertical - 5
Ability Enhancement Course
2 Credit

with effect from
Academic Year 2025-2026

Title: Communication Skills in Sindhi
COURSE CODE: CHMSINIAEC

Sr. No.	Heading	Particulars
1	**Description the Course:**	Communication is the core component of commerce and trade. In communication, language plays very significant role. If a student has mastered the skills of language, undoubtedly, he or she would be able to communicate in the best manner. In this course basic part of Sindhi language would be taught based on the NEP 2020. Innovative approaches like critical thinking, creative mind, and use of technology will lead to communicating and participating with different groups. The vocabulary section would be given prominence. The course would be in the Devanagari script so that it can attract majority of the students. Even non-Sindhi students shall have opportunity to adopt this course.
2	**Vertical 1**	AEC – Ability Enhancement Course
3	**Type**	Theory + Practicum (Teaching Method: Lecture/ Discussion/Reading)
4	**Credit**	2 credits (1 credit = 15 hours for theory or 30 hours of Practical work in a semester)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50Marks
7	**Course Objectives**: After successful completion of this course: **CO(A) 1:** The learner will get understanding of communication skills. **CO(A) 2:** The learner will understand how to accurate the pronunciation of special words in Sindhi **CO(A) 3:** The learner will improve the conversation skill in Sindhi. **CO(A) 4:** The learner will become best communicator in Sindhi language	
8	**Course Outcomes**: Student will be able to **CO1**: Know the basic special features of Sindhi language. **CO2**: Understand communication skills. **CO3**: Knowing the conversation with businessmen and customers **CO4**: Know the etiquettes with parents, relatives, friends and others in effective way	

9	**Syllabus**

UNIT I: Fundamental of Sindhi Communication

- Introduction of Communication skills through Pictorial Presentation
- Importance of Language
- Basic aspects of language:
  i) Types of Language, ii) Role of Language, iii) Changes in Language iv) Non-violent aspects of language v) Language & New generation vi) Language & Modern technology
- New Education Policy (NEP) & Importance of language
- Sindhi language: (Special features of spoken Sindhi language with pronunciation through audio visual presentation

UNIT II: Functional Communication

- Importance of Communication
- Types of Communication (Presentation through video clips):
  i) Verbal, ii) non-verbal, iii) Written iv) Digital Communication
- Characteristics of Communication
- Obstacles in Communication of Sindhi Language
- Methods of Best Communication through role plays
- Spoken Sindhi in Business
- Conversation with customers and proprietors

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Syllabus

यूनिट १: सिंधी राबते जो बुनियाद

- संचारी भाषा: वाक्फियत
- भाषा जी अहिमियत
- भाषा जा बुनियादी पहलू

  १) किस्म, २) भाषा जो किरदार, ३) भाषा मे तबदीलियूं, ४) भाषा जा अहिसासाती पहलू ५) बोली ऐ नई पीड़ी ६) बोली ऐ जदीद टेकनालाजी
- नई तैलीमी नीति ऐं बोलियुन जी अहमियत
- असां जी सिंधी बोली

यूनिट २: अमली राबतो (असराइतो गालाइण जो तरीको)

- राबते जी अहमियत
- राबते जा किस्म

  १) जिबानी राबतो, २) गैर जिबानी राबतो, ३) लिख्त राबतो ४) डिजीटल राबतो राबते मां फायदा
- रााबते में रंडकुं
- बेहतर राबते जा तरीका
- ग्राहकन सां सिंधी बोलीअ मे गुफ्तगू
- कारोबार में सिंधी गालाइण

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10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question No	Nature of Questions	Marks
Q1.A)	Objective Type Questions (Unit- I)	05
Q1.B)	Attempt ANY 2 out of 4- (5 marks each) (Unit-I)	10
Q2.A)	Objective Type Questions (Unit- II)	05
Q2.B)	Attempt ANY 2 out of 4- (5 marks each) (Unit-II)	10
Total		**30**
		Total 30

Internal Examination: Continuous Evolution - 20 marks

	Assessment / evaluation	Marks
1.	**Written assignment on any one of the following topics** 1) Draft a Notice and Report writing in Sindhi 2) Simulate dialogues such as interview, daily conversation and public speaking in Sindhi (Students are required to use AI assistance in the preparation of their drafts. Eg: Microsoft Copilot, Google Gemini, Google voice Typing tool)	15
2.	Class Attendance and Participation	05
	Total	**20**

11

REFERENCE BOOKS:

1. Sanchari Basha – By Dr. Pushpa Kodwani
2. Sindhi Pahakaa – Dr. Jetly M.K.
3. Sindhi Muhavahra – By Hardwani Lachhman
4. Sindhi Adhyat mak Shabdhkesh – By Hardwani Lachhman
5. Acho Sindhi Sikhu – By Hardwani Lachhman

Syllabus Committee:

Sr No	Name of the Faculty	Designation and College	Signature
1.	Dr. Kajal Ramchandani	H.O.D. of Jai Hind College	
2.	Mrs. Komal Totani	Faculty In-Charge, Smt. CHM College	

Name & Signature of the BoS Chairperson: (Dr. Kajal Ramchandani)

Name & Signature of the Dean: (Dr. Nitin Arekar) _____

Smt. Chandibai Himathmal Mansukhani College, Ulhasnagar (Autonomous)

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester- I

Title: Cocurricular Course I

Vertical - 6
Cocurricular Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Cocurricular Course - I

Course Code: CHMCCI6

Sr. No.	Heading	Particulars
1	**Description the Course:**	This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement and experiential learning. Students are encouraged to explore their interests and talents by engaging in cultural, social, literary, sports, extension, or club-based events conducted by the college throughout the academic year. Participation will be recorded and assessed based on involvement, initiative, team spirit, creativity, and consistency. The aim is to nurture essential life skills such as leadership, communication, collaboration, and responsibility in a supportive, informal setting. This non-theory course offers students the opportunities and the freedom to learn beyond the classroom and grow into well-rounded individuals, contributing positively to campus life and society.
2	**Vertical 6**	Cocurricular Course (Mandatory)
3	**Type** **Teaching Methods**	Non Theory Participation, Report Writing, Presentation etc.
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: 1. To inculcate a spirit of active participation in cultural, social, environmental, and creative activities. 2. To enhance personal and interpersonal skills through real-life experiences and teamwork. 3. To foster a sense of responsibility, leadership, and community engagement among students. 4. To develop self-confidence and emotional well-being through creative expression and collaboration. 5. To integrate classroom learning with experiential learning for holistic growth.	
8	**Learning Outcomes**: By the end of the course, students will be able to: **LO1:** Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences. **LO2:** Demonstrate improved communication, leadership, and teamwork skills. **LO3:** Exhibit increased awareness of social responsibility and civic engagement. **LO4:** Build confidence through creative, cultural, and intellectual expressions. **LO5:** Maintain a portfolio or activity log to track participation and personal development.	

9	**Syllabus** **Unit I - Suggested Areas of Participation in the activities:** • **Cultural Events:** Drama, dance, music, literary events, debates, etc. • **Social Outreach:** Blood donation, awareness campaigns, cleanliness drives. • **Clubs & Societies:** Photography, quiz, environment club, shram club, etc. • **Sports & Fitness:** College tournaments, yoga, marathons, fitness challenges. • **Institutional Events:** Foundation Day, Annual Day, College Festivals, Intercollegiate events. • **National Festivals:** Independence Day, Republic Day etc. **Unit II - Program Specific Topics** • **Workshops/Seminars:** Report Writing, Personality Development, Soft Skills, Leadership Talks. • **Speak, Show, Shine:** Presentation / Poster Presentation / Viva and Learning Experience **Mode of Evaluation:** • **Faculty Coordinator:** To guide and evaluate student progress. • **Participation Proof:** Certificates, photos, attendance records. • **Reflective Journal:** Minimum 2–3 pages summarizing experiences, learning, and growth. • **Final Viva/Presentation:** 5-minute talk on poster presentation and on overall learning.
10	**Scheme of Examination and Assessment Pattern** **Based on 3 approved Activities** **Semester End External - 30 marks**

Activity No	Nature of Activities	Marks
1.	Title of Approved Activity - 1	10
2.	Title of Approved Activity - 2	10
3.	Title of Approved Activity - 3	10
	Total	**30**

Internal Examination: Continuous Evaluation – 20 marks

	Assessment / Evaluation	Marks
1.	Reflective journal	10
2.	Presentation/ poster presentation/viva	10
	Total	**20**

Suggested Readings:

- How to Win Friends and Influence People
- The 7 Habits of Highly Effective People
- Thinking, Fast and Slow
- Leaders Eat Last
- Talk Like Ted

Name & Signature of the Principal & Chairperson, Academic Council:

Dr. Manju Lalwani Pathak

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester - I

Title: Indian Knowledge System

Vertical - 5
IKS Subject - 2 Credits

With effect from
Academic Year 2025-2026

Title: Indian Knowledge System
Course Code: CHMIKSI

Sr. No.	Heading	Particulars
1	**Description the Course:**	This course introduces students to the Indian Knowledge System (IKS), emphasizing its historical depth, cultural relevance, and interdisciplinary value. Rooted in the context of Indian civilization, it explores the holistic development of knowledge from ancient to pre-modern times, including contributions in medicine, mathematics, logic, linguistics, governance, arts, and sciences. By revisiting the traditional education systems and intellectual heritage of India, the course encourages learners to connect ancient insights with contemporary disciplines. It aims to enhance awareness, foster appreciation of indigenous wisdom, and reveal the interconnectedness of various streams of knowledge, aligning with the goals of the NEP 2020.
2	**Vertical 5**	IKS
3	**Type & Teaching Methods**	Theory + Practicum Lectures/Discussions/Presentations/Case Studies, etc.
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A)1:** To sensitize the students about context in which they are embedded i.e. Indian culture and civilization including its Knowledge System and Tradition. **CO(A)2:** To help student to understand the knowledge, art and creative practices, skills and values in ancient Indian system. **CO(A)3:** To help to study the enriched scientific Indian heritage. **CO(A)4:** To introduce the contribution from Ancient Indian system & tradition to modern science & Technology.	
8	**Course Outcomes**: Student will be able to **CO1:** Understand and appreciate the rich Indian Knowledge Tradition. **CO2:** Understand the contribution of Indians in various fields. **CO3:** Experience increase subject-awareness and self-esteem. **CO4:** Develop a comprehensive understanding of how all knowledge is ultimately intertwined.	

9	**Syllabus** **UNIT I: Introduction** • **Introduction to IKS** (What is knowledge System, Characteristic Features of Indian Knowledge System) • **Why IKS?** (Macaulay's Education Policy and its impact, Need of revisiting Ancient Indian Traditions) • **Scope of IKS** (The Universality of IKS (from Micro to Macro), development form Earliest times to 18th Century CE) • **Tradition of IKS** (Ancient Indian Education System: Home, Gurukul, Pathashala, Universities and ancient educational centres) • **Relevant sites in the vicinity of the Institute** (Water Management System at Kanheri, Temple Management of Ambernath, etc.) **UNIT II** • Medicine (Ayurveda) • Alchemy • Mathematics • Logic • Art of Governance (Arthashastra) **UNIT III (Select Any FIVE out of the following)** • Aesthetics • Town Planning • Strategic Studies • Krishi Shastra • Vyakaran & Lexicography • Natyashastra • Ancient Sports • Astronomy • Yoga and Wellbeing • Linguistics • Chitrasutra • Architecture • Taxation • Banking • Trade and Commerce

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hours

Format of Question Paper

Attempt all questions.

Question No	Nature of Questions	Marks
Q1	Attempt any two out of five	06
Q2	Attempt any three out of five	12
Q3	Attempt any three out of fifteen	12
TOTAL		**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class test during lectures (MCQ / Short notes / Match the pairs / Puzzles)	10
2.	Participation in Workshop / Conference / Seminar / Case Study / Field Visit / Certificate Course / Project presentation / Viva	10
TOTAL		**20**

11

REFERENCES:

1. Concise history of science in India- D.M. Bose, S.N Sen, B.V. Subbarayappa.
2. Positive sciences of the Ancient Hindus- Brajendranatha seal, Motilal Banrasidas, Delhi 1958.
3. History of Chemistry in Ancient India & Medieval India, P. Ray- Indian Chemicals Society, Calcutta 1956.
4. Charaka Samhita- a scientific synopsis, P. Ray & H.N Gupta National Institute of Sciences of India, New Delhi 1965.
5. MacDonnell A.A- History of Sanskrit literature.
6. Winternitz M- History of Indian Literature Vol. I, II.
7. Dasgupta S.N & De S.K- History of Sanskrit literature Vol' I.
8. Ramkrishna Mission- cultural heritage of India Vol' I, II.
9. Majumdar R. C & Pushalkar A.D- History & culture of the Indian people, Vol. I, II & III.
10. Keith A.B- History of Sanskrit literature.

Name & Signature of the Dean &Adhoc BoS Chairperson(Interdisplinary):

(Dr. Nitin Arekar)

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester - I

Title: Environmental Management and Sustainable Development-I

Vertical - 5
VEC Subject - 2 Credits

With effect from
Academic Year 2025-2026

Title: Environmental Management and Sustainable Development-I
Course Code: CHMVECI

Sr. No.	Heading	Particulars
1	**Description the Course:**	This course introduces students to the basics of environmental management and sustainable development. It explains how ecosystems work, the importance of biodiversity, and the need to protect our natural resources. Students will learn about different environmental problems, human impact on nature, and how to manage disasters. The course also covers Indian environmental movements, ethics, and the role of public awareness. Real-life examples and case studies help students understand the connection between nature and human communities in a simple and practical way.
2	**Vertical 5**	VEC
3	**Type & Teaching Methods**	Theory + Practicum Lectures/Discussions/Presentations/Case Studies, etc.
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A)1:** To introduce about ecosystems, biodiversity and to make aware for the need of conservation. **CO(A)2:** To sensitize students towards environmental concerns, issues, and impacts of human population. **CO(A)3:** To analyze the impact of human population growth and development activities on the environment, including issues related to displacement, disaster response, and rehabilitation. **CO(A)4:** To foster awareness of environmental ethics and the role of cultural and social movements in shaping sustainable environmental practices through communication, policy, and activism.	
8	**Course Outcomes**: Student will be able to **CO1:** Explain the interrelationships within ecosystems and analyze energy flow and succession, using examples from various ecological zones. **CO2:** Critically evaluate biodiversity levels and conservation strategies, applying knowledge of endemic species, threats, and ecological services to real-world scenarios. **CO3:** Assess the socio-environmental implications of population growth, displacement, and disasters, incorporating case studies to understand sustainable development challenges. **CO4:** Demonstrate an understanding of environmental ethics and advocacy, by interpreting the influence of cultural values, environmental movements, and communication strategies on sustainability.	

9

Syllabus

UNIT I: Ecosystems, Biodiversity and Conservation

- Introduction, structure, and function of ecosystems; Energy flow: food chains, food webs and ecological succession. Case studies of the following:
  - Forest ecosystem
  - Grassland ecosystem
  - Desert ecosystem
  - Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns.
- India as a mega-biodiversity nation; Endangered and endemic species of India.
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and informational value.

UNIT II: Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected persons; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g. CNG vehicles in Delhi).

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hours

Format of Question Paper

Attempt any 3 out of 4 questions.

Question No	Nature of Questions	Marks
Q1	Theory based on Unit I	10
Q2	Theory based on Unit I	10
Q3	Theory based on Unit II	10
Q4	Theory based on Unit II	10
TOTAL		**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Test, Creative writing/visits/role play (Short notes/ MCQ's/ Match the Pairs/ Answer in one sentence/ Quiz)	10
2.	Project /Presentation / Viva/Group Discussion/Case study	10
TOTAL		**20**

11 **REFERENCES:**

1. Carson, R. (2002). *Silent Spring*. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R. (1993). *This Fissured Land: An Ecological History of India*. University of California Press.
3. Gleeson, B., & Low, N. (Eds.). (1999). *Global Ethics and Environment*. Routledge.
4. Gleick, P. H. (1993). *Water in Crisis*. Pacific Institute for Studies in Development, Environment & Security; Stockholm Environment Institute; Oxford University Press.
5. Sodhi, N. S., Gibson, L., & Raven, P. H. (Eds.). (2013). *Conservation Biology: Voices from the Tropics*. John Wiley & Sons.
6. Thapar, V. (1998). *Land of the Tiger: A Natural History of the Indian Subcontinent*.
7. Warren, C. E. (1971). *Biology and Water Pollution Control*. W. B. Saunders.
8. Wilson, E. O. (2006). *The Creation: An Appeal to Save Life on Earth*. W. W. Norton.
9. Harper, Charles L. (2017). *Environment and Society: Human Perspectives on Environmental Issues* (6th Edition). Routledge.
10. Rajagopalan, R. (2011). *Environmental Studies: From Crisis to Cure*. Oxford University Press.
11. Harris, Frances (2012). *Global Environmental Issues* (2nd Edition). Wiley-Blackwell.

Name & Signature of the Dean &Ad-hoc BoS Chairperson (Interdisciplinary):

Dr. Nitin Arekar

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College, Ulhasnagar

(Autonomous)

Affiliated to the University of Mumbai

F.Y. B.Sc. (IT)

(Self-Financing Course)

Semester – II

Choice Based and Credit Based syllabus with effect from the Academic Year 2025-2026

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- II

Title: Object Oriented Programming using C++

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Object Oriented Programming using C++

Course Code: CHMITII1

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces students to Java programming, covering fundamental concepts such as data types, operators, control statements, loops, and core Object-Oriented Programming principles including classes, objects, inheritance, and polymorphism. Students will also explore interfaces, abstract classes, and packages to design modular and organized programs, along with exception handling and multithreading for managing program flow and concurrency. Additionally, the course covers streams and file handling, enabling students to perform essential file operations and work with both byte and character streams effectively.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Understand the core concepts and principles of object-oriented programming. **CO(A) 2:** Learn to design and implement classes, objects, and member functions in C++. **CO(A) 3:** Apply inheritance and polymorphism to build reusable and flexible programs. **CO(A) 4:** Gain proficiency in operator overloading, constructors, destructors, and virtual functions. **CO(A) 5:** Develop error-free programs using exception handling techniques.	

8	**Course Outcomes**: Student will be able to **CO 1:** Explain the principles and features of object-oriented programming. **CO 2:** Design and implement classes, objects, and constructors in C++. **CO 3:** Apply inheritance and polymorphism to create reusable programs. **CO 4:** Use operator overloading and virtual functions for dynamic behavior. **CO 5:** Handle runtime errors effectively using exception handling techniques.
9	**Syllabus** **UNIT I:** **Object Oriented Methodology:** Introduction, Advantages and Disadvantages of Procedure-Oriented Languages, Application of OOP, Concept, Classes, Objects, Real-World Analogy of Objects and Classes, Data Abstraction and Data Encapsulation, Inheritance, Polymorphism, Message Passing, Comparison of OOP with Procedure-Oriented Programming. **Classes and Objects:** Simple Classes (Class Specification, Class Members Accessing), Access Specifiers, Defining Member Functions, Inline Functions, Default Argument in Functions, this pointer, Introduction to Constructors, Implicit and Explicit Default Constructor, Parameterized Constructor, Copy Constructor and Examples, Destructors, Scope Resolution Operator, Defining Class Members Outside the Class, Constant Members, Static Members, composition, Passing Object as an Argument, Returning Object from Functions, Friend Function, Friend Classes. **UNIT II:** **Program Development Using Inheritance:** Introduction, Advantages Provided by Inheritance, Choosing the Access Specifier, Derived Class Declaration, Derived Class Constructors, Class Hierarchies, Multiple Inheritance, Multilevel Inheritance, Hybrid Inheritance, Virtual Inheritance. **Polymorphism and Virtual Functions:** Concept of polymorphism, compile-time and run-time polymorphism, function overloading, operator overloading including unary operators (++, --, -) and binary operators (+, -, *, /, %, ==, !=, >, <, >=, <=, &&, ||), virtual functions, pure virtual functions, abstract classes, virtual destructors. **Exception Handling:** Introduction, Exception Handling Mechanism, Concept of Throw and Catch with Example.

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Test-It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQs which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total 20

11 **REFERENCES:**

1. Object-oriented Programming C++, Hari Mohan Pandey, Laxmi Publications
2. C++ Programming: An Object-Oriented Approach, Behrouz A. Forouzan, Richard F. Gilberg, McGraw-Hill Education
3. C++ How to Program, Paul Deitel, Harvey Deitel
4. Object Oriented Programming in C++, E Balagurusamy
5. Object-Oriented Programming in C++, Robert Lafore, Pearson Education
6. Demystified Object- Oriented Programming with C++, Dorothy R. Kirk
7. https://www.dickbaldwin.com/AdvOOP/AdvCpp00110.htm

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- II

Title: Web Designing

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Course Code: CHMITII2

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces students to the essential skills needed to build and design modern web pages. It covers the basics of HTML5 for structuring web content and CSS for styling and layout design. Students will also learn JavaScript to make web pages interactive and dynamic, along with an introduction to jQuery for simplifying scripting tasks and adding visual effects. The course further explores JSON, a popular format for storing and exchanging data on the web. By the end of the course, students will be able to create well-structured, visually appealing, and interactive web pages that include multimedia elements and support smooth data communication.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To introduce the fundamental concepts of web development using HTML5 for creating structured and semantic web pages. **CO(A) 2:** To develop skills in applying CSS for styling, layout design, and responsive presentation of web content. **CO(A) 3:** To enable students to design interactive and dynamic web pages using JavaScript and event handling.	

	CO(A) 4: To familiarize students with the use of jQuery for simplified DOM manipulation and visual effects. **CO(A) 5:** To understand JSON for data representation, exchange, and integration in web applications.
8	**Course Outcomes**: Student will be able to: **CO 1**: Create structured and well-formatted web pages using HTML5 tags, lists, forms, hyperlinks, and multimedia elements. **CO 2**: Apply CSS for effective text formatting, layout design, image handling, and page styling. **CO 3**: Develop dynamic and interactive web content using JavaScript constructs, functions, and event-driven programming. **CO 4**: Implement simplified DOM operations and animations using jQuery. **CO 5**: Utilize JSON for efficient data storage, parsing, and exchange between client and server applications.
9	**Syllabus** **UNIT I:** • **Introduction to HTML 5**: Basics of HTML, Tags, and Document structure with DOCTYPE, HTML, and Title; Formatting Text: Headings, Bold, Italic, Superscript, Subscript, Monospace, and Preformatted text; Lists and Backgrounds: Bulleted, Numbered, and Definition Lists; Special Characters; Horizontal Lines; Background and Text Colors; Hyperlinks and Anchors: Linking Web Pages, Email, and Other Content. • **Style Sheets and Graphics**: Introduction to Style Sheets: Understanding Styles, Constructing Style Rules, Creating Styles for Nested Tags, Applying Styles to Hyperlinks, Creating and Linking to External Style Sheets. • **Formatting Text And Paragraphs Using Style Sheets:** Specifying Font Family, Size, and Color; Applying Bold, Italics, Strikethrough, and Underline; Creating Inline Spans; Adjusting Letter Spacing; Indenting Paragraphs; Adding Paragraph Borders; and Setting Horizontal Alignment. • **Displaying Graphics:** Selecting and preparing graphics for web use, inserting and arranging images, controlling image size and padding, creating graphic hyperlinks and thumbnails, adding alternate text, and including figure captions. • **Page Layout And Navigation:** Creating Navigational Aids, Text-Based And Graphical Navigation Bars, And Image Maps; Creating And Formatting Tables, Specifying Table And Column Sizes, Merging Cells, Applying Borders Using Attributes And Styles, Adjusting Cell Padding, Spacing,

	And Alignment, And Setting Horizontal And Vertical Alignment. CSS Layout Techniques: Positioning elements on the page, Placing boxes side by side using float, Creating flexible layouts with Flexbox, Building grid-based designs with CSS Grid. • **Creating User Forms**- Creating a Basic Form- Creating a Text Box,Special Field types for E-Mail and Web Addresses, Creating a Text Area, Creating a Submit or Clear Button, Creating Check Boxes and Option Buttons, Additional Input Types in HTML5. • **Incorporating Sound and Video:** HTML5 Audio And Video Features, Embedding Video With <video> And <embed> Tags, Placing Video Clips on Web Pages, and Incorporating Audio on Web Page. **UNIT II:** • Java Script: Introduction: Syntax, Variables, Values, Data Types, comments, functions, expressions, and scope, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects. **Operators:** Arithmetic Operators, Assignment Operators, Comparison Operators, Logical Operators, Bitwise Operators **Statements:** Conditional Statements – if else, switch, Loops – while, do while, for, for…in, for…of, Loop Control – break, continue, labels. **JavaScript Objects:** User-defined Objects, with Keyword, Native Objects –Array, String, Date, Math, Number, RegExp. **Events and Event Handlers:** Understanding HTML and DOM events, using event listeners, and handling common events such as mouse, keyboard, form, focus, load, and error events. • **JQuery**: Basics of JQuery, JQuery selection and events, JQuery Effects, JQuery traversal and manipulation, Element Attributes. • **JSON:** Introduction, JSON Grammar, JSON Values, JSON Tokens, Syntax, JSON vs. XML, Data Types, Objects, Arrays, Creating JSON, JSON Object, Parsing JSON , Persisting JSON , Data Interchange.

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Test-It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQs which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total 20

11 **REFERENCES:**

1. Step by Step HTML5 by Faithe Wempen, Microsoft Press,2011
2. The Complete Reference HTML & CSS, Thomas A. Powell. McGrawHill, 5 th Edition,2010
3. The Complete Reference JavaScript Thomas A. Powell &Fritz Schneider McGrawHill 3rd 2012
4. Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Black Book Kindle Edition,by Kogent Learning Solutions Inc
5. JSON at work ,Tom MArrs,O'REILLY,First edition,2017
6. Learning Web Design A Beginner's Guide to Html, CSS, JavaScript, And Web Graphics, Jennifer Niederst Robbins, O'Reilly, 5th Edition,2018.
7. Ivan Bayross, "Web Enabled Commercial Applications Development using HTML, DHTML, Javascript, Perl CGI", BPB, 2004
8. https://developer.mozilla.org/en-US/docs/Web/
9. https://www.w3schools.com/
10. https://api.jqueryui.com/1.13/
11. https://developer.mozilla.org/en-US/docs/Learn_web_development/Core/Scripting/JSON

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- II

Title: Major Practical II

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Major Practical II

Course Code: CHMITII3

Sr. No.	Heading	Particulars
1	**Description of the Course:**	**Object Oriented Programming using C++ Practical** OOP encourages modular objects for reusable code, ensures well-organizedand maintainable codevia encapsulation, inheritance, and polymorphism, allowing flexibility and easy updates. Additionally, OOP models real- world scenarios, enhancing system understanding. **Web Designing Practical** This practical course trains students to design and develop interactive web pages using **HTML, CSS, JavaScript, jQuery, and JSON**, focusing on layout design, styling, interactivity, and data handling for dynamic web applications.
2	**Vertical 1**	Major
3	**Type**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To learn and apply core object-oriented programming concepts like classes, objects, inheritance, and polymorphism using C++. **CO(A) 2:** To implement practical C++ programs using advanced OOP features such as operator overloading, virtual functions and exception handling. **CO(A) 3:** To introduce the fundamentals of web design using HTML and CSS for creating well-structured and visually appealing web pages.	

	CO(A) 4: To develop skills in using JavaScript and jQuery for adding interactivity and dynamic behavior to web applications. **CO(A) 5:** To understand and apply JSON for data exchange and integration in web-based environment.
8	**Course Outcomes**: Student will be able to: **CO 1:** Design and implement C++ programs using classes, objects, and core OOP concepts. **CO 2:** Ability to apply advanced OOP techniques like operator overloading, virtual functions, and exception handling to solve real-world problems. **CO 3:** Design and develop complete web pages using HTML and CSS with proper layout, formatting, and multimedia elements. **CO 4:** Implement client-side functionality using JavaScript and jQuery, including event handling, form validation, and effects. **CO 5:** Utilize JSON for data representation and communication between web applications and scripts.
9	**Syllabus** **UNIT I:** • **Programs covering class design, data abstraction, data hiding and encapsulation:** **Sample Programs** a. Design a class Demo with a private method readNo() to input a number and public methods: factorial() to compute its factorial, reverseNo() to reverse it, isPalindrome() to check if it's a palindrome, and isArmstrong() to verify if it's an Armstrong number. b. Create a class Student to manage student information. The private method getData() reads and stores the details, while the public method displayData() displays them. This ensures data is encapsulated and accessed in a controlled way. • **Programs on class design, methods and constructors with default parameters and using the scope resolution operator:** **Sample Programs** a. Create a program that defines a class named BankAccount which stores the account holders name, account number and current balance. The program must use the scope resolution operator to define all member functions outside the class. Include functions to display account details and to perform deposit and withdrawal operations, and show the updated balance after every transaction. b. Write an OOP in C++ to implement a class employee. An employee has a name and

a salary (double). Write a default constructor and constructor with two parameters (name and salary) and two methods:
(i) To return the name and salary and
(ii) A method that raises the employee's salary.

c. Design a class Actor that stores the actor's name, role and remuneration. Use a constructor with default parameters to initialize the data. Include a function showGrade() to display the grade based on remuneration and a function showActor() to present all details clearly.

- **Programs covering constructors and method with objects as parameter:**
  Sample Programs
  a. Design a class Point2D with two integer data members representing the x and y coordinates of a point. Include relevant constructors and a member function to display the point in (x, y) format. Also include functions to add and subtract two points.
  b. Write a program that defines a class ComplexNumber and demonstrates the use of a copy constructor. Create and initialize an object, then use the copy constructor to create a new object as a copy, showing how the data is duplicated.
  c. Write a program using OOP to create a class Time with hour, minute, and second. Include relevant constructors to initialize values, a method to display time in 02:45:05 format, and a method to add two Time objects.
  d. Write a program to illustrate containment relationship.
- **Programs static variables, destructors, friend function and method overloading:**
  Sample Programs
  a. Create a C++ class Geometry with methods to compute area and volume. The area() method is overloaded to handle different shapes or input types, making it versatile and easy to use for various geometric calculations.
  b. Write a C++ program that counts objects created and currently alive, updating the count on construction and destruction.
  c. Create a class ComplexNumber with two private data members, real and maginary, and write a friend function to add two complex numbers.
- **Programs covering single, multilevel and hybrid inheritance and method overriding.**
- **Programs covering multiple inheritance and Virtual Inheritance.**
- **Programs covering overloading unary operator (+) operator, arithmetic operators and relational operators:**

Sample Programs

a. Overload the operator unary(-) for demonstrating operator overloading
b. Overload the operator + for adding the timings of two clocks and also pass object as an argument.
c. Design a class Route with an integer data member distance that stores the distance between two places. Include relevant constructors and methods in it. Also include operator function so that the following operation can be performed:

```
Route r1(100);
Route r2(67);
if(r1==r2)
Cout<<"Route 1 and Route 2 to covers the same distance";
else if(r1>r2)
cout<<"Route 1 is longer than Route 2";
else
cout<<"Route 2 is longer than Route 1";
```

- **Programs covering overloading increment operator (++), and relational operators:**

  Sample Programs

  a. Design a class with a single integer data member. Include relevant constructors in it. Also include operator functions for postfix and prefix increment operator overloading.
  b. Design a class Date with integer data members for day, month, and year. Include relevant constructors and functions to initialize and display a date. Implement the functionality to get the next day using the overloaded ++ operator.

- **Programs covering new operator, virtual functions, abstract classes and virtual destructors.**
- **Programs covering exception handling.**

UNIT II:

- Use of Basic and Advanced Tags, Lists and Backgrounds
  a. Design a web page demonstrating the use of basic and advanced HTML tags, including text formatting, special characters, and proper page structure.
  b. Create web pages using ordered, unordered, description, and nested lists, along with suitable background and foreground colors.
  c. Develop an HTML web page to display your CV, applying appropriate formatting, layout, and design elements.

- Creating Hyperlinks, Anchors and style sheets
  a. Design web pages using hyperlinks to enable navigation between pages, including links to email addresses and automatic redirection to other content.
  b. Create a web page that applies styles to hyperlinks and demonstrates the use of nested tag styling.
  c. Design and implement a web page using external style sheets to manage and apply consistent styles across multiple pages.
- Formatting Text and Paragraph by Using Style Sheets and displaying graphics
  a. Design a web page using text formatting tags, inline spans, adjusting line spacing, paragraph indentation, borders, and horizontal alignment.
  b. Create a web page by inserting images with controlled size and padding.
  c. Develop a web page that makes images clickable as hyperlinks, uses thumbnail graphics, and includes alternate text for graphics.
- Tables , Page Layout and Navigation
  a. Display a time table and display it in tabular format.
  b. Write an html program to get the following output.

NAME	SUBJECT	MARKS
Hillary	Advanced Web	75
	Operating System	60
Lary	Advanced Web	80
	Operating System	75
	Total Average: 72.5	

  c. Design a web page that includes both a text-based and a graphical navigation bar for easy navigation between web pages.
  d. Design a web page with Image Map
  e. Design a web page using CSS floats to place two boxes side by side, ensuring that subsequent content appears below the boxes without overlapping.
  f. Create a navigation bar using CSS Flexbox with evenly spaced menu items distributed across the full width of the page.
  g. Develop a web page using CSS Grid to arrange six content blocks in three columns and two rows, ensuring proper spacing and alignment for a clean layout.
- Forms and Introducing video and audio tags
  a. Design a web page with a form that uses all types of controls.
  b. Design an admission form for any course in your college with text, password fields, check boxes, radio button and reset button.

c. Write a program to get the following output

d. Design a web page embedding image, audio and video.

- Basics of JavaScript
  a. Using JavaScript, design a web page to accept a number from the user and print its Factorial.
  b. Using JavaScript, a web page that prints Fibonacci series/any given series.
  c. Write a JavaScript program to display all the prime numbers between 1 and 100.
  d. Write a JavaScript program to accept a number from the user and display the sum of its digits.
- JavaScript: Validating User fields
  a. Demonstrate the use of Document object methods.
  b. Using java script, demonstrate validating Text Input Fields,
  c. Drop-down Lists and Checkboxes
  d. Using java script, demonstrate validating Radio buttons and Validating Multi-Select Boxes
  e. Write a Java script to prompt for users name and display it on the screen
- JavaScript : Handling the events
  a. Using JavaScript, demonstrate the use of keyboard events.
  b. Using JavaScript, demonstrate the use of mouse events.
  c. Implement a web page to demonstrate focus and form-related events.
  d. Create examples showcasing common JavaScript event handlers such as click, change, and resize events.
- JQuery
  a. Use JQuery effect in page
  b. Use JQuery Events
  c. JQuery traversal and manipulation
- JSON Basics and Working with JSON
  a. Creating JSON
  b. Parsing JSON
  c. Persisting JSON
  d. Demonstrate use of JSON objects in array, print array on web page using document object

e. Read data from json file and convert it into a JavaScript object and display the data in web page using document object.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
	Total: 30	

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11	**REFERENCES:**

1. Object-Oriented Programming in C++ by Robert Lafore
2. Object Oriented Programming in C++, E Balagurusamy
3. Demystified Object- Oriented Programming with C++, Dorothy R. Kirk
4. Step by Step HTML5, Faithe Wempen, Microsoft Press,2011
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6. Learning Web Design A Beginner's Guide to Html, CSS, JavaScript, And Web Graphics, Jennifer Niederst Robbins, O'Reilly, 5th Edition,2018.
7. "Web Enabled Commercial Applications Development using HTML, DHTML, Javascript, Perl CGI", Ivan Bayross, BPB, 2004
8. HTML 5 for Web Designers (By: Jeremy Keith) – http:// freepdf-books.com
9. https://developer.mozilla.org/en-US/docs/Web/
10. https://www.w3schools.com/
11. https://api.jqueryui.com/1.13/
12. https://developer.mozilla.org/en-US/docs/Learn_web_development/Core/Scripting/JSON

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B.Sc.
(Mathematics)

Semester- II

Title: Applied Logic, Analytical Reasoning and Coding Techniques

Vertical – 2
Minor – 2 Credits

with effect from
Academic Year 2025-2026

Title: Applied Logic, Analytical Reasoning and Coding Techniques
Course Code: CHMMATHII3

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces students to the foundational and applied aspects of **logical reasoning and data interpretation**, focusing on structured thinking, pattern recognition, spatial reasoning, relational analysis, coding–decoding, and data sufficiency. These competencies form the backbone of problem-solving across disciplines, including mathematics, computer science, and data science. Emphasis is placed on developing the ability to analyze numerical, symbolic, and verbal patterns; interpret and represent relational and directional information; and evaluate the adequacy of data in real-world and mathematical contexts. The course also strengthens skills essential for **competitive and entrance examinations** such as Banking, Management Aptitude Tests, UPSC/MPSC, SET/NET, GRE/GMAT, among others, where logical thinking and data interpretation constitute core testing components. Through graded difficulty levels and practice-oriented learning, students will gain the analytical capacity, reasoning accuracy, and decision-making clarity required to tackle diverse logical and data-driven problems.
2	**Vertical 2**	Minor
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: This course reinforces essential mathematical concepts acquired during school education while engaging learners with advanced, indirect, and analytically challenging problems. It is designed to cultivate critical thinking, strengthen logical and reasoning abilities, and encourage deeper intellectual engagement with numerical, symbolic, and relational information. By developing these core cognitive skills, the course prepares learners to approach complex problem-solving tasks with confidence and enhances their competence for various competitive and entrance	

	examinations. **CO(A) 1.** To strengthen foundational abilities in pattern recognition, symbolic manipulation, and sequential reasoning through structured exercises in numerical, alphabetic, and symbolic series. **CO(A) 2.** To develop analytical and deductive reasoning skills by engaging with classification tasks, relational mapping, directional problems, and spatial reasoning scenarios. **CO(A) 3.** To build proficiency in encoding and decoding information using alphabetic, numeric, symbolic, and substitution-based systems relevant to mathematical reasoning and computational logic. **CO(A) 4.** To cultivate the ability to assess data adequacy and interpret information presented in varied forms, enabling learners to determine the minimum required data for decision-making in mathematical and real-life contexts. **CO(A) 5.** To prepare learners for advanced logical reasoning tasks encountered in academic, professional, and competitive examination settings by nurturing critical thinking, precision, and systematic problem-solving abilities.
8	**Course Outcomes**: After successful completion of the course, learners will be able to: **CO 1:** Analyze numerical, alphabetical, and symbolic sequences to identify underlying patterns and determine missing or predicted elements. **CO 2:** Apply classification and logical comparison skills to identify inconsistencies or odd elements within a given set of numbers, symbols, or objects. **CO 3:** Construct and interpret relational and directional representations—including family trees, generational diagrams, and spatial pathways—to solve reasoning problems. **CO 4:** Apply coding–decoding principles using alphabetic, numeric, symbolic, and substitution-based methods to encode information or interpret coded messages. **CO 5:** Evaluate the sufficiency of given information in mathematical or real-life scenarios and determine the minimum additional data required to reach a valid conclusion.
9	**Syllabus** **UNIT I: Foundations of Logical Thinking** **1. Number, Letter, and Symbol Series** • Identification of patterns in numerical sequences, including differences, ratios, powers (squares and cubes), and recursive relations. • Completion of missing terms at the beginning, middle, or end of a given sequence. • Analysis of sequences comprising letters or symbols; recognition of embedded patterns and prediction of missing elements. **2. Analytical Reasoning: Odd-One-Out** • Determining the element that does not conform to the underlying rule governing a sequence of numbers. • Identifying inconsistencies in sequences composed of letters or symbols by observing

structural or logical deviations.

3. Relational Reasoning

- Understanding common family and social relationship terminologies: parent, child, grandparent, sibling, spouse, nephew, niece, cousin, etc.
- Construction of family diagrams or relational trees using standardized notation:
    a) **Square** for male, **circle** for female, **triangle** for unspecified/undetermined gender
    b) **Double arrow (↔)** for siblings
    c) **Equal sign (=)** for marital/spousal relationships
- Interpretation of information across generations through vertical alignment of relational structures.

UNIT II: Applied Logical Thinking and Data Interpretation

1. Direction Sense and Spatial Reasoning

- Understanding and identifying the eight cardinal and intercardinal directions.
- Interpreting angular relationships between directions.
- Application of standard Pythagorean triplets (3-4-5, 6-8-10, 5-12-13, etc.) and 45°–45°–90° triangles in solving distance and movement problems involving perpendicular paths.

2. Coding and Decoding Techniques

- Introduction to various coding mechanisms:
    a) Alphabet-based coding
    b) Numerical coding
    c) Symbol coding
    d) Value-based and substitution coding
- Deciphering coded messages and constructing logical mappings between original and encoded information.

3. Data Sufficiency

- Understanding the concept and principles of data sufficiency, focusing on how to determine whether the information provided is adequate to reach a definite conclusion.
- Identifying whether a problem is solvable, unsolvable, or conditionally solvable based on the given data, and recognizing situations where additional information is required.
- Working with problems drawn from elementary mathematics and everyday contexts, such as:
    - Determining whether the **area or perimeter** of a geometric figure (triangle, quadrilateral, circle) can be computed with the given measurements.
    - Checking whether the **value of an unknown variable** in simple algebraic equations can be determined with the available conditions.
    - Assessing whether the **age of a person** or the **relation between two individuals** can be concluded from partial relational information.
    - Evaluating whether the **time, distance, or speed** in a basic motion scenario can be derived from the data provided.

- Judging whether a **quantity comparison** (e.g., which number is larger, which container holds more water) can be made without exact values.
- Emphasis is placed on identifying the minimum additional information required for a conclusive solution, rather than computing the final numerical answer.

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	**Marks**
1.	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQs which should be solved in a time duration of 20 minutes.	10
2.	Project, Self-Learning Evaluation, Presentation, etc.	10
		Total 20

11 **REFERENCES:**

1. **Aggarwal, R. S.** *A Modern Approach to Verbal & Non-Verbal Reasoning.* S. Chand Publishing.
2. **Gupta, A. K.** *Logical and Analytical Reasoning.* Ramesh Publishing House.
3. **Aggarwal, R. S.** *Quantitative Aptitude for Competitive Examinations.* S. Chand Publishing.
4. **Sinha, Nishit K.** *Reasoning for Competitive Examinations.* Pearson Education.
5. **Jaikishan & Premkishan.** *How to Crack Test of Reasoning in All Competitive Exams.* Arihant Publications.
6. **Gourav Gupta.** *Logical Reasoning & Data Interpretation.* McGraw Hill / Other Competitive Exam Publishers.
7. *The Pearson Guide to Logical Reasoning & Data Interpretation.* Pearson Education.

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2. https://www.selfstudys.com/
3. https://testbook.com/reasoning/coding-decoding
4. https://testbook.com/reasoning/data-sufficiency-reasoning
5. https://www.indiabix.com/

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)
(Affiliated to the University of Mumbai)

Board of Studies (BoS) Mathematics

Sr. No.	Name of the Faculty	Designation and College
1.	Ms. Urmila Pillay	Head and Associate Professor, Department of Mathematics, Smt. CHM College (Autonomous)
2.	Mr. Amish Thakker	Associate Professor, Smt. CHM College (Autonomous)
3.	Ms. Asha Chugh	Associate Professor, Smt. CHM College (Autonomous)
4.	Mr. Mandar Khasnis	Associate Professor, Smt. CHM College (Autonomous)
5.	Dr. Dipak Jadhav	Associate Professor, Smt. CHM College (Autonomous)
6.	Ms. Pooja Rajani	Assistant Professor, Smt. CHM College (Autonomous)
7.	Mr. Salil Sawarkar	Assistant Professor, Smt. CHM College (Autonomous)
8.	Mrs. Usha Hemasundar	Outside University nominee Head and Associate Professor, K.C. College, Churchgate
9.	Dr. Pankit Gandhi	Outside University nominee Professor, K.C. College, Churchgate
10.	Ms. Minal Wankhede	Vice Chancellor Nominee Head and Associate Professor, B.N. Bandodkar College, Thane
11.	Mr. Mandar Dongare	Industry Representative Senior Manager, Customer Success, Teradata India Pvt. Ltd.
12.	Ms. Supriya Bhagat	Alumni Representative Senior Product Data Scientist, Project pro

Name and Signature of the Ad hoc BoS Chairperson: Ms. Urmila Pillay

Name and Signature of the Dean: Dr. Neena Anand

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- II

Vertical - 3
Open Elective Course - 2+2 Credits

with effect from
Academic Year 2025-2026

Faculty of Interdisciplinary

Vertical 3: List of Open Elective Skill Based Courses for First Year: Semester – II

Sr. No.	Nomenclature of the Paper
1	Cyber and Digital Safety
2	Audio -Video Editing Foundation for Graphics Design and Basics of Animation II
3	Basic Tools of AI for Economics and Education - II
4	English for Professional and Corporate World
5	Urbanisation and Real Estate
6	Business of Travel and Tours-II
7	Managing Family Wealth through Family Office
8	Interactive Web Design using Java Script
9	Basics of Nutrition II
10	Reels Production and Creator Branding
11	Performing Art
12	Data Analysis with Advanced Excel
13	Advanced Political Communication and Media Skills
14	Stress Management
15	Social Media and Society Identity, Power and Digital Citizenship
16	Mushroom Cultivation Training and Trading Level
17	Yoga and Fitness II
18	Basic Perfumery Course (Level-II)
19	Soft Skills II-Personal and Interpersonal Effectiveness
20	Beautician - Strategic Business Planning-II
21	Current Trends of Fashion Designing- Financial Perspective Level-II
22	Basic Accounting-II
23	Digital Marketing II
24	Online Trading and Stock Market-II
25	Event Management Course in Sindhi

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- II

Title: Assembly Language Programming

Vertical - 4
Vocational Skill Courses (VSC)- 2 Credits

with effect from
Academic Year 2025-2026

Sr. No.	Heading	Particulars
1	**Description of the Course:**	**Introduction:** The *8085 Assembly Language Programming* course focuses on the core principles and techniques of writing low-level software to control the 8085 Microprocessor. It offers a comprehensive understanding of the 8085 Microprocessor architecture and its instruction set, along with the ability to write, test, and optimize assembly language programs tailored for this processor. **Relevance and Usefulness:** This course holds great significance for computer science and engineering students who wish to explore the world of microprocessors and embedded systems programming. It builds a strong foundation in low-level software design and implementation — a crucial aspect of computer system development. Since assembly language forms the backbone of modern computing, the course remains highly relevant for anyone interested in computer systems and programming fundamentals. **Application and Interest:** The course is vital for students aiming to pursue careers in embedded systems, microcontroller or microprocessor programming, and other roles involving low-level software development. By completing this course, students will gain the skills to develop efficient and optimized assembly programs capable of controlling and managing microprocessor operations. **Connection with Other Courses:** 8085 Assembly Language Programming serves as a foundational subject that deepens the understanding of computer system operations at the hardware-software interface. It directly relates to other key computer science courses such as Computer Organization and Architecture, Operating Systems, Compiler Design, and Embedded Systems Design. **Industry Demand and Job Prospects:** Professionals skilled in low-level programming and microprocessor control are in great demand across multiple industries. Sectors like aerospace, automotive,

		healthcare, and consumer electronics often seek experts who can develop and maintain systems requiring precise low-level software control. Thus, mastering this course can open up a wide range of promising career opportunities in technology-driven fields.
2	**Vertical**	Vocational Skill Courses (VSC)
3	**Type & Teaching Method**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To gain a thorough understanding of the 8085-microprocessor architecture and its associated instruction set. **CO(A) 2:** To develop the ability to write and debug assembly language programs for the 8085 Microprocessor. **CO(A) 3:** To learn the principles of computer organization and how they relate to the 8085 Microprocessor. **CO(A) 4:** To become proficient in the use of 8085 assembly language programming tools, simulators, and debuggers. **CO(A) 5:** To understand the concept of interrupts and how they are used in 8085 assembly language programming.	
8	**Course Outcomes**: Student will be able to: **CO 1**: Explain the architecture of the 8085 microprocessor and its associated instruction set. **CO 2**: Identify the different types of registers and their functions in the microprocessor. **CO 3**: Describe the memory organization and addressing modes of the 8085 Microprocessor. **CO 4**: Write assembly language programs for the 8085 Microprocessor using various instructions and addressing modes.	

	CO 5: Simulate microprocessor operations using emulators and debuggers.
9	**Syllabus** **UNIT I:** **Perform the following Operations related to memory locations.** • Store the data byte 32H into memory location 4000H. • Exchange the contents of memory locations 2000H and 4000H **Simple assembly language programs.** • the result in memory locations 4004H and 4005H with the most significant byte in memory location 4005H. • Find the l's complement of the number stored at memory location 4400H and store the complemented number at memory location 4300H. • Find the 2's complement of the number stored at memory location 4200H and store the complemented number at memory location 4300H. **Packing and unpacking operations.** • Pack the two unpacked BCD numbers stored in memory locations 4200H and 4201H and store result in memory location 4300H. Assume the least significant digit is stored at 4200H. • Two digit BCD number is stored in memory location 4200H. Unpack the BCD number and store the two digits in memory locations 4300H and 4301H such that memory location 4300H will have lower BCD digit. **Register Operations** • Write a program to shift an eight bit data four bits right. Assume that data is in register C. • Program to shift a 16-bit data 1 bit left. Assume data is in the HL register pair • Write a set of instructions to alter the contents of flag register in 8085. • Write a program to count number of l's in the contents of D register and store the count in the B register. **Multiple memory locations.** • Calculate the sum of series of numbers. The length of the series is in memory location 4200H and the series begins from memory location 4201H. **a.** Consider the sum to be 8 bit number. So, ignore carries. Store the sum at memory location 4300H. **b.** Consider the sum to be 16 bit number. Store the sum at memory locations 4300H and 4301H

- Multiply two 8-bit numbers stored in memory locations 2200H and 2201H by repetitive addition and store the result in memory locations 2300H and 2301H.
- Divide 16 bit number stored in memory locations 2200H and 2201H by the 8 bit number stored at memory location 2202H. Store the quotient in memory locations 2300H and 2301H and remainder in memory locations 2302H and 2303H.
- Divide the 16-bit number in memory by the 8-bit number in memory and store the result.
- Find the largest number in a block of data. The length of the block is stored at memory location **4200H**, and the block of data begins from memory location **4201H**. Store the highest number found in memory location **4300H**. Assume all numbers in the block are **8-bit unsigned binary values**.

UNIT II:

Calculations with respect to memory locations.

- Write a program to sort given 10 numbers from memory location 2200H in the ascending order.
- Calculate the sum of series of even numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins from memory location 2201H. Assume the sum to be 8 bit number so you can ignore carries and store the sum at memory location 2Sample problem:
- Calculate the sum of series of odd numbers from the list of numbers. The length of the list is in memory location 2200H and the series itself begins from memory location 2201H. Assume the sum to be 16-bit. Store the sum at memory locations 2300H and 2301H.
- Search the given byte in the list of 50 numbers stored in the consecutive memory locations and store the address of memory location in the memory locations 2200H and 2201H. Assume byte is in the C register and starting address of the list is 2000H. If byte is not found store 00 at 2200H and 2201H

Assembly programs on memory locations.

- Write an assembly language program to separate even numbers from the given list of 50 numbers and store them in the another list starting from 2300H. Assume starting address of 50 number list is 2200H
- Write an assembly language program to generate Fibonacci number.
- Write an assembly language program to **count the number of odd numbers** in a list of 50 numbers stored in memory starting from **2200H**, and store the count at memory

location **2300H**.

String operations in assembly programs.

- Write an 8085 assembly language program to insert a string of four characters from the tenth location in the given array of 50 characters
- Write an 8085 assembly language program to delete a string of 4 characters from the tenth location in the given array of 50 characters.
- Multiply the 8-bit unsigned number in memory location 2200H by the 8- bit unsigned number in memory location 2201H. Store the 8 least significant bits of the result in memory location 2300H and the 8 most significant bits in memory location 2301H.

Calculations on memory locations.

- To test RAM by writing '1' and reading it back and later writing '0' (zero) and reading it back. RAM addresses to be checked are 40FFH to 40FFH.
- In case of any error, it is indicated by writing 01H at port 10
- Arrange an array of 8 bit unsigned no in descending order.
- Find the **square root** of an 8-bit number and store the result.
- Write a simple program to Split a HEX data into two nibbles and store it in memory

Operations on BCD numbers.

- Add two 4 digit BCD numbers in HL and DE register pairs and store result in memory locations, 2300H and 2301H. Ignore carry after 16 bit.
- Subtract the BCD number stored in E register from the number stored in the D register
- Write an assembly language program to multiply 2 BCD numbers

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
		Total 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11 **REFERENCES:**

1. 8080A/8085 Assembly Language Programming, Lance A. Leventhel, Osborne, 1978
2. Microprocessors Architecture, Programming and Applications with the 8085, Fifth Edition, Penram Publications, 2012

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B. Sc.
(Information Technology)

Semester- II

Title: Web Programming

Vertical - 4
Skill Enhancement Course (SEC) - 2 Credits

with effect from
Academic Year 2025-2026

Title: Web Programming

Course Code: CHMITII7

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course provides a practical foundation in **web development** using **JavaScript, PHP, MySQL, and Bootstrap**. It covers client-side and server-side scripting, data handling with XML/JSON, and database integration. Students will learn to design secure, dynamic, and responsive web applications through hands-on exercises.
2	**Vertical 4**	Skill Enhancement Course (SEC)
3	**Type & Teaching Method**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To introduce the fundamentals of client-side scripting using JavaScript. **CO(A) 2:** To develop skills in creating and styling XML documents using CSS and XSL. **CO(A) 3:** To understand PHP programming concepts for dynamic web development. **CO(A) 4:** To apply database operations using PHP and MySQL for data-driven applications. **CO(A) 5:** To design responsive web interfaces using Bootstrap.	
8	**Course Outcomes**: Student will be able to: **CO 1:** Write and execute JavaScript programs using built-in objects. **CO 2:** Demonstrate proficiency in client-side scripting and data handling using XML and JSON. **CO 3:** Develop PHP scripts for data handling, validation, and file operations.	

	CO 4: Implement database connectivity and CRUD operations using PHP and MySQL. **CO 5:** Design responsive and interactive web pages using modern Bootstrap components and layouts.
9	**Syllabus** **UNIT I:** • **Write JavaScript code for** a. Demonstrating different JavaScript Objects such as String, b. RegExp, Math, Date c. Demonstrating different JavaScript Objects such as Window, d. Navigator, History, Location, Document e. Storing and Retrieving Cookies • **Create a XML file with Internal / External DTD and display it using** a. CSS b. XSL • **Write PHP scripts for performing mathematical operations (factorial, Fibonacci, prime numbers)** • **PHP Fundamentals** **a. Retrieving and validating data from HTML form** **b. Working with arrays and file handling (Read/Write)** • **Advanced PHP** a. Write a PHP program to demonstrate use of sessions and cookies. b. Write a PHP program to demonstrate use of filters. c. Write a PHP program to demonstrate use of Exception Handling. **UNIT II:** • **PHP and MySQL** a. Write a PHP program to create: Create a database College b. Create a table Department (Dname, Dno, Number_of_faculty) c. Write a PHP program to create a database named "College". Create a table named "Student" with following fields (sno, sname, percentage). Insert 3 records of your choice. Display the names of the students whose percentage is between 35 to 75 in a tabular format. • **Write a PHP program** **a.** Update rows in a table b. Delete rows from a table

- **Design a PHP page for authenticating a user**
- **Write PHP scripts for**
  a. Storing and Retrieving Cookies
  b. Storing and Retrieving Sessions
- **Perform the following using Bootstrap:**
  a. Create a responsive layout using the Bootstrap grid system
  b. Create a simple Bootstrap navbar with dropdown menus
  c. Create a basic Bootstrap form with validation

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
		Total 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11	**REFERENCES:** **1.** HTML, XHTML, and CSS Bible Fifth Edition, Steven M. Schafer, WILEY, 2011 **2.** Learning PHP, MySQL, JavaScript, CSS & HTML5, Robin Nixon, O'Reilly, 2018 **3.** PHP, MySQL, JavaScript & HTML5 All-in-one for Dummies, Steve Suehring, Janet Valade Wiley, 2018 **4.** https://www.w3schools.com/php **5.** https://getbootstrap.com/docs/5.3/getting-started/introduction/

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year B.Sc.

Semester- II

Vertical – 5

Ability Enhancement Course (English)

2 Credits

with effect from
Academic Year 2025-2026

Title: Advanced English for Workplace and Academic Communication
Course Code: CHMBSCAECII

Sr. No.	Heading	Particulars
1	**Description of the Course:**	In an increasingly competitive academic and professional landscape, learners require advanced communication skills that enable clarity, precision, critical thinking, and professionalism. This course focuses on practical, real-world communication abilities needed for college-level academic work, job applications, workplace collaboration, and digital interactions. Through hands-on tasks, real-world assignments, and communication practice, learners become adept in using English confidently and appropriately in diverse settings.
2	**Vertical 5**	**AEC: Advanced English for Workplace and Academic Communication**
3	**Type** Teaching Methods:	Theory+ Practicum (Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: CO(A)1: To develop advanced communication skills required for academic and professional success. CO(A)2: To train learners in report writing, summary writing, and formal documentation. CO(A)3: To enhance proficiency in digital and virtual communication platforms. CO(A)4: To strengthen presentation, interview, and workplace communication skills. CO(A)5: To build confidence in expressing ideas clearly to varied audiences.	
8	**Course Outcomes**: After completing this course, learners will be able to: **CO-1:** Demonstrate clarity, precision, and professionalism in communication. **CO-2:** Interpret and summarize written texts, visuals, and data accurately. **CO-3:** Prepare well-structured reports, emails, and professional documents.	

CO-4: Use digital tools and virtual communication etiquette effectively.

CO-5: Communicate confidently in interviews, presentations, and teamwork situations

9

Syllabus

UNIT I: Communication for Academic & Professional Settings (15 Hours)

A. Communication in Academic & Workplace Contexts

1. Features of formal communication
2. Audience-centered communication
3. Ethics in communication: integrity, attribution, clarity
4. Explaining concepts in simple and clear language
5. Interpreting graphs, charts, tables, and infographics
6. Summarizing data concisely

B. Grammar & Style for Professional Writing

1. Tone: formal, neutral, objective
2. Avoiding redundancy and ambiguity
3. Active vs. passive structures
4. Editing, revising, and proofreading techniques

UNIT II: Practical Documentation & Employability Skills (15 Hours)

1. Report writing (academic/field-based/observational)
2. Project summary reports
3. Preparing short presentations
4. Creating informational posters or digital slides
5. Writing a formal complaint or request email
6. Creating a short informational or awareness write-up

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

All questions are compulsory:

Question No	Nature of Questions	Marks
Q. 1	**Short Notes** (Attempt any 3 out of 5) - **Unit 1** **OR** Attempt **Essay Type** question. (1 out of 2) - **Unit 1**	15
Q. 2	**Short Notes** (Attempt any 3 out of 5) - Unit 2 **OR**	15

	Attempt **Essay Type** question. (1 out of 2) - Unit 2	
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

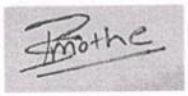
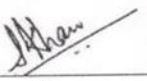
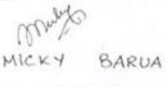
	Assessment / evaluation	**Marks**
1.	Assignments on **any one** of the following topics: Academic/Scientific Report/ Informational Poster / Digital Infographic (Students are required to use AI assistance in the preparation of their drafts. Eg: Notion AI, Otter.ai, Grammarly, Google Gemini, Canva, Piktochart, etc)	15
2.	Class Attendance and Participation	05
	Total	**20**

11

References:

1. Adler, Ronald B., et al. *Understanding Human Communication*. 15th ed., Oxford UP, 2021.
2. Bailey, Stephen. *Academic Writing: A Handbook for International Students*. 5th ed., Routledge, 2018.
3. Cargill, Margaret, and Patrick O'Connor. *Writing Scientific Research Articles*. Wiley-Blackwell, 2013.
4. Eastwood, John. *Oxford Guide to English Grammar*. Oxford UP, 2005.
5. Gerson, Sharon J., and Steven M. Gerson. *Technical Communication: Process and Product*. 9th ed., Pearson, 2021.
6. Hewings, Martin. *Advanced Grammar in Use*. Cambridge UP, 2013.
7. Kumar, Sanjay, and Pushp Lata. *Communication Skills*. 2nd ed., Oxford UP, 2018.
8. McCarthy, Michael, and Felicity O'Dell. *Academic Vocabulary in Use*. Cambridge UP, 2008.
9. Nordquist, Richard. *The Essentials of English Grammar*. McGraw-Hill Education, 2016.
10. Seely, John. *The Oxford Guide to Writing and Speaking*. Oxford UP, 2005.
11. Zinsser, William. *On Writing Well: The Classic Guide to Writing Nonfiction*. Harper Perennial, 2016.

Syllabus Committee:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Kailas Aute	Professor & Head, Dept. of English, Smt. CHM College	
2.	Prof. (Dr.) B. R. Hiramani,	(VC Nominee, University of Mumbai) Pancham Khemraj College, Sawantwadi	
3.	Prof. (Dr.) Vikas Raskar	(Subject Expert outside University) Hutatma Rajguru Mahavidyalay, Rajguru Nagar, Khed, (Affiliated to Savitribai Phule University)	
4.	Prof. (Dr.) Prashant Mothe	(Subject Expert outside University) Aadarsh Mahavidyalay, Umerga, Dharashiv, (Affiliated to Dr. Baba Saheb Ambedkar Marathwada University	
5.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	
6.	Ms. Sana Khan	Asst. Professor, Dept. of English, Smt. CHM College	
7.	Dr. Micky Barua	Faculty Vidyalankar Institute of technology, Alumni Member	
8.	Ms. Sofy Verghese	Accenture, Industry Representative	

Name & Signature of the Ad-hoc BoS Chairperson: Prof. (Dr). Kailas Aute

Name & Signature of the Dean: Prof. (Dr). Nitin Arekar

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester- II

Title: Communication Skills in Sindhi

Vertical – 5
Ability Enhancement Course – 2 Credits

with effect from
Academic Year 2025-2026

Title: Communication Skills in Sindhi
COURSE CODE: CHMSINIIAEC

Sr. No.	Heading	Particulars
1	**Description the Course:**	Communication is the core component of commerce and trade. In communication, language plays very significant role. If a student has mastered the skills of language, undoubtedly, he or she would be able to communicate in the best manner. In this course basic part of Sindhi language would be taught based on the NEP 2020. Innovative approaches like critical thinking, creative mind, and use of technology will lead to communicating and participating with different groups. The vocabulary section would be given prominence. The course would be in the Devanagari script so that it can attract majority of the students. Even non-Sindhi students shall have opportunity to adopt this course.
2	**Vertical 1**	AEC – Ability Enhancement Course
3	**Type**	Theory + Practicum (Teaching Method: Lecture/ Discussion/Reading)
4	**Credit**	2 credits (1 credit = 15 hours for theory or 30 hours of Practical work in a semester)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50Marks
7	**Course Objectives**: After successful completion of this course: **CO(A) 1:** The learner will get understanding of communication skills. **CO(A) 2:** The learner will understand how to accurate the pronunciation of special words in Sindhi **CO(A) 3:** The learner will improve the conversation skill in Sindhi. **CO(A) 4:** The learner will become best communicator in Sindhi language	
8	**Course Outcomes**: Student will be able to **CO1**: Know the basic special features of Sindhi language. **CO2**: Understand communication skills. **CO3**: Knowing the conversation with businessmen and customers **CO4**: Know the etiquettes with parents, relatives, friends and others in effective way	

9	**Syllabus** **Communication Skills in Sindhi** **UNIT I: Everyday & Professional Communication in Sindhi** ● Daily Life Conversation Skills: Greetings and introductions, asking for information, making requests/giving instructions, small talk in simple Sindhi ● Workplace & Business Communication: Customer interaction, Office enquiries, permissions, complaints, Bank/shop/travel conversation, Basic telephone conversation, Short Event Reports **UNIT II: Digital & Modern Communication in Sindhi** ● Email & Message Writing: Professional emails, WhatsApp/SMS etiquette, Announcements, reminders ● Product and Promotive Communication: Short ads, Taglines & slogans, Simple product description, Pitch Presentation, Interview / Communication for Market **********

Syllabus

Communication Skills in Sindhi

यूनिट १: रोज़मरह जी जिंदगी में गुफ्तगू (सिंधीअ में):

- वाकुफ़ियत डियण ऐ जाण हासुल करण, वेंती मोकिलण, अर्ज करण, हिदायतूं डियण, सौली सिंधीअ में गालाईण.
- कम करण वारी जगह ते राबतो ऐ कारोबारी राबतोः ग्राहकनि सा गुफ्तगू, ऑफिस में पूछताछ, परमीशन, शिकायत पत्र, बैंक जे करमचारियुनि सा गुफ्तगू, ग्राहकनि सा गालिहाइणि, बेसिक टेलीफोनिक संवादु, नंडे जशन जी रिपोर्ट.

यूनिट २: डिजिटल ऐ आधुनिक संवादु (सिंधी में):

- ईमेल ऐ मैसेज लिखण, पेशेवर ईमेल, वाट्सप ऐ समसे (Message) जा शिष्टाचार (Etiquettes), घोषणा याद डियारण वारो नोट (Reminders),
- उत्पाद ऐ प्रचार प्रसार संवादु, नंडो विज्ञापन (Small Ads), टैगलाइन ऐ स्लोगन सौलो उत्पाद वर्णन.
- पिच प्रिन्टेशन, इंटरव्यू, मार्केट रिसर्च जे लाइ संवादु.

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10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question No	Nature of Questions	Marks
Q1.A)	Objective Type Questions (Unit- I)	05
Q1. B)	Attempt ANY 2 out of 4- (5 marks each) (Unit-I)	10
Q2.A)	Objective Type Questions (Unit- II)	05
Q2. B)	Attempt ANY 2 out of 4- (5 marks each) (Unit-II)	10
	Total	**30**

Internal Examination: Continuous Evolution - 20 marks **Total 30**

	Assessment / evaluation	Marks
1.	**Written assignment on any one of the following topics** 1) Draft a formal letter and formal E_mail in Sindhi 2) Write a conversation between Customer and Shopkeeper, Nurse and patient. (Students are required to use AI assistance in the preparation of their drafts. Eg: Notion AI, Powtoon, Elicit)	15
2.	Class Attendance and Participation	05
	Total	**20**

11

REFERENCE BOOKS:

1. Sanchari Basha – By Dr. Pushpa Kodwani
2. Sindhi Pahakaa – Dr. Jetly M.K.
3. Sindhi Muhavahra – By Hardwani Lachhman
4. Sindhi Adhyat mak Shabdhkesh – By Hardwani Lachhman
5. Acho Sindhi Sikhu – By Hardwani Lachhman

Syllabus Committee:

Sr No	Name of the Faculty	Designation and College	Signature
1.	Dr. Kajal Ramchandani	H.O.D. of Jai Hind College	
2.	Mrs. Komal Totani	Faculty In-Charge, Smt. CHM College	

Name & Signature of the BoS Chairperson: (Dr. Kajal Ramchandani)

Name & Signature of the Dean: (Dr. Nitin Arekar) _____

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester- II

Title: Cocurricular Course I

Vertical - 6
Cocurricular Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Cocurricular Course - I

Course Code: CHMCCI6

Sr. No.	Heading	Particulars
1	**Description the Course:**	This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement and experiential learning. Students are encouraged to explore their interests and talents by engaging in cultural, social, literary, sports, extension, or club-based events conducted by the college throughout the academic year. Participation will be recorded and assessed based on involvement, initiative, team spirit, creativity, and consistency. The aim is to nurture essential life skills such as leadership, communication, collaboration, and responsibility in a supportive, informal setting. This non-theory course offers students the opportunities and the freedom to learn beyond the classroom and grow into well-rounded individuals, contributing positively to campus life and society.
2	**Vertical 6**	Cocurricular Course (Mandatory)
3	**Type** **Teaching Methods**	Non Theory Participation, Report Writing, Presentation etc.
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: 1. To inculcate a spirit of active participation in cultural, social, environmental, and creative activities. 2. To enhance personal and interpersonal skills through real-life experiences and teamwork. 3. To foster a sense of responsibility, leadership, and community engagement among students. 4. To develop self-confidence and emotional well-being through creative expression and collaboration. 5. To integrate classroom learning with experiential learning for holistic growth.	
8	**Learning Outcomes**: By the end of the course, students will be able to: **LO1:** Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences. **LO2:** Demonstrate improved communication, leadership, and teamwork skills. **LO3:** Exhibit increased awareness of social responsibility and civic engagement. **LO4:** Build confidence through creative, cultural, and intellectual expressions. **LO5:** Maintain a portfolio or activity log to track participation and personal development.	

9	**Syllabus** **Unit I - Suggested Areas of Participation in the activities:** • **Cultural Events:** Drama, dance, music, literary events, debates, etc. • **Social Outreach:** Blood donation, awareness campaigns, cleanliness drives. • **Clubs & Societies:** Photography, quiz, environment club, shram club, etc. • **Sports & Fitness:** College tournaments, yoga, marathons, fitness challenges. • **Institutional Events:** Foundation Day, Annual Day, College Festivals, Intercollegiate events. • **National Festivals:** Independence Day, Republic Day etc. **Unit II - Program Specific Topics** • **Workshops/Seminars:** Report Writing, Personality Development, Soft Skills, Leadership Talks. • **Speak, Show, Shine:** Presentation / Poster Presentation / Viva and Learning Experience **Mode of Evaluation:** • **Faculty Coordinator:** To guide and evaluate student progress. • **Participation Proof:** Certificates, photos, attendance records. • **Reflective Journal:** Minimum 2–3 pages summarizing experiences, learning, and growth. • **Final Viva/Presentation:** 5-minute talk on poster presentation and on overall learning.
10	**Scheme of Examination and Assessment Pattern** **Based on 3 approved Activities** **Semester End External - 30 marks**

Activity No	Nature of Activities	Marks
1.	Title of Approved Activity - 1	10
2.	Title of Approved Activity - 2	10
3.	Title of Approved Activity - 3	10
	Total	**30**

Internal Examination: Continuous Evaluation – 20 marks

	Assessment / Evaluation	Marks
1.	Reflective journal	10
2.	Presentation/ poster presentation/viva	10
	Total	**20**

Suggested Readings:

- How to Win Friends and Influence People
- The 7 Habits of Highly Effective People
- Thinking, Fast and Slow
- Leaders Eat Last
- Talk Like Ted

Name & Signature of the Principal & Chairperson, Academic Council:

Dr. Manju Lalwani Pathak

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester - II

Title: Environmental Management and Sustainable Development - II

Vertical - 5
VEC Subject - 2 Credits

with effect from
Academic Year 2025-2026

Title: Environmental Management and Sustainable Development - II

Course Code: CHMVEC2

Sr. No.	Heading	Particulars
1	**Description the Course:**	This course examines the relationship between environmental pollution and human health, with detailed coverage of air, water, soil, noise, thermal, and radioactive pollution and their sources, standards, and impacts. It enables learners to understand pollution generation processes, waste management challenges, and the assimilative capacity of the environment. The course also introduces environmental laws, constitutional provisions, and regulatory frameworks, along with tools such as Environmental Management Systems (ISO 14001), life cycle analysis, and cost–benefit analysis. Emphasis is placed on sustainable practices, pollution control measures, the 3R concept, ecolabeling, and global initiatives such as the Sustainable Development Goals and Mission LiFE.
2	**Vertical 5**	VEC
3	**Type & Teaching Methods**	Theory + Practicum Lectures/Discussions/Presentations/Case Studies, etc.
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A)1:** To develop a comprehensive understanding of various types of environmental pollution, their sources, standards, and impacts on human health and ecosystems. **CO(A)2:** To familiarize students with environmental laws, constitutional provisions, and regulatory frameworks related to environmental protection and management. **CO(A)3:** To equip learners with knowledge of environmental management tools, pollution control measures, and sustainable waste management practices. **CO(A)4:** To create awareness about global and national sustainability initiatives such as the Sustainable Development Goals, Mission LiFE, and their role in achieving sustainable development.	

8	**Course Outcomes**: Student will be able to **CO1**: Identify and analyze different types of environmental pollution and assess their impacts on human health and ecological systems. **CO2**: Explain key environmental laws, constitutional provisions, and institutional mechanisms for environmental protection. **CO3**: Apply environmental management tools and sustainable waste management practices in real-world contexts. **CO4**: Evaluate sustainability initiatives such as the SDGs and Mission LiFE and relate them to environmental management and sustainable development practices.
9	**Syllabus** **UNIT I: Environmental Pollution and Health** • Understanding pollution: Production processes and generation of wastes; Assimilative capacity of the environment; Definition of pollution; Point sources and non-point sources of pollution. • Air pollution: Sources of air pollution; Primary and secondary pollutants; Indoor air pollution; Adverse health impacts of air pollutants; National Ambient Air Quality Standards. • Water pollution: Sources of water pollution; River, lake and marine pollution, groundwater pollution; water quality parameters and standards; adverse health impacts of water pollution on human and aquatic life. • Soil pollution and solid waste: Soil pollutants and their sources; Solid and hazardous waste; Impact on human health. • Noise pollution: Definition of noise; Unit of measurement of noise pollution; Sources of noise pollution; Noise standards; adverse impacts of noise on human health. • Thermal and Radioactive pollution: Sources and impact on human health and ecosystems. **UNIT II: Environmental Management** • Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g) and other derived environmental rights; • Introduction to environmental legislations on the forest, wildlife and pollution control. Environmental management system: ISO 14001 Life cycle analysis; Cost-benefit analysis • Pollution control and management; Waste Management- Concept of 3R (Reduce, Recycle and Reuse) and sustainability; Ecolabeling /Ecomark scheme. • Introduction to Millennium Development Goals, Sustainable Development Goals, & Mission Life.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hours

Format of Question Paper

Attempt any 3 out of 4 questions.

Question No	Nature of Questions	Marks
Q1	Theory Question based on Unit I	10
Q2	Theory Question based on Unit I	10
Q3	Theory Question based on Unit II	10
Q4	Theory Question based on Unit II	10
TOTAL		**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Assignment / Project	10
2.	Case Study / Assignment	10
TOTAL		**20**

11

REFERENCES:

1. Barrow, C. J. (2012). *Environmental management for sustainable development* (2nd ed.). Routledge.
2. Doabia, T. S. (2023). *Environmental and pollution laws in India* (4th ed.). Eastern Book Company.
3. Kumar, S. (2009). *Environmental policies in India*. Northern Book Centre.
4. Rajagopalan, R. (2023). *Environmental studies* (4th ed.). Oxford University Press India.
5. Rogers, P. P., Jalal, K. F., & Boyd, J. A. (2007). *An introduction to sustainable development*. Earthscan.
6. Singh, J., Singh, A., & Gupta, S. (2019). *Environmental science and engineering*. New Age International Publishers.

Sr No	Name of the Faculty	Designation and College	Signature
1.	Dr. Sunil Lalchandani	Dean, Faculty of Interdisciplinary	

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College, Ulhasnagar

(Autonomous)

Affiliated to the University of Mumbai

S.Y. B.Sc. (IT)

(Self-Financing Course)

Semester – III

Choice Based and Credit Based syllabus
as per NEP 2020 with effect from the
Academic Year 2025-2026

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- III

Title: Python Programming

Vertical - 1
Major Subject - 2 Credits

with effect from
Academic Year 2025-2026

Title: Python Programming
Course Code: CHMITIII1

Sr. No.	Heading	Particulars
1	**Description of the Course:**	**Introduction to Programming with Python** course is designed to help beginners learn Python, a versatile and beginner-friendly language known for its simplicity and readability. Python is an excellent choice for newcomers to programming due to its clear syntax and broad applications in fields like web development, data analysis, and artificial intelligence. In today's technology-driven world, programming skills are increasingly essential, and Python's popularity has surged due to its ease of use and extensive support community. Python is also a gateway language, allowing learners to transition easily into more advanced topics such as machine learning, data science, and web development. As an interpreted, high-level language, Python is particularly relevant across industries like technology, healthcare, finance, and academia, making Python proficiency a highly sought-after skill. The course focuses on core programming concepts like syntax, data structures, and control flow, ensuring that learners can write efficient and functional code. The course also encourages further learning, serving as a stepping stone for advanced Python courses or specialized areas like machine learning and web development. Python's beginner-friendly nature and expansive libraries make it an enjoyable language to learn, fostering both interest and engagement. By combining theory with hands-on projects, the course aims to spark curiosity and provide learners with tangible results from their efforts. As learners gain proficiency in Python, they will have the tools to tackle more complex programming challenges, making this course an invaluable starting point for anyone interested in programming or pursuing a career in tech. **Demand in the Industry:** Python's popularity in the industry is soaring. Professionals proficient in Python are in high demand across various sectors, including technology, finance, healthcare, and academia. Completion of this Course opens doors to entry- level positions in software development, quality assurance, data analysis, and scripting.
2	**Vertical 1**	Major
3	**Type** **Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits

5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Master the core features of Python, including its execution model and a wide range of data types. **CO(A) 2:** Develop proficiency in control flow by working with conditional statements, loops, and other control structures. **CO(A) 3:** Work efficiently with arrays, strings, and complex data structures, leveraging Python's capabilities for data manipulation. **CO(A) 4:** Apply functions, modules, and string operations to solve real-world programming problems with flexibility and ease. **CO(A) 5:** Manage file operations, utilize regular expressions, and handle date and time functions for comprehensive Python programming tasks.	
8	**Course Outcomes**: Student will be able to **CO 1**: Demonstrate mastery of Python features to tackle a wide range of programming challenges. **CO 2**: Utilize control flow statements to ensure accurate and logical program execution. **CO 3**: Efficiently manipulate arrays, strings, and data structures to enhance data handling and problem-solving. **CO 4**: Manage file operations, employ regular expressions, and manipulate date and time data to improve program functionality and performance.	
9	**Syllabus** **UNIT I:** **Basic Elements of Python Programming:** Features of Python, Execution of a Python Program, Python Interpreter, Comments, IDLE, Data types, Dictionary, Sets, Mapping, Basic Elements of Python, Variables, Input and Output Statements, Command Line Arguments. Operators, Precedence of Operators, Associativity of Operators **Control Statements:** The if statement, The if … else Statement, The if … elif … else Statement, Loop Statement- while loop, for loop, Infinite loop, Nested loop, The else suite, break statement, continue statement, pass statement, assert statement, return statement. **Working with Arrays (NumPy):** Creating and Using NumPy Arrays, Indexing and Slicing, Array Attributes and Dimensions, Array Operations and Mathematical Functions, Array Aliasing **Functions:** Function definition and call, Returning Results, Returning Multiple Values from a Function, Built-in Functions, Difference between a Function and a Method, Parameters and Arguments, Default arguments, Keyword arguments, Variable-length arguments, Modules in Python. **Strings:** Creating Strings, Functions of Strings, Working with Strings, Formatting Strings, Finding the Number of Characters and Words, Inserting Substrings into a String.	

UNIT II:

List and Tuple:

Exploring List, Tuples and Dictionaries: Lists, List Functions and Methods, List Operations, List Slices, Nested Lists, Tuples, Functions in Tuple, Introduction to Sets, and basic Set Operations (union, intersection, difference, symmetric difference).

Working with Dictionaries:

Creating a Dictionary, Operators in Dictionary, Dictionary Methods, Using for Loop with Dictionaries, Operations on Dictionaries

Files in Python:

Opening and Closing a File, Working with Text Files, Working with Binary Files, The 'with' statement, The seek() and tell() Methods, Random Accessing of Binary Files, Zipping and Unzipping Files, Working with Directories

Regular Expressions:

Introduction, Sequence Characters in Regular Expressions, Special Characters in Regular Expressions, Regular Expression Functions and Methods

Date And Time in Python:

Time, Date, Date and Time Now, formatting date and time, Finding and comparing dates, Timezones and Timezone-aware DateTime Handling, Knowing the Time taken by a Program

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question	Options	Marks
Q1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	10
Q2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	10
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	Marks
1.	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11	**REFERENCE BOOKS:** 1. Learning Python, Fourth Edition by Mark Lutz Copyright © 2009 Mark Lutz. Published by O'Reilly Media, Inc. 2. Python Basics: A Practical Introduction to Python 3 Revised and Updated 4th Edition David Amos, Dan Bader, Joanna Jablonski, Fletcher Heisler 3. Let Us Python, Yashwant. B. Kanetkar, BPB Publication, 2019 4. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018 5. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017 6. https://docs.python.org/3/ 7. https://www.w3schools.com/python/

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- III

Title: Data Structures

Vertical - 1
Major Subject - 2 Credits

with effect from
Academic Year 2025-2026

Title: Data Structures
Course Code: CHMITIII2

Sr. No.	Heading	Particulars
1	**Description of the Course:**	Data Structures is a fundamental subject that focuses on the organization, storage, and manipulation of data. It provides the tools and techniques to efficiently manage and process data, forming the backbone of algorithms and software development.
2	**Vertical 1**	Major
3	**Type** **Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Demonstrate knowledge of core data structures such as arrays, linked lists, stacks, and queues, along with their operations. **CO(A) 2:** Analyze the time and space complexity of algorithms and select the most efficient solutions for given problems. **CO(A) 3:** Translate algorithmic logic into correctly functioning code using an appropriate programming language. **CO(A) 4:** Implement and traverse binary trees and binary search trees, showcasing a clear understanding of their properties and operations. **CO(A) 5:** Apply suitable data structures and algorithms to solve practical problems involving data organization, searching, and sorting.	
8	**Course Outcomes**: Student will be able to **CO 1**: Demonstrate knowledge of core data structures such as arrays, linked lists, stacks, and queues, along with their operations. **CO 2**: Analyze the time and space complexity of algorithms and select the most efficient solutions for given problems. **CO 3**: Translate algorithmic logic into correctly functioning code using an appropriate programming language. **CO 4**: Implement and traverse binary trees and binary search trees, showcasing a clear understanding of their properties and operations. **CO 5**: Apply suitable data structures and algorithms to solve practical problems involving data organization, searching, and sorting.	

9

Syllabus

UNIT I:

Introduction:

Basic terminology: data, information, data structure, abstract data type (ADT) Classification of data structures: linear, non-linear

Asymptotic Analysis and Notations, Big O Notation, Big Omega Notation, Big Theta Notation

Arrays and Linked Lists:

Array representation and operations (traversal, insertion, deletion, searching) Linked lists: singly linked lists (representation, insertion, deletion, traversal) Comparison of arrays and linked lists, advantages and disadvantages.

Stacks and Queues:

Stack ADT: push, pop, peek operations Array implementation of stacks

Applications of stacks: expression evaluation (infix to postfix conversion) Queue ADT: enqueue, dequeue, peek operations

Array implementation of queues

Applications of queues: basic scheduling scenarios

Recursion:

Concept of recursion, base case, recursive step Examples: factorial, Fibonacci sequence.

UNIT II:

Trees:

Binary trees: representation, traversal (inorder, preorder, post order) Binary search trees: insertion, deletion, search

Applications of trees: basic hierarchical data representation

Hashing:

Hash Tables, Collision Handling (Separate Chaining), Applications of Hashing (Dictionaries)

Graph:

Introduction to Graph, Graph Terminology, Memory Representation of Graph, Adjacency Matrix representation of Graph, Adjacency List of Graph, Applications of the Graph.

Sorting and Searching:

Sorting algorithms: bubble sort, insertion sort, selection sort Searching algorithms: linear search, binary search

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question	**Options**	Marks
Q1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	10
Q2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	10
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	Marks
1.	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11

REFERENCE BOOKS:

1. Data Structures and Algorithms made Easy: Data Structures and Algorithmic Puzzles, Narasimha Karumanchi ,5th Edition 2017
2. A Simplified Approach to Data Structures, Lalit Goyal, Vishal Goyal, Pawan Kumar SPD,1st 2014
3. Problem Solving in Data Structures & Algorithms Using C by Hemant Jain ,1st Edition, BPB Publications, 2018
4. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 4th Edition, MIT Press,2022
5. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-006-introduction-to-algorithms-fall-2011/
6. https://www.geeksforgeeks.org/data-structures/

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- III

Title: Operating System

Vertical - 1
Major Subject - 2 Credits

with effect from
Academic Year 2025-2026

Title: Operating System
Course Code: CHMITIII3

Sr. No.	Heading	Particulars
1	**Description of the Course:**	Introduce Operating System Concepts (Processes, Threads, Scheduling, Synchronization, Deadlocks, Memory Management and File Systems) Introduce the issues to be considered in the design and development of operating system.
2	**Vertical 1**	Major
3	**Type** **Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Learn the basic concepts and functions of operating systems. **CO(A) 2:** Understand the concept of process, thread and CPU Scheduling. **CO(A) 3:** Understand the concepts of process synchronization and deadlock. **CO(A) 4:** Learn how memory is managed, including virtual memory techniques. **CO(A) 5:** Understand how file systems and directories are organized and used.	
8	**Course Outcomes**: Student will be able to **CO 1**: Outline the basic concept of operating systems and understand how they work. **CO 2**: Understand process management and compare different CPU scheduling methods. **CO 3**: Use concepts of synchronization and identify deadlock situations. **CO 4**: Analyze how memory is allocated and how replacement policies affect performance. **CO 5**: Effectively use and manage secondary memory.	
9	**Syllabus** **UNIT I:** **Operating System Overview:** Definition of Operating System, Objectives, Functions and Evolution of Operating System, Operating-System Structures, Operating-System Services, System Calls, System Boot, System Programs, Protection and Security. **Process Management**: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms (FCFS, SJF, SRTN, Priority, RR), Threads, Types of Threads, Multicore and Multithreading. **Process Synchronization:** Principles of Concurrency, Mutual Exclusion: Hardware Support , Peterson's Solution, Semaphores, The Producer/Consumer Problem.	

UNIT II:

Memory Management: Main Memory, Swapping, Memory Partitioning: Fixed, Partitioning, Dynamic Partitioning, Memory Allocation Strategies, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing.

Deadlock: Principles of Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker‟s Algorithm, Deadlock Detection and Recovery, Dining Philosophers Problem

File Management: Overview, File Organization and Access, File Directories, , File Sharing , Secondary Storage Management.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question	Options	Marks
Q1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	10
Q2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	10
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	Marks
1.	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles William Stallings, Pearson 9th , 2018.
2. Operating System Concepts, Abraham Silberschatz, Wiley, 8th Edition
3. Achyut Godbole and Atul Kahate, Operating Systems, McGraw Hill Education, 3rd Edition.
4. Andrew Tannenbaum, Operating System Design and Implementation, Pearson, 3rd Edition.
5. https://cs162.org/
6. https://www.tutorialspoint.com/operating_system/index.htm

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- III

Title: Major Practical 3

Vertical - 1
Major Subject - 2 Credits

with effect from
Academic Year 2025-2026

Title: Major Practical 3
Course Code: CHMITIII4

Sr. No.	Heading	Particulars
	Description of the Course:	This course offers a comprehensive exploration of advanced Python programming concepts, designed to equip students with the tools to tackle real-world problems efficiently. It covers a range of topics, including text processing with regular expressions to identify patterns and extract meaningful data, as well as file handling techniques for both text and binary files. Students will also gain expertise in manipulating and comparing dates using Python's built-in date and time modules, along with performing calendar-based operations. The course emphasizes performance optimization by teaching students how to measure and improve program execution time. Additionally, students will learn how to extract structured data, such as hyperlinks from HTML files, and apply these techniques in practical scenarios. By the end of the course, students will be adept at solving complex problems, optimizing their Python solutions, and utilizing advanced programming concepts to handle diverse data processing tasks.
	Vertical 1	Major
	Type **Teaching Method**	Practical
	Credit	2 Credits
	Hours allotted	60 Hours
	Marks allotted	50 Marks
	Course Objectives: **CO(A) 1:** Understand and apply core Python programming concepts such as input/output operations, conditional statements, loops, functions, recursion, and modular programming. **CO(A) 2:** Work with data structures like lists, dictionaries, and arrays using NumPy, including operations like indexing, slicing, and mathematical computations. **CO(A) 3:** Implement advanced Python features such as file handling, text processing, date manipulation, and performance analysis to solve real-world problems. **CO(A) 4:** Develop hands-on skills in implementing fundamental data structures (arrays, linked lists, stacks, queues, trees, graphs), along with designing and analyzing algorithms, understanding dynamic memory allocation, and managing data efficiently.	

CO(A) 5: Enable students to choose appropriate data structures for specific applications, justify their use, and effectively debug and optimize code for reliable and efficient performance.

Course Outcomes: Student will be able to

CO 1: Apply core Python programming concepts such as input/output, conditionals, loops, and functions to solve computational and real-world problems effectively.

CO 2: Work with data structures like arrays (using NumPy), lists, and dictionaries, including operations like indexing, slicing, and data manipulation for efficient program design.

CO 3: Implement modular programming, perform file and text processing, handle dates, and analyze program performance through execution time measurement to address complex tasks.

CO 4: Demonstrate the ability to implement, manipulate, and apply both basic and advanced data structures to solve real-world problems efficiently.

CO 5: Develop proficiency in designing efficient algorithms using appropriate data structures, analyzing their time and space complexity, and applying them across domains like databases, networks, and operating systems.

Syllabus

UNIT I:

1. Write programs for the following:

a. Write a program that asks the user to enter their name and their age. Print out a message addressed to them that tells them the year that they will turn 100 years old.

b. Write a program to accept a number from the user and depending on whether the number is even or odd, print out an appropriate message to the user.

c. Write a program to accept the SGPI from the user and print corresponding grade based on the following:

SGPI	Grade
9.00 – 10.00	O
8.00 – 8.99	A+
7.00 – 7.99	A
6.00 – 6.99	B+
5.50 – 5.99	B
5.00 – 5.49	C
4.00 – 4.99	P
Below 4	F

2. Write programs for the following:

a. d. Write a program to generate the Fibonacci series.

b. e. Write a program to accept a number from the user display sum of its digits.

c. Write a program to print a right-angled triangle pattern of stars (*) of height ‘n’ using nested loops.

d. Write a program to calculate the power of a number (base^exponent) using a **for** loop.

e. Write a program to count the number of digits in a number using a **do-while** loop.

3. Write programs for the following:

a. Write a program to perform basic operations, indexing and slicing on arrays.

b. Write a program to implement mathematical functions on arrays.

c. Write a program to perform array aliasing and copying.

4. Write programs for the following:

a. Write a program to perform slicing, basic and advanced indexing on

NumPy arrays.

b. Write a program to analyze dimensions and attributes of arrays

5. Write programs for the following:

a. Write a function that takes a list of numbers and returns the sum, average, maximum, and minimum. Call the function and display the results.

b. Write a function that accepts any number of arguments and returns only the even numbers as a tuple.

c. Define a function with default arguments to calculate the compound interest. Allow the user to optionally specify the number of times interest is compounded annually.

d. Demonstrate the difference between a method and a function using a string object. Show at least two examples for each for clarity.

6. Write programs for the following:

a. Write a program to compute number of characters and words in a string.

b. Create a file geometry.py to calculate base areas for shapes square and circle. In another file, write a function pointyShapeVolume(x, y, squareBase) that calculates the volume of a square pyramid if squareBase is True and of a right circular cone if squareBase is False. x is the length of an edge on a square if squareBase is True and the radius of a circle when squareBase is False. y is the height of the object. First use squareBase to distinguish the cases. Use the circleArea and squareArea from the geometry module to calculate the base areas.

7. Write programs for the following:

a. Write a program that takes two lists and returns True if they have at least one common member.

b. Write a Python script to sort (ascending and descending) a dictionary by value.

8. Write programs for the following:

a. Write a program to accept and pass radius to a function that returns area and circumference (using tuple).

b. Write a program to perform basic file operations on text files and binary files.

c. Write a Python program to read last n lines of a file.

9. Write programs for the following:

a. Write a program to count the occurrences of a specific word in a file using regular expressions.

b. Write a Python program that reads a list of numbers from a file named numbers.txt. The program should separate the numbers into odd and even, then write all odd numbers to a file named odd.txt and all even numbers to a file named even.txt.

10. Write programs for the following:

a. Write a program that compares two dates (in DD/MM/YYYY format) and prints which one is earlier.

b. Write a program to measure program execution time.

c. Write a program to display the current date and time in the format: YYYY-MM-DD HH:MM:SS.

d. Create a program that asks the user to input their birth date and calculates their age in years.

e. Write a program that displays the current time in three different timezones (e.g., UTC, US/Eastern, Asia/Kolkata).

UNIT II:

Array Operations: Write a program to implement basic array operations:

a. Insert an element at a specific position in an array.

b. Delete an element from a specific position in an array.

	c. Search for an element in an array (linear search). 2. Linked List Manipulation: Write a program to: a. Create a singly linked list. b. Insert a node at the beginning, end, and at a given position in a linked list. c. Delete a node from a given position in a linked list. 3. Stack Application: Write a program to: a. Implement a stack using an array. b. Convert an infix expression to postfix notation using a stack. 4. Queue Application: Write a program to: a. Implement a queue using an array. b. Simulate a simple queuing system (e.g., customer service queue). 5. Binary Search Tree: Write a program to: a. Create a binary search tree. b. Insert nodes into a binary search tree. c. Search for a node in a binary search tree. 6. Tree Traversal: Write a program to: a. Implement pre-order, b. in-order, Post-order traversal of a binary tree. 7. Graph Traversal a. Write a program to implement BFS. b. Write a program to implement DFS. 8. Sorting Algorithms: Write programs to implement and compare the following sorting algorithms: a. Bubble sort b. Insertion sort c. Selection sort 9. Searching Algorithms: Write programs to implement and compare: a. Linear search b. Binary search (on a sorted array) 10. Combined Application: Design a simple program that uses multiple data structures.

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

1

REFERENCE BOOKS:

1. Learning Python, Fourth Edition by Mark Lutz Copyright © 2009 Mark Lutz. Published by O'Reilly Media, Inc.
2. Python Basics: A Practical Introduction to Python 3 Revised and Updated 4th Edition David Amos, Dan Bader, Joanna Jablonski, Fletcher Heisler
3. Data Structures and Algorithms made Easy: Data Structures and Algorithmic Puzzles, Narasimha Karumanchi ,5th Edition 2017
4. A Simplified Approach to Data Structures, Lalit Goyal, Vishal Goyal, Pawan Kumar SPD,1st 2014
5. Let Us Python, Yashwant. B. Kanetkar, BPB Publication, 2019
6. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018
7. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017
8. Problem Solving in Data Structures & Algorithms Using C by Hemant Jain ,1st Edition, BPB Publications, 2018
9. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, 4th Edition, MIT Press,2022

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.

Semester- III

Title: Fundamentals of Operations Research

Vertical – 2

Minor Course: 2 Credits

with effect from
Academic Year 2025-2026

Title: Operations Research -I

Course Code: CHMMTIII8

Sr. No.	Heading	Particulars
1	**Description the Course:**	**Introduction:** Operations Research (OR) is a discipline focused on the application of advanced analytical methods to support effective decision-making. This course offers a comprehensive understanding of core concepts and techniques in operations research, with emphasis on linear programming, transportation problems, and assignment problems.
2	**Vertical 2**	Minor
3	**Type**	Theory
4	**Credit**	2 credits (1 credit = 30 Hours of Practical work in a semester)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1.** To understand the fundamental concepts and structure of Linear Programming Problems (LPP). **CO(A) 2.** To develop the ability to formulate and solve LPPs using appropriate methods. **CO(A) 3.** To analyze the concept of duality in linear programming and its managerial significance. **CO(A) 4.** To design and evaluate efficient transportation schedules. **CO(A) 5.** To apply assignment models for optimal allocation of jobs to machines.	
8	**Course Outcomes**: **CO 1:** To develop the skills to formulate and solve Linear Programming Problems (LPP) for optimizing cost, time, profit, or loss. **CO 2:** To understand and analyze the concept of duality in LPP and its significance in managerial decision-making. **CO 3:** To design optimal transportation schedules that minimize cost and maximize efficiency. **CO 4:** To allocate jobs to machines effectively using assignment models for optimal resource utilization. **CO 5:** To explore advanced topics in Operations Research, including transportation problems, and assignment problems.	

9

Syllabus

UNIT I:

- **Linear Programming:** Mathematical formulation of maximization and minimization problems; concepts of solution, feasible solution, basic feasible solution, and optimal solution. Graphical method for two-variable problems. Simplex method for problems with two or more variables, including the Big M method. Introduction to duality and its application in solving LPPs; relationship between primal and dual solutions, and the economic interpretation of dual variables.

UNIT-II:

- **Transportation Problem:** Concept and mathematical formulation; solution concepts including feasible solution and initial basic feasible solution using North West Corner Rule, Matrix Minima Method, and Vogel's Approximation Method. Optimal solution through MODI Method, including optimality testing and improvement procedures. Variants include unbalanced and maximization-type transportation problems.

- **Assignment Problem:** Concept and mathematical formulation; solution methods including Complete Enumeration and Hungarian Method. Variants include unbalanced and maximization-type problems. Introduction to the Travelling Salesman Problem (TSP) as a special case.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 01:00 hours

Format of Question Paper

Question	Based on	Options	Marks
Q.1.	Unit – 1	Any 2 out of 4	10
Q.2.	Unit – 2	Any 2 out of 4	10
Q.3.	Unit – 1 and Unit – 2	Any 2 out of 4	10
			Total 30

Internal Examination: Continuous Evaluation – 20 marks

	Assessment / evaluation	Marks
1.	**Class Test –** It should be conducted using any learning management system such as MOODLE. The test should have 10 MCQs which should be solved in a time duration of 20 minutes.	10
2.	Presentation, Demonstration, Case Study, Seminar, Posters, Mini-Project, Role play etc.	10
		Total 20

11	**REFERENCES:** 1. Operations Research: Kantiswaroop and Manmohan Gupta. 4th Edition; S Chand & Sons. 2. Schaum Series book in O.R. Richard Broson. 2nd edition Tata Mcgraw Hill Publishing Company Ltd. 3. Operations Research: Methods and Problems: Maurice Sasieni, Arthur Yaspan and Lawrence Friedman, (1959), John Wiley & Sons. 4. Mathematical Models in Operations Research : J K Sharma, (1989), Tata McGraw Hill Publishing Company Ltd. 5. Principles of Operations Research with Applications to Management Decisions: Harvey M. Wagner, 2nd Edition, Prentice Hall of India Ltd. 6. Operations Research: S.D.Sharma.11th edition, Kedar Nath Ram Nath & Company. 7. Quantitative Techniques For Managerial Decisions: J.K.Sharma , (2001), MacMillan India Ltd. 8. Operations Research: Theory and Applications, J K Sharma, Trinity Press, 6th Edition , 2017 9. Introduction to Operations Research, Frederick S. Hillier, Gerald J. Lieberman, McGraw Hill Education; 11th edition, 2021 10. Operations Research, P K Gupta, S. Chand Publications, 7th Edition, 2018 11. Operations Research, P. Rama Murthy, New Age Publication, 2nd Edition 12. Operations Research: An Introduction, 10th Edition, Hamdy A. Taha, Pearson Education, 2019

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)
(Affiliated to the University of Mumbai)

Board of Studies (BoS) Mathematics

Sr. No.	Name of the Faculty	Designation and College
1.	Ms. Urmila Pillay	Head and Associate Professor, Department of Mathematics, Smt. CHM College (Autonomous)
2.	Mr. Amish Thakker	Associate Professor, Smt. CHM College (Autonomous)
3.	Ms. Asha Chugh	Associate Professor, Smt. CHM College (Autonomous)
4.	Mr. Mandar Khasnis	Associate Professor, Smt. CHM College (Autonomous)
5.	Dr. Dipak Jadhav	Associate Professor, Smt. CHM College (Autonomous)
6.	Ms. Pooja Rajani	Assistant Professor, Smt. CHM College (Autonomous)
7.	Mr. Salil Sawarkar	Assistant Professor, Smt. CHM College (Autonomous)
8.	Mrs. Usha Hemasundar	Outside University nominee Head and Associate Professor, K.C. College, Churchgate
9.	Dr. Pankit Gandhi	Outside University nominee Professor, K.C. College, Churchgate
10.	Ms. Minal Wankhede	Vice Chancellor Nominee Head and Associate Professor, B.N. Bandodkar College, Thane
11.	Mr. Mandar Dongare	Industry Representative Senior Manager, Customer Success, Teradata India Pvt. Ltd.
12.	Ms. Supriya Bhagat	Alumni Representative Senior Product Data Scientist, Project pro

Name and Signature of the Ad hoc BoS Chairperson: Ms. Urmila Pillay

Name and Signature of the Dean: Dr. Neena Anand

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Computer Science)

Semester- III

Title: Practicals based on Fundamentals of Operations Research

Vertical – 2

Minor Course: 2 Credits

with effect from
Academic Year 2025-2026

Title: Practical's based on Operations Research -I

Course Code: CHMMTIII9

Sr. No.	Heading	Particulars
1	**Description the Course:**	**Introduction:** Operations Research (OR) is a scientific approach to decision-making that involves the use of advanced analytical methods. This course aims to provide a thorough understanding of fundamental OR techniques, with a primary focus on linear programming, transportation problems, and assignment problems, to support optimal and efficient decision-making.
2	**Vertical 2**	Minor
3	**Type**	Practical
4	**Credit**	2 credits (1 credit = 30 Hours of Practical work in a semester)
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1.** To gain a foundational understanding of the concepts and structure of Linear Programming Problems (LPP). **CO(A) 2.** To build the skills required to formulate and solve LPPs using suitable analytical methods. **CO(A) 3.** To examine the concept of duality in linear programming and interpret its managerial relevance. **CO(A) 4.** To develop and assess cost-effective and efficient transportation schedules. **CO(A) 5.** To apply assignment models for the optimal distribution of tasks or jobs to available resources.	
8	**Course Outcomes**: **CO 1:** Develop the skills to formulate and solve Linear Programming Problems (LPP) for optimizing cost, time, profit, or loss. **CO 2:** Understand and analyze the concept of duality in LPP and its relevance to managerial decision-making. **CO 3:** Design efficient transportation schedules to minimize cost and improve operational effectiveness. **CO 4:** Apply assignment models for optimal job-to-machine allocation and resource utilization. **CO 5:** Explore advanced topics in Operations Research, with a focus on transportation and assignment problems.	

9

Practical 1: a) Formulation and graphical solution of Linear Programming Problems (LPP).
b) Solving minimization, maximization problems using the graphical methods

Practical 2: Application of the Simplex Method for solving minimization, maximization LPPs with standard constraints.

Practical 3: (a) Implementation of the Big-M Method for solving LPPs with artificial variables.
(b) Application of the Two-Phase Method as an alternative to Big-M Method for artificial variable problems

Practical 4: Understanding and solving problems involving Duality.

Practical 5: **a)** Formulation of the Transportation Problem and obtaining the Initial Basic Feasible Solution using the **North West Corner Rule (NWCR)**.
b) Application of the **Matrix Minima Method** to find the Initial Basic Feasible Solution.Solving Assignment Problems for optimal job allocation.

Practical 6: **a)** Implementation of **Vogel's Approximation Method (VAM)** for finding the Initial Basic Feasible Solution.
b) Comparison of NWCR, Matrix Minima, and VAM in terms of initial cost effectiveness.

Practical 7: **a)** Computation of the **Optimal Solution using the MODI Method**.
b) Handling **Unbalanced Transportation Problems** using balancing techniques.
c) Solving **Maximization-type Transportation Problems** by converting them into equivalent minimization models.

Practical 8: **a)** Mathematical formulation and solution of **Assignment Problems** using the **Hungarian Method**.
b) Application of the **Complete Enumeration Method** to a small-scale assignment problem for comparison.

All above practical problems solving manual and using TORA/Excel Solver.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 02:00 hours

Format of Question Paper

Question	Practical Questions Based on	Marks
Q.1.	Practical 1, 2, 3 and 4	15
Q.2.	Practical 5, 6, 7 and 8	15
	Total 30	

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is an essential component of the evaluation process.

Internal Examination: Continuous Evaluation – 20 marks

	Assessment / evaluation	Marks
1.	Practical Assignments / Experiments / Hands-On Tests / Presentations / Demonstrations / Online Class Test / Case Studies / Mini-Projects / Complete the code block / Develop the incomplete portion of the code etc.	15
2.	Journal	05
	Total	**20**

11 **REFERENCES:**

1. Operations Research: Kantiswaroop and Manmohan Gupta. 4th Edition; S Chand & Sons.
2. Schaum Series book in O.R. Richard Broson. 2nd edition Tata Mcgraw Hill Publishing Company Ltd.
3. Operations Research: Methods and Problems: Maurice Sasieni, Arthur Yaspan and Lawrence Friedman, (1959), John Wiley & Sons.
4. Mathematical Models in Operations Research : J K Sharma, (1989), Tata McGraw Hill Publishing Company Ltd.
5. Principles of Operations Research with Applications to Management Decisions: Harvey M. Wagner, 2nd Edition, Prentice Hall of India Ltd.
6. Operations Research: S.D.Sharma.11th edition, Kedar Nath Ram Nath & Company.
7. Quantitative Techniques For Managerial Decisions: J.K.Sharma , (2001), MacMillan India Ltd.
8. Operations Research: Theory and Applications, J K Sharma, Trinity Press, 6th Edition , 2017
9. Introduction to Operations Research, Frederick S. Hillier, Gerald J. Lieberman, McGraw Hill Education; 11th edition, 2021
10. Operations Research, P K Gupta, S. Chand Publications, 7th Edition, 2018
11. Operations Research, P. Rama Murthy, New Age Publication, 2nd Edition
12. Operations Research: An Introduction, 10th Edition, Hamdy A. Taha, Pearson Education, 2019

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Name and Signature of the Ad hoc BoS Chairperson: Ms. Urmila Pillay

Name and Signature of the Dean: Dr. Neena Anand

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- III

Vertical - 3
Open Elective Course - 2+2 Credits

with effect from
Academic Year 2025-2026

Faculty of Interdisciplinary

Vertical 3: List of Open Elective Skill Based Courses for Second Year: Semester – III

Sr. No.	Nomenclature of the Paper
1	Data Analysis And Visualization Using Excel
2	2D Animation And Motion Graphics
3	Advance Tools Of AI For Economics And Education - I
4	English For Journalism And Advertising
5	Urbanization And Real Estate: Infrastructure, Technology And Urban Change
6	Tourism Marketing
7	Managing Family Wealth Through Family Office-III
8	Responsive &Amp; Modern Web Designing
9	Basics Of Nutrition -3
10	Reel Making For Media And Social Change
11	Preforming Art- Dance-3
12	Data Analysis With Excel And Power BI
13	Digital Political Strategy, AI And Public Engagement Skills
14	Psychology Of Personal Relationship-I
15	Introduction To Sociology And Digital Society
16	Mushroom Cultivation Training And Trading Level 3
17	Yogasanas: Intermediate Series
18	Perfumery Course Level 3
19	Workplace And Professional Skills
20	Beautician: Strategic Business Planning III
21	Current Trends In Fashion Designing: Financial Perspective Level 3
22	Basics Of Accounting-III
23	Digital Marketing -III
24	Advanced Trading Strategies In Stock Market

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- III

Title: Applied Mathematics

Vertical - 4
Vocational Skill Course (VSC) - 2 Credits

with effect from
Academic Year 2025-2026

Title: Applied Mathematics
Course Code: CHMITIII8

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course is designed for developing competency of the students in the applications of various mathematical concepts. It is equipped with Complex numbers, Laplace transform, Inverse Laplace transform, Differential equations of first order with first degree and higher degree. This course introduces basic concepts of Algebra and prepares students to study further courses in linear and abstract algebra.
2	**Vertical 4**	Vocational Skill Course
3	**Type** **Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Interpret mathematical results in physical or practical terms, especially in the context of complex numbers. **CO(A) 2:** Understand and apply various methods to solve problems using Laplace Transforms. **CO(A) 3:** Understand and apply different techniques to solve differential equations in practical contexts. **CO(A) 4:** Develop problem-solving skills by applying Laplace Transforms and differential equations to real-world problems. **CO(A) 5:** Foster mathematical thinking and reasoning through the study of indeterminate forms and advanced mathematical concepts.	
8	**Course Outcomes**: Student will be able to **CO 1**: Understand and perform operations on complex numbers in various forms. **CO 2**: Compute Laplace and Inverse Laplace transforms using their definitions. **CO 3**: Solve problems involving matrix operations, rank of matrices, and vector dependence. **CO 4**: Solve first-order and first-degree differential equations using appropriate methods. **CO 5**: Solve higher-order differential equations and apply them to practical problems.	
9	**Syllabus** **UNIT I:** **Complex Numbers**: Complex number, Equality of complex numbers, Graphical representation of complex number (Argand's Diagram), Polar form of complex numbers. Polar form of x+iy for different signs of x.y, Exponential form of complex numbers, Mathematical operation with complex numbers and their representation on Argand's Diagram, Circular functions of complex	

angles, Definition of hyperbolic function. Relations between circular and hyperbolic functions, Inverse hyperbolic functions.

The Laplace Transform: Introduction. Definition of the Laplace Transform, Table of Elementary Laplace Transforms. Theorems on Important Properties of Laplace Transformation, First Shifting Theorem, Second Shifting Theorem, Convolution Theorem, Laplace Transform of Derivatives.

Inverse Laplace Transform: Shifting Theorem, Partial fractions Methods, Use of Convolution Theorem,

Matrices: Inverse of a matrix, Properties of matrices, Elementary Transformation, Rank of Matrix, Echelon or Normal Matrix, Inverse of matrix, Linear equations, Linear dependence and linear independence of vectors, Linear transformation, Characteristics roots and characteristics vectors, Properties of characteristic vectors, Caley Hamilton Theorem

UNIT II:

Equation of the first order and of the first degree: Separation of variables, Equations homogeneous in x and y, Non-homogeneous linear equations, Exact differential Equation, Integrating Factor, Linear Equation and equation reducible to this form, Method of substitution.

Differential equation of the first order of a degree higher than the first: Introduction, Solvable for p (or the method of factors), Solve for y, Solve for x, Clairaut's form of the equation, Method of Substitution.

Linear Differential Equations with Constant Coefficients: Introduction, The Differential Operator, Linear Differential Equation f(D) y = 0, Different cases depending on the nature of the root of the equation f(D) = 0, Linear differential equation f(D) y = X, The complimentary Function, The inverse operator 1/f(D) and the symbolic expression for the particular integral

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question	**Options**	Marks
Q1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	10
Q2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	10
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11

REFERENCE BOOKS:

1. A text book of Applied Mathematies Vol I, P. N. Wartikar and J. N.Wartikar, Pune Vidyathi Griha,7* ,1995
2. A text book of Applied Mathematies Vol II , P. N. Wartikar and J. N. Wartikar, Pune Vidyathi Griha,7" .1995
3. Higher Engineering Mathematies, Dr. B. S.Grewal, Khanna Publications.
4. https://tutorial.math.lamar.edu/Classes/Alg/ComplexNumbers.aspx
5. https://tutorial.math.lamar.edu/Classes/DE/LaplaceTransforms.aspx
6. https://ocw.mit.edu/courses/mathematics/18-03sc-differential-equations-fall-2011/
7. https://www.khanacademy.org/math/linear-algebra/matrix-transformations

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B.Sc.

Semester- III

Vertical – 5

Ability Enhancement Course (English)

2 Credits

(To be offered to Students who opted Sindhi AEC in Sem I & II)

with effect from
Academic Year 2025-2026

Title: Introduction to Communication Skills in English
Course Code: CHMBSCAECIII

Sr. No.	Heading	Particulars
1	**Description the Course:**	Effective communication is the cornerstone of academic and professional success. This course introduces learners to foundational skills in English communication, with a focus on both oral and written competencies essential in academic, social, and workplace contexts. It aims to equip learners with the ability to read critically, write precisely, speak confidently, and listen actively. Emphasis is placed on building clarity, coherence, and conciseness in communication, along with an understanding of audience, purpose, and tone. The course integrates grammar reinforcement, vocabulary building, reading comprehension, and practice-oriented modules such as email etiquette, group discussion, and formal writing. Through dynamic classroom interactions and practical assessments, learners will gain confidence in using English effectively and purposefully**.**
2	**Vertical 4**	Ability Enhancement Course
3	**Type** Teaching Methods:	Theory+ Practicum (Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: CO(A)1: To introduce learners to the fundamentals of effective communication and its components. CO(A)2: To enhance learners' reading comprehension through exposure to multiple genres and contexts. CO(A)3: To develop grammatical accuracy and lexical resourcefulness for academic and professional communication. CO(A)4: To strengthen verbal and non-verbal presentation skills and promote interactive speaking abilities.	

	CO(A)5: To build competence in real-world writing tasks such as email drafting, bio-data preparation, and descriptive writing.
8	**Course Outcomes**: Student will be able to CO-1: Understand and apply key principles of effective communication in varied contexts. CO-2: Comprehend and analyze written texts using appropriate reading strategies. CO-3: Recognize and correct common grammatical and lexical errors. CO-4: Engage in clear, confident, and context-appropriate spoken interactions. CO-5: Produce structured, coherent, and grammatically correct written content for academic and workplace use.

9	**Syllabus**

UNIT I: Foundations of English Communication

A) Core Concepts of Communication

- Principles of Effective Communication: The 7 Cs
- Verbal and Non-verbal Communication with Examples
- Cross-cultural Communication in the Globalized World
- Technology in Communication: Email, Messaging, Video Conferencing
- Listening for Detail and Intent: Barriers to Listening and Strategies

B) Reading Comprehension

- Understanding the Main Idea and Supporting Details
- Interpreting Tone, Purpose, and Bias
- Using Context Clues for Vocabulary Building
- Reading Visual Texts: Graphs, Charts, and Infographics
  Sample readings will include excerpts from news articles, reports, editorials, and educational essays (200–250 words).

C) Grammar and Vocabulary

- Subject-Verb Agreement
- Sentence Structures
- Punctuation and Capitalization
- Commonly Confused Words
- Editing and Proofreading Practice

A remedial and functional approach will be followed with contextual exercises.

UNIT II: Applied Communication Skills

A) Speaking and Listening Skills

- Introducing Oneself in Academic/Professional Settings
- Participating in Group Discussions and Expressing Opinions
- Delivering a Short Speech (2–3 minutes) on Familiar Topics
- Understanding and Responding to Instructions
- Listening Comprehension Practice through Audio/Video Clips

B) Functional Writing Skills

- Formal Email Writing with Subject and Tone Sensitivity
- Descriptive Paragraph Writing (People, Places, Processes)
- Bio-data and Resume Writing
- Drafting Job Applications (Solicited and Unsolicited)
- Writing a Statement of Purpose

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Question No	Nature of Questions	Marks
Q. 1	**Short Notes** (Attempt any 3 out of 5) - **Unit 1** **OR** **Essay-Type Question** (Attempt any 1 out of 2)- **Unit 1**	15
Q. 2	**Short Notes** (Attempt any 3 out of 5) - **Unit 2** **OR** **Essay-Type Question** (Attempt any 1 out of 2)- **Unit 2**	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Students are required to draft a job application letter along with a resume using the following AI assistance: Canva Resume Builder, Resume.oi, Zety, Novopresume, Rezi etc **OR** Draft an SoP with the help of the following AI assistance: Quillbot, Yocket, Writesonic, Jasper AI	15
2.		05
	Total	**20**

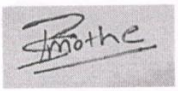
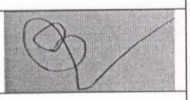
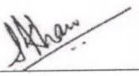
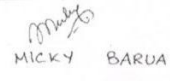
11

REFERENCES:

1. Adler, Ronald B., et al. *Understanding Human Communication*. 15th ed., Oxford UP, 2021.
2. Bailey, Stephen. *Academic Writing: A Handbook for International Students*. 5th ed., Routledge, 2018.
3. Barrass, Robert. *Students Must Write: A Guide to Better Writing in Coursework and Examinations*. Routledge, 2005.
4. Brown, Gillian, and George Yule. *Teaching the Spoken Language: An Approach Based on the Analysis of Conversational English*. Cambridge UP, 1983.
5. Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. Pocket Books, 2006.
6. Chaney, Lillian, and Jeanette Martin. *Intercultural Business Communication*. 6th ed., Pearson, 2014.
7. Cullen, Pauline, et al. *English Grammar in Use Supplementary Exercises*. Cambridge UP, 2019.
8. Eastwood, John. *Oxford Guide to English Grammar*. Oxford UP, 2005.

9. Gerson, Sharon J., and Steven M. Gerson. *Technical Communication: Process and Product*. 9th ed., Pearson, 2021.
10. Hewings, Martin. *Advanced Grammar in Use: A Self-study Reference and Practice Book for Advanced Learners of English*. 3rd ed., Cambridge UP, 2013.
11. Jones, Leo. *Functions of English: Communication Practice in English*. Cambridge UP, 1981.
12. Kumar, Sanjay, and Pushp Lata. *Communication Skills*. 2nd ed., Oxford UP, 2018.
13. Lynch, Tony. *Listening in Language Learning*. Longman, 1988.
14. McCarthy, Michael, and Felicity O'Dell. *Academic Vocabulary in Use*. Cambridge UP, 2008.
15. Nordquist, Richard. *The Essentials of English Grammar*. McGraw-Hill Education, 2016.
16. Quirk, Randolph, et al. *A Comprehensive Grammar of the English Language*. Longman, 1985.
17. Seely, John. *The Oxford Guide to Writing and Speaking*. Oxford UP, 2005.
18. Straus, Jane, et al. *The Blue Book of Grammar and Punctuation*. 12th ed., Jossey-Bass, 2021.
19. Wallace, Catherine. *Reading*. Oxford UP, 1992.
20. Zinsser, William. *On Writing Well: The Classic Guide to Writing Nonfiction*. Harper Perennial, 2016.

Syllabus Committee:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Kailas Aute	Professor & Head, Dept. of English, Smt. CHM College	
2.	Prof. (Dr.) B. R. Hiramani,	(VC Nominee, University of Mumbai) Pancham Khemraj College, Sawantwadi	
3.	Prof. (Dr.) Vikas Raskar	(Subject Expert outside University) Hutatma Rajguru Mahavidyalay, Rajguru Nagar, Khed, (Affiliated to Savitribai Phule University)	
4.	Prof. (Dr.) Prashant Mothe	(Subject Expert outside University) Aadarsh Mahavidyalay, Umerga, Dharashiv, (Affiliated to Dr. Baba Saheb Ambedkar Marathwada University	
5.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	
6.	Ms. Sana Khan	Asst. Professor, Dept. of English, Smt. CHM College	
7.	Dr. Micky Barua	Faculty Vidyalankar Institute of technology, Alumni Member	 MICKY BARUA
8.	Ms. Sofy Verghese	Accenture, Industry Representative	

Name & Signature of the Ad-hoc BoS Chairperson: Prof. (Dr). Kailas Aute 

Name & Signature of the Dean: Prof. (Dr). Nitin Arekar 

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year BA/BCom/BSc/SFC
(Marathi)

Semester- III

Vertical -5
Ability Enhancement Course (AEC) -2 Credits

with effect from
Academic Year 2026-2027

Title: **लेखन कौशल्ये – १ (कार्यालयीन लेखनव्यवहार आणि पत्रव्यवहार)**

COURSE CODE: CHMAECMARIII

Sr. No.	Heading	Particulars
1	**Description the Course:**	**(कार्यालयीन लेखनव्यवहार आणि पत्रव्यवहार)** लेखन ओळख ते लेखन कौशल्य हा बराच मोठा प्रवास आहे. वाचन आणि लेखनाच्या सरावाने, लेखन कौशल्य विकसित करता येते. बहुतेक वेळा आपण मिळवलेले ज्ञान हे लिखित स्वरूपात मांडावे लागते. त्यासाठी आपण लेखन कौशल्याचे योग्य उपयोजन करतो. लेखने म्हणजे मजकूर तंतोतंत उतरवणे नव्हे. एखादे निवेदन, वृत्त, निबंध, पुस्तकाची टिपणे, अर्ज यांसाठी लेखन आवश्यक असते. कार्यालयीन पत्रव्यवहार, कार्यवृत्ते, नोंदी, जाहिरात, टिप्पणी ही सर्व उपयोजित लेखन कौशल्ये आहेत. कार्यालयीन पत्रव्यवहार करणे हे एक वेगळ्या प्रकारचे कौशल्य आहे. त्यातील काही उपयोजन कौशल्यांचा विचार या अभ्यासपत्रिकेत अपेक्षित आहे. कार्यालयीन लेखन व्यवहार आणि पत्रव्यवहार या अभ्यासपत्रिकेत शिकविला जाईल.
2	**Vertical 5**	Ability Enhancement Course
3	**Type**	Theory
4	**Credit**	2 Credits (1 Credit = 15 Hours for Theory or 30 Hours of Practical Work in a Semester)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** कार्यालयीन लेखन व्यवहार स्वरूप समजावून सांगणे. **CO(A) 2:** कार्यालयीन पत्रव्यवहाराचे स्वरूप समजावून सांगणे,. **CO(A) 3:** प्रभावी कार्यालयीन लेखनासाठी आवश्यक असणाऱ्या क्षमता ऑणि तंत्रांचा परिचय करून देणे,	
8	**Course Outcomes**: प्रस्तुत अभ्यासक्रम शिकल्यानंतर: **CO1**: विद्यार्थ्यांना कार्यालयीन लेखन व्यवहाराचे स्वरूप समजेल, **CO2:** विद्यार्थ्यांना कार्यालयीन पत्रव्यवहाराचे स्वरूप समजेल. **CO3:** प्रभावी कार्यालयीन लेखनासाठी आवश्यक असणाऱ्या तंत्रांचा विद्यार्थ्यांना परिचय होईल.	

9

Syllabus

UNIT I कार्यालयीन लेखनव्यवहार

१. जाहीर निवेदन आणि माहितीपत्रक

२. इतिवृत्त लेखन

३. टिप्पणी लेखन

(६० मिनिटांच्या १५ तासिका, श्रेयांकन १)

(सूचना : विद्यार्थ्यांमध्ये उपरोक्त कार्यालयीन लेखन व्यवहार व पत्रव्यवहार करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)

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UNIT II: कार्यालयीन पत्रव्यवहार

१. कार्यालयीन/प्रशासनिक पत्र

२. नोकरीसाठी अर्जलेखन

३. पत्रात्मक लेखन: नवी रूपे (शुभेच्छा, निमंत्रण)

(६० मिनिटांच्या १५ तासिका, श्रेयांकन-१)

(सूचना : विद्यार्थ्यांमध्ये उपरोक्त कार्यालयीन लेखन व्यवहार व पत्रव्यवहार करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hours

Format of Question Paper

All questions are compulsory:

Q. No	Nature of Questions	Marks
Q1	Essay type question on Module 1	10
Q2	Essay type question on Module 2	10
Q6	MCQs 15 out of 20, 10 MCQs on each module	10
	Total 30	

Internal Examination: Continuous Evaluation - 20 marks

	Project and presentation / Viva	Marks
1.	• AI च्या साहाय्याने जाहीर निवेदन आणि माहितीपत्रक तयार करणे. त्यामध्ये शीर्षक, उद्दिष्ट, कार्यक्रमाचे वेळापत्रक, संपर्क इत्यादींची आकर्षक मांडणी करणे. • AI साधने वापरून सभेचे Audio/Video नुसार इतिवृत्त तयार करणे.	20

			त्यानंतर विद्यार्थ्यांनी त्यात आवश्यक ती सुधारणा करणे. • AI चा वापर करून कार्यालयीन टिप्पणी तयार करणे. त्यातील भाषा, रचना, औपचारिकता इत्यादींचे परीक्षण करून सुधारित टिप्पणी तयार करणे. • AI साधनांच्या माध्यमातून प्रशासनिक पत्रांचे विविध नमुनारूप तयार करणे. भाषेची औपचारिकता तपासणे. • AI साधनांच्या साहाय्याने नोकरीसाठी अर्ज तयार करणे. दिलेल्या जाहिरातीवर आधारित Cover Letter तयार करणे. • विविध प्रसंगांसाठी AI साधनांच्या आधारे निमंत्रणपत्र व शुभेच्छापत्र तयार करणे. **AI** साधने: ChatGPT, Google Gemini, Claude, Perplexity AI, NotebookLM, Canva, CapCut, InVideo, Grammarly, QuillBot, Whisper, ElevenLabs		
				Total 20	
11	**संदर्भ ग्रंथ (Reference Books) :** १. प्रशासनिक लेखन, भाषा संचालनालय, महाराष्ट्र शासन, मुंबई, १९६६ २. भाषिक सर्जन आणि उपयोजन, राजन गवस, अरुण शिंदे, गोमटेश्वर पाटील, दर्या प्रकाशन, पुणे, २०१२ ३. परब प्रकाश, व्यावहारिक मराठी, मिथुन प्रकाशन, डोंबिवली पूर्व, मुंबई, १९८९ ४. नाईक सदानंद, राजभाषा मराठी, व्यावहारिक मराठी, प्रका-नागरी सेवा प्रबोधिनी, मुंबई, २००२ ५. तावरे स्नेहल (संपा.), व्यावहारिक मराठी, स्नेहवर्धन प्रकाशन, पुणे, चौथी आवृत्ती, २०११ ६. केतकी मोडक, संतोष शेणई, सुजाता शेणई (संपा.), उपयोजित मराठी, पद्मगंधा प्रकाशन, २०१२ ७. नसीराबादकर ल. रा., व्यवहारिक मराठी, भाषा विकास संशोधन संस्था, कोल्हापूर २०२३				

Smt. Chandibai Himathmal Mansukhani College

(Autonomous)

Second Year B.A

(Hindi)

Semester – III

Title : हिंदी भाषा : कौशल के आधार

Vertical - 5
Ability Enhancement Course 2 Credits

with effect from

Academic Year 2025-2026

Title : हिंदी भाषा : कौशल के आधार
Course Code : CHMAECHINIII

Sr.No.	Heading	Particulars
1.	Description of the Course :	विद्यार्थियों के लिए हिंदी एक सामान्य भाषा होने के साथ विशेष भाषा तब बन जाती है जब वह हिंदी के माध्यम से अपने कौशल में अभिवृद्धि करें, हिंदी के माध्यम से रोजगार के कई अवसरों को प्राप्त करें, इस दृष्टि से पाठ्यक्रम अत्यंत लाभवर्धक और उपयोगी सिद्ध होगा, हिंदी भाषा में कौशल विकास की असीम संभावनाएं हैं और कौशल के विभिन्न आयाम जुड़े हुए हैं जो अलग – अलग दिशाओं में देखे जा सकते हैं, पाठ्यक्रम विद्यार्थियों में लेखन, वाचन कौशल की अभिवृद्धि करने के साथ रोजगारपरक अवसर प्रदान करता है।
2.	Vertical : 5	AEC
3.	Type : Teaching Method	Theory + Practicum Lecture / Discussion / Presentation / Self Study, etc.
4.	Credit :	2 Credits
5.	Hours Allotted :	30 Hours
6.	Marks Allotted :	50 Marks
7.	Course Objectives : CO(A)1 : विद्यार्थियों को लेखन, वाचन कौशल का ज्ञज्ञन देना एवं रोजगार के अवसरों से जोड़ना। CO(A)2 : विद्यार्थियों को लेखन, वाचन कौशल से परिचय करते हुए अभिव्यक्ति की शैलियों का विकास करना। CO(A)3 : विद्यार्थियों को भाषण कला के विविध रूपों को समझाना, मौलिकता में अभिवृद्धि लाना एवं विशेषज्ञता दिलाना। CO(A)4 : विद्यार्थियों को श्रवण कौशल की विशेषताओं से परिचय कराते हुए श्रवण कौशल के लाभों से अवगत कराना।	

8.	Course Outcomes : CO1 : विद्यार्थियों का लेखन, वाचन कौशल के ज्ञान प्राप्ति के साथ मौलिक अभिव्यक्ति में बदलाव आएगा । CO2 : विद्यार्थियों का लेखन, वाचन कौशल द्वारा मानसिक विकास होगा, पठन शक्ति, शैली का विकास होगा । CO3 : विद्यार्थियों को लेखन, भाषण कौशल से भषिक – शक्ति, शैलियों का संवर्धन होगा विशेषज्ञता आएगी । CO4 : विद्यार्थियों को लेखन, वाचन, श्रावण, भाषण कौशल की विशेषताओं और उपयोगिता का ज्ञान प्राप्त होगा ।
9.	**Syllabus**
	UNIT I : हिंदी भाषा कौशल के आधार
	1.1 लेखन कौशल का अर्थ एवं स्वरूप लेखन कौशल की उपयोगिता एवं महत्व 1.2 लेखन कौशल की विधियाँ एवं विशेषताएँ 1.3 वाचन कौशल का अर्थ, स्वरूप एवं विशेषताएँ 1.4 वाचन कौशल की उपयोगिता एवं विधियाँ
	UNIT II : हिंदी भाषा कौशल के आधार
	2.1 भाषण कौशल का अर्थ एवं स्वरूप 2.2 भाषण कौशल का महत्व एवं उपयोगिता 2.3 भाषण कौशल की विधियाँ एवं विशेषताएँ 2.4 श्रवण कौशल का अर्थ, स्वरूप एवं विशेषताएँ 2.5 श्रवण कौशल का महत्व एवं उपयोगिता

10.

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination : Semester End External – 30 Marks Time : 1:00 Hour

Format of Question Paper

All Questions are Compulsory

मूल्यांकन प्रारूप	इकाई	अंक
<u>बाह्य मूल्यांकन</u> प्रश्न 1 : चार प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए ।	इकाई 1	15
प्रश्न 2 : चार प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए ।	इकाई 2	15 ☐
कुल अंक		**30**

मूल्यांकन प्रारूप	अंक
<u>आंतरिक मूल्यांकन</u> • AI Writing Tools की सहायता से हिंदी लेखन कौशल का अभ्यास, भाषा-संपादन, व्याकरण सुधार, सारांश लेखन एवं रचनात्मक लेखन करना। • AI की सहायता से दिए गए विषयों पर भाषण, लेख, संवाद एवं लघु-प्रस्तुति तैयार करना तथा भाषा, शैली एवं प्रभावशीलता का विश्लेषण करना। • AI Voice Tools का उपयोग करके हिंदी वाचन, भाषण, उच्चारण, स्वर, गति एवं प्रवाह का अभ्यास करना तथा AI आधारित Feedback प्राप्त करना। • AI Speech-to-Text एवं Text-to-Speech Tools की सहायता से श्रवण एवं वाचन कौशल विकसित करना तथा उच्चारण की शुद्धता का अभ्यास करना। • AI की सहायता से Reading Comprehension, प्रश्नोत्तर, शब्दार्थ, शब्दावली (Vocabulary) एवं भाषा-अभ्यास गतिविधियाँ तैयार करना। • AI आधारित Mock Interview, Group Discussion तथा Public Speaking गतिविधियों के माध्यम से भाषण एवं संप्रेषण कौशल विकसित करना। • AI की सहायता से हिंदी Podcast, Audio Narration एवं Listening Exercises तैयार करना तथा श्रवण कौशल का मूल्यांकन करना।	20
कुल अंक	**20**

11.	**संदर्भ ग्रंथ सूची –** 1. हिंदी भाषा शिक्षण के विविध आयाम – प्राध्यापक डॉ. राठौर, किनले एडिशन 2. अभिनव पत्र लेखन – डॉ. अनिल सिंह 3. हिंदी के व्यावहारिक रूप – डॉ. संतोष मोटवानी, परिदृश्य प्रकाशन, मुंबई 4. हिंदी भाषा लेखन कौशल – गुलीबाबा पब्लिकेशन प्राइवेट लिमिटेड

Bos in Hindi :

Sr No	Name of the Faculty	Designation and College
1.	Dr. Bhavna M.Rochlani	I/C HOD Asst. Professor CHM College Ulhasnagar
2.	Dr. Ajeet Kumar Rai	Associate Professor KC College Mumbai
3.	Dr. Santosh Motwani	Associate Professor RKT College Ulhasnagar

Name & Signature of the Ad-hoc BoS Chairperson –

Dr. Bhavna M. Rochlani : _____

Name & Signature of the Dean –

Dr. Nitin Arekar : _____

Smt Chandibai Himathmal Mansukhani College, Ulhasnagar (Autonomous)

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Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester- III

Title: Cocurricular Course I

Vertical - 6
Cocurricular Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Cocurricular Course - I

Course Code: CHMCCI6

Sr. No.	Heading	Particulars
1	**Description the Course:**	This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement and experiential learning. Students are encouraged to explore their interests and talents by engaging in cultural, social, literary, sports, extension, or club-based events conducted by the college throughout the academic year. Participation will be recorded and assessed based on involvement, initiative, team spirit, creativity, and consistency. The aim is to nurture essential life skills such as leadership, communication, collaboration, and responsibility in a supportive, informal setting. This non-theory course offers students the opportunities and the freedom to learn beyond the classroom and grow into well-rounded individuals, contributing positively to campus life and society.
2	**Vertical 6**	Cocurricular Course (Mandatory)
3	**Type** **Teaching Methods**	Non Theory Participation, Report Writing, Presentation etc.
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: 1. To inculcate a spirit of active participation in cultural, social, environmental, and creative activities. 2. To enhance personal and interpersonal skills through real-life experiences and teamwork. 3. To foster a sense of responsibility, leadership, and community engagement among students. 4. To develop self-confidence and emotional well-being through creative expression and collaboration. 5. To integrate classroom learning with experiential learning for holistic growth.	
8	**Learning Outcomes**: By the end of the course, students will be able to: **LO1:** Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences. **LO2:** Demonstrate improved communication, leadership, and teamwork skills. **LO3:** Exhibit increased awareness of social responsibility and civic engagement. **LO4:** Build confidence through creative, cultural, and intellectual expressions. **LO5:** Maintain a portfolio or activity log to track participation and personal development.	

9	**Syllabus** **Unit I - Suggested Areas of Participation in the activities:** • **Cultural Events:** Drama, dance, music, literary events, debates, etc. • **Social Outreach:** Blood donation, awareness campaigns, cleanliness drives. • **Clubs & Societies:** Photography, quiz, environment club, shram club, etc. • **Sports & Fitness:** College tournaments, yoga, marathons, fitness challenges. • **Institutional Events:** Foundation Day, Annual Day, College Festivals, Intercollegiate events. • **National Festivals:** Independence Day, Republic Day etc. **Unit II - Program Specific Topics** • **Workshops/Seminars:** Report Writing, Personality Development, Soft Skills, Leadership Talks. • **Speak, Show, Shine:** Presentation / Poster Presentation / Viva and Learning Experience **Mode of Evaluation:** • **Faculty Coordinator:** To guide and evaluate student progress. • **Participation Proof:** Certificates, photos, attendance records. • **Reflective Journal:** Minimum 2–3 pages summarizing experiences, learning, and growth. • **Final Viva/Presentation:** 5-minute talk on poster presentation and on overall learning.
10	**Scheme of Examination and Assessment Pattern** **Based on 3 approved Activities** **Semester End External - 30 marks**

Activity No	Nature of Activities	Marks
1.	Title of Approved Activity - 1	10
2.	Title of Approved Activity - 2	10
3.	Title of Approved Activity - 3	10
	Total	**30**

Internal Examination: Continuous Evaluation – 20 marks

	Assessment / Evaluation	Marks
1.	Reflective journal	10
2.	Presentation/ poster presentation/viva	10
	Total	**20**

Suggested Readings:

- How to Win Friends and Influence People
- The 7 Habits of Highly Effective People
- Thinking, Fast and Slow
- Leaders Eat Last
- Talk Like Ted

Name & Signature of the Principal & Chairperson, Academic Council:

Dr. Manju Lalwani Pathak

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- III

Title: Field Project (FP)

Vertical - 6
Field Project - 2 Credits

with effect from
Academic Year 2025-2026

Title: Field Project

Course Code: CHMITIII9

Sr. No.	Heading	Particulars
1	**Description of the Course:**	Field projects offer students a practical learning experience by engaging them directly with real-world contexts. Students design questionnaires or interview schedules, interact with actual users or institutions, and gather first-hand data from the field. Through careful analysis of this data, they gain insights into real issues and challenges, helping them connect theory with practice. The project concludes with drawing meaningful conclusions and suggesting realistic improvements, thereby strengthening analytical skills, communication abilities, and professional awareness.
2	**Vertical 6**	Field Project
3	**Type & Teaching Method**	Field Work + Survey + Discussion + Report Writing
4	**Credit**	2 Credits
5	**Hours allotted**	30 hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: CO(A) 1. To develop the ability to design clear and relevant questionnaires or interview protocols. CO(A) 2. To build confidence in interacting with real users and institutions. CO(A) 3. To gain hands-on experience in collecting reliable field data. CO(A) 4. To analyze real-world data to identify patterns and issues. CO(A) 5. To draw practical insights and suggest feasible improvements.	
8	**Course Outcomes**: Student will be able to **CO1:** Design simple, relevant questionnaires or interview guides. **CO2:** Communicate confidently with real users and institutions. **CO3:** Gather and manage field data with care and accuracy. **CO4:** Interpret data to understand real-world situations. **CO5:** Suggest practical and realistic improvements based on evidence.	

9

Syllabus

Each student is required to select one topic from the given list. The topics are designed to help you explore the real-world application of IT concepts through direct observation and interaction. Choose a topic that genuinely interests you and is practically feasible, as you will be expected to engage with users or institutions, collect relevant data, and draw meaningful conclusions. The selected topic must be finalized with the instructor to ensure clarity and avoid overlap.

Sr. No.	Name of the Topic
1	Impact of IT Infrastructure on Academic Institutions' Administration
2	Survey of Cloud Computing Adoption in Educational Institutes or Clinics
3	Assessment of IT Readiness in Local Government Offices (e-Governance Study)
4	Field Analysis of ERP Implementation in Medium-Scale Industries/academic Institutions
5	Impact of Recommendation Algorithms on User Decisions: A Consumer Survey
6	Use of AI in Local Healthcare: Benefits, Challenges, and Acceptance
7	Perception of AI-Based Surveillance in Urban vs. Rural Areas
8	Cyber Hygiene Practices Among College Students and Faculty
9	Field Study on Awareness of Data Privacy Among College Students
10	Field Study on Cybersecurity Policies in Educational Institutions
11	Awareness of Cyber Laws Among Small Business Owners
12	Impact of Two-Factor Authentication Adoption in Retail Outlets
13	Digital Payments Usage and Security Concerns in Local Kirana Stores
14	Field Study on Mobile App Usage Among Senior Citizens
15	Study of Tech-Based Learning Adoption in Rural Schools
16	Study on Remote Work Tools and Employee Productivity Post-COVID
17	Use of Project Management Tools in Small IT Startups
18	Use of Mobile Apps for Community Services (e.g., blood donation, garbage pickup)
19	Impact Assessment of Online Learning Platforms in Tier-2 Cities
20	Survey on IT Accessibility for Differently-Abled Individuals
21	Survey of IoT Device Use and Security Concerns in Urban Homes
22	Adoption of Chatbots in Customer Service: Field Interviews
23	Effectiveness of Online Proctoring Systems in University Exams
24	Student Perception of Learning Management Systems (LMS) in Higher Education
25	Impact of Gamified Learning Tools in IT Education

Guidelines for Field Project

Following are the general guidelines for the conduct of Field Project (Semester III & IV)

Head of the Department (HOD)/ Field Project Co-ordinator

1. To ensure that FP program aligns with departmental and academic objectives as per NEP Structure within syllabus framework.
2. Appointment of field project incharges from the faculty of the department for group of Students.
3. To conduct orientation of FP Supervisor and decide the time line of the project.
4. To support the student for Filed Project.

FP Supervisor:

1. To give Guidelines for the field project.
2. To monitor student progress and provide guidance.

Project (Dissertation) Report:

Students are required to submit a report of the field project at the end of the semester in following suggested format.

The project should be typed on A4 sheets
Font Size 12, Times New Roman, 1.5 line Spacing
The project report shall have student details with signature of Field Project Incharge and photographs if any and it should be of minimum of 10 pages.

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Nature of Evaluation	Marks
Field Project Report	30
	Total 30

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	**Marks**
1.	Involvement of Survey of Field Project	05
2.	Field Visit Participation and Completion	10
3.	Overall Impression	05
		Total 20

11	**Appendix I** **Attendance of the Student: Active Participation** I,the undersigned Ms./Mr. _____Roll No.____studying in the_____Year of _____ Full-time Course, is doing my project work under the guidance of Dr./Ms./Mr. _____. I wish to state that I have met my Internal guide on the following dates mentioned below for Project Guidance: - Sr No Date Signature of the Internal Guide Signature of the Candidate Signature of Field Project Supervisor
	Appendix II **Name of the Department/College/Institute** **Certificate** I hereby certify that Mr./Ms. _____ Student of _____ studying in _____, has completed a project titled _____in the area of _____specialization for the academic year 2025–2026 to the best of my knowledge the work of the student is original and the information included in the project is correct. Field Project Supervisor Head of the Department

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College,
Ulhasnagar
(Autonomous)
Affiliated to the University of Mumbai

S.Y. B.Sc. (IT)
(Self-Financing Course)

Semester – IV

Choice Based and Credit Based syllabus
with effect from the Academic Year 2025-2026

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- IV

Title: Core Java

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Core Java
Course Code: CHMITIV1

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces students to Java programming, covering fundamental concepts such as data types, operators, control statements, loops, and core Object-Oriented Programming principles including classes, objects, inheritance, and polymorphism. Students will also explore interfaces, abstract classes, and packages to design modular and organized programs, along with exception handling and multithreading for managing program flow and concurrency. Additionally, the course covers streams and file handling, enabling students to perform essential file operations and work with both byte and character streams effectively.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Understand and apply the fundamentals of Java programming, including data types, operators, control statements, loops, and basic program structure. **CO(A) 2:** Develop and use classes, objects, and OOP concepts such as inheritance, polymorphism, and encapsulation to build modular and maintainable programs. **CO(A) 3:** Implement interfaces, abstract classes, and packages to design flexible, reusable, and well-organized Java applications. **CO(A) 4:** Handle exceptions and work with threads to manage program flow and perform concurrent operations safely and efficiently. **CO(A) 5:** Perform file operations and work with streams for reading, writing, and managing data in Java programs.	

8	**Course Outcomes**: Student will be able to **CO 1:** Write and run Java programs using core language features, control statements, and loops. **CO 2:** Design and implement classes and objects using OOP concepts like inheritance, polymorphism, and encapsulation. **CO 3:** Apply interfaces, abstract classes, and packages to organize and structure Java applications effectively. **CO 4:** Handle exceptions and create multithreaded programs to manage errors and concurrency. **CO 5:** Perform file operations and use streams to read, write, and manage data in Java programs.
9	**Syllabus** **UNIT I:** **Introduction to Java Programming:** History of Java and its Evolution, Features of Java, Java Program Structure, Data Types and Variables, Constants and Literals, Operators, Arithmetic Promotion, Type Casting. **Decision Making and Loops:** If-Else Statements, Switch Statement, Loops (For, While, Do-While), Break and Continue Statements. **Classes and Objects:** Array, Arrays, String class and String methods, StringBuffer and StringBuilder, Object-Oriented Programming Concepts, Defining Classes and Creating Objects, Instance Variables and Methods, Constructors, this Keyword, Wrapper Classes, Autoboxing and Unboxing, Types of Classes, Scope Rules, Access Modifier, Static Members of a Class, Garbage Collection. **Inheritance and Polymorphism:** Types of Inheritance, Superclass and Subclass, super keyword, Final Classes and Final Methods, Compile-Time and Runtime Polymorphism. **UNIT II:** **Interfaces and Packages:** Defining Interfaces, Implementing Interfaces, Abstract Classes and Abstract Methods, Implementing Multiple Interfaces, Default Methods in Interfaces, Static Methods in Interfaces, Interface Variables and Constants, Differences Between Abstract Classes and Interfaces. Predefined (Built-In) Packages, User Defined Packages, Package Visibility, Java Built-In Packages, Naming Conventions for Packages, Package Hierarchy, Import Statement, Static Import, Advantages of Packages. **Exception handling**: Try, Catch, and Finally Blocks, Throw and Throws Keywords. **Introduction to Threads:** Creating and Running Threads, Runnable vs Thread Class, Thread Lifecycle, Thread Synchronization **Streams and File Handling:** Introduction to Streams, Byte Streams, Character Streams, FileInputStream, FileOutputStream, FileReader, FileWriter, Try-With-Resources, File Class, Basic File Operations such as Creating, Reading, Writing, Checking File Existence, Deleting Files, Listing Files in a Directory.

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Test-It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQs which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total 20

11 **REFERENCES:**

1. Java: The Complete Reference Herbert Schildt MC-Graw HILL 12th EDITION 2022
2. Core Java, Volume I: Fundamentals Hortsman Pearson 9th 2013
3. Core Java, Volume II: Advanced FeaturesGary Cornell and Hortsman Pearson 8th 2008
4. https://www.studytonight.com
5. https://www.freejavaguide.com

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- IV

Title: Software Engineering

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Software Engineering
Course Code: CHMITIV2

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces software engineering concepts, development life cycle models, and Agile methodologies with a focus on the Scrum framework. It emphasizes project planning, execution, and management while addressing quality, cost, risk, and customer aspects.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To understand the fundamentals of software engineering and various development process models. **CO(A) 2:** To study Agile methodology and Scrum framework including its roles, artifacts, and processes. **CO(A) 3:** To develop skills in sprint planning, backlog management, and user story creation. **CO(A) 4:** To analyze software quality, measurement metrics, and project tracking within Scrum. **CO(A) 5:** To apply project management principles including cost, risk, and customer management in both Agile and traditional models.	

8 **Course Outcomes**: Student will be able to:

CO 1: Explain various software development life cycle models and process frameworks.

CO 2: Differentiate between Waterfall and Agile methodologies.

CO 3: Plan and manage sprints using Scrum principles.

CO 4: Evaluate projects using Agile metrics and quality management tools.

CO 5: Demonstrate collaboration and iterative improvement in project development.

9

Syllabus

UNIT I:

- Fundamentals of Software Engineering, Software Development Lifecycle and Waterfall Model, Process Models, Introduction to Agile Concepts, Understanding Scrum Framework and Roles**,** Scrum Process: High-Level View. Product Backlog Management, Sprint Planning, Writing Effective User Stories, Sprint Execution, Monitoring and Review Techniques, Sprint Retrospectives.

UNIT II:

- Measurements and Metrics in Scrum, Project Management in Scrum and Waterfall, Quality Management in Scrum, Customer Management in Scrum, Risk Management in Scrum, Cost Management in Scrum.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Test-It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQs which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total 20

11	**REFERENCES:**

1. “Agile Scrum”, Rama Bedarkar, Wiley, 1st, 2020
2. "Mastering Professional Scrum: A Practitioner's Guide to Overcoming Challenges and Maximizing the Benefits of Agility" by Stephanie Ockerman and Simon Reindl, Addison-Wesley Professional, 1st edition (2019).
3. "Scrum: A Pocket Guide" by Gunther Verheyen, Van Haren Publishing, 2nd edition (2019).
4. "Software in 30 Days" by Ken Schwaber and Jeff Sutherland, Wiley, 1st edition (2012).
5. "Scrum Insights for Practitioners: The Scrum Guide Companion" by Hiren Doshi, PracticeAgile Solutions, 1st edition (2016).
6. "A Scrum Book: The Spirit of the Game" by Jeff Sutherland and James O. Coplien, Pragmatic Bookshelf, 1st edition (2019).
7. "The Scrum Fieldbook: A Master Class on Accelerating Performance, Getting Results, and Defining the Future" by J.J. Sutherland, Random House Business, 1st edition
    a. (2019).
8. https://www.tutorialspoint.com/scrum/index.htm

Smt. Chandibai Himathmal Mansukhani College
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Second Year B. Sc.
(Information Technology)

Semester- IV

Title: Computer Networks

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Computer Networks
Course Code: CHMITIV3

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces the fundamentals of computer networks and data communication. It covers network architectures, data transmission, routing and switching, and transport and application layer protocols. Students will also learn about emerging networking technologies and basic security concepts for effective network management.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives(CO):** **CO(A) 1:** Explain data transmission across different network layers. **CO(A) 2:** Gain awareness of emerging trends and network security.	
8	**Course Outcomes**: Student will be able to: **CO 1:** Understand and explain the OSI and TCP/IP models, and their functions in network communication. **CO 2:** Analyze and interpret data flow and transmission processes across different network layers. **CO 3:** Configure and troubleshoot basic routing, switching, and addressing techniques in computer networks. **CO 4:** Apply transport and application layer protocols to design reliable and efficient communication systems. **CO 5:** Demonstrate knowledge of emerging networking technologies and implement basic network security practices.	

9

Syllabus

UNIT I:

- Introduction: Computer Network, Different types of Computer Network, Network topologies, Network Models: OSI Model, TCP/IP Protocol Suite
- Physical layer and Data link layer: Data and signals, transmission impairment, Data Link Layer Design Issues, Error detection and correction
- Network Layer: Address Resolution Protocol (ARP), IPV 4 Addresses and Protocol and IPV6 Addresses and Protocol.
- Unicast Routing Protocols (RIP, OSPF and BGP)

UNIT II:

- Transport Layer: User Datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP Connection Management
- Host Configuration: DHCP, Domain Name System (DNS)
- Remote Login: TELNET and SSH, File Transfer: FTP, World Wide Web and HTTP
- Electronic Mail: SMTP, POP3, IMAP and MIME

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Class Test-It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQs which should be solved in a time duration of 20 minutes.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total 20

11	**Books and References:** 1. TCP/IP Protocol Suite, Behrouz A. Forouzan, 4th Edition, Tata McGrawHill 2. (Chapter 2, 5, 7, 26, 27, Chapter 8, 9, 10, 11, Chapter 14,15, Chapter 16, 18, 19, 3. Chapter 20, 21, 22, Chapter 23, 25) 4. Behrouz A. Forouzan, *TCP/IP Protocol Suite*, 4th Edition, Tata McGraw-Hill. 5. Andrew S. Tanenbaum & David J. Wetherall, *Computer Networks*, 5th Edition, Pearson Education. 6. James F. Kurose & Keith W. Ross, *Computer Networking: A Top-Down Approach*, 8th Edition, Pearson. 7. William Stallings, *Data and Computer Communications*, 10th Edition, Pearson Education.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- IV

Title: Major Practical 4

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Major Practical 4
Course Code: CHMITIV4

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This practical helps students learn core Java through practical exercises. Students will gain experience in writing, testing, and running programs that use fundamental concepts like variables, loops, functions, classes, and file handling. This course provides hands-on experience in designing, configuring, troubleshooting computer networks. Students will work with routers, switches, and simulation tools to practice IP addressing, subnetting, routing, VLANs, and basic network security.
2	**Vertical**	Major
3	**Type & Teaching Method**	Practical
4	**Credit**	2 credits (30 Hours of Practical work in a semester)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	30 Marks
7	**Course Objectives(CO):** **CO(A) 1:** Understand core Java programming concepts, including data types, control structures, and object-oriented programming principles. **CO(A) 2:** Develop the ability to implement inheritance, polymorphism, interfaces, and abstract classes effectively. **CO(A) 3:** Understand the fundamentals of computer network components and configurations. **CO(A) 4:** Configure routers, switches, and VLANs using simulation or real devices. **CO(A) 5:** Implement and verify routing protocols for network communication.	

8	**Course Outcomes**: Student will be able to: **CO 1:** Gain hands-on skills in core Java concepts, including OOP, control structures, exception handling, and file operations. **CO 2:** Build practical, interactive, and modular Java programs using classes, inheritance, interfaces, and threads. **CO 3**: Understand and implement the basic components of computer networks **CO 4**: Assign and manage IP addresses, subnets, and VLANs. **CO 5** Implement routing protocols (e.g., RIP, OSPF) in simulated or real environments.
9	**Module 1** • **Fundamentals of Java Programming and Decision Making** This practical introduces primitive data types, variables, and constants, along with arithmetic operators. Decision-making constructs such as if-else, nested if-else, and switch statements are also covered. Suggested programs: calculator, a grading system, a loan eligibility checker with multiple criteria (age, income, credit score), and a calendar date validator. • **Loops and Array Operations** Students will learn to use for, while, and do-while loops, along with one-dimensional, multi-dimensional, and jagged arrays. Array operations like insertion, traversal, sum, and average are included. Suggested programs: matrix addition, jagged array sums, multiplication table, sum of diagonal elements in a 2D array, computing the nth power of a number without using built-in functions, and printing patterns using nested loops. • **String Handling** This practical covers String, StringBuffer, and StringBuilder classes. Students will perform operations such as concatenation, substring extraction, comparison, reversal, and finding the length of strings. Suggested programs: palindrome checking, printing abbreviations of a given string, counting vowels and consonants, and converting strings to title case. • **Class Design and Object-Oriented Programming Basics** Students will explore classes and objects, instance variables, methods, constructors, and the this keyword. Static members and constants are also included. Suggested programs: creating a student record class, demonstrating method overloading, calculating yearly salary using an employee class, and using static members to count objects created. • **Wrapper Classes, Autoboxing, and Unboxing** This practical focuses on using wrapper classes like Integer, Double, and Character, along with autoboxing and unboxing examples. Students will convert between

primitives and objects, compute sums and averages with wrapper objects, parse numeric strings, compare wrapper objects using compareTo(), and find maximum and minimum values using wrapper objects.
Suggested programs: conversion between primitives and objects, sum/average calculations with wrapper objects, parsing numeric strings, and comparing wrapper objects.

- **Inheritance and Polymorphism**

  Students will learn single and multilevel inheritance, the use of the super keyword, and final classes and methods. Both compile-time and runtime polymorphism will be demonstrated.
  Suggested programs: building an employee hierarchy, creating a vehicle class with Car and Bike subclasses, calculating salary using method overriding, and demonstrating the use of super to access parent constructors or methods.
- **Interfaces, Abstract Classes, and Packages**

  This practical introduces abstract classes and interfaces, default and static methods in interfaces, and multiple interface implementation. Students will also learn about packages, both built-in and user-defined.
  Suggested programs: implementing multiple interfaces, creating an abstract class Shape with Circle and Rectangle implementations, and using static import to call package methods.
- **Exception Handling**

  Students will use try, catch, finally, throw, and throws to handle exceptions. Multiple exception types including arithmetic, input mismatch, array index out of bounds, and number format exceptions will be handled.
  Suggested programs: division program, array access validation, numeric input parsing, nested try-catch demonstrations, handling multiple exceptions in a single program, and throwing exceptions for invalid marks or age.
- **File Handling and Streams**

  This practical covers byte streams and character streams. Students will perform file operations such as create, read, write, delete, check existence, and list directories. Try-with-resources will be demonstrated for safe resource management.
  Suggested programs: directory listing, writing and reading data from a file, copying content from one file to another, counting lines, words, and characters in a file, and appending data to an existing file.
- **Threads and Basic File-Based Operations**

  Students will learn to create threads using the Thread class and Runnable interface, with basic thread synchronization. Simple file-based thread-safe operations will also be demonstrated.
  Suggested programs: creating threads using Runnable and Thread class, implementing a counter with multiple threads, demonstrating thread synchronization using the synchronized keyword, and synchronized file writing.

Module 2

1. Configuring LAN setup
   a. Planning and Setting IP networks
   b. Configuring subnet
   c. Using, linux-terminal or Windows-cmd, execute following networking commands and note the output: ping, traceroute, netstat, arp, ipconfig, Getmac, hostname, NSLookUp, pathping, SystemInfo
2. IPv4 Addressing and Subnetting
   a. Given an IP address and network mask, determine other information about the IP address such as:
      - Network address
      - Network broadcast address
      - Total number of host bits
      - Number of hosts
   b. Given an IP address and network mask, determine other information about the IP address such as:
      - The subnet address of this subnet
      - The broadcast address of this subnet
      - The range of host addresses for this subnet
      - The maximum number of subnets for this subnet mask
      - The number of hosts for each subnet
      - The number of subnet bits
3. Configure Static IP routing using .
4. Configure IP routing using RIP.
5. Configuring Simple and multi-area OSPF
6. Configuring BGP protocol (Multi-Autonomous)
7. Configuring server and client.
   a. Configure DHCP
   b. Configure DNS
   c. Configure HTTP
   d. Configure Telnet
   e. Configure FTP
8. Configure basic security features for networks

   Configure VLANs and Inter-VLAN Routing

   Create multiple VLANs on a switch
   - Assign ports to VLANs
   - Configure trunk links and perform inter-VLAN communication through a router
9. Configure Network Address Translation (NAT) and Port Address Translation (PAT)
   - Configure static and dynamic NAT
   - Configure PAT for internet access
   - Verify translation using command outputs
10. IPV6 Addressing Basics

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
	Total: 30	

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11 **REFERENCES:**

1. Java: The Complete Reference Herbert Schildt MC-Graw HILL 12th EDITION 2022
2. Core Java, Volume I: Fundamentals Hortsman Pearson 9th 2013
3. Core Java, Volume II: Advanced FeaturesGary Cornell and Hortsman Pearson 8th 2008
4. https://www.studytonight.com
5. https://www.freejavaguide.com
6. Cisco CCNA 200-301 Official Cert Guide

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Minor Course Provided By
B.Sc. (Mathematics)

Semester- IV

Title: Mathematical Modelling for Computer Applications

Vertical – 2
Minor Course – 2 Credits

with effect from
Academic Year 2025-2026

Title: Mathematical Modelling for Computer Applications
(Course Code: CHMMATHIV4)

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course provides an application-focused understanding of how mathematical models help explain and predict behaviours in modern computer systems. Students learn foundational modelling concepts and explore growth, decay, and spread processes relevant to digital platforms, user dynamics, and information or malware propagation. The course also introduces graph-based network models, influence and diffusion behaviours, and basic system and queue modelling used to analyse server performance and network congestion. Emphasis is placed on intuitive reasoning, real-world scenarios, and developing a modelling mindset for analysing complex computing environments.
2	**Vertical 2**	Minor
3	**Type & Teaching Method**	Theory
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: By the end of this course, learners will be able to: **CO(A) 1.** Explain the fundamental principles of mathematical modelling, including model types, assumptions, formulation, validation, and interpretation, in the context of computer-based systems. **CO(A) 2.** Analyse and interpret growth, decay, and spread/epidemic processes (e.g., user growth, viral content, malware propagation) using conceptual and graphical representations of exponential, logistic, and SIR-type models. **CO(A) 3.** Apply graph-based modelling concepts such as connectivity, centrality, shortest paths, and influence propagation to understand real-world networked systems, including communication and social networks. **CO(A) 4.** Evaluate influence, diffusion, and cascading behaviours in digital platforms and networked environments, identifying the factors governing information spread, opinion formation, and viral phenomena.	

	CO(A) 5. Model and interpret basic system and queue behaviours—including arrival, service, waiting, and congestion—to understand performance characteristics of servers, cloud services, and networked systems.
8	**Course Outcomes**: After successful completion of the course, learners will be able to: **CO 1:** Describe key modelling concepts—model types, assumptions, formulation, and validation—and explain their role in analysing computer-based systems. **CO 2:** Interpret growth, decay, and epidemic/spread behaviours using conceptual, graphical, and application-oriented models relevant to digital platforms and networks. **CO 3:** Apply basic graph and network modelling ideas (nodes, edges, paths, connectivity, centrality) to understand communication networks and social influence patterns. **CO 4:** Analyse diffusion, influence, and cascading processes that govern viral information, trending content, and behavioural spread in online systems. **CO 5:** Examine simple system and queue models to interpret server performance, congestion patterns, and latency behaviour in computing environments.
9	**Syllabus** **UNIT I: Foundations, Growth Models and Spread/Epidemic Models** • **Introduction to Mathematical Modelling:** Purpose and role of models in computing. Types of models: deterministic/probabilistic, discrete/continuous. Steps in modelling: assumptions, formulation, validation, interpretation. Case discussions: system performance modelling, traffic growth, user dynamics • **Growth and Decay Models (Application-Oriented):** Exponential and logistic growth (conceptual, graphical understanding), Stability and long-term behaviour. **Real-world applications such as:** User-growth modelling for a digital platform, Forecasting server traffic or demand spikes, Modelling viral content growth • **Epidemic and Spread Models in Computing:** SIR-type models: compartments, flows, parameters. Epidemic thresholds, peak behaviour (conceptual). **Real-world applications such as:** Information/malware spread on networks, Misinformation propagation on social media, Contagion behaviour in distributed systems **UNIT II: Network Models, Influence Models and System Behaviour Models** • **Network Models (Graph-Based Modelling): Graph concepts:** nodes, edges, weighted/unweighted, paths. Connectivity, shortest paths, centrality (conceptual). **Real-world applications such as :** Communication and data networks, Routing intuition, Network congestion behaviour, Social network influence modelling (spread of opinions, influence scores) • **Influence and Diffusion Models:** Threshold models, cascading behaviour. Influence maximization (conceptual, no algorithms). Diffusion of ideas/information in networks. **Real-world Applications such as:** Viral marketing, Social influence dynamics, Trend propagation online • **System Behaviour and Queue Models:** Concept of discrete-time system modelling. Intuitive introduction to queues: arrival, service, waiting. Behaviour of servers under increasing load. **Real-**

world applications such as: Simple server/queue behaviour simulation, Cloud service delay modelling, Network latency and buffering

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE out of SIX. (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	**Marks**
1.	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQs which should be solved in a time duration of 20 minutes.	10
2.	Mini-Project, Case Study, Seminar, Posters, Self-Learning Evaluation, Presentation, etc.	10
		Total 20

11

REFERENCES:

1. Edwards, D., & Hamson, M. (1990). *Guide to mathematical modelling*. Springer.
2. Kapur, J. N. (1988). *Mathematical modelling*. Wiley Eastern.
3. Kermack, W. O., & McKendrick, A. G. (1991). *Contributions to the mathematical theory of epidemics* (Vol. 1). Springer.
4. Newman, M. E. J. (2010). *Networks: An introduction*. Oxford University Press.
5. Kleinrock, L. (1975). *Queueing systems, volume I: Theory*. Wiley.
6. Barabási, A.-L. (2016). *Network science*. Cambridge University Press.
7. Easley, D., & Kleinberg, J. (2010). *Networks, crowds, and markets: Reasoning about a highly connected world*. Cambridge University Press.
8. Pastor-Satorras, R., Castellano, C., Van Mieghem, P., & Vespignani, A. (2015). *Epidemic processes in complex networks*. Oxford University Press.
9. Trivedi, K. S. (2002). *Probability and statistics with reliability, queuing, and computer science applications* (2nd ed.). Wiley.
10. Mitzenmacher, M., & Upfal, E. (2005). *Probability and computing: Randomized algorithms and probabilistic analysis*. Cambridge University Press.

11. Taha, H. A. (2017). *Operations research: An introduction* (10th ed.). Pearson.
12. Singiresu, S. R. (2016). *Engineering optimization: Theory and practice* (5th ed.). Wiley India.
13. Rao, S. S. (2010). *Applied numerical methods for engineers and scientists*. PHI Learning.
14. Kanti Swaroop, P., & Mohan, M. (2014). *Operations research*. Sultan Chand & Sons.
15. Negi, L. R. (2014). *Mathematical models in operations research*. McGraw Hill Education.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Minor Course Provided By
B.Sc. (Mathematics)

Semester- IV

Title: Practicals based on Mathematical Modelling for Computer Applications

Vertical – 2
Minor Course – 2 Credits

with effect from
Academic Year 2025-2026

Title: Practicals based on Mathematical Modelling for Computer Applications (Course Code: CHMMATHIV5)

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course provides an application-focused understanding of how mathematical models help explain and predict behaviours in modern computer systems. Students learn foundational modelling concepts and explore growth, decay, and spread processes relevant to digital platforms, user dynamics, and information or malware propagation. The course also introduces graph-based network models, influence and diffusion behaviours, and basic system and queue modelling used to analyse server performance and network congestion. Emphasis is placed on intuitive reasoning, real-world scenarios, and developing a modelling mindset for analysing complex computing environments.
2	**Vertical 2**	Minor
3	**Type & Teaching Method**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1.** To enable students to understand and apply the fundamental steps of mathematical model building—including problem formulation, assumption identification, and graphical interpretation—through practical, real-world computing scenarios. **CO(A) 2.** To develop the ability to construct, compare, and analyse growth-based models (exponential, logistic, and combined growth–decay) for applications such as user growth prediction, server load behaviour, and viral content dynamics. **CO(A) 3.** To equip learners with hands-on skills in designing and interpreting epidemic-style SIR models for understanding information/malware propagation and evaluating intervention or control strategies in networked systems. **CO(A) 4.** To introduce students to graph-based network modelling and analysis, enabling them to compute fundamental network metrics, identify bottlenecks,	

	model routing behaviour, and understand influence dynamics in social networks. **CO(A) 5.** To apply modelling techniques to system performance scenarios by simulating queue behaviours, analysing server load patterns, and interpreting performance outcomes for computing and communication systems.
8	**Course Outcomes**: After successful completion of the course, learners will be able to: **CO 1:** Apply the complete model-building process—problem identification, assumption setting, formulation, and visualization—to real computing scenarios such as user-growth prediction. **CO 2:** Construct and compare exponential, logistic, and combined growth–decay models, and interpret their behaviour through graphical and analytical techniques relevant to server load and viral content dynamics. **CO 3:** Implement and analyse SIR-based epidemic models to study malware or information spread in networks, and evaluate the impact of intervention or control strategies. **CO 4:** Build and analyse graph-based network models, compute essential graph metrics, and identify network bottlenecks and routing behaviours through hands-on network simulations. **CO 5:** Develop and execute practical simulations of influence diffusion, recommendation behaviour, and queue-based system performance models to interpret real-world server, congestion, and latency patterns.
9	**Syllabus** **PRACTICAL 1: Introduction to Model Building - User Growth Prediction** a) Understanding the Model Building Process: Problem Formulation and Visualization b) Applying Different Model Types: Solving Simple Growth Prediction Problems **PRACTICAL 2: Exponential vs. Logistic Growth - Server Load Modelling** a) Formulation and Graphical Solution of Exponential Growth Problems b) Solving Logistic Growth Problems Using Graphical and Analytical Methods **PRACTICAL 3: Viral Content Spread Simulation** a) Implementation of Combined Growth-Decay Models for Viral Dynamics b) Application of Parameter Sensitivity Analysis to Viral Spread Models **PRACTICAL 4: SIR Epidemic Model - Malware Propagation** a) Understanding and Solving SIR Compartmental Models for Network Security b) Application of Control Measures and Intervention Strategies **PRACTICAL 5: Network Fundamentals - Social Network Analysis** a) Formulation of Network Models and Computing Basic Graph Metrics b) Application of Centrality Measures **PRACTICAL 6: Network Flow and Bottlenecks - Routing Model** a) Formulation and Solution of Maximum Flow Problems b) Comparison of Routing Strategies **PRACTICAL 7: Influence and Recommendation Systems** a) Implementation of Probabilistic Influence Spread Models in Social Networks

b) Application of Seed Selection Strategies and Adoption Rate Sensitivity Analysis

PRACTICAL 8: System Queuing and Server Performance Modelling

a) Mathematical Formulation and Manual Calculation of Queuing Systems

b) Multi-Server Systems and Priority Queuing

10

Scheme of Examination and Assessment Pattern

Paper – 50

External Examination: Semester End External - 30 marks

Sr. No.	Nature of Evaluation	Marks
	Project Evaluation:	
1)	Problem definition and justification	05
2)	Model design and assumptions	05
3)	Implementation quality	05
4)	Analysis depth	05
5)	Presentation and documentation	10
	Total 30	

Internal Examination: Continuous Evaluation - 20 marks

Sr. No.	Nature of Evaluation	Marks
	Project Evaluation:	
1)	Week 1: Choose topic, define problem, get approval	03
2)	Week 2: Design model, start implementation	05
3)	Week 3: Complete implementation, run scenarios	06
4)	Week 4: Analysis, visualization (Interpretation and Validation)	06
5)	Week 5: Report writing, Presentation and submission	--
	Total 20	

Integrated Project - Network Modelling Case Study: Apply all learned concepts to build a complete modelling project.

Project Options (Choose ONE):

1. **Misinformation Spread on Social Media**
   - Model how false information spreads through a social network.
   - Combine: SIR model + Network structure
   - Components: Believers (I), Skeptics (S), Fact-checkers (R)
   - Include: Network centrality, threshold effects, intervention strategies
2. **User Growth and Churn on a Platform**
   - Model user acquisition and retention for an app.
   - Combine: Logistic growth + Network effects
   - Components: New users, Active users, Churned users, Referrals
   - Include: Growth rate, retention rate, network-driven virality
3. **Network Congestion and Load Balancing**
   - Model traffic distribution in a server network.
   - Combine: Flow models + Queuing concepts
   - Components: Multiple servers, varying capacities, request routing

- Include: Bottlenecks, load distribution, optimization

4. **Open Choice**
   - Propose your own computing-related modelling problem.
   - Must incorporate at least TWO concepts from the course
   - Must have clear application to computer science
   - Get instructor approval before starting

Project Requirements for internals:

1. **Problem Definition:**
   - Clear statement of problem
   - Why is modelling useful here?
   - What are you trying to predict/understand?
2. **Model Design:**
   - Clearly state all assumptions
   - Define model type and justify choice
   - Explain parameters and their meanings
   - Draw diagrams of model structure
3. **Implementation:**
   - Build working simulation (Excel/Python)
   - Show calculations/code clearly
   - Demonstrate model runs with different parameters
4. **Analysis:**
   - Present results with visualizations (graphs, charts)
   - Compare different scenarios
   - Identify key insights and patterns
   - Discuss thresholds, peaks, optimal points
5. **Interpretation and Validation:**
   - Do results make sense?
   - What are model limitations?
   - How could the model be improved?
   - Real-world applicability

Deliverables for external evaluation:

1. **Written Report (1500-2000 words):**
   - All sections above
   - Professional formatting
   - References to course concepts
2. **Visualizations:**
   - Minimum 3 graphs/charts
   - Network diagrams where applicable
   - Clear labels and legends
3. **Presentation (10 minutes):**
   - Problem overview
   - Model explanation
   - Key results
   - Insights and recommendations
4. **Working Model:**

	○ Excel file or Python code ○ Commented and organized ○ Runnable by instructor
11	**REFERENCES:** 1. Edwards, D., & Hamson, M. (1990). *Guide to mathematical modelling*. Springer. 2. Kapur, J. N. (1988). *Mathematical modelling*. Wiley Eastern. 3. Kermack, W. O., & McKendrick, A. G. (1991). *Contributions to the mathematical theory of epidemics* (Vol. 1). Springer. 4. Newman, M. E. J. (2010). *Networks: An introduction*. Oxford University Press. 5. Kleinrock, L. (1975). *Queueing systems, volume I: Theory*. Wiley. 6. Barabási, A.-L. (2016). *Network science*. Cambridge University Press. 7. Easley, D., & Kleinberg, J. (2010). *Networks, crowds, and markets: Reasoning about a highly connected world*. Cambridge University Press. 8. Pastor-Satorras, R., Castellano, C., Van Mieghem, P., & Vespignani, A. (2015). *Epidemic processes in complex networks*. Oxford University Press. 9. Trivedi, K. S. (2002). *Probability and statistics with reliability, queuing, and computer science applications* (2nd ed.). Wiley. 10. Mitzenmacher, M., & Upfal, E. (2005). *Probability and computing: Randomized algorithms and probabilistic analysis*. Cambridge University Press. 11. Taha, H. A. (2017). *Operations research: An introduction* (10th ed.). Pearson. 12. Singiresu, S. R. (2016). *Engineering optimization: Theory and practice* (5th ed.). Wiley India. 13. Rao, S. S. (2010). *Applied numerical methods for engineers and scientists*. PHI Learning. 14. Kanti Swaroop, P., & Mohan, M. (2014). *Operations research*. Sultan Chand & Sons. 15. Negi, L. R. (2014). *Mathematical models in operations research*. McGraw Hill Education.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- IV

Vertical - 3
Open Elective Course - 2+2 Credits

with effect from
Academic Year 2025-2026

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College

(Autonomous)

(Affiliated to the University of Mumbai)

University College Code: 217 | JD Office: T14

Faculty of Interdisciplinary

List of Skill Based Open Electives for Second Year: Semester – IV

Sr. No.	Semester IV Subject
1	Digital Interface, Web Design And Publishing
2	3D Modeling And Character Animation Fundamentals
3	Advance Tools Of AI For Economics And Education - II
4	English For Leadership and Strategic Communication
5	Urbanization And Real Estate: Applied Urban Planning, Design And Sustainable Cities
6	Travel Agency And Tour Operators Business
7	Managing Family Wealth Through Family Office-IV
8	Advanced Web Designing &Amp; Portfolio Development
9	Basics Of Nutrition - 4
10	Reel Strategy And Influencer Management
11	Preforming Art- Dance-4
12	Data Analysis Project Based Approach
13	Strategic Political Communication, Digital Governance And AI-Driven Public Engagement Skills
14	Psychology Of Personal Relationship-II
15	Digital Society And Social Change
16	Mushroom Cultivation Training And Trading Level 4
17	Pranayama And Yogic Breathing Practices
18	Perfumery Course Level 4
19	Career Launchpad: Communication And Employability Skills
20	Beautician: Strategic Business Planning -IV
21	Current Trends In Fashion Designing: Financial Perspective Level 4
22	Basics Of Accounting-IV
23	Digital Marketing -IV
24	Online Trading For Investment Management

Smt. Chandibai Himathmal Mansukhani College Ulhasnagar (Autonomous)

P.B. No 17, Opp. Railway Station, Smt. Chandibai Himathmal Mansukhani Road, Ulhasnagar- 421003, Dist. Thane, (MAHARASHTRA)
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Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B. Sc.
(Information Technology)

Semester- IV

Title: Computer Graphics

Vertical - 4
Skill Enhancement Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Computer Graphics
Course Code: CHMITIV8

Sr. No.	Heading	Particulars
1	**Description of the Course:**	**Computer Graphics Practical** is a hands-on course designed to introduce students to the foundational principles of computer graphics, including 2D transformations, graphical modelling, and basic animations. The course focuses on applying mathematical concepts like translation, rotation, scaling, and shearing to create and manipulate graphical objects. Students will learn to use programming tools such as Python (Matplotlib, Pygame, OpenCV) or C/C++ libraries to implement these concepts. Through practical assignments, they will develop the skills to create simple 2D animations, simulate real-world objects, and design graphical scenes. The course bridges the gap between theoretical concepts and real-world applications, fostering creativity and problem-solving in visual computing.
2	**Vertical 4**	Skill Enhancement Course
3	**Type**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Introduce foundational concepts of 2D transformations, geometric modelling, and rendering techniques in computer graphics. **CO(A) 2:** Develop skills to apply 2D transformations (translation, rotation, scaling, shearing, reflection) and basic animations. **CO(A) 3:** Enable students to simulate real-world objects and create simple animations. **CO(A) 4:** Equip students to understand graphics pipelines, coordinate systems, and basic rendering principles.	

	CO(A) 5: Foster creativity and logical thinking by implementing graphical scenes and animations.
8	**Course Outcomes**: Student will be able to: **CO 1:** Understand and apply 2D transformation matrices to graphical objects. **CO 2:** Implement simple graphics primitives and manipulate them using transformations. **CO 3:** Create basic 2D animations (e.g., bouncing ball, rotating shapes). **CO 4:** Understand and utilize color models, coordinate systems, and graphical libraries. **CO 5:** Develop basic graphical applications using lightweight tools and programming languages.

9	**Syllabus**
	UNIT I:
	• Drawing Basic Shapes
	  • Objective: a) Draw lines, circles, rectangles, Concentric Circles and polygons using graphical primitives. b) Draw a co-ordinate axis at the center of the screen.
	  • Tool: Python with Matplotlib or OpenCV.
	• Create a simple house using basic shapes
	  • Objective: Combine multiple primitives(rectangle, triangle, square, circle) to form a simple figure.
	  • Tool: Python with Matplotlib or OpenCV.
	• Line Drawing Algorithms
	  • Objective: Implement the DDA (Digital Differential Analyzer) algorithm.
	  • Tool: Python or C++.
	• Bresenham's Line Drawing Algorithm
	  • Objective: Implement Bresenham's line drawing algorithm.
	  • Tool: Python or C++.
	• Circle Drawing Algorithms
	  • Objective: Implement the Midpoint Circle algorithm.
	  • Tool: Python or C++.
	• Polygon Filling
	  • Objective: Implement the 4-connected and 8-connected boundary-fill and flood-fill algorithms.
	  • Tool: Python or C++.
	• Translation Transformation
	  • Objective: Shift a 2D object using translation matrices.
	  • Tool: Python with Matplotlib.
	• Rotation Transformation
	  • Objective: Rotate a 2D object about a fixed point or origin.
	  • Tool: Python with Matplotlib.
	• Scaling Transformation
	  • Objective: Scale a 2D object up or down using scaling matrices.
	  • Tool: Python with Matplotlib.
	• Reflection Transformation
	  • Objective: Reflect a 2D object across x-axis, y-axis, and diagonal.
	  • Tool: Python with Matplotlib.
	• Shearing Transformation

- Objective: Apply x-axis and y-axis shearing to a 2D object.
- Tool: Python with Matplotlib.

- Composite Transformations
  - Objective: Combine translation, rotation, and scaling on a 2D object.
  - Tool: Python with Matplotlib.
- Clipping Algorithms
  - Objective: Implement the Cohen-Sutherland line clipping algorithm.
  - Tool: Python or C++.
- Window-to-Viewport Transformation
  - Objective: Map a 2D object from a window to a viewport.
  - Tool: Python or C++.
- Basic Interactive Graphics
  - Objective: Create a simple interactive graphics program (e.g., moving a rectangle with arrow keys).
  - Tool: Python with Pygame.

UNIT II:

- Simple Animation
  - Objective: Animate a moving ball across the screen.
  - Tool: Python with Pygame.
- Bouncing Ball Animation
  - Objective: Create a bouncing ball with collision detection.
  - Tool: Python with Pygame.
- Rotating Object Animation
  - Objective: Animate a rotating triangle or square.
  - Tool: Python with Pygame or Matplotlib.
- Scaling Animation
  - Objective: Create an animation showing pulsating objects (grow/shrink).
  - Tool: Python with Matplotlib.
- Multiple Object Animation
  - Objective: Animate multiple objects moving independently.
  - Tool: Python with Pygame.
- Color Models
  - Objective: Experiment with RGB and HSI color models.
  - Tool: Python with OpenCV.
- Bezier Curves
  - Objective: Draw and animate a Bezier curve.
  - Tool: Python with Matplotlib.
- 2D Game Development Basics
  - Objective: Create a simple 2D game (e.g., a ball avoiding obstacles).
  - Tool: Python with Pygame.
- Shape Animation
  - Objective: Perform a smiling face animation.
  - Tool: Python with Pygame or Matplotlib.
- Parallax Scrolling Animation
  - Objective: Implement parallax scrolling for a background in 2D graphics.
  - Tool: Python with Pygame.

- Path Animation
  - Objective: Animate an object moving along a predefined path.
  - Tool: Python with Matplotlib.
- Collision Detection
  - Objective: Implement collision detection between 2D objects.
  - Tool: Python with Pygame.
- Interactive Graphics with Mouse Input
  - Objective: Create an interactive program where shapes follow mouse clicks.
  - Tool: Python with Pygame.
- Text Rendering
  - Objective: Render and animate text in a 2D graphical environment.
  - Tool: Python with Pygame.
- Final Project
  - Objective: Combine multiple concepts to create a complete animated 2D scene.
  - Example: A car moving on a road with a rising sun and trees.
  - Tool: Python with Matplotlib or Pygame

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	15
Q2	Unit 2	15
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	Marks
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11 REFERENCES:

1. Python Graphics: A Reference for Creating 2D and 3D Images, Bernard Korites, Apress, 2nd Edition 2023.
2. Computer Graphics from Scratch: A programmer's Introduction to 3D Rendering, Gabriel Gambetta, no starch press, 2021
3. 2D Computer Graphics: Modern C++ and Standard Library, Hakan Blomqvist, 2023
4. Computer graphics: C version (2nd ed.). Hearn, D. D., & Baker, M. P. (1997). Pearson Education.
5. https://matplotlib.org/stable/tutorials/advanced/transforms_tutorial.html
6. https://github.com/Apress/python-graphics
7. https://www.pygame.org/docs/

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year B.Sc.

Semester- IV

Vertical – 5

Ability Enhancement Course (English)

2 Credits

(To be offered to Students who opted Sindhi AEC in Sem I & II)

with effect from
Academic Year 2025-2026

Title: Advanced English for Workplace and Academic Communication
Course Code: CHMBSCAECIV

Sr. No.	Heading	Particulars
1	**Description of the Course:**	In an increasingly competitive academic and professional landscape, learners require advanced communication skills that enable clarity, precision, critical thinking, and professionalism. This course focuses on practical, real-world communication abilities needed for college-level academic work, job applications, workplace collaboration, and digital interactions. Through hands-on tasks, real-world assignments, and communication practice, learners become adept in using English confidently and appropriately in diverse settings.
2	**Vertical 5**	**AEC: Advanced English for Workplace and Academic Communication**
3	**Type** Teaching Methods:	Theory+ Practicum (Lecture/ Discussion/ Presentation/ Reading sessions/ Worksheets/ etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: CO(A)1: To develop advanced communication skills required for academic and professional success. CO(A)2: To train learners in report writing, summary writing, and formal documentation. CO(A)3: To enhance proficiency in digital and virtual communication platforms. CO(A)4: To strengthen presentation, interview, and workplace communication skills. CO(A)5: To build confidence in expressing ideas clearly to varied audiences.	
8	**Course Outcomes**: After completing this course, learners will be able to: **CO-1:** Demonstrate clarity, precision, and professionalism in communication. **CO-2:** Interpret and summarize written texts, visuals, and data accurately. **CO-3:** Prepare well-structured reports, emails, and professional documents.	

CO-4: Use digital tools and virtual communication etiquette effectively.

CO-5: Communicate confidently in interviews, presentations, and teamwork situations

9

Syllabus

UNIT I: Communication for Academic & Professional Settings (15 Hours)

A. Communication in Academic & Workplace Contexts

1. Features of formal communication
2. Audience-centered communication
3. Ethics in communication: integrity, attribution, clarity
4. Explaining concepts in simple and clear language
5. Interpreting graphs, charts, tables, and infographics
6. Summarizing data concisely

B. Grammar & Style for Professional Writing

1. Tone: formal, neutral, objective
2. Avoiding redundancy and ambiguity
3. Active vs. passive structures
4. Editing, revising, and proofreading techniques

UNIT II: Practical Documentation & Employability Skills (15 Hours)

1. Report writing (academic/field-based/observational)
2. Project summary reports
3. Preparing short presentations
4. Creating informational posters or digital slides
5. Writing a formal complaint or request email
6. Creating a short informational or awareness write-up

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

All questions are compulsory:

Question No	Nature of Questions	Marks
Q. 1	**Short Notes** (Attempt any 3 out of 5) - **Unit 1** **OR** Attempt **Essay Type** question. (1 out of 2) - **Unit 1**	15
Q. 2	**Short Notes** (Attempt any 3 out of 5) - Unit 2 **OR** Attempt **Essay Type** question. (1 out of 2) - Unit 2	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / evaluation	Marks
1.	Assignments on **any one** of the following topics: Academic/Scientific Report/ Informational Poster / Digital Infographic (Students are required to use AI assistance in the preparation of their drafts. Eg: Notion AI, Otter.ai, Grammarly, Google Gemini, Canva, Piktochart, etc)	15
2.	Class Attendance and Participation	05
	Total	**20**

11

References:

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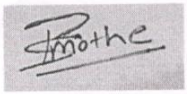
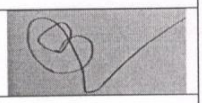
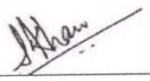
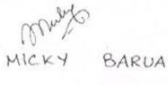
2. Bailey, Stephen. *Academic Writing: A Handbook for International Students*. 5th ed., Routledge, 2018.
3. Cargill, Margaret, and Patrick O'Connor. *Writing Scientific Research Articles*. Wiley-Blackwell, 2013.
4. Eastwood, John. *Oxford Guide to English Grammar*. Oxford UP, 2005.
5. Gerson, Sharon J., and Steven M. Gerson. *Technical Communication: Process and Product*. 9th ed., Pearson, 2021.
6. Hewings, Martin. *Advanced Grammar in Use*. Cambridge UP, 2013.
7. Kumar, Sanjay, and Pushp Lata. *Communication Skills*. 2nd ed., Oxford UP, 2018.
8. McCarthy, Michael, and Felicity O'Dell. *Academic Vocabulary in Use*. Cambridge UP, 2008.
9. Nordquist, Richard. *The Essentials of English Grammar*. McGraw-Hill Education, 2016.
10. Seely, John. *The Oxford Guide to Writing and Speaking*. Oxford UP, 2005.
11. Zinsser, William. *On Writing Well: The Classic Guide to Writing Nonfiction*. Harper Perennial, 2016.

Syllabus Committee:

Sr. No	Name of the Faculty	Designation and College	Signature
1.	Prof. (Dr.) Kailas Aute	Professor & Head, Dept. of English, Smt. CHM College	
2.	Prof. (Dr.) B. R. Hiramani,	(VC Nominee, University of Mumbai) Pancham Khemraj College, Sawantwadi	
3.	Prof. (Dr.) Vikas Raskar	(Subject Expert outside University) Hutatma Rajguru Mahavidyalay, Rajguru Nagar, Khed, (Affiliated to Savitribai Phule University)	
4.	Prof. (Dr.) Prashant Mothe	(Subject Expert outside University) Aadarsh Mahavidyalay, Umerga, Dharashiv, (Affiliated to Dr. Baba Saheb Ambedkar Marathwada University	
5.	Mr. Ananda Pandhare	Asst. Professor, Dept. of English, Smt. CHM College	
6.	Ms. Sana Khan	Asst. Professor, Dept. of English, Smt. CHM College	
7.	Dr. Micky Barua	Faculty Vidyalankar Institute of technology, Alumni Member	
8.	Ms. Sofy Verghese	Accenture, Industry Representative	

Name & Signature of the Ad-hoc BoS Chairperson: Prof. (Dr). Kailas Aute 

Name & Signature of the Dean: Prof. (Dr). Nitin Arekar 

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Second Year BA/BCom/BSc/SFC
(Marathi)

Semester- IV

Vertical -5
Ability Enhancement Course (AEC) -2 Credits

with effect from
Academic Year 2026-2027

Title: **लेखन कौशल्ये - २ (महाजालावरील लेखन)**

COURSE CODE: CHMAECMARIII

Sr. No.	Heading	Particulars
1	**Description the Course:**	राष्ट्रीय शैक्षणिक धोरण - २०२० विद्यार्थ्यांच्या सर्वांगीण विकासावर (Wholistic Development) भर देते. या धोरणात सर्वांगीण विकासाचा भाग म्हणून **क्षमता वर्धन अभ्यासक्रम (Ability Enhancement Course)** या स्तंभांतर्गत भाषिक कौशल्य अभ्यासक्रमाचा समावेश करण्यात आला आहे. कला, वाणिज्य व विज्ञान या विद्याशाखांमध्ये अध्ययन करणाऱ्या विद्यार्थ्यांना तिसऱ्या सत्रामध्ये 'आधुनिक भारतीय भाषां'चे अध्ययन अनिवार्य करण्यात आले आहे. सदर **क्षमता वर्धन अभ्यासक्रमा**चे स्वरूप प्रामुख्याने भाषाकेंद्री असावे, असेही राष्ट्रीय शैक्षणिक धोरणात नमूद करण्यात आले आहे. विद्यार्थ्यांना विविध प्रकारच्या भाषिक कौशल्यांचा तपशीलवार परिचय करून देणे, तसेच ती कौशल्ये आत्मसात करण्याची संधी विद्यार्थ्यांना उपलब्ध करून देणे, ही या अभ्यासक्रमाची महत्त्वाची उद्दिष्टे आहेत. ही उद्दिष्टे लक्षात घेऊन **'लेखन कौशल्ये - २ (महाजालावरील लेखन)' (श्रेयांकने २)** या अभ्यासपत्रिकेची आखणी करण्यात आली आहे. आंतरमहाजाल हे एकविसाव्या शतकातील अत्यंत प्रभावी साधन आहे. जगभरातील संगणक एकमेकांशी जोडले जाऊन त्यांचे जाळे तयार झाले आहे. विविध सामाजिक माध्यमस्थळांवर स्वतःचे खाते (अकाउंट) तयार करणे आणि त्यावर मराठी भाषा व देवनागरी लिपीतून लिहिणे, ही समकालीन संपर्क व्यवहारातील आवश्यक बाब झाली आहे. यास अनुसरून आपल्या अभिव्यक्तीला व्यासपीठ मिळवून देणारी अनुदिनी (ब्लॉग) तयार करणे, विकिपीडियावर भोवतालातील भाषा, साहित्य, संस्कृतीशी निगडित माहितीपर व विश्लेषणात्मक नोंदी लिहिणे, सामाजिक माध्यमस्थळांवरील आपल्या खात्यावर सातत्याने अभ्यासपूर्ण लेखन करणे, स्वक्षमतेशी निगडित समाजगट / आभासी कट्टे (कम्युनिटी ग्रुप) तयार करणे, या बाबींसाठी आवश्यक सामाजिक माध्यमस्थळ साक्षरता आणि मराठी भाषा व देवनागरी लिपीतून लिहिण्याची क्षमता **'लेखन कौशल्ये - २ (महाजालावरील लेखन)' (श्रेयांकने २)** या अभ्यासपत्रिकेच्या अध्ययनातून विद्यार्थ्यामध्ये निर्माण होईल.
2	**Vertical 5**	Ability Enhancement Course
3	**Type**	Theory
4	**Credit**	2 Credits (1 Credit = 15 Hours for Theory or 30 Hours of Practical Work in a Semester)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks

7	**Course Objectives:** **CO1:** महाजालावरील लेखन कौशल्याचे स्वरूप समजावून सांगणे. **CO2:** महाजालावर प्रभावी लेखन करण्यासाठी आवश्यक असणाऱ्या तंत्रांचा परिचय करून देणे. **CO3:** नेहमीच्या पठडीतील लेखन व महाजालावरील लेखन यांमधील साम्य-भेद स्पष्ट करणे. **CO4:** विविध सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित करणे.
8	**Learning Outcomes:** प्रस्तुत अभ्यासक्रम शिकल्यानंतर: **LO1:** विद्यार्थ्यांना महाजालावरील लेखन कौशल्याचे स्वरूप समजेल. **LO2:** विद्यार्थ्यांना महाजालावर प्रभावी लेखन करण्यासाठी आवश्यक तंत्रांचा परिचय होईल. **LO3:** विद्यार्थ्यांना नेहमीच्या पठडीतील लेखन व महाजालावरील लेखन यांमधील साम्य-भेद स्पष्ट होईल. **LO4:** विद्यार्थ्यांमध्ये विविध सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील.
9	**Syllabus** **UNIT I: सामाजिक माध्यमस्थळांवर मराठी भाषा व देवनागरी लिपीचा वापर करून लेखन (भाग - १)** १. माध्यम साक्षरता २. अनुदिनी (ब्लॉग) लेखन ३. विकिपीडियावरील लेखन (६० मिनिटांच्या १५ तासिका, श्रेयांकन १) (सूचना : विद्यार्थ्यांमध्ये उपरोक्त सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.) . **UNIT II: सामाजिक माध्यमस्थळांवर मराठी भाषा व देवनागरी लिपीचा वापर करून लेखन (भाग - २)** १. फेसबुक, इन्स्टाग्राम, एक्स यांवरील लेखन २. समाज गट (कम्युनिटी ग्रुप), आभासी कट्टे यांवरील लेखन (६० मिनिटांच्या १५ तासिका, श्रेयांकन-१) (सूचना : विद्यार्थ्यांमध्ये उपरोक्त सामाजिक माध्यमस्थळांवर लेखन करण्यासाठी आवश्यक कौशल्ये व क्षमता विकसित होतील या दृष्टीने शिक्षकांनी सराव करून घ्यावा.)

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hours

Format of Question Paper

All questions are compulsory:

Q. No	Nature of Questions	Marks
Q1	Essay type question on Module 1	10
Q2	Essay type question on Module 2	10
Q6	MCQs 15 out of 20, 10 MCQs on each module	10
	Total 30	

Internal Examination: Continuous Evaluation - 20 marks

	Project and presentation / Viva	Marks
1.	• **विकिपीडियासाठी माहिती संकलन, संदर्भ व्यवस्थापन, तथ्य पडताळणी Fact Checking tool तयार करणे आणि लेख तयार करणे.** • **AI साधने वापरुन Facebook, Instagram आणि X (Twitter) साठी मराठीतील पोस्ट, Caption, Hashtags आणि Content Calendar तयार करणे.** • **AI Copywriting Tools चा वापर करून सामाजिक माध्यमांसाठी आकर्षक व लक्ष्यित (Targeted) मजकूर तयार करणे.** • **AI साधनाच्या सहाय्याने Social Media Content चे भाषा विश्लेषण, शुद्धलेखन तपासणी आणि देवनागरी लिपीतील लेखन सुधारणा करणे.** • **AI साधनाच्या सहाय्याने Community Groups आणि Virtual Discussion Platforms साठी माहितीपूर्ण पोस्ट, जनजागृती मोहीम आणि संवादात्मक मजकूर तयार करणे.** • **AI Image Generation आणि Video Tools च्या सहाय्याने सामाजिक माध्यमांसाठी Creative Campaign तयार करणे.** • **Blog, Wikipedia आणि Social Media Content यांची AI-assisted comparative analysis करून प्रभावी डिजिटल लेखनाचा अभ्यास करणे.** **AI साधने:** ChatGPT, Google Gemini, Claude, Perplexity AI, NotebookLM, Canva, CapCut, InVideo, Grammarly, QuillBot, Whisper, ElevenLabs	20
		Total 20

11	**संदर्भ ग्रंथ (Reference Books) :** १. *मराठी व्याकरण आणि लेखन*, विनायक गंधे व मीरा जोशी, निराली प्रकाशन, पुणे, २०१२. २. *उपयोजित मराठी*, (संपा.) केतकी मोडक व अन्य, पद्मगंधा प्रकाशन, पुणे, २०१२. ३. *मराठी भाषिक कौशल्य विकास,* (संपा.) पृथ्वीराज तौर, अथर्व पब्लिकेशन्स, धुळे, २०१८. ४. व्यावहारिक मराठी, ल. रा. नसिराबादकर, भाषा विकास संशोधन संस्था, कोल्हापूर, २०२३. ५. *Aayushi International Interdisciplinary Research Journal* (ISSN 2349-638x) Peer Reviewed Journal www.aiirjournal.com

Smt. Chandibai Himathmal Mansukhani College

(Autonomous)

Second Year B.A

(Hindi)

Semester – IV

Title : हिंदी भाषा : व्यावहारिक प्रयोग

Vertical - 5

AEC – 2 Credits

with effect from

Academic Year 2025-2026

Title : हिंदी भाषा : व्यावहारिक प्रयोग
Course Code : CHMAECHINIV

Sr.No.	Heading	Particulars
1.	Description of the Course :	भाषा का जीवन में सदैव महत्व रहा है, जीवन और भाषा का चोली – दामन का संबंध है, जब हमारी भाषा मधुर और सार्थक होती है तो श्रेता पर विशिष्ट प्रभाव पड़ता है, भाषा का यदि सही और सार्थक रूप से प्रयोग किया जाए तो मुनष्य जीवन में कहीं भी असफल नहीं हो सकता है, इसी भाषा के माध्यम से हम सभी को अपनी ओर आकर्षित भी करते है, वर्तमान युग में रोजगार में बहुत से क्षेत्र भाषा से जुड़े हुए है, जिसके माध्यम से विद्यार्थी इनका लाभ ग्रहण कर सकते है, भाषाई क्षमता हमारे विचारों की संवाहक होती है, आज डिजिटल युग में अभिव्यक्ति के कई माध्यमों का प्रसार हुआ है, इन माध्यमों में भाषा ही सशक्त तत्व है जो आपकी अभिव्यक्ति को पूरे जगत को अवगत कराती है, भाषा का महत्व हर समय, हर माध्यम में रहा है, परंतु भाषा का सार्थक रूप का प्रयोग आज बहुत आवश्यक है। आज हिंदी अंतरराष्ट्रीय स्तर पर प्रयोग में लाई जा रही है, तकनीक, सूचना प्रौद्योगिकी सोशल मीडिया, राजनीति की भाषा हिंदी बन चुकी है, जीवन में कई क्षेत्रों में व्यावहारिक स्तर पर हमें अपनी भाषा के लिखित स्वरूप के कार्यो को करना होता है और ऐसे में कार्य-दक्ष्ता महत्व रखती है, हिंदी भाषा में व्यावहारिक प्रयोग को केंद्र में रखकर और इन्हीं पहलूओं को ध्यान में रखते हुए इस पाठ्यक्रम का गठन किया गया है, हम हिंदी भाषा को सही और शुद्ध रूप में प्रयोग कर अभिव्यक्ति को सफल बनाए और बिना व्याकरण के यह संभव नहीं है, इस दृष्टि से पाठ्यक्रम सर्वाधिक लाभकारी सिद्ध होगा
2.	Vertical : 5	AEC
3.	Type : Teaching Methods :	Theory + Practium Lecture / Discussion / Presentation / Self Study, etc.

4.	**Credit :**	2 Credits (1 Credit = 15 Hours for Theory)
5.	**Hours Allotted :**	30 Hours
6.	**Marks Allotted :**	50 Marks
7.	**Course Objectives :** **CO(A)1:** विद्यार्थियों को राजभाषा हिंदी का विधिवत ज्ञान प्रदान करना । **CO(A)2:** विद्यार्थियों को राजभाषा हिंदी के संवैधानिक महत्तव से परिचित करवाना । **CO(A)3:** विद्यार्थियों को संज्ञा आदि का ज्ञान प्रदान करना। **CO(A)4:** विद्यार्थियों को कारकों, वाक्य रचना एवं भाषिक चिन्हों आदि का ज्ञान प्रदान करना ।	
	Course Outcomes : **CO1 :** विद्यार्थियों को राजभाषा हिंदी का ज्ञान प्राप्त होगा, एवं दक्षता प्राप्त होगी । **CO2 :** विद्यार्थियों को राजभाषा हिंदी के संवैधानिक महत्तव की जानकारी प्राप्त होगी । **CO3 :** विद्यार्थियों को हिंदी – संज्ञा आदि का ज्ञान प्राप्त होने के साथ भाषा के शुद्ध, व्यावहारिक रूप का ज्ञान होगा । **CO4 :** विद्यार्थियों को कारकों, वाक्य रचना एवं भाषिक चिन्हों आदि का ज्ञान प्राप्त होगा ।	
9.	**Syllabus**	
	UNIT I :	
	1. हिंदी भाषा – सामान्य परिचय	
	2. राजभाषा हिंदी – संवैधानिक महत्तव	
	3. वर्णमाला – स्वर एवं व्यंजन	
	4. शब्द भेद – सामान्य परिचय (संज्ञा आदि)	
	UNIT II :	
	1. वाक्य – सामान्य परिचय	
	2. वर्तनी – शुद्धता का प्रयोग एवं सावधानियाँ	
	3. कारक एवं विराम चिन्ह	
	4. निबंध लेखन – (सामाजिक निबंध, आत्मकथात्मक निबंध, समसामायिक निबंध)	

10.

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination : Semester End External – 30 Marks Time : 1:00 Hours

Format of Question Paper

All Questions are Compulsory

मूल्यांकन प्रारूप	इकाई	अंक
<u>बाह्य मूल्यांकन</u> प्रश्न 1 : चार प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए। प्रश्न 2 : चार प्रश्नों में से किन्हीं दो प्रश्नों के उत्तर लिखिए।	इकाई 1 इकाई 2	15 15
	कुल अंक	**30**

मूल्यांकन प्रारूप	अंक
<u>आंतरिक मूल्यांकन</u> • AI की सहायता से हिंदी भाषा, राजभाषा हिंदी एवं उसके संवैधानिक महत्व पर शोध, सारांश एवं डिजिटल प्रस्तुति (Presentation) तैयार करना। • AI Grammar एवं Writing Tools का उपयोग करके वर्णमाला, शब्द-भेद, वाक्य-रचना, कारक, विराम-चिह्न तथा वर्तनी शुद्धता का अभ्यास करना एवं त्रुटियों का विश्लेषण करना। • AI की सहायता से हिंदी व्याकरण पर आधारित प्रश्नसंच (Question Bank), Quiz तथा Interactive अभ्यास-पत्र तैयार करना। • AI Writing Tools का उपयोग करके सामाजिक, आत्मकथात्मक एवं समसामयिक विषयों पर निबंध लेखन करना तथा AI द्वारा तैयार निबंध और विद्यार्थी द्वारा लिखे गए निबंध का तुलनात्मक विश्लेषण करना। • AI की सहायता से कठिन शब्दों के अर्थ, पर्यायवाची, विलोम, शब्दावली तथा सरल भाषा में व्याख्या तैयार करना। • AI Voice Tools का उपयोग करके शुद्ध उच्चारण, वाचन एवं मौखिक अभिव्यक्ति का अभ्यास करना तथा उच्चारण संबंधी Feedback प्राप्त करना।	20
कुल अंक	**20**

11.	**संदर्भ ग्रंथ सूची –** 1. बाबूराम सक्सेना – सामान्य भाषा विज्ञान, हिंदी साहित्य सम्मेलन, प्रयाग। 2. कामताप्रसाद गुरू – हिंदी व्याकरण, लोकभारती प्रकाशन, इलाहाबाद। 3. आचार्य देवेंद्र नाथ शर्मा – भाषा विज्ञान की भूमिका, राधाकृष्ण प्रकाशन, दिल्ली। 4. भाषा विज्ञान एवं भाषा शास्त्र – कपिलदेव द्विवेदी, विश्वविद्यालय प्रकाशन, वाराणसी। 5. भोलानाथ तिवारी, भाषा विज्ञान, किताब महल, इलाहाबाद।

Bos in Hindi :

Sr No	Name of the Faculty	Designation and College
1.	Dr. Bhavna M.Rochlani	I/C HOD Asst. Professor CHM College Ulhasnagar
2.	Dr. Ajeet Kumar Rai	Associate Professor KC College Mumbai
3.	Dr. Santosh Motwani	Associate Professor RKT College Ulhasnagar

Name & Signature of the Ad-hoc BoS Chairperson –

Dr. Bhavna M. Rochlani : _____

Name & Signature of the Dean –

Dr. Nitin Arekar : _____

Hiranandani Mansukhani College, Ulhasnagar * Smt Chandibai (Autonomous)

27

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

First Year

Semester- IV

Title: Cocurricular Course I

Vertical - 6
Cocurricular Course - 2 Credits

with effect from
Academic Year 2025-2026

Title: Cocurricular Course - I

Course Code: CHMCCI6

Sr. No.	Heading	Particulars
1	**Description the Course:**	This student-friendly Co-Curricular Course is uniquely designed to promote holistic development through active participation in various college-based activities. Unlike traditional theory-based subjects, this course emphasizes hands-on involvement and experiential learning. Students are encouraged to explore their interests and talents by engaging in cultural, social, literary, sports, extension, or club-based events conducted by the college throughout the academic year. Participation will be recorded and assessed based on involvement, initiative, team spirit, creativity, and consistency. The aim is to nurture essential life skills such as leadership, communication, collaboration, and responsibility in a supportive, informal setting. This non-theory course offers students the opportunities and the freedom to learn beyond the classroom and grow into well-rounded individuals, contributing positively to campus life and society.
2	**Vertical 6**	Cocurricular Course (Mandatory)
3	**Type** **Teaching Methods**	Non Theory Participation, Report Writing, Presentation etc.
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: 1. To inculcate a spirit of active participation in cultural, social, environmental, and creative activities. 2. To enhance personal and interpersonal skills through real-life experiences and teamwork. 3. To foster a sense of responsibility, leadership, and community engagement among students. 4. To develop self-confidence and emotional well-being through creative expression and collaboration. 5. To integrate classroom learning with experiential learning for holistic growth.	
8	**Learning Outcomes**: By the end of the course, students will be able to: **LO1:** Participate meaningfully in diverse co-curricular activities and reflect on their learning experiences. **LO2:** Demonstrate improved communication, leadership, and teamwork skills. **LO3:** Exhibit increased awareness of social responsibility and civic engagement. **LO4:** Build confidence through creative, cultural, and intellectual expressions. **LO5:** Maintain a portfolio or activity log to track participation and personal development.	

9	**Syllabus** **Unit I - Suggested Areas of Participation in the activities:** • **Cultural Events:** Drama, dance, music, literary events, debates, etc. • **Social Outreach:** Blood donation, awareness campaigns, cleanliness drives. • **Clubs & Societies:** Photography, quiz, environment club, shram club, etc. • **Sports & Fitness:** College tournaments, yoga, marathons, fitness challenges. • **Institutional Events:** Foundation Day, Annual Day, College Festivals, Intercollegiate events. • **National Festivals:** Independence Day, Republic Day etc. **Unit II - Program Specific Topics** • **Workshops/Seminars:** Report Writing, Personality Development, Soft Skills, Leadership Talks. • **Speak, Show, Shine:** Presentation / Poster Presentation / Viva and Learning Experience **Mode of Evaluation:** • **Faculty Coordinator:** To guide and evaluate student progress. • **Participation Proof:** Certificates, photos, attendance records. • **Reflective Journal:** Minimum 2–3 pages summarizing experiences, learning, and growth. • **Final Viva/Presentation:** 5-minute talk on poster presentation and on overall learning.
10	**Scheme of Examination and Assessment Pattern** **Based on 3 approved Activities** **Semester End External - 30 marks**

Activity No	Nature of Activities	Marks
1.	Title of Approved Activity - 1	10
2.	Title of Approved Activity - 2	10
3.	Title of Approved Activity - 3	10
	Total	**30**

Internal Examination: Continuous Evaluation – 20 marks

	Assessment / Evaluation	Marks
1.	Reflective journal	10
2.	Presentation/ poster presentation/viva	10
	Total	**20**

Suggested Readings:

- How to Win Friends and Influence People
- The 7 Habits of Highly Effective People
- Thinking, Fast and Slow
- Leaders Eat Last
- Talk Like Ted

Name & Signature of the Principal & Chairperson, Academic Council:

Dr. Manju Lalwani Pathak

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College, Ulhasnagar

(Autonomous)

Affiliated to the University of Mumbai

Bachelor of Science
(Information Technology)
(Self-Financing Course)

Semester – V

Choice Based and Credit Based syllabus as per NEP 2020 with effect from the Academic Year 2026-2027

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: Dot .Net Core and Progressive Web Application

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Dot .Net Core and Progressive Web Application
Course Code: CHMITV1

Sr. No.	Heading	Particulars
1	**Description of the Course:**	.NET Core and PWA is a major theory course It bridges two of the most important domains in contemporary full-stack and cross-platform web development: server side application development on the modern Microsoft .NET platform using C# and ASP.NET Core, and client side Progressive Web Application (PWA) engineering using open web standards. Together, they equip students with an end-to-end skill set for building enterprise grade, cross-device, and offline-capable web applications — a profile that is in exceptionally high demand across Indian IT industry, product companies, and global MNCs. language fundamentals (data types, control flow, methods, error handling) through object-oriented programming (classes, inheritance, polymorphism, interfaces, exception handling) — before progressing to ASP.NET Core architecture: the request pipeline, middleware, routing, the Model-View-Controller (MVC) pattern, Razor Pages, and RESTful Web API development. The second half pivots to Progressive Web Applications — exploring the PWA philosophy, Service Workers and their lifecycle, the Web App Manifest, caching strategies, offline functionality, push notifications, responsive/mobile-first design, and the critical integration of PWA front-ends with ASP.NET Core back-ends, rounded off by security fundamentals (CORS, JWT overview) and performance optimisation using industry tools such as Lighthouse.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits (1 credit = 15 Hours for Theory)
5	**Hours allotted**	30 Hours

6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To provide students with fundamental and advanced knowledge of C# programming and the modern .NET platform. **CO(A) 2:** To enable students to design and develop web applications using ASP.NET Core architecture and MVC concepts. **CO(A) 3:** To familiarize students with restful API development and integration with front-end applications. **CO(A) 4:** To introduce the concepts, architecture, and implementation of Progressive Web Applications (PWA). **CO(A) 5:** To develop skills in building responsive, secure, and performance-optimized web applications using modern web standards.	
8	**Course Outcomes**: Student will be able to: **CO 1:** Develop applications using C# and implement object-oriented programming Concepts in the .NET environment. **CO 2:** Design and deploy dynamic web applications using ASP.NET Core, routing, Middleware, and MVC architecture. **CO 3:** Build and consume restful APIs and integrate backend services with client Side applications. **CO 4:** Create Progressive Web Applications with features such as service workers, Web app manifest, and offline caching. **CO 5:** Apply modern web development practices including responsive design, security mechanisms, and performance optimization in real-world Applications.	
9	**Syllabus** **UNIT I: Introduction to C#.NET** • **Overview of .NET Ecosystem:**.NET Framework vs. .NET Core / .NET 5+ / .NET 7+, Common Language Runtime (CLR), Assemblies, CLI tools Operators: arithmetic operators, relational operators, logical operators, increment and decrement operators, assignment operator, compound assignment operators, conditional operator, operator precedence, order of evaluation in expressions • **Basics of C# Language:** Data types, Variables, Operators, Expressions, Control Structures: If, Switch, Loops, Methods, Parameters, Error Handling • **Object Oriented Programming in C#:** Classes & Objects, inheritance, Polymorphism, Interfaces, Namespaces and Exception Handling • **ASP.NET Core Fundamentals:** Web Server Basics, Middleware, Request Lifecycle, Routing, Controllers, Views (MVC),Razor pages and REST API endpoints, Web Forms	

UNIT II: PWA

- **Introduction to PWA:** Concept and evolution of Progressive Web Applications, key characteristics (reliable, fast, engaging), comparison with native and hybrid apps, requirement of HTTPS.
- **Core PWA Components:** Web App Manifest (properties and configuration), Service Workers (registration and lifecycle), caching strategies, offline functionality, and basic push notifications.
- **Responsive Web Design:** Mobile-first approach, media queries, flexible layouts, and UI/UX principles for cross-device compatibility.
- **Integration with .NET Backend:** Consuming ASP.NET Core Web APIs, deployment basics, performance testing using tools like Lighthouse. Security and Optimization: CORS basics, authentication concepts (JWT overview), performance and accessibility best practices.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE (out of five/Six). (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE (out of five/Six). (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		Marks
1	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11	**REFERENCES:** 1. Beginning ASP.NET 4.5 in C#, Matthew MacDonald,Apress 2. C# 2015, Anne Bohem and Joel Murach,Murach,Third 3. Progressive Web App,Dean Alan Hume 4. C# 4.0: The Complete Reference Paperback – 27 April 2010 by Herbert Schildt (Author) 5. C#: A Beginner's Guide, McGraw-Hill Professional 6. Progressive Web Applications by Jason Grigsby

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: (Dot) .Net Core and Progressive Web Application (Practical)

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: (Dot) .Net Core and Progressive Web Application (Practical)
Course Code: CHMITV2

Sr. No.	Heading	Particulars
1	**Description of the Course:**	.Net Core and PWA practical course focuses on developing hands-on skills in C# and .NET technologies along with modern web development. Students work on basic programming tasks like arithmetic operations, sorting, and patterns, and gradually learn advanced concepts such as inheritance, interfaces, delegates, and exception handling. It also includes building web applications using ASP.NET, working with databases through Entity Framework Core, and performing CRUD operations. In addition, students are introduced to Progressive Web Applications (PWAs), where they learn to create web apps with offline support and real-world features.
2	**Vertical 1**	Major
3	**Type**	Practical
4	**Credit**	2 Credits (1 credit = 30 Hours of Practical work in a semester)
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To provide fundamental knowledge of C# programming and object-oriented concepts. **CO(A) 2:** To develop problem-solving skills using advanced C# features such as delegates, events, interfaces, and exception handling. **CO(A) 3:** To enable students to design and develop web applications using ASP.NET Web Forms and ASP.NET Core. **CO(A) 4:** To introduce database connectivity and ORM concepts using SQL Server and Entity Framework Core. **CO(A) 5:** To familiarize students with Web API development and modern web technologies such as Progressive Web Applications (PWA).	

8	**Course Outcomes**: Student will be able to: **CO 1**: Develop C# programs using basic programming constructs, arrays, strings, and pattern generation. **CO 2**: Apply Object-Oriented Programming concepts such as inheritance, polymorphism, interfaces, constructors, delegates, and exception handling. **CO 3**: Design and develop ASP.NET Web Forms and ASP.NET Core applications using server controls and validation techniques. **CO 4**: Implement database connectivity using SQL Server and Entity Framework Core to perform CRUD operations. **CO 5**: Develop Web APIs and Progressive Web Applications (PWA) with offline support, service workers, and manifest configuration.
9	**Unit 1:** **1.Write the program for the following:** a. Create an MVC application to perform basic Arithmetic Operations. b. Create an application to print Floyd's triangle till n rows in C#. c. Write C# code to arrange the name of cities in sorted order. Accept name of 10 cities from the user **2. Write the program with different features of C#** a. Function Overloading b. Inheritance (all types) c. Constructor overloading d. Interfaces e. Using Delegates and events f. Exception handling **3. Write the program for the following:** a. Create methods add(). multiply(), substract() ,divide() with suitable parameters and call these methods using concept of C# delegate. b. Write a program using multicast delegate. c. Create a class BankAccount with AccountNumber and Balance. Implement property for Balance with validation (Balance cannot be negative). **4. Create an ASP.NET Web Forms application using simple server controls.** a. Design a Student Registration Form using the following ASP.NET controls: i. Label and TextBox to accept Student Name ii. RadioButton to select Gender (Male/Female) iii. DropDownList to select Course (BSc IT, BSc CS, BCA) iv. CheckBox for accepting Terms & Conditions v. Calendar control to select Date vi. Button control to submit the form vii. Label control to display the output b. Create a Registration form to demonstrate use of various Validation controls.

	c. Create Web Form to demonstrate use of Adrotator Control. **5. Create the following application:** a. Create a web application to demonstrate the use of different types of Cookies. b. Create a Product Table in SQL Server and perform Insert Operation using Entity Framework Core. c. Develop a web application to perform CRUD Operations (Create, Read, Update, Delete) on Employee table using EF Core. d. Authentication and Authorization in ASP.NET Core. **Unit 2:** **1.** a. Create a simple website for a College Information Portal and convert it into a Progressive Web Application. b. Create a PWA that displays a custom offline page when the user is not connected to the internet. **2.** a. Develop a PWA that works in offline mode using Service Worker. b. Create a Student Record Management PWA. **3.** a. Create an HTML page that would be the starting point of the application. This HTML will contain a link to the file named manifest.json. This is an important file that would be created in the next step. b. Create a simple Web API that returns Student data in JSON format. **4.** a. Develop CRUD operations using ASP.NET Core Web API and Entity Framework Core. b. Create an API endpoint to calculate Factorial of a Number and test it using Postman. **5.** a. Create a PWA with a Web App Manifest file including: App name Icons Start URL Display mode Implement Push Notifications in a PWA. b. Develop an E-Commerce PWA with product listing and offline cart functionality.

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	13
Q2	Unit 2	12
Q3	Journal and Viva	05
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11 **REFERENCES:**

1. Programming in C# – E. Balagurusamy, McGraw Hill Education.
2. ASP.NET Core in Action – Andrew Lock, Manning Publications.
3. Pro ASP.NET Core MVC – Adam Freeman, Apress.
4. Entity Framework Core in Action – Jon P Smith, Manning Publication
5. Professional ASP.NET Core – Jon Galloway et al., Wrox Publication.
6. Learning Progressive Web Apps – John Wargo, Addison-Wesley.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: Artificial Intelligence and Application Development

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Artificial Intelligence and Application Development
Course Code: CHMITV3

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces the fundamental concepts and practical methodologies of Artificial Intelligence with a strong emphasis on real-world application development. It covers intelligent agents, problem-solving through search, probabilistic reasoning, machine learning, and deep learning techniques using standard AI frameworks and development tools. Students learn to design, implement, evaluate, and deploy AI models as part of complete application systems. The course integrates theoretical foundations with hands-on development, enabling learners to build intelligent solutions such as predictive analytics systems, recommendation engines, chatbots, and computer vision applications.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits (1 credit = 15 Hours for Theory)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To understand and apply core AI concepts including intelligent agents, search techniques, probabilistic reasoning, and fundamental machine learning models. **CO(A) 2:** To implement supervised and introductory deep learning algorithms with appropriate evaluation and performance analysis. **CO(A) 3:** To design end-to-end AI pipelines integrating data preprocessing, model development, validation, and inference within application architectures. **CO(A) 4:** To develop and deploy AI-based applications while ensuring scalability,	

	robustness, and ethical considerations. To develop skills in building responsive, secure, and performance-optimized web applications using modern web standards.
8	**Course Outcomes**: Student will be able to: **CO 1:** Apply intelligent agent models, search algorithms, probabilistic reasoning, and fundamental machine learning techniques to solve structured AI problems. **CO 2:** Implement and evaluate supervised and basic deep learning models using appropriate performance metrics. **CO 3:** Design and construct end-to-end AI pipelines including data preprocessing, model training, validation, and inference integration within applications. **CO 4:** Develop and deploy AI-based applications ensuring scalability, robustness, and adherence to ethical and responsible AI practices.
9	**Syllabus** **UNIT I: Foundations and theoretical approach** • **Introduction:** What Is AI? The Foundations of Artificial Intelligence, The State of the Art, Risks and Benefits of AI. • **Intelligent Agents:** Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents • **Solving Problems by Searching:** Problem-Solving Agents, Example Problems, Search Algorithms, Uninformed Search Strategies, Informed (Heuristic) Search Strategies, Heuristic Functions • **Quantifying Uncertainty:** Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and Its Use, Naive Bayes Models, The Wumpus World Revisited • **Probabilistic Reasoning:** Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Exact Inference in Bayesian Networks, Approximate Inference for Bayesian Networks, Causal Networks **UNIT II: AI Application Development and Ethics** • **Learning from Examples:** Forms of Learning, Supervised Learning, Learning Decision Trees, Model Selection and Optimization, The Theory of Learning, Linear Regression and Classification, Nonparametric Models, Ensemble Learning, Developing Machine Learning Systems. • **The Machine Learning Landscape :**What Is Machine Learning?, Why Use Machine Learning?, Types of Machine Learning Systems, Supervised and Unsupervised Learning, Batch and Online Learning, Instance-Based Versus Model-Based Learning, Main

Challenges of Machine Learning, Insufficient Quantity of Training Data, Nonrepresentative Training Data, Poor-Quality Data, Irrelevant Features, Overfitting the Training Data, Underfitting the Training Data, Stepping Back, Testing and Validating, Exercises

- **Classification:** MNIST, training a Binary Classifier, Performance Measures, Measuring Accuracy Using Cross-Validation, Confusion Matrix, Precision and Recall, Precision/Recall Tradeoff, The ROC Curve, Multiclass Classification, Error Analysis, Multilabel Classification, Multioutput Classification.
- **Decision Trees:** Training and Visualizing a Decision Tree, Making Predictions, Estimating Class Probabilities, The CART Training Algorithm, Computational Complexity, Gini Impurity or Entropy? Regularization Hyperparameters, Regression, Instability, Exercises
- **Philosophy, Ethics, and Safety of AI:** The Limits of AI, Can Machines Really Think?, The Ethics of AI

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE (out of five/Six). (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE (out of five/Six). (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		Marks
1	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11	**REFERENCES:** 1. Artificial Intelligence: A Modern Approach – Stuart Russell and Peter Norvig – Pearson Education, 2020 2. Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow – Aurélien Géron,O'Reilly Media, 2022 (Third Edition) 3. The Hundred-Page Machine Learning Book – Andriy Burkov – Andriy Burkov, 2020 (First Edition) 4. Machine Learning for Absolute Beginners – Oliver Theobald – Independently published, 2020 (First Edition) 5. Artificial Intelligence: Foundations of Computational Agents – David L. Poole and Alan K. Mackworth– Cambridge University Press, 2023 (Third Edition) 6. Online Resources: https://artint.info/3e/slides/index.html https://soclibrary.futa.edu.ng/books/ Machine%20Learning%20Engineering%20(Andriy%20Burkov)%20(Z Library).pdf

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: Artificial Intelligence Application Development and Jira (Practical)

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Artificial Intelligence Application Development and Jira (Practical)
Course Code: CHMITV4

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This practical component provides hands-on experience in implementing Artificial Intelligence and machine learning algorithms using modern tools. It covers search techniques, probabilistic modelling, classification, regression, and model evaluation. Students work with datasets to build, validate, and analyse AI systems. This course also provides hands-on training in Agile Project Management using Jira Cloud. Students will learn how to create and manage Scrum and Kanban projects, configure workflows, manage issues, generate reports, implement automation, and apply security controls. The course emphasizes practical implementation aligned with industry standards to enhance employability and project management skills.
2	**Vertical 1**	Major
3	**Type**	Practical
4	**Credit**	2 Credits (1 credit = 30 Hours of Practical work in a semester)
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Implement intelligent agent models and search algorithms to solve AI problems. **CO(A) 2:** Develop probabilistic models and perform inference using appropriate tools. **CO(A) 3:** Build and train machine learning models for classification and regression tasks. **CO(A) 4:** Evaluate AI models using validation techniques and performance metrics. **CO(A) 5:** Develop and deploy a complete AI application using datasets. **CO(A) 6:** Assess bias, fairness, and ethical considerations during AI model development. **CO(A) 7:** To understand Agile project management concepts. **CO(A) 8:** To configure and manage projects using Jira Cloud. **CO(A) 9:** To implement Scrum and Kanban frameworks. **CO(A) 10:** To customize workflows, permissions, dashboards, and automation.	

8	**Course Outcomes**: Student will be able to: **CO 1**: Develop C# programs using basic programming constructs, arrays, strings, and pattern generation. Implement intelligent agent models and classical search algorithms to solve structured AI problems. **CO 2**: Construct probabilistic models and perform inference using Bayes' rule, Naive Bayes, and Bayesian networks. **CO 3**: Develop and train machine learning models for classification and regression using real-world datasets. **CO 4**: Evaluate and compare AI models using appropriate performance metrics such as accuracy, precision, recall, F1-score, and ROC curves. **CO 5**: Apply cross-validation and basic hyperparameter tuning techniques to improve model performance. **CO 6**: Design and deploy a basic AI application while analysing fairness, bias, and ethical considerations. **CO 7**: Create and configure Jira projects. **CO 8:** Manage issues and workflows effectively. **CO 9:** Implement Scrum and Kanban practices. **CO 10:** Use JQL, reports, and dashboards for project tracking. **CO 11:** Configure permissions, security, and automation rules
9	**Unit 1:** **1. Introduction to AI and Intelligent Agents** **1.** Design a Simple Rational Agent by defining PEAS for Vacuum Cleaner Environment and Autonomous Taxi. Classify environments (fully/partially observable, deterministic/stochastic, episodic/sequential). Implement a simple table-driven agent in Python. **2. Problem Solving by Searching (Uninformed Search)** **2.** Given an initial configuration of the 8-puzzle and a goal configuration, write a Python program to find the shortest sequence of moves to reach the goal state using Breadth-First Search (BFS). **3.** Given two water jugs of 4 litres and 3 litres capacity, write a Python program to obtain exactly 2 litres in one jug using Depth-First Search (DFS). [Vary capacity of jugs] Given a weighted graph representing cities and distances between them, write a Python program to find the least-cost path from Arad to Bucharest using Uniform Cost Search (UCS). [Provide any other weighted graph for applying UCS] **3. Problem Solving by Searching (Informed Search)** 1. Given an initial configuration of the 8-puzzle and a goal configuration, write a Python program to find the solution using Greedy Best-First Search with the Manhattan Distance

heuristic.

2. Given an initial configuration of the 8-puzzle and a goal configuration, write a Python program to find the shortest path using A* search with the Manhattan Distance heuristic.

3. Given a weighted graph representing cities and distances between them, write a Python program to find the shortest path from Arad to Bucharest using A* search with a heuristic function (straight-line distance to destination).

4. Bayes' Rule Application

1. Scenario:

A medical test is used to detect a particular disease. The probability that a randomly selected person has the disease is 1%. If a person has the disease, the test returns positive with probability 99%. If a person does not have the disease, the test still returns positive with probability 5% (false positive rate). A person takes the test and receives a positive result.
Problem Statement:

Write a Python program to compute the probability that the person actually has the disease given that the test result is positive.

5. Naïve Bayes' Classification

1. Using a small dataset (e.g., weather or spam dataset), implement a Naive Bayes classifier using scikit-learn.

6. Probability Reasoning (Bayesian Networks & Inference)

1. Using a simple example (Burglary-Alarm), create a Bayesian Network using pgmpy.

2.Write a program to compute Posterior Probability using Bayesian Networks(Burglar|Alarm = True)

7. Machine Learning

1. Using any small dataset (e.g., Iris or a CSV dataset), write a Python program to demonstrate the basic machine learning workflow.

a. Load dataset using Pandas.

b. Perform basic preprocessing (handling missing values or scaling).

c. Split dataset into training and testing sets.

d. Train a simple classifier.

e. Display training and testing accuracy.

2. Using a suitable regression dataset, implement Linear Regression using scikit learn.

	3. Using the MNIST dataset (digit vs not digit), implement a binary classifier. 4. Implement k-fold cross-validation on a classification model. 5. Implement a Decision Tree classifier using the Iris or any relevant dataset. 6. Implement Decision Tree regression on a regression dataset. 7. Implement k-Nearest Neighbors (kNN) classifier. 8. Implement multiclass classification using Logistic Regression or Decision Tree. **8. Ethics and Bias Analysis** Select any publicly available dataset (for example, Iris, Adult Income, or a classification dataset of your choice) and analyze it for possible bias and class imbalance. **Unit 2: Jira Setup & Project Configuration, Advanced Configuration, Reporting & Governance** **Practical 1: Jira Setup & Project Creation** A. Create a Jira Cloud account and explore the dashboard. B. Create a Company-managed Scrum/Kanban Project. C. Configure project details **Practical 2: Team Creation & Role Assignment** A. Add Team Members B. Assign Roles **Practical 3: Issue Types & Configuration** A. Create and configure Issue Types (Epic, Story, Task, Bug) B. Create Components and Versions. **Practical 4: Issue Management** A. Create issues under an Epic. B. Assign issues to users and set Priority & Due Date. **Practical 5: Workflow Customization** A. Design a custom workflow B. Add transitions and conditions. C. Publish and associate workflow with a project.

	Practical 6: Scrum Board & Sprint Management A. Create and configure Scrum Board. B. Create and start a Sprint. C. Complete Sprint and generate Sprint Report **Practical 7: Kanban Board Management** A. Create a Company-managed Kanban Project. B. Configure Kanban Board C. Track issue progress and generate Control Chart **Practical 8: JQL & Filters** A. Write basic JQL queries (Status, Assignee, Priority). B. Create and save filters. **Practical 9: Reports & Dashboards** A. Generate Burndown Chart and Velocity Chart. B. Create Pie Chart / Issue Statistics Report. C. Create a Custom Dashboard with gadgets. **Practical 10: Permission & Security Management** A. View and modify Project Permission Scheme. B. Configure Project Roles and assign permissions. **Practical 11: Jira Automation** A. Create an Automation Rule (Trigger → Condition → Action). B. Configure rule (e.g., When issue is moved to Done → send email / auto-assign). C. Test and enable automation rule. **Practical 12: Introduction to Jira Mobile App** A. Install and configure the Jira Mobile App. B. View and update issues from mobile (Status, Comment, Assign). Receive notifications and manage real-time updates

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	13
Q2	Unit 2	12
Q3	Journal and Viva	05
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11 **REFERENCES:**

1. Artificial Intelligence: A Modern Approach – Stuart Russell and Peter Norvig – Pearson Education, 2020
2. Hands-On Machine Learning with Scikit-Learn, Keras & TensorFlow – Aurélien Géron,O'Reilly Media, 2022 (Third Edition)
3. Schwaber, Ken & Sutherland, Jeff. The Scrum Guide.
4. Official Documentation of Jira Software by Atlassian.
5. The Hundred-Page Machine Learning Book – Andriy Burkov – Andriy Burkov, 2020 (First Edition)
6. Machine Learning for Absolute Beginners – Oliver Theobald – Independently published, 2020 (First Edition)
7. Artificial Intelligence: Foundations of Computational Agents – David L. Poole

	and Alan K. Mackworth – Cambridge University Press, 2023 (Third Edition) 8. Online Resources: a. https://artint.info/3e/slides/index.html b. https://soclibrary.futa.edu.ng/books/Machine%20Learning%20Engineering%20(Andriy%20Burkov)%20(Z-Library).pdf 9. Highsmith, Jim. Agile Project Management: Creating Innovative Products. Addison-Wesley. 10. Cohn, Mike. Succeeding with Agile: Software Development Using Scrum. Addison-Wesley. 11. Rubin, Kenneth S. Essential Scrum: A Practical Guide to the Most Popular Agile Process. Addison-Wesley. 12. https://www.atlassian.com/software/jira/guides 13. JIRA 4.3 Documentation User documentation for JIRA Software Server 7.1.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: Indian Knowledge Systems in Information Technology

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Indian Knowledge Systems in Information Technology
Course Code: CHMITV5

Sr.No.	Heading	Particulars
1	**Description of the Course:**	**Introduction:** The course "IKS in Computational Systems – Research-Based Project" explores classical Indian Knowledge Systems (IKS) through the lens of modern computational thinking. It examines how śāstra-based formalization in traditions such as Pāṇini's Aṣṭādhyāyī, Piṅgala's combinatorics, Nyāya logic, Ayurvedic classification systems, and Arthaśāstra reflect structured, rule-based, and algorithmic modes of reasoning that are conceptually analogous to key ideas in Computer Science. Through guided research, literature review, conceptual modelling, comparative analysis, and case-based studies, students investigate the relevance of these knowledge systems in understanding foundational concepts of computation, logic, language processing, and knowledge representation in modern computing paradigms. **Relevance:** This course is highly relevant in the context of interdisciplinary education envisioned under NEP 2020, linking traditional knowledge frameworks with modern computational theory. It demonstrates that formal systems, symbolic encoding, logical inference, structured reasoning, classification mechanisms, and algorithmic processes have deep historical roots aligned with contemporary developments in Artificial Intelligence, Natural Language Processing, Knowledge Representation, Formal Grammars, Combinatorics, Data Analytics, and Cyber Security.

		Usefulness: The course develops conceptual clarity in knowledge representation, rule-based reasoning, generative systems, symbolic abstraction, inference validation, classification methodologies, and computational thinking. It strengthens analytical and research skills by encouraging students to investigate classical structures such as pramāṇa theory, prastāra enumeration, generative grammar, and syllogistic reasoning through modern computational frameworks. The project-based approach further develops competencies in literature review, academic writing, research methodology, critical analysis, scholarly communication, and interdisciplinary problem solving. **Application:** The computational parallels of śāstra methodology, Pāṇinian grammar, Nyāya logic, Ayurvedic reasoning, and Arthaśāstra cryptography have applications in formal language theory, natural language processing, expert systems, decision trees, inference engines, knowledge graphs, explainable AI, secure communication systems, and computational modeling. Students gain insight into how structured reasoning and knowledge organization models can inform AI system design, feature engineering, classification systems, semantic technologies, and algorithm development. **Interest** The course is intellectually stimulating as it reveals algorithmic, logical, linguistic, mathematical, and organizational sophistication embedded in Indian knowledge traditions. Discovering binary encoding in Piṅgala, generative grammar in Pāṇini, inference structures in Nyāya, multi-valued reasoning in Jain logic, knowledge representation in Navya-Nyāya, computational astronomy, and coded communication in Arthaśāstra creates a unique synthesis of traditional scholarship and modern Computer Science.

		The research-based format encourages students to formulate research questions, investigate classical sources, develop conceptual models, and generate innovative interpretations of computational ideas rooted in Indian Knowledge Systems. **Connection with Other Courses:** This course connects strongly with several core areas of Computer Science and Information Technology. It complements Artificial Intelligence through concepts of knowledge representation, reasoning, and explainable AI; Machine Learning through classification and feature engineering; and Natural Language Processing through grammar, parsing, and semantic analysis. The course also relates to Formal Languages and Automata Theory by exploring formal grammars and rule-based systems, and to Design and Analysis of Algorithms through recursive and combinatorial methods. Further, it supports learning in Data Science and Analytics through classification and decision models, Knowledge Engineering and Semantic Technologies through structured knowledge representation, and Cyber Security through cryptographic principles and secure communication models. The research-oriented approach of the course also aligns with Research Methodology and Theory of Computation. Overall, the course enriches computational disciplines by providing historical, philosophical, and interdisciplinary perspectives that connect traditional Indian knowledge systems with modern computing paradigms. **Demand in the industry:** Modern fields such as Artificial Intelligence, Natural Language Processing, Knowledge Engineering, Data Analytics, Semantic Computing, Explainable AI, and Cyber Security rely heavily on rule-based systems, logical inference, structured knowledge representation, and computational reasoning. The course highlights foundational principles behind these technologies through classical knowledge frameworks while simultaneously developing research and analytical skills valued across industry and

		academia. **Job Prospects:** The concepts, analytical abilities, and research skills developed through this course support career opportunities in emerging areas such as Artificial Intelligence, Data Science and Analytics, Computational Linguistics, Natural Language Processing, Knowledge Engineering, Semantic Technologies, Cyber Security, Research and Development, and Digital Humanities. By integrating traditional knowledge systems with modern computational perspectives, the course equips students with interdisciplinary problem-solving and critical thinking skills that are increasingly valued in both industry and academia. The analytical, computational, and research-oriented perspective gained through the course also provides a strong foundation for higher studies and advanced research in Computer Science, Artificial Intelligence, Computational Linguistics, Information Systems, Digital Humanities, and Indian Knowledge Systems.
2	**Vertical**	Major - IKS
3	**Type**	Project
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Explore computational principles embedded in Indian Knowledge Systems through systematic research and scholarly inquiry. **CO(A) 2:** Investigate the relationship between traditional Indian knowledge frameworks and modern Computer Science concepts such as algorithms, logic, knowledge representation, artificial intelligence, and cryptography. **CO(A) 3:** Develop competencies in literature review, research methodology, analytical thinking, academic writing, and presentation of research findings. **CO(A) 4:** Analyze and compare classical Indian knowledge systems with contemporary computational models using interdisciplinary approaches. **CO(A) 5:** Design and execute a research project that demonstrates the relevance and	

	application of Indian Knowledge Systems in Computational Sciences.
8	**Course Outcomes:** After successful completion of this course, students will be able to: **CO 1:** Conduct systematic literature reviews and identify research problems related to Indian Knowledge Systems and Computational Sciences. **CO 2:** Analyze computational, logical, linguistic, and mathematical concepts present in classical Indian knowledge traditions. **CO 3:** Apply research methodologies and analytical techniques to investigate selected IKS themes from a computational perspective. **CO 4:** Develop and present well-structured research reports, case studies, conceptual models, and seminar presentations. **CO 5:** Demonstrate interdisciplinary understanding and critical thinking by establishing connections between Indian Knowledge Systems and modern computational technologies.
9	**Syllabus** **Project Themes / Research Areas** **Students shall undertake one research project from any one of the following themes:** **1. Pingala's Chandas Shastra: Binary Representation of Laghu-Guru Patterns** **Topics:** Pingala's Chandas Shastra, Laghu-Guru syllable combinations, binary systems, combinatorics, algorithmic thinking **Modern CS Connection:** Binary representation, data encoding, combinatorial algorithms, computational thinking **2. Shunya: Mathematical and Computational Significance of Zero** **Topics Covered:** Shunya, Brahmagupta's arithmetic rules, decimal place value system, Indian mathematics **Modern CS Connection:** Binary logic, computer arithmetic, data representation, digital electronics **3. Dasha-Mana Sthana-Mulya Paddhati: Evolution of the Decimal Place Value System** **Topics Covered:** Decimal place value system, positional notation, Indian numerals, mathematical innovations **Modern CS Connection:** Number representation, arithmetic algorithms, digital computation, data processing

	4. Nyaya Darshana and Logical Reasoning **Topics Covered:** Nyaya logic, Pramana, Prameya, Hetu, Anumana, logical reasoning **Modern CS Connection:** Rule-based systems, logical programming, inference engines, artificial intelligence **5. Nyaya and Aristotelian Logic: A Comparative Study** **Topics Covered:** Nyaya syllogism, Aristotelian syllogism, logical reasoning, inference, knowledge validation **Modern CS Connection:** Computational logic, reasoning frameworks, decision-support systems, AI inference **6. Panini's Ashtadhyayi as a Rule-Based Knowledge System** **Topics Covered:** Ashtadhyayi, Sutras, Paribhasha, rule hierarchy, linguistic rules **Modern CS Connection:** Rule engines, knowledge representation, expert systems, formal modelling **7. Paninian Vyakarana and Compiler Design** **Topics Covered:** Paninian grammar, word derivation, formal language structures, grammar rules **Modern CS Connection:** Lexical analysis, syntax parsing, compiler construction, language processing **8. Samskrita Bhasha and Natural Language Processing** **Topics Covered:** Sanskrit grammar, semantics, computational linguistics, language structure **Modern CS Connection:** Natural language processing, machine translation, semantic analysis, conversational AI **9. Aryabhatiya and Computational Algorithms** **Topics Covered:** Aryabhata's algorithms, square roots, cube roots, trigonometric calculations, astronomical computations **Modern CS Connection:** Numerical algorithms, scientific computing, mathematical modelling, computational astronomy **10. Pramana Siddhanta and Knowledge Representation** **Topics Covered:** Pratyaksha, Anumana, Upamana, Shabda, Nyaya, Vedanta, Mimamsa **Modern CS Connection:** Knowledge graphs, ontologies, semantic networks, AI

knowledge bases

11. Kautilya's Arthashastra and Structured Decision-Making

Topics Covered: Arthashastra, Rajaniti, strategic planning, governance models, analytical thinking

Modern CS Connection: Decision-support systems, business analytics, strategic modelling, recommendation systems

12. Sankhya, Ganana and Algorithmic Thinking in Ancient Indian Mathematics

Topics Covered: Algorithmic procedures, combinatorics, recursion-like structures, numerical methods

Modern CS Connection: Algorithm design, recursion, optimization techniques, computational mathematics

13. Chaturanga: Strategy and Computational Thinking

Topics Covered: Chaturanga, strategic reasoning, move combinations, decision-making

Modern CS Connection: Game theory, search algorithms, AI game playing, strategic computing

14. Digitization of Bharatiya Jnana Parampara

Topics Covered: Manuscript digitization, traditional knowledge systems, digital repositories, knowledge preservation

Modern CS Connection: Digital libraries, database systems, metadata management, cloud storage

15. Chaitanya, Jnana and Artificial Intelligence

Topics Covered: Cognition, consciousness, learning models, reasoning processes, Indian philosophy

Modern CS Connection: Artificial intelligence, cognitive computing, human-computer interaction, ethical AI

Students may choose any one theme and formulate a specific research problem in consultation with the course instructor. The project may be theoretical, analytical, comparative, conceptual, computational, experimental, or prototype-based depending upon the nature of the selected topic. If required faculty members will allot Projects topics in addition to the above list that are relevant and important to the core Subject. The Project may be taken individually or in a group of students with proper guidance and prior sanction from the faculty.

Guidelines for Project Work

Students shall undertake a research-based project on any one of the prescribed themes. The project should demonstrate the student's ability to investigate, analyze, interpret, and present the computational aspects of Indian Knowledge Systems using appropriate research methods.

Suggested Approaches

A. Literature-Based Research Study

- Systematic review of classical texts, books, journal articles, and research papers.
- Comparative analysis of traditional concepts and modern computational theories.
- Identification of computational principles embedded in Indian Knowledge Systems.

B. Conceptual Modeling

- Development of logical, mathematical, linguistic, or computational models based on IKS concepts.
- Creation of flowcharts, frameworks, ontologies, decision models, knowledge graphs, or process models.
- Mapping of traditional knowledge structures to modern Computer Science concepts.

C. Experimental or Computational Study

- Simulation, algorithmic implementation, data analysis, computational verification, or prototype development.
- Development of small software tools, demonstrations, proof-of-concept applications, or analytical models where applicable.

D. Case Study and Comparative Analysis

- Investigation of selected texts, systems, methodologies, or applications.
- Comparative study between Indian Knowledge Systems and contemporary computational approaches.

Nature of Deliverables

The project deliverable may consist of one or more of the following:

- Research Report
- Review Paper
- Comparative Study
- Conceptual Framework
- Knowledge Representation Model
- Ontology or Knowledge Graph
- Algorithm Design
- Flowchart-Based Model
- Computational Analysis
- Software Prototype
- Simulation Study
- Case Study Report

Note: Since the course encompasses diverse themes within Indian Knowledge Systems, not all projects are expected to result in software development or programming-based outcomes. Therefore, for evaluation purposes, the term "Prototype Development / Experimental Implementation / Conceptual Model Demonstration" shall include software prototypes, algorithmic implementations, simulations, conceptual frameworks, ontologies, decision models, knowledge graphs, formal representations, or any other research artifact appropriate to the chosen topic.

The emphasis of the course is on originality, analytical rigor, interdisciplinary understanding, and the ability to relate Indian Knowledge Systems to modern computational sciences.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End **External - 30 marks**

The External Assessment shall evaluate the final research work, outcomes, findings, report quality, and viva voce examination.

Assessment Component		Marks
1.	Prototype Development / Experimental Implementation / Conceptual Model Demonstration	10
2.	Analysis, Interpretation, and Discussion of Results / Findings	10
3.	Final Research Report / Research Paper	05
4.	Viva Voce Examination	05
	Total	**30**

Guidelines for External Assessment

Prototype Development / Experimental Implementation / Conceptual Model Demonstration (10 Marks)

- Development of software prototype, simulation, algorithm, conceptual framework, ontology, knowledge graph, decision model, comparative model, or other project artifact appropriate to the selected theme
- Originality and relevance of the work
- Technical and conceptual quality

Analysis, Interpretation, and Discussion of Results / Findings (10 Marks)

- Quality of analysis
- Interpretation of observations and findings
- Computational relevance and insights
- Critical discussion and conclusions

Final Research Report / Research Paper (5 Marks)

The report should include:

- Title and Abstract
- Objectives
- Literature Review
- Methodology
- Analysis and Findings
- Conclusion
- References

Viva Voce Examination (5 Marks)

- Understanding of the selected topic
- Knowledge of research methodology
- Ability to explain findings and conclusions
- Response to questions from examiners

Internal Examination: Continuous Evaluation- 20 marks

The Internal Assessment shall evaluate the student's ability to identify a research problem, conduct literature review, plan the project, and communicate progress during the semester.

Assessment Component		**Marks**
1.	Research Problem Identification, Objectives Formulation, and Literature Review	**10**
2.	Internal Seminar / Progress Review (Problem Understanding, Methodology, Presentation Skills, Communication and Discussion)	**10**
	Total	**20**

Guidelines for Internal Assessment

Research Problem Identification and Literature Review (10 Marks)

- Selection and justification of research topic
- Clarity of research objectives
- Identification of research gap/problem statement
- Review of relevant literature and sources
- Understanding of IKS and computational perspectives

Internal Seminar / Progress Review (10 Marks)

- Project planning and methodology
- Progress made during the semester
- Presentation skills and communication
- Ability to answer questions and justify approach
- Active participation in review discussions

11

REFERENCES:

1. Computing Science in Ancient India, T.R.N. Rao/ Subhash Kak
2. The Mathematics of India: Concepts, Methods, Connections P. P. Divakaran, Hindustan Book Agency, 2018
3. Pāṇini: Background and introduction, George Cardona, Motilal Banarsidass, 1988
4. Nyaya-Vaisesika (A History of Indian Literature) B. K. Matilal, Harrassowitz, 1977
5. The Computation Meme: Explorations in Indic Computational Thinking K. Gopinath &

	Shailaja D. Sharma, Indian Institute of Science (IISc), Bengaluru, 2022 6. Indian Mathematics Engaging the World from Ancient to Modern Times G. G. Joseph, 2016 7. Research papers, conference proceedings, theses, and digital archives related to Indian Knowledge Systems and Computational Sciences. 8. Publications from the Indian Knowledge Systems Division, Ministry of Education, Government of India.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: Enterprise Java Practical

Vertical 1 – Electives (2 Credits)

with effect from
Academic Year 2026-2027

Title: Enterprise Java Practical
Course Code: CHMITV6

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course equips learners with the knowledge and practical skills required to design, develop, and deploy Enterprise Java applications through extensive hands on laboratory sessions. It covers core and advanced technologies including Servlets, JDBC, Cookies and Session management, JSP, EJB, Hibernate, and the Spring Framework. Emphasis is placed on building scalable, secure, and database-driven web applications. By the end of the course, learners will be able to integrate these technologies effectively to develop robust, real-world enterprise solutions aligned with industry standards.
2	**Vertical**	Electives
3	**Type**	Practical
4	**Credit**	2 Credits (1 credit = 30 Hours of Practical work in a semester)
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To understand the concept of and develop applications using servlets and database connectivity. **CO(A) 2:** To develop applications that can handle cookies, sessions and file operations. **CO(A) 3:** To understand the concept of and design applications using Java server pages. **CO(A) 4:** To understand the concept of and design applications using Enterprise Java Beans. **CO(A) 5:** To understand the concepts of persistence, Hibernate and develop JPA Applications, Hibernate applications. **CO(A) 6:** To understand Spring Framework	

8	**Course Outcomes**: Student will be able to: **CO 1**: Proficiently understand and apply servlets and database connectivity concepts to develop dynamic web applications. **CO 2**: Demonstrate the ability to develop applications capable of managing cookies, sessions, and performing file operations effectively. **CO 3**: Proficient in understanding and designing applications using Java Server Pages (JSP), enabling dynamic and interactive web content creation. **CO 4**: Adept at comprehending and designing applications utilizing Enterprise Java Beans (EJB), facilitating the development of scalable and distributed enterprise-level applications **CO 5**: Possess a thorough understanding of persistence concepts, Hibernate framework, and the ability to develop Java Persistence API (JPA) and **CO 6**: Hibernate applications proficiently. **CO 7**: Apply Spring Framework, dependency injection with spring
9	**Unit 1:** 1. Implement the following Simple Servlet applications. a. Create a simple calculator application using servlet. b. Create a servlet for a login page. If the username and password are correct then it says message “Hello <username>” else a message “login failed” c. Create a registration servlet in Java using JDBC. Accept the details such as Username, Password, Email, and Country from the user using HTML Form and store the registration details in the database. 2. Implement the following Servlet applications with Cookies and Sessions. a. Using Request Dispatcher Interface create a Servlet which will validate the password entered by the user, if the user has entered "Servlet" as password, then he will be forwarded to Welcome Servlet else the user will stay on the index.html page and an error message will be displayed. b. Create a servlet that uses Cookies to store the number of times a user has visited servlet. c. Create a servlet demonstrating the use of session creation and destruction. Also check whether the user has visited this page first time or has visited earlier also using sessions. 3. Implement the Servlet IO and File applications. a. Create a Servlet application to upload and download a file. b. Develop Simple Servlet Question Answer Application using Database.

c. Create simple Servlet application to demonstrate Non-Blocking Read Operation.

4. Implement the following JSP applications

a. Develop a simple JSP application to display values obtained from the use of intrinsic objects of various types.

b. Develop a simple JSP application to pass values from one page to another with validations. (Name-txt, age-txt, hobbies-checkbox, email-txt, gender

radio button).

c. Create a registration and login JSP application to register and authenticate

the user based on username and password using JDBC

5. Implement the Servlet IO and File applications.

a. Create a Servlet application to upload and download a file.

b. Develop Simple Servlet Question Answer Application using Database.

c. Create simple Servlet application to demonstrate Non-Blocking Read Operation.

6. Implement the following JSP JSTL and EL Applications.

a. Create an html page with fields, eno, name, age, designation, salary. Now on submit this data to a JSP page which will update the employee table of database with matching eno.

b. Create a JSP page to demonstrate the use of Expression language.

c. Create a JSP application to demonstrate the use of JSTL.

Unit 2:

1. Implement the following EJB Applications

a. Create a Currency Converter application using EJB

b. Develop a Simple Room Reservation System Application Using EJB

c. Develop simple shopping cart application using EJB [Stateful Session Bean].

2. Implement the following EJB applications with different types of Beans

a. Develop simple EJB application to demonstrate Servlet Hit count using Singleton Session Beans.

b. Develop simple visitor Statistics application using Message Driven Bean [Stateless Session Bean].

c. Develop simple Marks Entry Application to demonstrate accessing Database using

	EJB. 3. Implement the following JPA applications. a. Develop a simple Inventory Application Using JPA. b. Develop a Guestbook Application Using JPA. c. Create simple JPA application to store and retrieve Book details. 4. Implement the following JPA applications with ORM and Hibernate. a. Develop a JPA Application to demonstrate use of ORM associations. b. Develop a Hibernate application to store Feedback of Website Visitor in MySQL Database c. Develop a Hibernate application to store and retrieve employee details in MySQL Database. 5. Implement the following Hibernate a. Develop an application to demonstrate Hibernate One- To -One Mapping Using Annotation. b. Develop Hibernate application to enter and retrieve course details with ORM Mapping c. Develop a five page web application site using any two or three Java EE Technologies. 6. Implement the following using Spring Concept a. Build web application in Java with spring boot3 b. Develop application using Spring Framework, Lightweight c. Containers and Dependency Injection with Spring

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	13
Q2	Unit 2	12
Q3	Journal and Viva	05
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11	**REFERENCES:** 1. Java EE 8 Application, David R Heffelfinger, Packt, First, 2017 2. Java EE Essentials, Arun Gupta, O'reilly, First, 2013 3. Java EE 7 For Beginners, Sharanam Shah & Vaishali Shah, SPD First, 2017 4. Java EE cookbook, Elder Moraes, Packt, First, 2018 5. Advanced Java Programming, Uttam Kumar Roy, Oxford Press , 2015.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: Linux Administration Practical
Vertical 1 – Electives (2 Credits)

with effect from
Academic Year 2026-2027

Title: Linux Administration Practical

Course Code: CHMITV7

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces learners to the fundamental and applied concepts of Linux system administration through extensive hands-on laboratory practice. Students will install, configure, secure, and manage a Linux operating system environment using virtualization platforms. The course focuses on developing practical abilities required for entry-level roles such as System Administrator The laboratory-oriented pedagogy enables learners to work in real-world computing
2	**Vertical**	Elective Major
3	**Type**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Understand the architecture, features, and working environment of the Linux operating system and perform installation using virtualization tools. **CO(A) 2:** Use Linux command-line interface effectively to manage files, directories, text processing, permissions, and software packages. **CO(A) 3:** Administer users, groups, file systems, and storage devices while applying appropriate access control and security practices. **CO(A) 4:** Configure essential networking services including IP addressing, SSH remote access, web server, and network file sharing. **CO(A) 5:** Monitor system performance, manage processes, implement firewall rules, and troubleshoot common system issues. **CO(A) 6:** Automate administrative tasks using shell scripting and scheduling tools such as cron and at.	

8	**Course Outcomes**: Student will be able to: **CO 1**: Install and configure a Linux operating system and work in graphical and command-line environments. **CO 2**: Perform file handling, text processing, and package management using standard Linux utilities and commands. **CO 3**: Create and manage users, groups, permissions, and access control lists to secure system resources. **CO 4**: Configure networking, remote login (SSH), and basic server services such as Apache web server and network storage. **CO 5**: Analyse and manage processes, partitions, logical volumes, and system performance. **CO 6**: Write basic shell scripts and schedule automated tasks to manage and monitor system operations.
9	**Unit 1:** 1. a. Installing Red Hat Enterprise Linux (Virtual Box/ VmWare) b. Linux Graphical Environment i. Display/Login Manager ii. Desktop Environment iii. Linux Directory Structure and File Systems 2. Basic System Commands a. Use input-output redirection (>, >>, |, 2>, etc) b. Use grep and regular expressions to analyse text c. Log in and switch users in multi-user targets d. Working with Text Files cat,cut,less,hesd,tail,sort,wc,grep, awk 3. Essential File Management Tools a. Managing Files ,Using Links b. Working with Archives and Compressed Files c. Create, delete, copy, and move files and directories d. Archive, compress, unpack, and uncompress files using tar, star, gzip, and bzip2 e. Create hard and soft links

	f. Managing File Ownership, Managing Basic Permissions g. Managing Advanced Permissions, Managing ACLs h. Setting Default Permissions with umask i. Working with User-Extended Attributes j. List, set, and change standard ugo/rwx permissions k. Create and configure set-GID directories for collaboration l. Create and manage access control lists 4. Working with Users, Groups, and Permissions a. Creating and Managing Users b. Creating and Managing Groups c. Using Permissions and Advanced Permissions d. Change passwords and adjust password aging for local user accounts e. Configure superuser access -> su,sudo,root 5. Managing Software a. Managing Software Packages with YUM b. Using yum c. Managing Software Packages with RPM d. Install and update software packages repository from the local file system **Unit 2:** 6. Managing Processes a. Introduction to Process Management b. Managing Shell Jobs c. Using Common Command-Line Tools for Process Management d. Using top to Manage Processes e. Using tuned to Optimize Performance f. Identify CPU/memory-intensive processes and kill processes 7. Managing Storage

	a. Understanding MBR and GPT Partitions b. Managing Partitions and File Systems c. Mounting File Systems d. List, create, delete partitions on MBR and GPT disks e. Configure systems to mount file systems at boot by universally unique ID (UUID) or label f. Add new partitions and logical volumes, and swap to a system non-destructively g. Create, mount, unmount, and use vfat, ext4, and xfs file systems 8. Configuring Networking a. Managing Network Addresses and Interfaces b. Validating Network Configuration c. Managing Network Configuration with nmtui and nmcli d. Configure IPv4 and IPv6 addresses e. Configure DNS-hostname resolution 9. Configuring SSH a. Using SSH and Related Utilities b. Access remote systems using SSH c. Configuring Key-Based Authentication with Passphrases d. Configure key-based authentication for SSH 10. Configuring web server a. Configuring a Basic Apache Server b. Understanding Apache Configuration Files c. Creating Apache Virtual Host 11. Configure Firewall a. Linux Firewall with iptables b. Working with Firewalld 12. Accessing Network Storage a. Using NFS Services

b. Using CIFS Services

c. Mounting Remote File Systems Through fstab

d. Using Automount to Mount Remote File Systems

13. Creating Shell scripts

a. automate or monitor tasks/processes

b. Getting and setting system information

14. Scheduling Tasks

a. Configuring Cron to Automate Recurring Tasks

b. Configuring At to Schedule Future Tasks

c. Schedule tasks using at and cron

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Unit 1	13
Q2	Unit 2	12
Q3	Journal and Viva	05
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	Marks
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11 REFERENCES:

1. Red Hat RHCA 8 Cert Guide by Sander van Vugt 11
2. RHCSA Red Hat Enterprise Linux 8 Training and Exam Preparation Guide (EX200) by Asghar Ghori
3. Red Hat Enterprise Linux 8 Administration - Master Linux Administration Skills and Prepare for the RHCSA Certification Exam (Packt, 2021)

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year
(Mathematics)

Semester- V

Title: Basics of Mathematics in Real Life – IV

Vertical - 2
Minor - 2 Credits

with effect from
Academic Year 2026-2027

Title: Basics of Mathematics in Real Life – IV

Course Code: CHMMATHV10

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course gives introduction to natural numbers, integers, rational numbers, real numbers and complex numbers in detail. Basic concepts like primes and congruences are introduced.
2	**Vertical 2**	Minor
3	**Type**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To develop the notions of limits and continuity **CO(A) 2:** To identify the properties of congruences **CO(A) 3:** To associate diagrams based on equalities and inequalities of complex numbers **CO(A) 4:** To recognize various properties of functions and their use in basic counting	
8	**Course Outcomes**: Student will be able to: **CO 1:** Understand and remember basic concepts of numbers, sets, functions, sequences, and counting principles. **CO 2:** Apply mathematical techniques to solve routine and real-life problems. **CO 3:** Analyze patterns, relationships, and structures in numbers, functions, and sequences. **CO 4:** Justify/check mathematical results using logical reasoning and proof methods. **CO 5:** Construct simple mathematical models, proofs, and examples for real-life situations.	

9	# Syllabus **UNIT I: Basics of integers, real numbers and complex numbers (15 Hours)** • Natural numbers, Integers, Rational numbers and Irrational numbers • Introduction to induction in natural numbers via proofs of sums of first n natural numbers and sums of squares and cubes of the first n natural numbers. • Further applications of induction through problem solving. • Operations on integers and rational numbers like addition, multiplication and subtraction. Equivalence of two rational numbers. • Divisibility in integers and basic properties of divisibility • Definition of prime numbers and statement of fundamental theorem of arithmetic (without proof). • Greatest common divisor, least common multiple and relation to the product of numbers, Euclid's algorithm (without proof) • Infinitude of primes (with proof) and existence of irrational numbers (Square-root two is irrational with proof). • Congruences and their basic properties like solution of linear congruence • Real number line and properties of real numbers. • Order on real numbers and relation to the operation on real numbers. • Definition of a complex number and visualization in the plane. Plotting of complex numbers. • Operations on complex numbers like addition and multiplication and polar form of complex numbers. DeMoivre's theorem and its proof via induction. • Plotting of regions in the complex plane defined by equalities and inequalities. • Definition of a sequence and examples of sequences of natural numbers, integers and real numbers and analyzing the behaviour of sequences pictorially and introduction to the idea of convergence. **UNIT II: Introduction to basic counting and basics of functions (15 Hours)** • Permutations and combinations of distinct objects. • Examples based on permutations: digits, license plates etc.

- Examples based on combinations: digits, bit strings etc.
- Addition and multiplication principles for counting and illustrations
- Permutations with repetitions (only formula) and examples
- Combinations with repetitions (only formula) and examples
- De Morgan's laws for sets and introduction to functions between sets
- Injective and surjective functions
- Bijective functions, examples and their properties
- Inverse images of sets and their properties
- Limit of a function at a point
- Properties of limits: uniqueness (with proof)
- Computations of limits in various examples
- Definition and examples of continuous functions
- Properties of continuous functions: sums, products and ratios

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE (out of five/Six). (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE (out of five/Six). (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

Continuous Evaluation through: Quizzes, Class Tests, presentations, projects, role play, creative writing, assignments etc. (at least 3)

Sr. No.	Particulars	Marks
1	A class test of 10 marks is to be conducted during each semester in an Offline mode.	10
2	Project on any one topic related to the syllabus or a quiz (offline/online) on one of the modules.	05
3	Seminar/ group presentation on any one topic related to the syllabus.	05

Paper pattern of the Test (Offline Mode with One hour duration):

Q1: Definitions/Fill in the blanks/ True or False with Justification. (04 Marks: 4 x 1).

Q2: Attempt any 2 from 3 Descriptive questions. (06 marks: 2 × 3)

11 REFERENCES:

1. Burton, D. M/. Elementary Number Theory, McGraw Hill Education
2. Bartle R. G. and Sherbert D. R., Introduction to Real Analysis, John Wiley and Sons.
3. Niven, Ivan, Zuckerman H. S., Montgomery, H. L., An Introduction to the theory of numbers, Wiley, 1972.
4. Richard R. Goldberg, Methods of Real Analysis, John Wiley and Sons.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year
(Mathematics)

Semester- V

Title: Practical Based on Basics of Mathematics in Real Life – IV

Vertical - 2
Minor - 2 Credits

with effect from
Academic Year 2026-2027

Title: Practical Based on Basics of Mathematics in Real Life – IV

Course Code: CHMMATHV11

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course is based on problem-solving which is a fundamental aspect of any mathematics course. While advanced courses often emphasize the theoretical nature of the subject, engaging in problem-solving reinforces concepts and enhances learners' ability to analyze existing problems and devise solutions. This activity not only motivates learners but also empowers them to formulate new results, propose conjectures, and develop innovative theories.
2	**Vertical 2**	Minor
3	**Type**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To develop the notions of limits and continuity **CO(A) 2:** To identify the properties of congruences **CO(A) 3:** To associate diagrams based on equalities and inequalities of complex numbers **CO(A) 4:** To recognize various properties of functions and their use in basic counting	

8

Course Outcomes: Student will be able to:

CO 1: Apply mathematical techniques to solve routine and real-life problems.

CO 2: Analyze patterns, relationships, and structures in numbers, functions, and sequences.

CO 3: Justify/check mathematical results using logical reasoning and proof methods.

CO 4: Construct simple mathematical models, proofs, and examples for real-life situations.

9

Syllabus

UNIT I: Practical based on basics of integers, real numbers and complex numbers (30 Hours)

- Integers and divisibility
- Computation of greatest common divisor using Euclid's algorithm
- Properties of congruences
- Solutions of linear congruences
- Plotting of regions in the complex numbers and conversion to polar form
- Applications of DeMoivre's theorem
- Sequences and their plotting, Convergence of sequences based on plotting

UNIT II: Practical based on Introduction to basic counting and basics of functions (30 Hours)

- Permutations of distinct objects
- Combinations of distinct objects
- Permutations and combinations of multisets
- Injective, bijective, surjective functions
- Inverse images of sets under functions
- Limit of a function and examples
- Continuity of a function
- Arithmetic of continuous functions

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	**Marks**
Q1	Five out of Eight multiple choice questions (four from	(3 ×5 =15 Marks)

	Unit 1 and four from Unit 2) (LO1 to LO3)	
Q2	Attempt any Two out of Four (Two from Unit 1 and two From Unit 2). (LO 3 and LO 4)	(5 × 2 = 10 Marks)
Q3	Journal	5 (2.5 marks for each Unit 1 & Unit 2)
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

Continuous Evaluation through: Quizzes, Class Tests, presentations, projects, role play, creative writing, assignments etc. (at least 3)

	Assessment / Evaluation	**Marks**
1.	Objective question test	10
2.	Overall performance	5
3.	Viva	5
		Total: 20

Paper pattern of the Test (Offline Mode):

Q1: (Attempt any 5 from 8) Multiple choice questions. (10 marks: 5 × 2) Duration: 1Hrs

While setting question paper four MCQ on unit I and four MCQ on unit II both.

11	**REFERENCES:** 1. Niven H. Zuckerman and H. Montogomery. An Introduction to the Theory of Numbers. John Wiley & Sons. Inc. 2. David M. Burton. An Introduction to the Theory of Numbers. Tata McGraw-Hill Edition. 3. Bartle R. G. and Sherbert D. R., Introduction to Real Analysis, John Wiley and Sons. 4. Richard R. Goldberg, Methods of Real Analysis, John Wiley and Sons. 5. Thomas and Finney, Calculus and Analytical Geometry, Pearson 6. Ajit Kumar and S. Kumaresan, A basic course in real analysis, Chapman and Hall 7. B. V. Limaye and Sudhir Ghorpade, A course in calculus and real analysis, Springer Nature.

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)
(Affiliated to the University of Mumbai)

Board of Studies (BoS) Mathematics

Sr. No.	Name of the Faculty	Designation and College
1.	Ms. Urmila Pillay	Head and Associate Professor, Department of Mathematics, Smt. CHM College (Autonomous)
2.	Mr. Amish Thakker	Associate Professor, Smt. CHM College (Autonomous)
3.	Ms. Asha Chugh	Associate Professor, Smt. CHM College (Autonomous)
4.	Mr. Mandar Khasnis	Associate Professor, Smt. CHM College (Autonomous)
5.	Dr. Dipak Jadhav	Associate Professor, Smt. CHM College (Autonomous)
6.	Ms. Pooja Rajani	Assistant Professor, Smt. CHM College (Autonomous)
7.	Mr. Salil Sawarkar	Assistant Professor, Smt. CHM College (Autonomous)
8.	Mrs. Usha Hemasundar	Outside University nominee Head and Associate Professor, K.C. College, Churchgate
9.	Dr. Pankit Gandhi	Outside University nominee Professor, K.C. College, Churchgate
10.	Ms. Minal Wankhede	Vice Chancellor Nominee Head and Associate Professor, B.N. Bandodkar College, Thane
11.	Mr. Mandar Dongare	Industry Representative Senior Manager, Customer Success, Teradata India Pvt. Ltd.
12.	Ms. Supriya Bhagat	Alumni Representative Senior Product Data Scientist, Project pro

Name and Signature of the Ad hoc BoS Chairperson: Ms. Urmila Pillay

Name and Signature of the Dean: Dr. Neena Anand

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: Internet of Things Practical
Vertical 4 – VSC (2 Credits)

with effect from
Academic Year 2026-2027

Title: Internet of Things Practical
Course Code: CHMITV8

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This IoT practical course uses Raspberry Pi to build real world projects with sensors, displays, security modules, GPS, ADCs, relays, and cameras. Students learn Python based interfacing, automation, data acquisition, and MQTT communication through hands-on exercises, gaining strong foundational skills for developing functional IoT systems and smart applications.
2	**Vertical**	VSC
3	**Type**	Practical
4	**Credit**	2 Credits (1 credit = 1 30 Hours of Practical work in a semester)
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To introduce students to the fundamentals of Internet of Things (IoT) through hands-on practical experiments using Raspberry Pi. **CO(A) 2:** To develop skills in interfacing digital, analog, and communication modules such as sensors, RFID, fingerprint readers, GPS, relays, and displays. **CO(A) 3:** To enable students to write Python programs for device control, sensor data processing, automation, and real-time applications. **CO(A) 4:** To familiarize learners with IoT communication protocols such as MQTT for data exchange and remote monitoring. **CO(A) 5:** To build confidence in assembling complete IoT systems combining hardware, software, and networking components. **CO(A) 6:** To cultivate problem-solving and prototyping skills essential for designing IoT-based smart solutions.	

8	**Course Outcomes**: Student will be able to: **CO 1**: Ability to Interface and Control Digital & Analog Hardware Components. **CO 2**: Competence in Implementing Real-World IoT Communication and Automation. **CO 3**: Skills in Reading, Processing, and Displaying Sensor Data **CO 4**: Ability to Implement Identity & Security Mechanisms **CO 5**: Capability to Design and Deploy an Integrated IoT-Based Smart System. **CO 6**: Ability to Integrate and Program Multiple Hardware Interfaces for Security and Automation **CO 7**: Proficiency in Designing Multi-Layer Authentication and Access Control Systems. **CO 8**: Competence in IoT Communication and Web-Based Control of Embedded Devices. **CO 9**: Skills in Implementing Intelligent Monitoring Systems Using Raspberry Pi. **CO 10**: Capability to Deploy, Test, and Evaluate Complete Embedded Solutions on Raspberry Pi.
9	**Unit 1:** 1. Create different blinking patterns with LEDs by connecting to GPIO pints of Raspberry Pi. 2. Use Telegram to control Raspberry Pi GPIO. 3. Interface TM1637 with Raspberry Pi and Display current time. 4. Interface GPS module with Raspberry Pi. 5. Interface ADS 1115 with Raspberry Pi to act as oscilloscope. 6. Interface 16x2 LCD with Raspberry Pi using I2C module to display text. 7. Interface RFID module with Raspberry Pi to read and write to RFID tags/cards. 8. Interface Fingerprint Sensor with Raspberry Pi. 9. Interface Pi Camera with Raspberry Pi to capture image and video. 10. Design IoT based home automation system using Raspberry Pi **Unit 2:** 11. Interface Fingerprint Sensor and 16X2 LCD with Raspberry and display message RFID UID matched or unmatched. 12. Simulate door lock by interfacing fingerprint sensor and relay moule with raspberry Pi. 13. Implement basic Publisher - Subscriber using MQTT. Publish messages using paho

mqtt. Subscribe and control LED.

14. Design a web dashboard using Flask. Control relay module via web.

15. Create two factor authentication system by interfacing fingerprint sensor, RFID and relay with Raspberry Pi.

16. Create a motion detector by interfacing camera and 16X2 display with Raspberry Pi. Print the appropriate message on the display.

17. Design and implement a Node-RED flow on Raspberry Pi that integrates a physical push-button and an LED with a web dashboard. The flow must allow users to toggle the LED from the dashboard and via the physical button. A button press should force the LED ON for 5 seconds and then automatically restore the LED to the dashboard's last state.

18. Write a program to read the CPU%, Memory% and CPU temperature of Raspberry Pi.

19. Design and implement an embedded access-control prototype that grants entry only when either a whitelisted RFID tag is detected or a legitimate fingerprint is verified, provides real-time visual feedback on an LCD, indicates status via an LED, and pulses a relay (active-LOW) to unlock for a fixed interval. The system must log all events (time, method, result) for auditability.

20. Install Windows IoT 10 core on Raspberry pi and run the demo program.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	**Marks**
Q1	Unit 1	13
Q2	Unit 2	12
Q3	Journal and Viva	05
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential

component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

Sr.No	Assessment / Evaluation	Marks
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total:	**20**

11 REFERENCES:

1. Programming the Raspberry Pi: Getting Started with Python — Simon Monk, McGraw-Hill, 3rd ed.
2. Raspberry Pi Cookbook — Simon Monk, O'Reilly, 2nd ed.
3. Exploring Raspberry Pi — Derek Molloy, Wiley.
4. Getting Started with Python on Raspberry Pi — (Raspberry Pi Press / Foundation)
5. Exploring Arduino — Jeremy Blum, 2nd ed., Apress.
6. Practical Electronics for Inventors — Paul Scherz & Simon Monk, McGraw-Hill, 4th ed.
7. **RFID Handbook: Fundamentals and Applications** — Klaus Finkenzeller, Wiley, 3rd ed.
8. **Near Field Communication (NFC):** From Theory to Practice — Vedat Coskun et al., Wiley, 2nd ed.
9. **Handbook of Fingerprint Recognition** — Davide Maltoni et al., Springer, 2nd ed.
10. **Understanding GPS/GNSS:** Principles and Applications — Elliott D. Kaplan & Christopher Hegarty, Artech House
11. **GPS for Land Surveyors** — Jan Van Sickle, CRC Press.
12. **Programming the Raspberry Pi:** Picamera2 and libcamera Guides — (Foundation/Pi Press articles, community books)
13. **MQTT Essentials – A Lightweight IoT Protocol** — Gastón C. Hillar (Packt)
14. **Node-RED:** A visual tool for wiring the Internet of Things — Nick O'Leary & Dave Conway-Jones
15. **Flask Web Development** — Miguel Grinberg, O'Reilly, 2nd ed.
16. **Designing Connected Products** — Claire Rowland et al., O'Reilly.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- V

Title: Community Engagement Program
Vertical 6 – CEP (2 Credits)

with effect from
Academic Year 2026-2027

Title: Community Engagement Program
Course Code: CHMITV9

Duration: - 30 hrs. (Field Work+ Survey) + 15hrs. (Discussion + Report Writing): Total - 45 hrs.

Indicative Topics for CEP

Sr. No.	Name of the Topic
1.	Community projects on Mangrove conservation, tree plantation, and eco-awareness campaigns.
2.	Engagement in guided biodiversity trails and sustainability education campaigns.
3.	Assistance in slum-based education and nutrition programs for children.
4.	Improve public spaces and civic hygiene through youth-led volunteering
5.	Use digital skills to implement socially impactful tech projects
6.	Digital Literacy Training for Senior Citizens
7.	Basic Computer Skills for Rural School Students
8.	Smartphone Usage & Online Safety for Women Self-Help Groups
9.	Digital Awareness Program for Persons with Disabilities
10.	Teaching Internet Basics to First-Generation Learners
11.	Bridging the Digital Divide in Urban Slum Communities
12.	Multilingual Digital Literacy Content Development
13.	Helping Small Vendors Go Digital (UPI, QR, Apps)
14.	Cyber Awareness Campaign for Rural Communities
15.	Digital Skills Bootcamp for Unemployed Youth
16.	Cybercrime Awareness and Prevention Workshops
17.	Social Media Safety & Digital Footprint Awareness
18.	Phishing, Scam & Fraud Detection Awareness Program
19.	Password Hygiene and Personal Data Protection Campaign
20.	Cyber Ethics and Responsible Internet Usage Program
21.	Online Safety for Children and Adolescents
22.	Digital Privacy Awareness for Community Organizations
23.	Secure Online Banking Awareness Programme
24.	Community Helpdesk for Cyber Safety Queries
25.	Fake News Detection and Media Literacy Programme
26.	Assisting Citizens in Using Government Digital Portals
27.	Awareness Program on Digital India Initiatives
28.	Helping Communities Access Online Healthcare Services
29.	Training on DigiLocker, Aadhaar & PAN Services
30.	Online Grievance Redressal Systems Awareness
31.	Digital Tax Filing Support for Small Businesses
32.	Voter Awareness Using Digital Platforms
33.	Digital Skill Support for Local Government Offices
34.	Smart Village / Smart City IT Enablement Project

Sr. No.	Name of the Topic
35.	Creating Digital Guides for Public Welfare Schemes
36.	Developing E-Learning Content for Government Schools
37.	Setting Up Virtual Classrooms for Rural Schools
38.	Coding Awareness Program for School Children
39.	STEM Education Support Using Free Digital Tools
40.	Educational App Development for Local Language Learning
41.	Digital Library Creation for Community Centers
42.	Online Career Guidance Portal for Underprivileged Students
43.	Learning Management System (LMS) Setup for NGOs
44.	Assistive Learning Tools for Differently-Abled Students
45.	Digital Assessment Tools for Community Schools
46.	Health Awareness Campaign Using Mobile Applications
47.	Telemedicine Awareness and IT Support Program
48.	Environmental Monitoring Using Sensors & Data Analytics
49.	Waste Management Tracking System for Local Bodies
50.	Air & Water Quality Awareness Using Data Visualization
51.	IT-Based Disaster Preparedness and Alert Systems
52.	Nutrition & Health Tracking App for Community Use
53.	Digital Record System for Community Health Workers
54.	Smart Farming Advisory System for Farmers
55.	Climate Change Awareness Using Interactive Dashboards
56.	Website & Digital Presence Development for NGOs
57.	IT Support for Self-Help Groups and Micro-Entrepreneurs
58.	Digital Marketing Training for Small Businesses
59.	Inventory & Billing Software for Local Shops
60.	Data Management Solutions for Non-Profit Organizations
61.	Crowdfunding Platform Development for Social Causes
62.	Social Media Strategy for Community-Based Organizations
63.	Technology Support for Rural Startups
64.	Building Open-Source Solutions for Social Problems
65.	Community-Based Hackathon for Social Innovation

The topics are indicative and the faculty members should allot Community Engagement Project that are relevant and important as per core Subject. The Community Engagement Project may be taken individual or in a group up to 4 students with proper guidance from Faculty.

Evaluation Pattern:-Evaluation during CEP Program involves two key components:-

External Evaluation 60%

Internal Evaluation 40%

Evaluation Chart

(i) External Evaluation (Marks 30)

Criteria	Marks
Objectives, Literature Review , Methodology, Data Analysis, Conclusion and Recommendations	15
Overall Project Report Structure and Style	5
Presentation Skills & Communication	10
Total	30

(ii) Internal Evaluation by Guide (Marks 20)

Criteria	Marks
Attendance, Community interactions completion and interaction with Supervisor	10
Overall Report quality	10
Total	20

Please see the Guidelines for Community Engagement Project for UG Students, as per NEP 2020

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

HSNC Board's

Smt. Chandibai Himathmal Mansukhani College, Ulhasnagar

(Autonomous)

Affiliated to the University of Mumbai

Bachelor of Science
(Information Technology)
(Self-Financing Course)

Semester – VI

Choice Based and Credit Based syllabus as per NEP 2020 with effect from the Academic Year 2026-2027

Smt. Chandibai Himathmal Mansukhani College
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Third Year B. Sc.
(Information Technology)

Semester- VI

Title: Project Management

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Project Management
Course Code: CHMITVI1

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces the fundamental concepts and practices of project management in the context of IT projects. It covers project planning, scheduling, cost estimation, risk management, and quality control using standard tools and techniques. Students learn to manage the complete project life cycle, from initiation to closure, with effective teamwork and communication. The course equips learners with practical skills to successfully plan and execute real-world IT projects
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits (1 credit = 15 Hours for Theory)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To introduce fundamental concepts and principles of software project management. **CO(A) 2:** To understand project planning, estimation, scheduling, and risk management techniques. **CO(A) 3:** To familiarize students with modern software process models and project evaluation methods. **CO(A) 4:** To develop managerial, leadership, and quality-oriented skills required for Successful software projects.	

8	**Course Outcomes**: Student will be able to: **CO 1**: Explain core concepts, processes, and challenges of software project management. **CO 2**: Apply project planning, estimation, scheduling, and risk management techniques to software projects. **CO 3**: Compare and select appropriate software process models and project approaches. **CO 4**: Analyze project performance, manage teams and quality, and execute effective project closure.
9	# Syllabus **Module I: Software Project Management, Evaluation & Planning** 1. **Introduction to Software Project Management:** Introduction, Importance of Software Project Management, What is a Project? Software Projects versus Other Types of Projects, Contract Management and Technical Project Management, Activities Covered by Software Project Management, Plans, Methods and Methodologies, Categorization of Software Projects. 2. **Project Initiation and Management Concepts**: Project Charter, Stakeholders, Setting Objectives, Business Case, Project Success and Failure, What is Management? Management Control, Project Management Life Cycle, Traditional versus Modern Project Management Practices. 3. **Project Evaluation and Programme Management**: Project Portfolio Management, Evaluation of Individual Projects, Cost–Benefit Evaluation Techniques, Risk Evaluation, Programme Management, Strategic Programme Management, Benefits Management, Reservations about Programme Management. 4. **Project Planning**: Stepwise Project Planning—Project Selection, Scope and Objectives, Infrastructure, Project Characteristics, Product and Activity Identification, Effort Estimation, Risk Identification, Resource Allocation, Plan Review and Execution. 5. **Selection of Project Approach**: Build vs Buy, Choosing Methodologies and Technologies, Software Processes, Choice of Process Models, Structure versus Speed of Delivery. **Module II: Estimation, Risk, Quality & Project Closure** 1. **Software Effort Estimation:** Estimation Issues, Over- and Under-Estimation Problems, Estimation Basis, Bottom-up and Top-down Approaches, Parametric Models, Expert Judgment, Estimation by Analogy, Function Point Analysis (Albrecht, Mark II, COSMIC), COCOMO II, Cost Estimation, Staffing Patterns, Schedule Compression, Capers Jones Estimation Rules.

2. **Software Process Models:** Waterfall Model, Spiral Model, Prototyping, Incremental Delivery, RAD, Agile Methods, Extreme Programming (XP), Scrum, Lean Software Development, Managing Iterative Processes, Selection of Appropriate Process Models.
3. **Activity Planning & Scheduling:** Project Scheduling, Network Planning Models, Critical Path Method, Activity Float, Project Duration Reduction, Activity-on-Arrow Networks.
4. **Risk Management & Resource Allocation**: Risk Categories, Risk Identification, Assessment, Planning, Boehm's Top 10 Risks, PERT Technique, Monte Carlo Simulation, Critical Chain Concepts, Resource Identification and Scheduling, Cost Schedules.
5. **Monitoring, Quality & Closure:** Earned Value Analysis, Change Control, Software Configuration Management (SCM), Managing People and Teams, Leadership and Communication, Software Quality Concepts, Quality Models (ISO 9126), Quality Planning, Testing, Software Reliability, Project Closure Process, Financial Closure, Project Closeout Report.

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt any three (out of five/Six) from Module 1	15
2	Attempt any three (out of five/Six) from Module 1	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		Marks
1	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11	**REFERENCES:**

1. Software Project Management – Dr. Pallawi Bulakh – Nirali Prakashan, 2022
2. Software Project Management– Neelima Padmawar, Deepak Kapase, Pritam Ahire, Vandana G. Dixit & Tulshiram Sul – TechKnowledge Publications, 2023
3. Software Project Management – Er. Rishabh Anand (Reprint editions in circulation– S.K. Kataria & Sons, 3rd Edition (reprint 2025)
4. Software Project Management ,Bob Hughes, Mike Cotterell, Rajib Mall TMH 6th 2018
5. Project Management and Tools & Technologies – An overview Shailesh Mehta ,SPD, 1st 2017
6. Software Project Management, Walker Royce ,Pearson, 2005

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- VI

Title: Computer Security

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Computer Security
Course Code: CHMITVI2

Sr. No.	Heading	Particulars
1	**Description of the Course:**	Security course introduces the fundamental concepts and practices of information security, including risk analysis, secure system design, authentication, encryption, database security, and network protection. It covers security technologies such as firewalls, intrusion detection systems, and operating system security models. The course emphasizes protecting information assets from cyber threats and unauthorized access. With the increasing demand for cybersecurity in industries like banking, IT, healthcare, and e-commerce, this course prepares students for careers in Cyber security and information protection.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits (1 credit = 15 Hours for Theory)
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Understand fundamental concepts, evolution, and importance of information security. **CO(A) 2:** Learn risk analysis, threat identification, and secure design principles. **CO(A) 3:** Understand authentication, authorization, encryption, and database security mechanisms. **CO(A) 4:** Study network device security, firewall technologies, and network protection	

	strategies. **CO(A) 5:** Understand intrusion detection, prevention systems, and security monitoring tools. **CO(A) 6:** Learn operating system security models and trusted computing standards.
8	**Course Outcomes**: Student will be able to: **CO 1**: Explain the importance, evolution, and methodology of information security. **CO 2**: Analyze risks, threats, attacks, and apply secure design principles. **CO 3**: Implement authentication, authorization, encryption, and database security techniques. **CO 4**: Apply network security controls including firewalls and network hardening. **CO 5**: Understand intrusion detection systems and security monitoring tools. **CO 6**: Evaluate operating system security models and apply trusted computing concepts.
9	**Syllabus** **Module I:** 1. **Information Security Overview:** The Importance of Information Protection, The Evolution of Information Security, Justifying Security Investment, Security Methodology, how to Build a Security Program, The Impossible Job, The Weakest Link, Strategy and Tactics, Business Processes vs. Technical Controls. Risk Analysis: Threat Definition, Types of Attacks, Risk Analysis, Secure Design Principles: The CIA Triad and Other Models, Defense Models, Zones of Trust, Best 2. **Authentication and Authorization:** Authentication, Authorization Encryption: A Brief History of Encryption, Symmetric-Key Cryptography, Public Key Cryptography, Public Key Infrastructure. Database Security: General Database Security Concepts, Understanding Database Security Layers, Understanding Database- Level Security, Using Application Security, Database Backup and Recovery, Keeping Your Servers Up to Date, Database

Auditing and Monitoring.

3. **Network Device Security**: Switch and Router Basics, Network Hardening Firewalls: Overview, The Evolution of Firewalls, Core Firewall Functions, Additional Firewall Capabilities, Firewall Design.

Module II:

1. **Intrusion Detection and Prevention Systems:** IDS Concepts, IDS Types and Detection Models, IDS Features, IDS Deployment Considerations, Security Information and Event Management (SIEM). Voice over IP (VoIP) and PBX Security: Background, VoIP Components, VoIP Vulnerabilities and Countermeasures, PBX, TEM: Telecom Expense Management. Operating System Security Models: Operating System Models, Classic Security Models, Reference Monitor, Trustworthy Computing, International Standards for Operating System Security
2. **Virtual Machines and Cloud Computing**: Virtual Machines, Cloud Computing. Secure Application Design: Secure Development Lifecycle, Application Security Practices, Web Application Security, Client Application Security, Remote Administration Security. Physical Security: Classification of Assets, Physical Vulnerability Assessment, Choosing Site Location for Security, Securing Assets: Locks and Entry Controls, Physical Intrusion Detection

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt any three (out of five/Six) from Module 1	15
2	Attempt any three (out of five/Six) from Module 1	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		Marks
1	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11 REFERENCES:

1. William Stallings, Cryptography and Network Security: Principles and Practice, 8th Edition, Pearson, 2023.
2. Principles of Information Security by Ph.D. Whitman, Michael E. Herbert J. Mattord , 7th Edition, Cengage Learning, 2021
3. Cloud Security: A Comprehensive Guide to Secure Cloud Computing 1st Edition, by Ronald L. Krutz
4. The Complete Reference: Information Security Mark Rhodes- Ousley McGraw-Hill Second 2013
5. Essential Cybersecurity Science Josiah Dykstra O'Reill Fifth 2017
6. Principles of Computer Security: CompTIA Security+ and Beyond Wm.Arthur Conklin,Greg White McGraw Hill Second 2010

Smt. Chandibai Himathmal Mansukhani College
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Third Year B. Sc.
(Information Technology)

Semester- VI

Title: Data Analytics and Business Intelligence

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Data Analytics and Business Intelligence
Course Code: CHMITVI3

Sr. No.	Heading	Particulars
1	**Description of the Course:**	Business Analytics equips students with the conceptual foundations, quantitative techniques, and practical tool-based skills required to extract meaningful, decision-relevant insights from business data. The course occupies a critical position in the curriculum — it synthesises students' prior knowledge of programming, databases, and statistics, and channels it towards real-world organisational problem-solving across domains such as marketing, finance, human resources, supply chain, and e-commerce. Foundations of Business Analytics & Data Analysis — builds the conceptual and technical groundwork: the four analytics types (Descriptive, Diagnostic, Predictive, Prescriptive), data collection from structured and unstructured sources, data cleaning and transformation (handling missing values, normalisation, standardisation), Exploratory Data Analysis (EDA) covering measures of central tendency and dispersion, correlation, covariance, and data visualisation, followed by practical mastery of industry analytics tools — Microsoft Excel (statistical functions, PivotTables, charts), Power BI, and Tableau. Predictive Analytics & Business Applications — advances into predictive modelling: Simple Linear Regression and Time Series basics, Classification (Decision Trees), Clustering (K-Means), Market Basket Analysis (Association Rules: Support, Confidence, Lift), and concludes with a business decision-making capstone covering interpretation of results, industry case studies, and the ethical dimensions of data analytics.
2	**Vertical 1**	Major
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits (1 credit = 15 Hours for Theory)
5	**Hours allotted**	30 Hours

6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To introduce students to the fundamental concepts and significance of Business Analytics in modern organizations. **CO(A) 2:** To develop an understanding of data collection methods, pre-processing techniques, and exploratory data analysis. **CO(A) 3:** To familiarize students with statistical tools and analytical techniques used in business decision-making. **CO(A) 4:** To provide knowledge of predictive models such as regression, classification, and clustering. **CO(A) 5:** To enable students to interpret analytical results and apply them to real-world business scenarios.	
8	**Course Outcomes**: Student will be able to: **CO 1**: Explain the key concepts and types of Business Analytics. **CO 2**: Perform data cleaning, transformation, and exploratory data analysis using analytical tools. **CO 3**: Apply statistical and predictive techniques to analyze business data. **CO 4**: Identify patterns and relationships using clustering and association rule methods. **CO 5**: Interpret and communicate analytical findings to support effective business decision-making.	
9	**Syllabus** **Module I: Foundations of Business Analytics & Data Analysis** 1. Introduction to Business Analytics: Meaning and importance of Business Analytics, Types of Analytics: Descriptive, Diagnostic, Predictive, Prescriptive, Applications in Marketing, Finance, HR, Operations 2. Data Collection and Pre-processing: Sources of Business Data (Structured & Unstructured), Data Cleaning and Transformation Handling Missing Values, Data Normalization and Standardization 3. Exploratory Data Analysis (EDA): Measures of Central Tendency (Mean, Median, Mode), Measures of Dispersion (Variance, Standard Deviation), Correlation and Covariance, Data Visualization (Bar chart, Pie chart, Histogram, Line graph) 4. Tools for Business Analytics: Introduction to Excel for Analytics Basic Statistical Functions, Pivot Tables and Charts, Power BI, Tabulae	

Module II: Predictive Analytics & Business Applications

1. Introduction to Predictive Analytics: Concept of Prediction, Regression Analysis (Simple Linear Regression), Time Series Basics
2. Classification and Clustering: Concept of Classification, Decision Trees (Basic idea), K-Means Clustering (Basic concept and steps)
3. Market Basket Analysis: Concept of Association Rules, Support, Confidence, Lift, Business Use Cases (Retail, E-commerce)
4. Business Decision Making: Interpreting Analytical Results, Case Studies in Business Analytics, Ethical Issues in Data Analytics

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt any three (out of five/Six) from Module 1	15
2	Attempt any three (out of five/Six) from Module 1	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		Marks
1	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11

REFERENCES:

1. Camm, Cochran, Fry, Ohlmann, Anderson, Sweeney, Williams - Essentials of Business

	Analytics, Cengage Learning. 2. James Evans, Business Analytics, Pearson. 3. Albright Winston, Business Analytics - Data Analysis - Data Analysis and Decision Making, Cengage Learning, Reprint 4. Sahil Raj, Business Analytics, Cengage Learning. 5. Ratnoo & Ratnoo, Essentials of R for Data Analytics, Wiley 6. Seema Acharya & D. R. Khanna – Fundamentals of Business Analytics 7. Thomas W. Miller – Modeling Techniques in Predictive Analytics 8. Ramesh Sharda, Dursun Delen, Efraim Turban – Business Intelligence: A Managerial Perspective on Analytics

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- VI

Title: Data Analytics and Business Intelligence and Computer Security in Practical

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Data Analytics and Business Intelligence and Computer Security in Practical
Course Code: CHMITVI4

Sr. No.	Heading	Particulars
1	**Description of the Course:**	The subject gives hands-on, laboratory counterpart to the Business Analytics Theory course, offered as a Major Practical in the sixth and final semester of the T.Y.I.T. programme under NEP 2020. Where the theory course builds conceptual and quantitative foundations, this practical course develops the applied, tool-based proficiency that employers directly evaluate in analytics roles. Students graduate having worked on real-world business datasets using three industry-standard platforms: Microsoft Excel, Python/R, and Microsoft Power BI — the exact tool trifecta encountered in Business Analyst, Data Analyst, MIS Executive, and BI Developer job descriptions. The course spans the full analytics pipeline from data warehousing to predictive modelling: importing and analysing data warehouse data in Excel using PivotTables and PivotCharts; performing OLAP-style cube analysis; applying What-If Analysis tools (Goal Seek, Scenario Manager, Data Tables) for business scenario modelling; implementing classification algorithms (Decision Trees, k-Nearest Neighbours) and clustering algorithms (K-Means) using Python (scikit-learn) or R (caret/kmeans); and building Simple and Logistic Regression models on data warehouse datasets. It focuses on lookup-based data retrieval, dimensional modelling (ROLAP, MOLAP, HOLAP cube design with fact and dimension tables), and professional Power BI dashboard development on real-world datasets including Sales data and the Netflix content dataset. Security in Computing Practical builds practical skills in threat detection, encryption, and secure system design through lab simulations. This lab-based course equips students with tools to secure computing environments, covering vulnerabilities, access controls, and ethical hacking basics. It familiarizes students with common cyber threats Enable hands-on configuration of firewalls, IDS/IPS, and secure protocols Develop skills in vulnerability scanning and basic penetration testing in controlled environments.
2	**Vertical 1**	Major

3	**Type**	Practical
4	**Credit**	2 Credits (1 credit = 30 Hours of Practical work in a semester)
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks

7 **Course Objectives**:

CO(A) 1: To understand the fundamentals of Data Warehousing including data warehouse architecture, ETL process, OLAP operations, and cube models (ROLAP, MOLAP, HOLAP)

CO(A) 2: To develop analytical skills using Microsoft Excel by applying Pivot Tables, Pivot Charts, Lookups (VLOOKUP, HLOOKUP), What-If Analysis, and data visualization techniques.

CO(A) 3: To implement predictive analytics techniques such as Linear Regression and Logistic Regression for real-world datasets.

CO(A) 4: To design interactive dashboards using Power BI for business decision-making.

CO(A) 5: To configure and secure network devices using industry-standard protocols.

CO(A) 6: To design and implement Access Control Lists (ACLs)

CO(A) 7: To implement Layer 2 security mechanisms on Cisco switches.

CO(A) 8: To configure IOS Intrusion Prevention Systems (IPS), site-to-site IPsec VPNs and Cisco ASA basic firewall settings using the CLI

CO(A) 9: To develop host-based security investigation skills using the Windows SysInternals Suite and to perform network reconnaissance and attack surface mapping using the Nmap port scanner.

CO(A) 10: To capture, filter, and analyse live network traffic using Wireshark, interpreting protocol behaviour across TCP (3-way handshake)

8 **Course Outcomes**: Student will be able to:

CO 1: Apply data warehousing concepts and perform OLAP analysis using Excel and cube models.

CO 2: Perform data analysis and visualization using Pivot tables, What-If analysis, and

	dashboards. **CO 3**: Implement data mining techniques such as classification and clustering using R/Python. **CO 4**: Apply regression techniques (Linear and Logistic) for predictive analysis **CO 5**: Design dimensional models and create BI dashboards using Power BI. **CO 6**: Configure routers for Syslog event logging **CO 7**: Configure, apply, and verify Extended Numbered IPv4 ACLs and IPv6 ACLs **CO 8**: Configure a Zone-Based Policy Firewall (ZPF) on a Cisco router **CO 9**: Implement Layer 2 security on Cisco switches **CO 10**: Configure IOS IPS using the CLI — enabling IPS **CO 11**: Use the Windows SysInternals Suite to investigate system security **CO 12**: Capture and analyse live network traffic using Wireshark
9	**Module I:** 1. Perform the analysis for the following: a. Import the data warehouse data in Microsoft Excel and create the Pivot table and Pivot Chart. b. Import the cube in Microsoft Excel and create the Pivot table and Pivot Chart to perform data analysis. 2. Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the data warehouse data. Use Excel. 3. Perform the data classification using classification algorithm using R/Python. 4. Perform the data clustering using clustering algorithm using R/Python. 5. Perform the Linear regression on the given data warehouse data using R/Python. 6. 6. Perform the logistic regression on the given data warehouse data using R/Python. 7. Perform lookups using Microsoft Excel a. Perform vlookup on any products data. b. Perform hlookup on any products data. 8. Create the cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model.

9. Create dashboard in POWER BI of Sales data. Use scattered chart and cards.
10. Create the dashboard in POWER BI of Netflix dataset.

Module II:

11. Configure Routers for
    a. Syslog, NTP, and
    b. SSH Operations
    c. OSPF MD5 authentication.
12. Configure AAA Authentication
    a. Configure a local user account on Router and configure authenticate on the console and vty lines using local AAA.
    b. Verify local AAA authentication from the Router console and the PC-A client.
13. Configuring Extended ACLs
    a. Configure, Apply and Verify an Extended Numbered ACL.
14. Configuring IPv6 ACLs
15. Configure IP ACLs to Mitigate Attacks
    a. Verify connectivity among devices before firewall configuration.
    b. Use ACLs to ensure remote access to the routers is available only from management station PC-C.
    c. Configure ACLs on to mitigate attacks.
16. Configuring a Zone-Based Policy Firewall (ZPF)
    a. Verify connectivity among devices before firewall configuration.
    b. Configure a zone-based policy (ZPF) firewall on R3.
    c. Verify ZPF firewall functionality using ping, SSH, and a web browser.
17. DHCP Snooping and ARP Inspection
18. Configure IOS Intrusion Prevention System (IPS) Using the CLI
    a. Enable IOS IPS.

	b. Configure logging. c. Modify an IPS signature. d. Verify IPS. 19. Implementing Layer 2 Security a. Assign the Central switch as the root bridge. b. Secure spanning-tree parameters to prevent STP manipulation attacks. c. Enable port security to prevent CAM table overflow attacks. 20. Implementing Layer 2 VLAN Security a. Enable trunking and configure security on the new trunk link. 21. Configure and Verify a Site-to-Site IPsec VPN Using CLI 22. Configuring ASA Basic Settings and Firewall Using CLI 23. Exploring Processes, Threads, Handles, and Windows Registry (SysInternals Suite) 24. Use a Port Scanner to Detect Open Ports a. Nmap, a port scanner and network mapping tool, to detect open ports. 25. Using Wireshark a. To Observe the TCP 3-Way Handshake. b. To Examine a UDP DNS Capture. 26. To Examine FTP and TFTP Captures.

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Module 1	13
Q2	Module 2	12
Journal and Viva		05
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11 **REFERENCES:**

1. Business Intelligence Guidebook – Rick Sherman Practical BI implementation strategies.
2. Applied Predictive Modeling – Max Kuhn & Kjell Johnson Regression and classification

	practical modeling. 3. Power BI Cookbook – Brett Powell 4. Advanced dashboard techniques and case studies. 5. CCNA Security 2.0 Lab Manual **Text Books:** 6. Microsoft Excel 365 Bible – Michael Alexander & Richard Kusleika Publisher: Wiley 7. (Covers Pivot Tables, What-If Analysis, Lookups, Data Analysis Tools.) 8. Python for Data Analysis – Wes McKinney Publisher: O'Reilly 9. (Hands-on implementation of regression and data analysis using Python.) 10. R for Data Science – Hadley Wickham & Garrett Grolemund Publisher: O'Reilly(Practical guide for clustering, classification and visualization using R.) 11. Practical Business Intelligence with Power BI – Brett Powell Publisher: Apress (Step-by-step dashboard development.)

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- VI

Title: Cloud Computing and Testing Tools Practical

Vertical - 1
Major Course - 2 Credits

with effect from
Academic Year 2026-2027

Title: Cloud Computing and Testing Tools Practical
Course Code: CHMITVI5

Sr. No.	Heading	Particulars
1	**Description of the Course:**	Cloud Computing Practical is the hands-on laboratory companion. This lab-based course bridges theoretical cloud concepts with applied, tool-based experience, equipping students with the skills to deploy, configure, and simulate virtualised cloud environments — the exact competencies demanded in roles such as Cloud Engineer, System Administrator, DevOps Associate, and Cloud Solutions Architect. the virtualisation and simulation foundation: installing and configuring VMware ESXi Server to manage bare-metal hypervisor deployments; implementing virtual machines on the open-source Xen Server (Type-1 paravirtualisation); exploring native virtualisation using Microsoft Hyper-V (hardware-assisted Type-1 hypervisor); followed by setting up the CloudSim simulation toolkit (Java JDK + Eclipse IDE), creating and simulating a cloud data centre with configurable host resources, and provisioning virtual machines within the CloudSim environment Software Testing Tools Practical is a hands-on laboratory course that provides students with direct, tool-based experience across the complete spectrum of modern software testing — from web UI automation and unit testing to load testing, behavior-driven development, and API testing. The course covers ten industry-standard tools and frameworks — Selenium IDE, Selenium RC, Selenium WebDriver, JUnit, TestNG, NUnit, AutoIT, Apache JMeter, Cucumber, and SoapUI/Postman — equipping students for roles such as QA Engineer, Automation Test Engineer, SDET (Software Developer in Test), and Performance Test Engineer.
2	**Vertical 1**	Major
3	**Type**	Practical
4	**Credit**	2 Credits (1 credit = 30 Hours of Practical work in a semester)
5	**Hours allotted**	60 Hours

6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To understand and implement Types of hypervisor-based virtualization platforms- VMware ESXi, Xen, and Microsoft Hyper-V **CO(A) 2:** To install and configure the CloudSim simulation toolkit (Java JDK + Eclipse IDE), understand its layered architecture, and successfully run basic simulation programs **CO(A) 3:** To create and simulate cloud data centers and virtual machines in CloudSim. **CO(A) 4:** To simulate task scheduling in a cloud environment by creating multiple cloudlets, assigning them to virtual machines using scheduling algorithms, and to model multiple distributed data centers **CO(A) 5:** To introduce students to web UI test automation using Selenium IDE, Selenium RC, and Selenium WebDriver, covering record-and-playback, scripted test creation, assertion-based verification, and screenshot capture. **CO(A) 6:** To develop proficiency in writing and executing unit test cases using JUnit (Java) and NUnit (.NET), including assertion methods, test lifecycle annotations, and coverage of both positive and negative test scenarios. **CO(A) 7:** To enable students to organise and manage automated test suites using TestNG lifecycle annotations, and to handle native desktop dialogs within browser tests by integrating AutoIT scripts with Selenium WebDriver. **CO(A) 8:** To equip students with skills to perform performance and load testing using Apache JMeter, including designing test plans, simulating concurrent user traffic, and interpreting throughput, response time, and error rate metrics. **CO(A) 9:** To introduce Behavior-Driven Development (BDD) using Cucumber with Gherkin syntax for writing human-readable acceptance tests, and to API testing using SoapUI and Postman for verifying RESTful web service correctness, payload integrity, and scalability under load.
8	**Course Outcomes**: Student will be able to: **CO 1**: Install and configure Type-1 hypervisors (VMware ESXi, Xen, and Microsoft Hyper-V) on bare-metal or lab environments; create, configure, and manage virtual machines **CO 2**: Install the CloudSim toolkit (JDK + Eclipse IDE + CloudSim library), import the project, and execute sample simulation programs successfully

	CO 3: Create and simulate a cloud data center in CloudSim by programmatically defining Data Center objects and host configurations **CO 4**: Create cloudlets with defined length, file size, and output size **CO 5**: Simulate task scheduling by creating multiple cloudlets, assigning them to VMs via scheduling algorithms, and model multiple distributed data centers with independent host **CO 6**: Execute cloud simulations and analyse performance metrics (task execution time, finish time, actual CPU time, and resource utilization **CO 7**: Record and replay browser-based test scenarios using Selenium IDE with element assertions; write and execute Selenium RC scripts and Selenium WebDriver tests **CO 8**: Write JUnit test cases in Eclipse to verify web application search functionality; **CO 9**: Configure and run a TestNG test suite with @Test, @BeforeMethod, @AfterMethod, @BeforeClass, and @AfterClass lifecycle annotations; write and integrate an AutoIT **CO 10**: Implement NUnit test cases for a .NET authentication system covering positive and negative scenarios; design Apache JMeter test plans **CO 11:** Write Cucumber .feature files in Gherkin (Given–When–Then) and implement Java step definition classes linking each step to Selenium WebDriver code
9	**Module I:** 1. Implement VMWAre ESXi Server. 2. Implementing VMs on Xen Server 3. Native Virtualization using Hyper-V 4. Installation of CloudSim Environment 5. To create and simulate a cloud data center using CloudSim. 6. To create virtual machines in CloudSim environment. 7. Virtual Machine Scheduling in cloud sim 8. Cloudlet Creation and Execution 9. To simulate task scheduling using CloudSim 10. Simulation of Multiple Data Centers 11. Performance Analysis of Cloud Simulation 12. Study of CloudSim Architecture

Module II:

13. Selenium IDE:
    a. Install Selenium IDE in your browser of choice.
    b. Record a simple test scenario such as logging into the web application.
    c. Add assertions to verify elements on the page.
    d. Export the test case to a programming language of your choice (e.g., Java).
14. Selenium RC Tools:
    a. Install Selenium RC and set up a test environment.
    b. Write a test script using Selenium RC to automate a registration form on the web application.
    c. Execute the test script and verify the results.
15. Creating JUnit Tests using Eclipse:
    a. Set up a Java project in Eclipse for automation testing.
    b. Write a JUnit test case to verify the search functionality of the web application.
    c. Run the JUnit test case and analyze the test results.
16. Web Testing using WebDriver Tool:
    a. Set up WebDriver in your preferred programming language (e.g., Java).
    b. Write a WebDriver test script to automate the checkout process of the web application.
    c. Implement synchronization techniques to handle dynamic elements on the page.
    d. Execute the WebDriver test script and capture screenshots for each step.
17. Automation using AutoIT Tool:
    a. Install AutoIT and familiarize yourself with its scripting language.
    b. Write an AutoIT script to automate a file upload process on the web application.
    c. Integrate the AutoIT script with your Selenium WebDriver test script.
    d. Execute the combined test script and verify the file upload functionality.
18. Setting Up TestNG Testing Framework:

a. Set up a TestNG testing framework in your preferred IDE (e.g., IntelliJ IDEA, Eclipse). Create a test class with multiple test methods to validate different functionalities of a sample web application. Utilize TestNG annotations such as @Test, @BeforeMethod, @AfterMethod, etc., to organize and execute your test cases effectively.

19. Unit Testing with Junit

    a. Develop a Java class representing a simple calculator with methods for addition, subtraction, multiplication, and division. Write Junit test cases to verify the correctness of each operation. Utilize Junit assertions to validate expected outcomes and ensure that the calculator functions as expected under various scenarios.

20. Unit Testing with Nunit and Load Testing with Jmeter:

    a. Implement a .NET class representing a user authentication system with methods for login and logout. Create Nunit test cases to validate the authentication functionality, including positive and negative test scenarios. Use Nunit's Assert methods to verify the behavior of the authentication system under different conditions.

    b. Set up a load testing environment using Apache Jmeter to assess the performance of a web application under heavy user load. Create Jmeter test plans to simulate concurrent user traffic accessing different pages of the application. Analyze Jmeter test results to identify performance bottlenecks and optimize system performance.

21. Behavior-Driven Development (BDD) with Cucumber/Cypress:

    a. Implement behavior-driven development (BDD) practices using Cucumber to define and execute acceptance tests for a web application. Write feature files in Gherkin syntax to describe various application features and scenarios. Develop step definitions in your preferred programming language to automate the execution of Cucumber scenarios.

22. API Testing with SoapUI/POSTMAN:

    Use SoapUI to perform functional and performance testing of a RESTful web service. Create SoapUI test suites to validate different API endpoints and verify the correctness of request and response payloads. Configure

    SoapUI load tests to simulate concurrent user interactions and measure the service's scalability and responsiveness.

10 **Scheme of Examination and Assessment Pattern**

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Module 1	13
Q2	Module 2	12
Journal and Viva		05
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11 **REFERENCES:**

1. GitHub
2. Vmware VCA lab manual
3. https://clouds.cis.unimelb.edu.au/cloudsim/

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- VI

Title: Geographical Information System Practical

Vertical 1 - Elective (2 Credits)

with effect from
Academic Year 2026-2027

Title: Geographical Information System Practical
Course Code: CHMITVI6

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course provides practical training in Geographic Information Systems (GIS) using QGIS. Students learn to manage, analyze, and visualize spatial data including vector and raster datasets. The course covers map creation, spatial analysis, georeferencing, projections, and automation using processing tools.
2	**Vertical 1**	Elective
3	**Type**	Practical
4	**Credit**	2 Credits (1 credit = 30 Hours of Practical work in a semester)
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** Understand the fundamentals of GIS concepts and spatial data types. **CO2:** Develop skills in managing, editing, and analyzing vector and raster datasets. **CO(A) 2:** Apply spatial analysis techniques to solve real-world geographic problems. **CO(A) 3:** Create raster data analysis on real applications.	
8	**Course Outcomes**: Student will be able to: **CO 1:** Demonstrate the ability to load, manage, and visualize spatial datasets using QGIS. **CO 2:** Perform vector and raster analysis operations including buffering, overlay, and terrain analysis. **CO 3:** Apply georeferencing, projection management, and spatial querying techniques effectively. **CO 4:** Design and present GIS-based solutions through map layouts and analytical reports.	

9	**Module I: Getting Started with QGIS** 1. QGIS Installation & Interface Overview • Install QGIS 3.40. • Explore panels: Browser, Layers, Map Canvas. • Load sample vector and raster data. • (Training Manual: "An Overview of the Interface", "Adding your first layers") 2. **Navigating Map Canvas & Basic Tools** • Pan, zoom, identify features. • Use selection tools and measure tools. Explore project properties**.** • (Based on "Navigating the Map Canvas") 3. **Symbology & Layer Styling** • Change symbology for point, line, polygon. Apply color ramps and symbols. • Save layer styles. • (Based on "Symbology") 4. **Working with Vector Attributes** • Open attribute table. • Sort, filter, calculate field values. Basic statistics. • (Based on "Vector Attribute Data") 5. **Labeling Vector** • Data Use • labeling tool. • Customize label appearance. 6. **Vector Data Classification** • Classify using unique values and graduated styles. Explore classification methods (Natural Breaks, Quantile). (Based on "Classification") 7. **Creating Print Layout** • Insert map in layout.

- Add title, legend, scale bar, north arrow. (Based on “Using Print Layout”)

8. **Dynamic Print Layout and Export**
    - Create multiple map views. Export as PDF and image
9. **Thematic Mapping**
    - Create choropleth maps using attribute data
10. **Creating New Vector Layers**
    - Create point, line, and polygon layers.
    - Add new features manually
    - Spatial Operations
11. **Feature Topology and Editing**
    - Enable topology rules. Snap to feature
12. **Vector Analysis**
    - Reprojecting and Transforming data
    - Vector Analysis
    - Network Analysis
    - Spatial Statistics

Module II: Raster Data and Analysis

13. **Loading and Styling Raster Data**
    - Add raster layers (e.g., DEM, satellite).
    - Change raster symbology
14. **Terrain Analysis**
    - Slope, aspect, hillshade analysis
15. **Raster Operations**
    - Clip and merge rasters using processing tools
16. **Raster to Vector Conversion**
17. **Installing and Using Plugins**

- Install essential plugins (e.g., QuickOSM, Georeferencer).
- Use plugin feature

18. **Create a base map, analyze the map and print the final map.**
19. **Forestry Application with GIS**

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Module 1	13
Q2	Module 2	12
Journal and Viva		05
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

	Assessment / Evaluation	**Marks**
1.	The internal evaluation will be determined by the completion of practical tasks and the submission of corresponding write-ups for each session. Each practical exercise holds a maximum value of 5 marks. The total evaluation, out of 100 marks, should be scaled down to a final score of **10 marks**.	10
2.	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
		Total: 20

11	**REFERENCES:** 1. https://docs.qgis.org/3.40/en/docs/training_manual/index.html 2. https://libguides.brown.edu/gis_data_tutorials/intro_qgis

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year B. Sc.
(Information Technology)

Semester- VI

Title: Cyber Law and Digital Policy

Vertical 1 - Elective (2 Credits)

with effect from
Academic Year 2026-2027

Title: Cyber Law and Digital Policy
Course Code: CHMITVI7

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course introduces students to the legal and policy framework governing cyberspace in India. It provides a comprehensive understanding of the evolution of cyber law, particularly under the Information Technology Act, 2000, and examines the regulatory mechanisms addressing digital rights, intermediary liability, cybercrimes, and electronic evidence. The course further explores emerging challenges in digital governance, including data protection under the Digital Personal Data Protection Act, 2023, privacy rights, domain name disputes, and Intellectual Property Rights (IPR) in the era of Artificial Intelligence. By integrating legal theory with practical case analysis, the course equips students with analytical skills to understand cyber frauds, digital forensics, AI-related IPR concerns, and contemporary digital policy developments in India.
2	**Vertical 1**	Elective
3	**Type**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits (1 credit = 15 Hours for Theory)
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To introduce the foundational components and statutory evolution of Cyber Law in India. **CO(A) 2:** To understand the legal complexities of online freedom and the liability of intermediaries. **CO(A) 3:** To analyse the mechanisms of cyber frauds and the evidentiary value of digital	

	forensics. **CO(A) 4:** To evaluate the legal impact of AI on Intellectual Property Rights and Data Privacy.
8	**Course Outcomes**: Student will be able to: **CO 1**: Describe the legal history and current components of the IT Act. **CO 2**: Assess the obligations of digital platforms under Intermediary Liability rules. **CO 3**: Apply the provisions of the DPDP Act, 2023 to data protection challenges. **CO 4**: Identify legal risks and protections related to AI-generated content and digital IPR.
9	**Module I: Statutory Framework & Data Policy** **1. Legal Foundations:** a. Cyber Law & Components of Cyber Law in India; Overview of the Information Technology Act, 2000. **2. Statutory Evolution:** a. 25 Years of the IT Act, 2000 (Milestones and Amendments). **3. Digital Rights & Liability:** a. Online Freedom of Speech and Expression; Liability of Intermediaries (Safe Harbour Framework). **4. Privacy Policy:** a. Privacy of Online Data and Information; Digital Personal Data Protection Act, 2023; Right to be Forgotten. **Module II: Cyber Crimes, Forensics & Digital IPR** **1. Offence Analysis:** a. Cyber Crimes and Cyber Contraventions; Investigation of Cyber Frauds & Various Cyber Scams (Phishing, Identity Theft). **2. Digital Evidence:** a. E-evidence and Computer Forensics; Legal standards for admissibility of electronic records in India.

3. Digital IPR Framework:

a. IPR Issues in Digital Media (International and Indian Scenario); Copyright and Patent Issues in the Digital Medium.

4. Emerging Policy Issues:

a. Domain Name Dispute & Resolution; Trademark Issues in Digital Medium; IPR Issues in the Era of Artificial Intelligence (AI).

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt any three (out of five/Six) from Module 1	15
2	Attempt any three (out of five/Six) from Module 1	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Assessment / Evaluation		Marks
1	Class Test- It should be conducted using any Learning Management System such as MOODLE. The test should have 10 MCQ's which should be solved in a time duration of 20 minutes.	10
2	AI-Integrated Internal Evaluation: Students shall undertake an AI-enabled learning activity relevant to the course, such as a case study, self-learning activity, practical exercise, presentation, or mini-project using appropriate AI tools.	10
	Total	**20**

11	**REFERENCES:** 1. Cyber Law of India – Dr. S.R. Myneni 2. Information Technology Law and Practice – Vakul Sharma 3. Cyber Laws – Farooq Ahmad 4. The Indian Cyber Law - Suresh T. Viswanathan 5. Cyber Laws, Information Technology & Artificial Intelligence - Dr. Jyoti Rattan (11th Edition).

BOARD OF STUDIES (BOS) INFORMATION TECHNOLOGY

Sr No	Name of the Faculty	Designation
1.	Ms.Agi Thomas	Assistant Professor, Smt. CHM College, Ulhasnagar
2.	Dr.Shiji Johnson	Assistant Professor, Smt. CHM College, Ulhasnagar
3.	Ms.Neha Kambale	Assistant Professor, Smt. CHM College, Ulhasnagar
4.	Ms.Pooja Gupta	Assistant Professor, Smt. CHM College, Ulhasnagar
5.	Mr.Jairam Mulchandani	Assistant Professor, Smt. CHM College, Ulhasnagar
6.	Ms. Pritee Badgujar	Assistant Professor, Smt. CHM College, Ulhasnagar
7.	Dr.Rakhi Gupta	Assistant Professor, K.C College, HSNCB University, Churchgate
8.	Dr.Pragati Tawani	Assistant Professor, K.C College, HSNCB University, Churchgate
9.	Mr.Vinod Rajput	Assistant Professor, Birla College, Kalyan
10.	Dr.Manoj Kavedia	Founder, Kaizen Futuretech
11.	Mr.Amal Anandan	Principal Data Scientist, Geninvo Technologies Pvt Ltd.

Name & Signature of the Ad-hoc BoS Chairperson: Mr.Agi Thomas

Name & Signature of the Dean: Mr.Agi Thomas

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year
(Mathematics)

Semester- VI

Title: Basics of Mathematics in Real Life – V

Vertical - 2

Minor - 2 Credits

with effect from
Academic Year 2026-2027

Title: Basics of Mathematics in Real Life – V

Course Code: CHMMATHVI12

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course gives a gentle introduction to one variable calculus, which is very helpful to students across various disciplines. Important concepts like convergence and recurrence relations are introduced. The linearization process that plays a vital role all across mathematics is introduced through the definition of differentiability. Important theorems based on this concept are presented. A quick flavour of integration, a key concept of mathematics, with extremely important applications is also given.
2	**Vertical 2**	Minor
3	**Type & Teaching Method**	Theory + Practicum (Lectures / Problem Solving / Discussion / Presentation / Case Study / Demonstration etc.)
4	**Credit**	2 Credits
5	**Hours allotted**	30 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To develop the notion of recurrence **CO(A) 2:** To identify sequences that are convergent **CO(A) 3:** To associate a Taylor series expansion to differentiable functions **CO(A) 4:** To recognize the importance of continuity and differentiability in locating zeroes of functions.	

8	**Course Outcomes**: Student will be able to: **CO 1:** Understand and remember definitions and examples of sequences, convergence, differentiability, derivatives, and integration. **CO 2:** Apply rules of sequences, recurrence relations, differentiation, and integration to solve standard and real-life problems. **CO 3:** Analyze the behavior of sequences and functions, including convergence, differentiability, and extrema.OC4: to outline methods to find zeroes of functions **CO 4:** Justify/check results using logical reasoning, limit arguments, and standard theorems of calculus. **CO 5:** Construct recurrence relations, Taylor expansions, and mathematical models for real-life applications.
9	**Syllabus** **UNIT I** • Sequences of real numbers and examples • Convergence of a sequence of real numbers: definition • Examples of convergent sequences • Examples of non-convergent (divergent) sequences • Sums and products of sequences (convergent sequences) • Sums and products of sequences (not necessarily convergent) • Sandwich theorem for sequences and applications • Sequences defined by recurrence relation: definition and examples • Statement for existence of solution of homogeneous recurrence relation (without proof) • Examples of solving homogeneous recurrence relations: linear and quadratic • Examples of solving homogeneous recurrence relations: cubic and quartic • Examples of non-homogeneous recurrence relations and statement for existence of solution. • Non homogeneous recurrence relation examples (root does not match with root of the associated characteristic polynomial) • Non homogeneous recurrence relation examples (root matches with a root of the associated characteristic polynomial) • Setting up recurrence relations in simple examples

UNIT II

- Definition of differentiability of a function
- Examples of differentiable and non-differentiable functions
- Calculation of the derivative using first principles: simple examples
- Sums, products of differentiable functions are differentiable (with proofs)
- Ratios of differentiable functions are differentiable (with proof)
- Applications of the above rules in various examples and intermediate value property
- Examples of functions which are differentiable finitely many times and those which are differentiable infinitely many times.
- Rolle's theorem (only statement) and applications
- Cauchy and Lagrange's mean value theorems and applications (only statements)
- Derivative of the inverse of a function and examples
- Taylor expansion of a function at a point: definition and remainder term
- Examples for computation of Taylor series of functions
- Applications of derivatives in real life problems (finding maxima, mimima)
- Definition of (Riemann) integration and examples
- Basic properties of Riemann integration and easy examples

10

Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 1:00 hour

Format of Question Paper

Q. No.	Structure of the Questions	Marks
1	Attempt ANY THREE (out of five/Six). (Each question of 5 marks, based on unit 1)	15
2	Attempt ANY THREE (out of five/Six). (Each question of 5 marks, based on unit 2)	15
	Total	**30**

Internal Examination: Continuous Evaluation - 20 marks

Continuous Evaluation through: Quizzes, Class Tests, presentations, projects, role play, creative writing, assignments etc. (at least 3)

Sr.No.	Particulars	Marks
1	A class test of 10 marks is to be conducted during each semester in an Offline mode.	10
2	Project on any one topic related to the syllabus or a quiz (offline/online) on one of the modules.	05
3	Seminar/ group presentation on any one topic related to the syllabus.	05

Paper pattern of the Test (Offline Mode with One hour duration):

Q1: Definitions/Fill in the blanks/ True or False with Justification. (04 Marks: 4 x 1).

Q2: Attempt any 2 from 3 Descriptive questions. (06 marks: 2 × 3)

11 REFERENCES:

1. Bartle R. G. and Sherbert D. R., Introduction to Real Analysis, John Wiley and Sons.
2. Kenneth Rosen, Discrete Mathematics and its applications, McGraw Hill.
3. Richard R. Goldberg, Methods of Real Analysis, John Wiley and Sons.
4. Brualdi, Richard A., Introductory Combinatorics, Pearson Education.

Smt. Chandibai Himathmal Mansukhani College
(Autonomous)

Third Year
(Mathematics)

Semester- VI

Title: Practical Based on Basics of Mathematics in Real Life – V

Vertical - 2
Minor - 2 Credits

with effect from
Academic Year 2026-2027

Title: Practical Based on Basics of Mathematics in Real Life – V

Course Code: CHMMATHVI13

Sr. No.	Heading	Particulars
1	**Description of the Course:**	This course is based on problem-solving which is a fundamental aspect of any Mathematics course. While advanced courses often emphasize the theoretical nature of the subject, engaging in problem-solving reinforces concepts and enhances learners' ability to analyze existing problems and devise solutions. This activity not only motivates learners but also empowers them to formulate new results, propose conjectures, and develop innovative theories.
2	**Vertical 1**	Minor
3	**Type**	Practical
4	**Credit**	2 Credits
5	**Hours allotted**	60 Hours
6	**Marks allotted**	50 Marks
7	**Course Objectives**: **CO(A) 1:** To develop the notion of recurrence **CO(A) 2:** To identify sequences that are convergent **CO(A) 3:** To associate a Taylor series expansion to differentiable functions **CO(A) 4:** To recognize the importance of continuity and differentiability in locating zeroes of functions	

8	**Course Outcomes**: Student will be able to: **CO 1:** Apply rules of sequences, recurrence relations, differentiation, and integration to solve standard and real-life problems. **CO 2:** Analyze the behavior of sequences and functions, including convergence, differentiability, and extrema.OC4: to outline methods to find zeroes of functions **CO 3:** Justify/check results using logical reasoning, limit arguments, and standard theorems of calculus. **CO 4:** Construct recurrence relations, Taylor expansions, and mathematical models for real-life applications.
9	**Syllabus** **UNIT I: Practical based on sequences and recurrence relations (30 Hours)** • Convergence of sequences of real numbers • Arithmetic of convergent sequences • Applications of sandwich theorem and divergent sequences • Homogeneous recurrence relations: degree one and two • Homogeneous recurrence relations: degree three and four • Non homogeneous recurrence relations • Examples of setting up recurrence relations **UNIT II: Practical based on Differentiability and Integrability of functions (30 Hours)** • Differentiability: examples from first principles • Arithmetic of differentiable functions • Derivate of the inverse of a function • Applications of Rolle's theorem and Mean value theorems • Taylor expansion of functions at a point • Applications of derivatives: maxima and minima • Applications of derivatives: further examples • Computations of simple integrals

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Scheme of Examination and Assessment Pattern

Paper – 50 Marks

External Examination: Semester End External - 30 marks Time: 2:00 hour

Format of Question Paper

Question	**Based On**	Marks
Q1	Five out of Eight multiple choice questions (four from Unit 1 and four from Unit 2) (LO1 to LO3)	(3 ×5 =1 5 Marks)
Q2	Attempt any Two out of Four (Two from Unit 1 and two From Unit 2). (LO 3 and LO 4)	(5 × 2 = 10 Marks)
Q3	Journal	5 (2.5 marks for each Unit 1 & Unit 2)
		Total: 30

Note:

- **Certified Journal** is **compulsory** for appearing at the time of Practical Exam, failing which they will not be allowed to appear for the examination.
- Students are required to perform 75% of the Practicals for the journal to be duly certified. The journal serves as a record of their practical work and is essential component of the evaluation process.

Internal Examination: Continuous Evaluation - 20 marks

Continuous Evaluation through: Quizzes, Class Tests, presentations, projects, role play, creative writing, assignments etc. (at least 3)

	Assessment / Evaluation	**Marks**
1.	Objective question test	10
2.	Overall performance	5
3.	Viva	5
		Total: 20

	Paper pattern of the Test (Offline Mode): Q1: (Attempt any 5 from 8) Multiple choice questions. (10 marks: 5 × 2) Duration: 1Hrs While setting question paper four MCQ on module 1 and four MCQ on module 2 both.
11	**REFERENCES:** 1. Bartle R. G. and Sherbert D. R., Introduction to Real Analysis, John Wiley and Sons. 2. Richard R. Goldberg, Methods of Real Analysis, John Wiley and Sons. 3. Thomas and Finney, Calculus and Analytical Geometry, Pearson 4. Ajit Kumar and S. Kumaresan, A basic course in real analysis, Chapman and Hall 5. B. V. Limaye and Sudhir Ghorpade, A course in calculus and real analysis, Springer Nature

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Name & Signature of the Dean: Mr.Agi Thomas