

**Haribhai V Desai College
of Arts, Science & Commerce, Pune.
(Autonomous)**

Faculty of Science and Technology

B.Sc. (Computer Science) Program



**Syllabus
For
S.Y B.Sc. (Computer Science)**

**Choice Based Credit System (CBCS)
Syllabus Under National Education Policy (NEP)
with effect from Academic Year 2024-25**

Title of the Program: B.Sc. (Computer Science)

Preamble:

The B. Sc. (Computer Science) and B. Sc. (Computer Science) (Honors) and (Research) course is a systematically designed program with Computer Science as a major subject under the faculty of Science and Technology. The objective of the course is to prepare students to undertake careers involving problem solving using computer science and technologies, or to pursue advanced studies and research in computer science. The syllabus which comprises of Computer Science (Major) subject along with that of the three allied subjects (Mathematics, Electronics and Statistics) (Minor) covers the foundational aspects of computing sciences and also develops the requisite professional skills and problem-solving abilities using computing sciences.

Introduction:

At the first year of under-graduation, the basic foundations of two important skills required for software development are laid. A course in problem solving and programming along with a course in database fundamentals forms the preliminary skill set for solving computational problems. The practical courses are designed to supplement the theoretical training in the year. Along with Computer Science (Major), VSC and SEC courses help in building a strong technical foundation. Another aspect of this course is IKS which tells about the rich heritage and advancement of India in the field of computation.

In the second year of under-graduation, computational problem-solving skills are further strengthened by a course in Data structures, C++ and python programming. Software engineering concepts that are required for project design are also introduced. Essential concepts of computer networking are also introduced this year. The practical course included in both semesters complements the theory courses. Field projects/ OJT is introduced so that students can implement the concept they have learnt in first year.

In Second Year, the “Subject 1 : Computer Science” will be the Major Subject and the Minor subject will be chosen from “Subject 2 or Subject 3”. Subject 2 and Subject 3 will not be available as Major Subjects in Second Year and Third Year.

At the third year of under-graduation, all the subjects are designed to fulfill core Computer Science requirements as well as meet the needs of the software industry. Theory courses are adequately supplemented by hands-on practical courses. Major elective courses are taking care of recent advancement in the field of computer science. Minor and Skill Enhancement courses enable the students to acquire additional skills.

At the fourth year (honors) and (research) of under-graduation, all the subjects are designed to fulfill core Computer Science requirements as well as meet the needs of the software industry. Practical courses and field projects enable students to get hands-on training. Various learning tracks are open through Major elective courses. Research methodology course will create interest among the students to carry research in the field of computer science.

Objectives:

- To develop problem solving abilities using a computer.
- To build the necessary skillset and analytical abilities for developing computer-based solutions for real life problems.
- To train students in professional skills related to the Software Industry.
- To prepare the necessary knowledge base for research and development in Computer Science.
- To help student's build-up a successful career in Computer Science and to produce entrepreneurs who can
- Innovate and develop software products.

Eligibility:

1. H.S.C. (10 + 2) Science stream with Mathematics.
2. Three years diploma course after S.S.C. (10th std.) of Board of Technical Education conducted by Government of Maharashtra or its equivalent.

Program Outcomes:

PO No.	Outcomes
PO1	Develop creative skills, critical thinking, analytical skills and research to address the real-world problems using computational skills.
PO2	Understand and apply mathematical foundation, computing and domain knowledge and develop computing models for defined problems.
PO3	Understand software project management and computing principles with computing knowledge to manage projects in multidisciplinary environments.
PO4	Illustrate the concepts of systems fundamentals, including architectures and organization, operating systems, networking and communication.
PO5	Understand and apply the concepts of Digital Electronics, Computer Architecture, IoT etc.
PO6	Recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
PO7	Apply modern computing tools, skills and techniques necessary for innovative software solutions.
PO8	Communicate effectively with the computing community as well as society by being able to comprehend effective documentations and presentations.
PO9	Gain Self Discipline and commit Professional Ethics in global economic environment.
PO10	Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment.
PO11	Identify opportunities, entrepreneurship vision and use innovative ideas to create value and wealth for the betterment of the individual and society.

The Poona Gujarati Kelvani Mandal's
Haribhai V. Desai College of Arts, Science and Commerce, Pune
 (Autonomous)

Structure of UG Program as per NEP-2020

Program : - B.Sc. (Computer Science) Major

Course: - Computer Science

SEMESTER-I

Level: 4.5 (First Year)

Course Type	Course Code	Course Title	Credits		Teaching Scheme Hour/Week		Evaluation Scheme and Max Marks		
			TH	PR	TH	PR	CIE	SEE	Total
Subject-1	CS-101-TH	Problem Solving using 'C' Programming	2		2		15	35	50
	CS-102-PR	Lab Course based on CS-101-TH		2		4	15	35	50
Subject-2	ELC-101-TH	Principles of Analog Electronics	2		2		15	35	50
	ELC-102-PR	Electronics Practical Course I		2		4	15	35	50
Subject-3	MTC-101-TH	Matrix Algebra	2		2		15	35	50
	MTC-102-PR	Mathematics Practical I		2		4	15	35	50
IKS (2)	IKS-101-TH	Introduction to Indian Knowledge System (Generic)	2		2		15	35	50
GE/OE* (2)	OE-101-CS - TH/ OE-102-CS - TH/ OE-103-CS - TH	Fundamentals of Computers I / Office Automation I / Introduction to Google Apps I / (Offering to other stream students)	2		2		15	35	50
	SEC-101-STS-PR	Statistical Methods for Computer Science I		2		4	15	35	50
AEC (2)	AEC-104-ENG-TH	Professional Communication Skills-I	2		2		15	35	50
VEC (2)	VEC-101-ENV-TH	Environmental Education-I	2		2		15	35	50
TOTAL			14	08	14	16	165	385	550

* The subjects offered to other faculty students under OE vertical are OE-101-CS -TH/ OE-102-CS -TH/OE-103-CS -TH The students of B.Sc. (Computer Science) will opt the subjects offered by other faculty given in College Basket.

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Structure of UG Program as per NEP-2020

Program : - B.Sc. (Computer Science) Major

Course: - Computer Science

SEMESTER-II

Level: 4.5 (First Year)

Course Type	Course Code	Course Title	Credits		Teaching Scheme Hour/Week		Evaluation Scheme and Max Marks		
			TH	PR	TH	PR	CIE	SEE	Total
Subject-1	CS-151-TH	Advanced C Programming	2		2		15	35	50
	CS-152-PR	Lab Course Based on CS-151-TH		2		4	15	35	50
Subject-2	ELC-151-TH	Principles of Digital Electronics	2		2		15	35	50
	ELC-152-PR	Electronics Practical Course II		2		4	15	35	50
Subject-3	MTC-151- TH	Graph Theory	2		2		15	35	50
	MTC-152-PR	Mathematics Practical II		2		4	15	35	50
GE/OE* (2)	OE-151-CS - PR/ OE-152-CS - PR/ OE-153-CS- PR	Fundamentals of Computers II / Office Automation II / Introduction to Google Apps II / (Offering to other stream students)		2		4	15	35	50
SEC (2)	SEC-151- STS-PR	Statistical Methods for Computer Science II		2		4	15	35	50
AEC (2)	AEC-154- ENG-TH	Professional Communication Skills-II	2		2		15	35	50
VEC (2)	VEC-151- ENV-TH	Environmental Education-II	2		2		15	35	50
CC (2)	CC	From College Basket		2		4	15	35	50
TOTAL			10	12	10	24	165	385	550

* The subjects offered to other faculty students under OE vertical are OE-101-CS -PR/ OE-102-CS -PR/OE-103-CS- PR The students of B.Sc. (Computer Science) will opt the subjects offered by other faculty given in College Basket.

Exit Option:

Award of UG Certificate in Major with 44 credits and an additional 4 credits core as per university guidelines OR Continue with Major and Minor Continue option: Student will select one subject among the (subject 2 and subject 3) as minor and subject 1 will be major subject.

In Second Year, the “Subject 1: Computer Science” will be Major Subject and the Minor subject will be chosen from “Subject 2 or Subject 3”. Subject 2 and Subject 3 will not be available as Major Subjects in Second Year and Third Year.

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Structure of UG Program as per NEP-2020

Program : - B.Sc. (Computer Science) Major

Course: - Computer Science

SEMESTER-III

Level- 5.0 (Second Year)

Course Type	Course Code	Course Title	Credit		Teaching Scheme Hr. / Week		Evaluation Scheme & Max Marks		
			TH	PR	TH	PR	CE	EE	Total
Major Core (4T+2P)	CS-201-MJ-TH	Data Structure-I	2		2		15	35	50
	CS-202-MJ-TH	Database Management System	2		2		15	35	50
	CS-203-MJ-PR	Lab Course based on CS-201-MJ-TH & CS-202-MJ-TH		2		4	15	35	50
VSC (2T)	CS-221-VSC-TH	Agile & Software Engineering	2		2		15	35	50
FP/OJT/ CEP (2)	CS-231-FP -PR	SEM-III Mini Project		2		4	15	35	50
Minor (2T+2P)	MTC-241-MN-TH OR ELC-241-MN-TH	Group Theory and Applications in Coding OR Microcontroller Architecture and Programming (MAP)	2		2		15	35	50
	MTC-242-MN-PR OR ELC-242-MN-PR	Python Programming Language-I OR Electronics Practical Course-III		2		4	15	35	50
GE/OE (2T)	OE-201-CS-TH OR	Web Designing-I OR	2		2		15	35	50
	OE-202-CS-TH	Digital Banking and Fintech Awareness	2		2		15	35	50
IKS (2T)	IKS-201-CS-TH	Vedik Mathematics in Algorithm Optimization	2		2		15	35	50
AEC (2T)	AEC	From College Basket	2		2		15	35	50
CC (2)	CC	From College Basket	2		2		15	35	50
TOTAL			16	6	16	12	165	385	550

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Structure of UG Program as per NEP-2020

Program : - B.Sc. (Computer Science) Major

Course: - Computer Science

SEMESTER-IV

Level- 5.0 (Second Year)

Course Type	Course Code	Course Title	Credit		Teaching Scheme Hr. / Week		Evaluation Scheme & Max Marks		
			TH	PR	TH	PR	CE	EE	Total
Major Core (6T+2P)	CS-251-MJ-TH	Data Structure-II	2		2		15	35	50
	CS-252-MJ-TH	Relational Database Management System	2		2		15	35	50
	CS-253-MJ-PR	Lab Course based on CS-251-MJ-TH & CS-252-MJ-TH		2		4	15	35	50
VSC (2T/P)	CS-271-VSC-PR	Python Programming		2		4	15	35	50
FP/OJT/ CEP (2)	CS-281-CEP -PR	SEM-IV Mini Project		2		4	15	35	50
Minor (2T+2P)	MTC-291-MN-TH OR ELC-291-MN-TH	Applied Mathematics OR Embedded Systems and IoT using Raspberry Pi and Arduino	2		2		15	35	50
	MTC-292-MN-PR OR ELC-292-MN-PR	Python Programming Language-II OR Electronics Practical Course - IV		2		4	15	35	50
GE/OE (2P)	OE-251-CS-PR OR	Web Designing-II OR		2		4	15	35	50
	OE-252-CS-TH	Digital Skills for Entrepreneurs	2		2		15	35	50
SEC (2P)	SEC-251-CS-PR OR SEC-252-STS-PR	Computer Networking OR Statistical Analysis using R Programming		2		4	15	35	50
AEC (2T)	AEC	From College Basket	2		2		15	35	50
CC (2)	CC	From College Basket	2		2		15	35	50
TOTAL			10	12	10	24	165	385	550

Exit option:

Award of UG Diploma in Major and Minor with **88 credits and an additional 4 credits** core as per college guidelines OR Continue with Major and Minor.

ATKT Rules:

Minimum number of credits required to take admission to T.Y. B.Sc.(Computer Science) is 44 credits to be completed from F.Y. B.Sc.(Computer Science) and at least 22 credits from S.Y. B.Sc.(Computer Science)

Assessment and Evaluation:

Scheme of Examination:	Exam Format	Minimum Passing Marks
CIE (15 Marks)	i) Internal Test and ii) Any of the following- A. Assignment B. Seminar C. Presentation D. Oral etc.	Min. 6 Marks (40% Passing)
SEE (35 Marks)	Theory/Practical Examination	Min. 14 Marks (40% Passing)
Total 50 Marks		Min.20 Marks (40% Passing)

SEM-III

Syllabus



The Poona Gujarati Kelavani Mandal's

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ID No.: PU / PN / ASC / 057/ (1984)
NAAC Grade B++ (2.86 CGPA) ■ AISHE CODE : C-41829

Principal:

Dr. Rajendra G. Gurao

M.Sc., Ph.D.

Email: principal@hvdesaicollege.edu.in

Restructured Syllabus (CBCS Pattern as per NEP 2020)

To be implemented from Academic Year: 2025-26

Faculty	Science and Technology
Program	Computer Science
Class	S.Y. B.Sc. (Computer Science)

Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
III	CS-201-MJ-TH	MJ	Data Structure-I	TH	2	2

Course Objectives:

- To learn the systematic way of solving problems
- To understand the different methods of organizing a large amount of data
- To efficiently implement the different data structures
- To efficiently implement solutions for specific problems
- To apply linear data structures.

Course Outcomes:

On completion of the course, students will be able to–

- To use well-organized data structures in solving various problems.
- To differentiate the usage of various structures in problem solutions.
- Implementing algorithms to solve problems using appropriate data structures.

Unit	Title and Contents	No. of lectures in Clock Hours
1.	Introduction to Data Structures and Algorithm Analysis 1.1 Introduction 1.1.1 Need of Data Structure 1.1.2 Definitions - Data and information, Data type, Data object, ADT, Data Structure 1.1.3 Types of Data Structures 1.2 Algorithm analysis 1.2.1 Space and time complexity	3

	1.2.2 Best, Worst, Average case analysis, Asymptotic notations (Big O, Omega Ω , Theta θ)	
2.	Array as a Data Structure 2.1 ADT of array, Operations 2.2 Array applications - Searching 2.2.1 Sequential search, variations - Sentinel search, Probability search, ordered list search 2.2.2 Binary Search 2.2.3 Comparison of searching methods 2.3 Sorting Terminology- Internal, External, Stable, In-place Sorting 2.3.1 Comparison Based Sorting - Lower bound on comparison based sorting, Methods- Bubble Sort, Insertion Sort, Selection Sort, Algorithm design strategies - Divide and Conquer strategy, Merge Sort, Quick Sort, complexity analysis of sorting methods. 2.3.2 Non Comparison Based Sorting: Counting Sort, Radix Sort, complexity analysis. 2.3.3 Comparison of sorting methods	8
3.	Linked List 3.1 List as a Data Structure, differences with array. 3.2 Dynamic implementation of Linked List, internal and external pointers 3.3 Types of Linked List – Singly, Doubly, Circular 3.4 Operations on Linked List - create, traverse, insert, delete, search, sort, reverse, concatenate, merge, time complexity of operations. 3.5 Applications of Linked List – concept, polynomial representation 3.6 Generalized linked list – concept, representation	9
4.	Stack 4.1 Introduction 4.2 Operations – init(), push(), pop(), isEmpty(), isFull(), peek(), time complexity of operations. 4.3 Implementation- Static and Dynamic 4.4 Applications of stack 4.4.1 Function call and recursion, String reversal, palindrome checking 4.4.2 Expression types - infix, prefix and postfix, expression conversion and evaluation (implementation of infix to postfix, evaluation of postfix)	6
5.	Queue	4

	5.1 Introduction 5.2 Operations - init(), enqueue(), dequeue(), isEmpty(), isFull(), peek(), time complexity of operations, differences with stack. 5.3 Implementation - Static and Dynamic 5.4 Types of Queue - Linear Queue, Circular Queue (with implementation) Priority Queue, Double Ended Queue - Concept	
Reference Books: 1. Classic Data Structures-D. Samanta, Prentice Hall India Pvt. Ltd. 2. Fundamentals of Data Structures in C- Ellis Horowitz, Sartaj Sahni, Susan Anderson Freed, 2nd Edition, Universities Press. 3. Data Structures using C and C++-Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Pearson Education 4. Data Structures: A Pseudocode approach with C, Richard Gilberg, Behrouz A. Forouzan, Cengage Learning. 5. Introduction to Data Structures in C-Ashok Kamthane, Pearson Education 6. Algorithms and Data Structures, Niklaus Wirth, Pearson Education		



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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
III	CS-202-MJ-TH	MJ	Database Management System	TH	2	2

Course Objectives:

- To understand the fundamental concepts of DBMS.
- To understand user requirements and frame it in a data model.
- To understand and learn Structured Query language and data manipulation language.

Course Outcomes:

On completion of the course, student will be able to–

- Solve real world problems using appropriate set, function, and relational models.
- Design E-R Model for given requirements and convert the same into database tables.
- Implement basic concepts of SQL.
- Understand various types of databases.

Unit	Title and Contents	No. of lectures in Clock Hours
1.	Introduction to DBMS 1.1. Introduction File Organisation 1.2. File system Vs DBMS Database Management System 1.3. Data Independence and Levels of data abstraction 1.4. Structure of DBMS (Roles of DBMS Users)	3

	1.5. Users of DBMS, Advantages of DBMS and Limitations of DBMS	
2.	Conceptual Design Database design and ER Model: 2.1. Overview of DB design process 2.2. Introduction to data models (E-R model, Relational model, Network model, Hierarchical model) 2.3. Conceptual design using ER data model (entities, attributes, entity sets, relations, relationship sets) 2.4. Constraints (Key constraints, Integrity constraints, referential integrity, unique constraint, Null/Not Null constraint, Domain, Check constraint, Mapping constraints) 2.5. Extended features – Specialization, Aggregation, Generalization 2.6. Pictorial representation of ER(symbols) 2.7. Structure of Relational Databases (concepts of a table) 2.8. Case Studies on ER Model	11
3.	SQL 3.1. Introduction to query languages 3.2. Basic structure 3.3. DDL Commands 3.4. DML Commands 3.5. DCL Commands 3.6. TCL Commands 3.7. Forms of a basic SQL query (Expression and strings in SQL) 3.8. Set operations 3.9. Aggregate functions ,Group by and Having clause 3.10. Date, String and other important functions 3.11. Nested Queries 3.12 SQL join operations (inner joins, outer joins and their types) 3.13 Examples on SQL (case studies)	9
4.	Relational Database Design 4.1 Introduction to Relational-Database Design (undesirable properties of a RDB design) 4.2 Concept of normalization, Normal Forms (1NF,2NF and 3NF, BCNF), Examples 4.3 Key Concepts with Example: Candidate Key and Super Key, Algorithm to find the super key, Candidate Key & primary key for a relation.	5
5.	Other Databases - I 5.1 Parallel databases 5.2 Distributed Databases 5.3 Object-Based Databases	2

Reference Books:

1. Database System Concepts, Henry F. Korth, Abraham Silberschatz, S.Sudarshan, ISBN:9780071289597, Tata McGraw-Hill Education
2. Database Management Systems
,RaghuRamakrishnan,ISBN:9780071254342,Mcgraw-hill higher Education
3. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill
Science/Engineering/Math; 3 edition, ISBN: 9780072465631
4. Database Systems, Shamkant B. Navathe, RamezElmasri, ISBN:9780132144988,
PEARSON HIGHER EDUCATION
5. Beginning Databases with PostgreSQL: From Novice to Professional, Richard Stones,
Neil
Matthew, ISBN:9781590594780, Apress
6. PostgreSQL, Korry Douglas, ISBN:9780672327568, Sams
7. Practical PostgreSQL (B/CD),JohnWorsley, Joshua Drake,ISBN:9788173663925
Shroff/O'reilly
8. Practical Postgresql , By Joshua D. Drake, John C Worsley (O'Reilly publications)
9. "An introduction to Database systems", Bipin C Desai, Galgotia Publications

Reference Links:

1. [PostgreSQL: The world's most advanced open source database](#)



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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
III	CS-203-MJ-PR	MJ	Lab Course Based on CS-201 MJ-TH & CS-202 MJ-TH	PR	2	4

Course Objectives:

- Understand and Implement Searching Techniques
- Apply Sorting Algorithms for Data Organization
- Implement and Utilize Data Structure
- Develop Problem-Solving and Analytical Skills

Course Outcomes:

On completion of this course, students will be able to:

- Apply Linear and Binary Search techniques efficiently.
- Analyze and implement sorting techniques.
- Develop Singly and Doubly Linked Lists with operations such as insertion, deletion, searching, reversal and concatenation.
- Evaluate the performance of Circular and Doubly Circular Linked Lists for dynamic memory-based data handling.
- Implement Stack Operations and Expression Handling. 6: Design and Implement Queue Operations.

Sr. No.	Title and Contents (CS-201-MJ-TH)
1.	Assignment 1:- Searching Algorithm 1. Implementation of Linear search algorithm 2. Implementation of Binary Search algorithm
2.	Assignment 2:- Sorting Algorithm 1. Implementation of Bubble Sort algorithm

	2. Implementation of Insertion sort algorithm 3. Implementation of the Selection sort algorithm 4. Implementation of Merge sort algorithm 5. Implementation of Quick Sort Algorithm 6. Implementation of Count Sort
3.	Assignment 3:- Singly Linked List 1. Implementation of Singly Linked List (Create, Insert, Delete, Display, Search, Sort, Reverse) 2. Merging of two singly linked lists. 3. Concatenation of two singly linked lists 4. Implementation of Singly Circular Linked List (Create, Insert, Delete, Display, Search)
4.	Assignment 4:- Doubly Linked List 1. Implementation of Doubly Linked List (Create, Insert, Delete, Display, Search operation) 2. Implementation of Doubly Circular Linked List (Create, Insert, Delete, Display, Search)
5.	Assignment 5:- Stack 1. Static and Dynamic implementation of Stack 2. Infix to Postfix conversion 3. Evaluation of postfix expression
6.	Assignment 6:- Queue 1. Static and Dynamic implementation of linear Queue 2. Implementation of circular queue

Course Objectives:

- To explain basic database concepts, applications, data models, schemas and instances.
- To demonstrate the use of constraints.
- Describe the basics of SQL and construct queries using SQL.
- To emphasize the importance of normalization in databases.

Course Outcomes:

At the end of the course the students are able to:

- Apply the basic concepts of Database Systems and Applications.
- Use the basics of SQL and construct queries using SQL in database creation and interaction.
- Design a relational database system using PostgreSQL.

Sr. No.	Title and Contents (CS-202-MJ-TH)
1.	Assignment 1 : DDL Commands 1. To create simple tables with only the primary key constraint (as a table level constraint & as a field level constraint) (include all data types) 2. To create more than one table, with referential integrity constraint, PK constraint. 3. To drop a table, alter the schema of a table .
2.	Assignment 2: DDL Commands with constraints 1. To create one or more tables with following constraints, in addition to the first two constraints (PK & FK) a. Check constraint b. Unique constraint c. Not null constraint
3.	Assignment 3 : DML Command 1. Insert / Update / Delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)
4.	Assignment 4 : Simple Queries 1. To query the tables using a simple form of select statement. Select <field-list> from table [where <condition> order by <field list>] 2. Select <field-list, aggregate functions> from table [where <condition> group by <> having <> order by <>]
5.	Assignment 5: Nested Queries -I 1. To query table, using set operations (union, intersect)
6.	Assignment 6 : Nested Queries -II 1. To query tables using nested queries (use of 'Except', exists, not exists, all clauses)



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III	CS-221-VSC-TH	VSC	Agile and Software Engineering	TH	2	2

Course Objectives:

- To get knowledge and understanding of software engineering discipline.
- To learn analysis and design principles for software project development.

Course Outcomes:

On completion of the course, student will be able to-

- compare and choose a process model for a software project development.
- identify requirements, analyze and prepare models.
- prepare the SRS, Design document, Project plan of a given software system.

Sr. No.	Title	No. of Lectures in Clock Hours
1.	Introduction To Software Engineering and Process Models 1.1 Definition of Software 1.2 Nature of Software Engineering 1.3 Changing nature of software 1.4 Software Process 1.4.1 The Process Framework 1.4.2 Umbrella Activities 1.4.3 Process Adaptation 1.5 Generic Process Model 1.6 Prescriptive Process Models 1.6.1 The Waterfall Model 1.6.2 Incremental Process Models 1.6.3 Evolutionary Process Models 1.6.4 Concurrent Models 1.6.5 The Unified Process	5
2.	Agile Development 2.1 What is Agility? 2.2 Agile Process 2.2.1 Agility Principles 2.2.2 The Politics Of Agile Development 2.2.3 Human Factors 2.3 Extreme Programming(XP) 2.3.1 XP Values 2.3.2 XP Process 2.3.3 Industrial XP 2.4 Adaptive Software Development(ASD) 2.5 Scrum 2.6 Dynamic System Development Model (DSDM) 2.7 Agile Unified Process (AUP)	6

3.	Requirements Analysis 3.1 Initiating the Requirements Engineering Process 3.1.1 Identifying the Stakeholders 3.1.2 Recognizing Multiple Viewpoints 3.1.3 Working toward Collaboration 3.2 Fact-Finding Techniques 3.2.1 Interview 3.2.2 Questionnaire 3.2.3 Record Review 3.2.4 Observation 3.3 Requirement Elicitation 3.4 Software requirement specification (SRS) 3.4.1 Developing Use Cases (UML based) 3.5 Building the Analysis Model 3.5.1 Elements of the Analysis Model 3.5.2 Analysis Patterns 3.5.3 Agile Requirements Engineering 3.6 Negotiating and Validating Requirements	6
4.	Requirements Modeling 4.1 Introduction to UML	9
	4.2 Structural Modeling 4.2.1 Use case model 4.2.2 Class model 4.3 Behavioral Modeling 4.3.1 Sequence model 4.3.2 Activity model 4.3.3 Communication or Collaboration Model 4.4 Architectural Modeling 4.4.1 Component model 4.4.2 Artifact model 4.4.3 Deployment model	

5.	Design Concepts 5.1 Design Process 5.1.1 Software Quality Guidelines and Attributes 5.1.2 Evolution of Software Design 5.2 Design Concepts 5.2.1 Abstraction 5.2.2 Architecture 5.2.3 Patterns 5.2.4 Modularity 5.2.5 Information Hiding 5.2.6 Functional Independence 5.2.7 Refinement, Aspect and Refactoring 5.2.8 Object Oriented Design Concepts 5.3 Design Classes 5.3.1 Dependency Inversion 5.3.2 Design for Test 5.4 The Design Model 5.4.1 Data Design Elements 5.4.2 Architectural Design Elements	4
Reference Books: 1. Software Engineering : A Practitioner's Approach - Roger S. Pressman, McGraw hill(Eighth Edition) ISBN-13: 978-0-07-802212-8, ISBN-10: 0-07-802212-6 2. A Concise Introduction to Software Engineering - Pankaj Jalote, Springer ISBN: 978-1-84800-301-9 3. The Unified Modeling Language Reference Manual - James Rumbaugh, Ivar Jacobson, Grady Booch ISBN 0-201-30998-X		



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Principal:

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Faculty	Science and Technology
Program	Computer Science
Class	S.Y. B.Sc. (Computer Science)

Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
III	CS-231-FP-PR	FP	SEM-III Mini Project	PR	2	4

Course Objective:

- Align classroom learning with workplace outcomes.
- Provide students with real-world work experience and align their expectations with job demands.
- Foster research skills, including knowledge discovery, analytical tools,
- Methodologies and ethical conduct.
- Introduce students to emerging technologies and their applications in various fields.
- Strengthen students' entrepreneurial skills and encourage job creation.

Course Outcomes:

After the completion of the OJT program, the student will be able to-

- Apply concepts learned in classrooms to real-world work environments, enhancing their understanding and skills.
- Show insights into the challenges, opportunities and culture of different workplaces, preparing them for future employment.
- Navigate through various learning modalities effectively through exposure to hybrid learning models.
- Show evidence of research aptitude and skills of critical thinking, analytical skills, and ethical research conduct and communication of their work.
- Use and appreciate the use of emerging technologies and their applications, enhancing their technological literacy and adaptability.
- Display problem-solving abilities in making informed decisions in complex scenarios through practical situations.

Sr.No.	Title and Contents
1.	Requirement Analysis 1.1 Problem identification 1.2 Functional & non-functional requirements 1.3 Feasibility study 1.4 Fact Finding Techniques
2.	System Design 2.1 ER Diagrams 2.2 Database Schema Design 2.3 Table Relationships 2.4 Use Case Diagrams 2.5 Class Diagrams
3.	Database Development 3.1 SQL basics 3.2 Table Creation 3.3 Constraints 3.4 Queries 3.5 Joins
4.	Behavioral Model 4.1 Behavioral Model 4.1.1 Sequence Diagram 4.1.2 Collaboration Diagram 4.1.3 Activity Diagram 4.1.4 State Chart Diagram 4.2 Architectural Model 4.2.1 Component Diagram 4.2.2 Deployment Diagram 4.2.3 Package Diagram



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III	OE-201-CS-TH	OE-CS	Web Designing-I	TH	2	2

Course Objectives:

- To develop the skill & knowledge of Web page design.
- Students will understand the know-how and can function either as an entrepreneur or take up jobs in the multimedia and Website development studio and other information technology sectors.

Course Outcomes:

On completion of the course, students will be able to

- Define the principle of Web page design.
- Define the basics of web design.
- Visualize and recognize the basic concept of HTML.
- Introducing the basic concept of CSS & developing the concept of web publishing.

Sr. No.	Title and Contents	No. of lectures in Clock Hours
1.	Web Design Principles 1.1 Basic principles involved in developing a website 1.2 Planning process 1.3 Five Golden rules of web designing 1.4 Designing the navigation bar 1.5 Page design 1.6 Home Page Layout 1.7 Design Concept	4

2.	Basics in Web Design 2.1 Brief History of Internet 2.2 What is World Wide Web 2.3 Why create a website 2.4 Web Standards 2.5 Audience requirement	4
3.	Introduction to HTML 3.1 What is HTML 3.2 HTML Documents 3.3 Basic structure of an HTML document 3.4 Creating an HTML document 3.5 Markup Tags 3.6 Heading-Paragraphs 3.7 Line Breaks 3.8 HTML Tags	6
4.	Elements of HTML 4.1 Introduction to elements of HTML 4.2 Working with Text 4.3 Working with Lists, Tables and Frames 4.4 Working with Hyperlinks, Images and Multimedia 4.5 Working with Forms and controls	9
5.	Introduction to Cascading Style Sheets 5.1 Concept of CSS 5.2 Creating Style Sheet 5.3 CSS Properties 5.4 CSS Styling(Background, Text Format, Controlling Fonts) 5.5 Working with block elements and objects 5.6 Working with Lists and Tables 5.7 CSS Id and Class 5.8 Box Model(Introduction, Border properties, Padding Properties, Margin properties) 5.9 CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) 5.10 CSS Color 5.11 Creating page Layout and Site Designs	7
Reference Books: 1. HTML 5 in simple steps: Kogent Learning Solutions Inc.Dreamtech Press 2. A beginner's guide to HTML :NCSA,14th May,2003 3. HTML, XHTML, and CSS Bible, 5ed :Steven M. Schafer ,Wiley India		

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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
IV	IKS-201-CS-TH	IKS	Vedic Mathematics in Algorithm Optimization	TH	2	2

Course Objectives:

- To enable the learners to explore the power of Vedic Maths.
- To make learners strong in Numerical Maths.
- To enable learners to recognize and understand simple techniques of Arithmetic Calculations.
- To train learners to use the ideas of Vedic Maths in daily calculations and make those calculations with accuracy and speed.

Course Outcomes:

On completion of the course, student will be able to—

- Perform simple arithmetic calculations with speed and accuracy
- Will be able to generate tables of any number
- To perform products of large numbers quickly
- Develop confidence in calculating square roots and cube roots of integers
- Perform difficult calculations speedily .
- Face Numerical Aptitude part of any Competitive Examination confidently

Unit	Title and Contents	No. of lectures in Clock Hours
1	Introduction to Indian Knowledge Systems and Computational Thought 1.1 Overview of Indian Knowledge Systems (IKS) 1.2 Early forms of logic and computation in ancient India 1.3 Importance of integrating traditional knowledge with modern computing	2
2	Vedic Mathematics and Algorithmic Thinking 2.1 Introduction to Vedic Mathematics 2.2 Selected Sutras for: ▪ Fast Multiplication and Division ▪ Square and Cube Roots 2.3 Deriving algorithmic steps from sutras 2.4 Coding simple Vedic algorithms (e.g., in Python)	4
3	Panini's Grammar and Modern NLP 3.1 Panini's Ashtadhyayi as a rule-based system 3.2 Sandhi rules and parsing logic 3.3 Relevance to computational linguistics and NLP applications	4
4	Ancient Indian Logic and Binary Concepts 4.1 Pingala's binary number system from Chandashastra 4.2 Basics of combinatorics and meters (Chhanda) 4.3 Logical reasoning in Nyaya philosophy and its influence on formal logic	4
5	Ancient Astronomy and Mathematical Modeling 5.1 Aryabhata's and Bhaskaracharya's algorithms 5.2 Time calculations, trigonometry, and ephemeris data 5.3 Modern applications in astronomical computation	6
6	Relevance to Modern Computing & Project Work 6.1 Mapping ancient algorithms to modern CS domains • Algorithm design • Parsing • Optimization techniques 6.2 Case study discussion 6.3 Mini project / group presentation on selected topics	10
References: 1. "Vedic Mathematics" by Bharati Krishna Tirthaji 2. "The Ashtadhyayi of Panini" 3. "History of Indian Mathematics" by Bibhutibhushan Datta		

SEM-IV

Syllabus

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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
IV	CS-251-MJ-TH	MJ	Data Structure - II	TH	2	2

Course Objectives:

- To learn the systematic way of solving problems
- To design algorithms
- To understand the different methods of organizing large amounts of data
- To efficiently implement the non-linear data structures

Course Outcomes:

On completion of the course, students will be able to :

- Implementation of different data structures efficiently
- Usage of well-organized data structures to handle large amounts of data
- Usage of appropriate data structures for problem-solving
- Implementation of different data structures efficiently

Sr. No.	Title and Contents	No. of lectures in Clock Hours
1.	Tree 1.1. Concept and Terminologies 1.2. Types of Binary trees - Binary tree, skewed tree, strictly binary tree, full binary tree, complete binary tree, expression tree, binary search tree, Heap 1.3. Representation – Static and Dynamic 1.4. Implementation and Operations on Binary Search Tree - Create, Insert, Delete(Concept), Search, Tree traversals– preorder, inorder, postorder (recursive implementation), Level-order	10

	Traversal using a queue, Counting leaf, non-leaf, and total nodes, find Maximum and Minimum element, Copy, Mirror. 1.5. Applications of trees 1.6. Heap sort (Concept and Problem Solving) 1.7. Introduction to Greedy strategy, Huffman encoding (Concept and Problem Solving)	
2.	Efficient Search Trees 2.1. Terminology: Balanced trees - AVL Trees, Red Black tree, splay tree, Lexical search tree -Tries 2.2. AVL Tree- concept and rotations 2.3. Red-Black Trees - Concept, Insertion, and Deletion. 2.4. Multi-way search tree - B and B+ tree – Concept, Insertion, Deletion	8
3.	Graph 3.1. Concept and terminologies 3.2. Graph Representation –Adjacency matrix, Adjacency list, Inverse Adjacency list, Adjacency multi-list 3.3. Graph Traversals – Breadth First Search and Depth First Search (with implementation) 3.4. Applications of graphs 3.5. Topological sorting 3.6. Use of Greedy Strategy in Minimal Spanning Trees (Prims algorithm) 3.7. Dynamic programming strategy, All pairs shortest path - Floyd Warshall algorithm (Concept) 3.8. Use of graphs in social networks	8
4.	Hash Table 4.1 Concept of hashing 4.2 Terminologies – Hash table, Hash function, Bucket, Hash address, collision, synonym, overflow, etc. 4.3 Properties of a good hash function 4.4 Hash functions: division function, MID square, folding methods 4.5 Collision resolution techniques (Concept) 4.5.1 Open Addressing - Linear probing, quadratic probing, rehashing 4.5.2 Chaining - Coalesced, separate chaining	4

Reference Books:

1. Fundamentals of Data Structures in C- Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, 2nd Edition, Universities Press.
2. Data Structures using C and C++-Yedidyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum, Pearson Education
3. Data Structures: A Pseudocode approach with C, Richard Gilberg ,Behrouz A. Forouzan, Cengage Learning.
4. Introduction to Data Structures in C-Ashok Kamthane, Pearson Education
5. Algorithms and Data Structures, Niklaus Wirth, Pearson Education
6. Introduction to Algorithms—Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein--MIT Press
7. Fundamentals of Computer Algorithms-- Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press



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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
IV	CS-252-MJ-TH	MJ	Relational Database Management System	TH	2	2

Course Objectives:

- To understand fundamental concepts of RDBMS (PL/PgSQL)
- To database management operations
- Be familiar with the basic issues of transaction processing and concurrency control
- To learn about data security and its importance

Course Outcomes:

On completion of the course, students will be able to–

- use database techniques such as SQL & PL/SQL.
- explain transaction Management in a relational database System.
- use advanced database Programming concepts
- understand various types of databases.

Sr. No.	Title and Contents	No. of lectures in Clock Hours
1.	Relational Database Design Using PL/SQL 1.1 Introduction to PLSQL 1.2 PL/PgSQL: Datatypes, Language structure 1.3 Controlling the program flow, conditional statements, loops 1.4. Views 1.5 Stored Procedures 1.6 Stored Functions 1.7 Handling Errors and Exceptions 1.8 Cursors 1.9 Triggers	8
2.	Transaction Concepts and Concurrency Control 2.1 Describe a transaction, properties of transaction, state of the transaction 2.2 Executing transactions concurrently, associated problems in concurrent execution 2.3 Schedules, types of schedules, concept of Serializability (Conflict and View), Precedence graph for Serializability 2.4 Ensuring Serializability by locks, different lock modes, 2PL and its variations 2.5 Basic timestamp method for concurrency, Thomas Write Rule 2.6 Locks with multiple granularity, dynamic database concurrency (Phantom Problem) 2.7 Timestamps versus locking 2.8 Deadlock and deadlock handling - Deadlock Avoidance(wait-die, wound-wait) 2.9. Deadlock Detection and Recovery (Wait for graph)	11
3.	Database Integrity and Security Concepts 3.1 Introduction to database security concepts 3.2 Methods for database security 3.2.1 Discretionary access control method 3.2.2 Mandatory access control 3.2.3 Role base access control for multilevel security. 3.3 Overview of encryption technique for security. 3.4 Statistical database security.	4
4.	Crash Recovery 4.1 Failure classification 4.2 Recovery concepts 4.3 Log base recovery techniques (Deferred and Immediate update) 4.4 Checkpoints, Relationship between database manager and buffer cache. Aries recovery algorithm. 4.5 Recovery with concurrent transactions (Rollback, checkpoints, commit) 4.6 Database backup and recovery from catastrophic failure	5
5.	Other Databases - II 5.1 XML Databases	2

	5.2 NoSQL Database 5.3 Multimedia Databases 5.4 Big Data Databases	
Reference Books: 1. Database System Concepts, By Silberschatz A., Korth H., Sudarshan S., 6th Edition, McGraw Hill Education 2. Database Management Systems, Raghu Ramakrishnan, Mcgraw-Hill Education 3. Database Systems, Shamkant B. Navathe, Ramez Elmasri, PEARSON HIGHER EDUCATION 4. Fundamentals of Database Systems, By: Elmasri and Navathe, 4th Edition Practical PostgreSQL O'REILLY 5. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, McGraw-Hill Science/Engineering/Math; 3 edition, ISBN: 9780072465631 6. NoSQL Distilled, Pramod J. Sadalage and Martin Fowler, Addison Wesley 7. An Introduction to Database Systems", C J Date, Addison-Wesley 8. Database Systems : Concepts, Design and Application", S.K.Singh, Pearson, Education 9. NoSQL Distilled A Brief Guide to the Emerging World of Polyglot Persistence : by Pramod J. Sadalage, Martin Fowler, Addison-Wesley, Pearson Education, Inc. 10. MongoDB: The Definitive Guide , Kristina Chodorow, Michael Dirolf, O'Reilly Publications. Reference Links: 1. <u>PostgreSQL: The world's most advanced open source database</u>		



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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
IV	CS-253-MJ-PR	MJ	Lab Course based on CS-251-MJ-TH and CS-252-MJ-TH	PR	2	4

Course Objectives:

- Understand and learn how to develop the algorithmic approaches and different data structures for problem-solving.
- Understand and learn algorithms and modular programs using different data structures and methods.
- Understand the linear and non-linear data structures.

Course Outcomes:

On completion of this course, students will be able to:

- Explore and develop the algorithmic approaches and different data structures for problem-solving.
- Apply and implement algorithms and modular programs using different data structures and methods.
- Implement the linear and non-linear data structures.

Sr. No.	Title and Contents (Based on CS-251-MJ-TH)
1.	Assignment 1: Binary Search Tree and Traversals 1. Implement Binary Search Tree (BST) to perform following operations on BST–Create, Recursive Traversals - Inorder, Preorder, Postorder 2. Perform following operations: insert, delete
2.	Assignment 2: Binary Search Tree Operations 1. Implement Binary Search Tree (BST) to perform following operations on BST–copy and mirror image of BST, counting leaf, non-leaf and total nodes, find Maximum and Minimum element 2. Level-order traversal of binary search tree using queue
3.	Assignment 3: Graph implementation 1. Implement Graph as adjacency matrix and adjacency list 2. Calculate indegree, outdegree and total degree of vertices 3. Graph traversals: BFS and DFS (Dynamic Implementation)
4.	Assignment 4: Graph Applications - I 1. Implementation of Topological sorting 2. Implementation of Prims Minimum spanning tree algorithm
5.	Assignment 5: Graph Applications - II Implementation of Floyd Warshall algorithm for all pairs shortest path

Course Objectives:

- To explain Relational database concepts.
- To demonstrate the use of Views, Stored procedures and Functions, Cursor, Trigger.
- To emphasize the importance of exception handling in databases.

Course Outcomes:

At the end of the course the students are able to:

- Apply the advance concepts of Database Systems.
- Use the basics of Stored functions, procedures, cursor, trigger.

Sr. No.	Title and Contents (Based on CS-252-MJ-TH)
1.	Assignment 1. Views 1. Create/Replace View 2. Alter View 3. Drop View

2.	Assignment 2: Stored Procedure 1. A Simple Stored Procedure 2. A Stored Procedure with IN, OUT and IN/OUT parameter
3.	Assignment 3: Stored Function 1. A Simple Stored Function 2. A Stored Function with parameter 3. A Stored Function that returns value
4.	Assignment 4 : Cursors 1. A Simple Cursor 2. A Parameterized Cursor
5.	Assignment 5 : Triggers 1. Before Triggers (insert, update, delete) 2. After Triggers (insert, update, delete)
6.	Assignment 6 : Exception Handling 1. Simple Exception- Raise Notice Level Messages 2. Simple Exception- Raise Exception Level Messages



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IV	CS-271-VSC-PR	VSC	Python Programming	PR	2	4

Course Objectives:

- To understand programming constructs in Python.
- To learn problem-solving using Python

Course Outcomes:

On completion of the course, students will be able to

- Write programs using Python programming constructs.
- Develop applications using Python programming.

Sr. No	Title and Content
1.	Assignment 1: Problem-Solving Aspects 1. Pseudo-code to programs 2. Compilation process (compilers, interpreters), linking and loading, syntax and semantic errors, testing a program 3. Practices (naming conventions, documentation, indentation) 4. Comments
2.	Assignment 2: Python Fundamentals 1. Python identifiers and reserved words 2. Input/output with print and input functions, 3. Command line arguments and processing command line arguments 4. data types, Typecasting 5. Python strings

3.	Assignment 3: Data Structures in Python List, Tuples, Sets and Dictionaries-I 1. Concepts and basic operations (creating and accessing elements, updating & deleting) on List, Tuples, Sets and Dictionary 2. Perform different operations on List, Tuples, Sets and Dictionary (like Indexing, slicing and Matrices, etc.)
4.	Assignment 4: Data Structures in Python List, Tuples, Sets and Dictionaries -II 1. Built-in functions of List, Tuples, Sets and Dictionary 2. Functional programming tools – filter(), map(), and reduce() 3. Using Lists as stacks and Queues, List comprehensions 4. Properties of dictionary keys
5.	Assignment 5: Python Operators 1. Python basic operators (Arithmetic, comparison, assignment, bitwise logical) , Operator Precedence 2. Python membership operators (in & not in) 3. Python identity operators (is & is not)
6.	Assignment 6: Python String 1. String special operations, String formatting operator, Single quotes, Double quotes, Triple quotes, Raw String, Unicode strings, Built-in String methods.
7.	Assignment 7: Control Structures (Conditional Statements) 1. Conditional Statements: if, elif, else 2. match statement
8.	Assignment 8: Control Structures (Loops) 1. Loops: for, while, nested loops 2. Loop control: break, continue, pass
9.	Assignment 9: Array and Iterators 1. Declaration, Initialization, Accessing array elements 2. Operations on arrays 3. iterators
10.	Assignment 10: Function 1. Defining a function (def) 2. Function arguments – Pass by value, Keyword Arguments, default arguments 3. Documentation Strings 4. Variable Number of Arguments
11.	Assignment 11: Advanced Concept of Function 1. Return Value 2. Global Variable 3. Call by Reference 4. Order of arguments (positional, extra & keyword) 5. Recursion
12.	Assignment 12: File Handling 1. Reading and writing files 2. Working with CSV and JSON 3. Deleting files



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IV	CS-281-CEP-PR	CEP	SEM-IV Mini Project	PR	2	4

Course Objective:

- To develop students' ability to design and implement effective research questionnaires for Community-based studies.
- To enhance students' skills in collecting and analyzing socio-economic and environmental data.
- To foster critical thinking and problem-solving through real-world research.
- To deepen understanding of the relationship between human activities.
- To promote active engagement with local communities to address research issues.
- To build students competence in synthesizing and presenting research findings.
- To prepare students for advanced academic research or professional roles in related fields.

Course Outcome:

By the end of the course, students will be able to:

- Demonstrate the ability to design and implement effective research questionnaires for community-based studies.
- Exhibit enhanced skills in collecting and analyzing research data.
- Apply critical thinking and problem-solving skills in conducting real-world research.
- Display a deeper understanding of the relationship between human activities.
- Actively engage with local communities to address and resolve issues.
- Demonstrate competence in synthesizing and presenting research findings clearly and effectively.
- Prepare for advanced academic research or professional roles in related fields

Sr. No.	Title and Contents
1.	Planning and Preparation for Field Work 1.1 Defining the Fieldwork Topic 1.2 Scope of the Study Area 1.3 Identifying Key Research Questions for Field Study 1.4 Understanding the Fieldwork Objectives 1.5 Ethical Considerations in Field Work 1.6 Creating a Fieldwork Plan
2.	Fieldwork Data Collection 2.1 Selecting the Fieldwork Methods (Surveys, Interviews, Observations) 2.2 Collecting Primary Data from the Field 2.3 Recording and Organizing Field Data (Photographs, Maps, Notes) 2.4 Handling Challenges in Data Collection 2.5 Post-Fieldwork Data Compilation and Preliminary Analysis
3.	Fieldwork Report Preparation and Presentation 3.1 Analyzing Field Data (Quantitative and Qualitative Methods) 3.2 Structuring the Fieldwork Report 3.3 Writing the Introduction and Study Area Description 3.4 Formulating Objectives and Hypothesis 3.5 Writing the Methodology and Data Analysis Sections 3.6 Discussing Results and Significance of Findings 3.7 Conclusion and Recommendations 3.8 Bibliography and References 3.9 Preparing for Oral Presentation of the Report 3.10 Submission of the Final Fieldwork Report

Reference Books:

Adams, J., Khan, H. T. A., Raeside, R. & White, D. (2007). Research methods for graduate business and social science students. New Delhi: Response Books. (C)

Ahmeed, Najma Perveen (2002). Research Methods in Indian music (2nd ed.). New Delhi: Manohar Publication & distributors. (C)

Alston, M. & Bowles, W. (2003). Research for social workers: an introduction to methods (2nd ed.). New Delhi: Rawat. (C)

Angrosino, M. (2007). Doing ethnographic and observational research. Los Angeles: Sage Publications. (C)

Evaluation:

Evaluate each student for 50 marks per semester at department level –

- 15 marks for Continuous Evaluation (CE)
 - Progress report on project implementation. (Field diary)
- 35 marks for End Semester Examination (ESE)
 - Project Report
 - Final Presentation of field project findings assessing project outcomes and reflections.



The Poona Gujarati Kelavani Mandal's

HARIBHAI V. DESAI COLLEGE

of Arts, Science & Commerce (Autonomous)

Affiliated to Savitribai Phule Pune University
(Linguistic Minority Institution) AICTE NO. : 1-44457797714
ID No.: PU / PN / ASC / 057/ (1984)
NAAC Grade B++ (2.86 CGPA) ■ AISHE CODE : C-41829

Principal:

Dr. Rajendra G. Gurao

M.Sc., Ph.D.

Email: principal@hvdesaicollege.edu.in

Restructured Syllabus (CBCS Pattern as per NEP 2020)

To be implemented from Academic Year: 2025-26

Faculty	Science and Technology
Program	Computer Science
Class	S.Y. B.Sc. (Computer Science)

Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
IV	OE-251-CS-PR	OE-CS	Web Designing-II	PR	2	4

Course Objectives:

- To develop the skill & knowledge of Web page design.
- Students will understand the knowhow and can function either as an entrepreneur or can take up jobs in the multimedia and Web site development studio and other information technology sectors

Course Outcomes:

On completion of the course, student will be able to-

- Define the principle of Web page design
- Define the basics in web design
- Visualize and recognize the basic concept of HTML.
- Introduce the basics concept of CSS. Develop the concept of web publishing

Sr. No.	Title and Contents
1.	Assignment 1: Be acquainted with elements, Tags and basic structure of HTML files.
2.	Assignment 2: Practicing basic and advanced text formatting.
3.	Assignment 3: Practicing use of multimedia components (Image, Video & Sound) in HTML documents.
4.	Assignment 4: Designing of web page-Document Layout.

5.	Assignment 5: Designing of web page-Working with List and Tables.
6.	Assignment 6: Practicing Hyper linking of web pages.
7.	Assignment 7: Designing of webpage-Working with Frames.
8.	Assignment 8: Designing of webpage-Working with Forms and Controls.
9.	Assignment 9: Acquaintance with creating style sheets, CSS properties and styling.
10.	Assignment 10: Designing with cascading style sheet-Internal style sheet, External style sheet



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Semester	Course Code	Type of Course	Course Title	Theory/ Practical	Credits	No. of clock hours per week
IV	SEC-251-CS-PR	SEC	Computer Networking	PR	2	4

Course Objectives:

- To understand computer network structure with network commands.
- Students will understand the know how to connect computers using packet tracer
- Students can understand how to implement network analyzers.

Course Outcomes:

On completion of the course, student will be able to -

- apply machine configuration using different commands.
- connect computers using packet tracer.
- set filters for unauthorized data.

Sr. No.	Title and Contents
1.	Assignment 1: Using linux-terminal or Windows-cmd execute following networking commands and note the output: ping, traceroute, netstat, arp, ipconfig, Getmac, host, NSLookUp, pathping, SystemInfo
2.	Assignment 2: Using Packet Tracer, create a basic network of two computers using appropriate network wire. Use Static IP address allocation and show connectivity.
3.	Assignment 3: Using Packet Tracer, create a basic network of One server and two computers using appropriate network wire. Use Dynamic IP address allocation and show connectivity.

4.	Assignment 4: Using Packet Tracer, create a basic network of One server and two computers and two mobile / movable devices using appropriate network wire. Show connectivity.
5.	Assignment 5: Using Packet Tracer, create a network with three routers with RIPv1 and each router associated network will have a minimum three PC. Show Connectivity.
6.	Assignment 6: Using Packet Tracer, create a network with three routers with OSPF and each router associated network will have a minimum three PC. Show Connectivity.
7.	Assignment 7: Using Packet Tracer, create a wireless network of multiple PCs using appropriate access point.
8.	Assignment 8: Using Wireshark, network analyzer, set the filter for ICMP, TCP, HTTP, UDP, FTP and perform respective protocol transactions to show/prove that the network analyzer is working.