



Rayat Shikshan Sanstha's
R. B. Narayanrao Borawake College, Shrirampur
(Autonomous)

(Affiliated to Savitribai Phule Pune University, Pune)

Department of Computer Science

FYUG (Computer Science) Syllabus as per
NEP-2020

Implemented
From
Academic Year: 2023-24

**Syllabus for F. Y. B. Sc. (Computer
Science)
Semester I**

Course Structure of F. Y. B. Sc. Computer Science (Semester-I)

Year	Semester	Course Type	Course Code	Course Title	Theory/ Practical	Credits	No. of Lectures/ Practical to be conducted
1 st	I	DSC (Major)	CS-MJ-111T	Problem Solving using Computer and 'C' Programming	Theory	2	30L
			CS-MJ-112T	Database Management System	Theory	2	30L
			CS-MJ-113P	Lab Course Based on CS-MJ-111T and CS-MJ- 112T	Practical	2	12P
		VSC	CS-VSC 114T	Introduction to Web Technology	Theory	2	30L
		SEC	CS-SEC-115T	Basics of Scripting	Theory	2	30L
		IKS	CS-IKS-116T	History of Science and Technology in India	Theory	2	30L

Course Structure of F. Y. B. Sc. Computer Science (Semester-II)

Year	Semester	Course Type	Course Code	Course Title	Theory/ Practical	Credits	No. of Lectures/ Practical to be conducted
1 st	II	DSC (Major)	CS-MJ-121T	Advanced “C” Programming	Theory	2	30L
			CS-MJ-122T	Relational Database Management System	Theory	2	30L
			CS-MJ-123P	Lab Course Based on CS-MJ-121T and CS-MJ-122T	Practical	2	12P
		VSC	CS-VSC-124P	Lab Course based on CS-VSC 114T	Practical	2	12P
		SEC	CS-SEC-125T	Web Designing using Bootstrap	Theory	2	30L

Syllabus for F. Y. B. Sc. (Computer Science)

Semester I

DISCIPLINE SPECIFIC CORE COURSE (CS-MJ-111T): Problem Solving using Computer and 'C' Programming

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-MJ-111T Problem Solving using Computer and 'C' Programming	02	02	--

LEARNING OBJECTIVES:

The Learning Objectives of this course area follows:

1. To introduce the foundations of computing, programming and problem- solving using computers.
2. To develop the ability to analyze a problem and devise an algorithm to solve it.
3. To develop the basic concepts and terminology of programming in general.
4. To implement algorithms in the 'C' language.
5. To test, debug and execute programs.

COURSE OUTCOMES:

After completion of this course student will able to;

CO-1: Explore algorithmic approaches to problem solving.

CO-2: Develop modular programs using control structures and arrays in 'C'.

SYLLABUS OF DSC-1

Unit-1: Fundamental of Computer**[04 Hours]**

- 1.1. Introduction – Uses of computer, History of computer, Generation of computer.
- 1.2. Hardware and Software.
- 1.3. Computer Hardware – CPU, I/O devices, storage devices, system memory.
- 1.4. Computer Software – OS, Utility software, Application software.

Unit-2: Problem Solving Aspects**[05 Hours]**

- 2.1 Introduction to problem solving using computers.
- 2.2 Problem solving steps.
- 2.3 Algorithms-definition, characteristics, examples, advantages and limitations.
- 2.4 Flowcharts - definition, notations, examples, advantages and limitations, Comparison with algorithms.
- 2.5 Pseudo codes - notations, examples, advantages and limitations.
- 2.6 Programming Languages as tools, programming paradigms, types of languages.
- 2.7 Converting pseudo-code to programs.
- 2.8 Compilation process (compilers, interpreters), linking and loading, syntax and semantic errors, testing a program.
- 2.9 Good Programming Practices (naming conventions, documentation, indentation).

Unit-3: 'C' Fundamentals**[06 Hours]**

- 3.1. History of 'C' language.
- 3.2. Application areas.
- 3.3. Structure of a 'C' program.
- 3.4. 'C' Program development life cycle
- 3.5. Function as building blocks.
- 3.6. 'C' tokens
- 3.7. Character set, Keywords, Identifiers
- 3.8. Variables, Constants (character, integer, float, string, escape sequences, enumeration constant).

3.9. Data Types (Built-in and user defined data types).

3.10. Operators, Expressions, types of operators, Operator precedence and Order of evaluation.

3.11. Character input and output.

3.12. String input and output.

Unit-4: Control Structure

[05 Hours]

4.1 Decision making structures: - if, if-else, switch and conditional operator.

4.2 Loop control structures: - while, do while, for.

4.3 Use of break and continue.

4.4 Nested structures.

Unit-5: Functions

[05 Hours]

5.1 Concept of function, Advantages of Modular design.

5.2 Standard library functions.

5.3 User defined functions: -declaration, definition, function call, parameter passing (by value), and return statement.

5.4 Recursive functions.

Unit-6: Arrays

[05 Hours]

6.1. Concept of Array.

6.2. Types of Arrays – One, Two and Multidimensional array.

6.3. Array Operations - declaration, initialization, accessing array elements.

6.4. Memory representation of two-dimensional array (row major and column major).

6.5. Multidimensional Array - 3D Array, visualizing 3D array, declaring 3D array, updating 3D array.

6.6. Passing arrays to function.

6.7. Array applications - finding maximum and minimum, occurrences count, linear search, binary search, sorting an array, merging two sorted arrays, Matrix operations (trace of matrix, addition, transpose, multiplication, symmetric, upper/ lower triangular matrix).

ESSENTIAL/RECOMMENDED READINGS:

1. How to Solve it by Computer, R.G. Dromey, Pearson Education.
2. Problem Solving and Programming Concept, Maureen Sprankle, 7th Edition, Pearson Publication.
3. C: The Complete Reference, Schildt Herbert, 4th edition, McGraw Hill.
4. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India.
5. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI.
6. Programming in C, A Practical Approach, Ajay Mittal, Pearson.
7. Programming with C, B. Gottfried, 3rd edition, Schaum's outline Series, Tata McGraw Hill.
8. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill.
9. <https://hamrocsit.com/note/c-program/problem-solving-computer/>
10. <https://learn.microsoft.com/>
11. <https://www.cprogramming.com/>
12. <https://www.learn-c.net/>

DISCIPLINE SPECIFIC CORE COURSE
(CS-MJ-112T) Database Management Systems

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-MJ-112T Database Management Systems	02	02	--

LEARNING OBJECTIVES:

The Learning Objectives of this course area follows:

1. To understand the fundamental concepts of database
2. To understand user requirements and frame it in data model.
3. To understand creations, manipulation and querying of data in databases.

COURSE OUTCOMES:

After completion of this course student will able to;

CO-1: Design data models, schemas and instances

CO-2: Design E-R Model for given Requirements and convert the same into database tables.

CO-3: Implement SQL: Data definition, constraints, schema, queries and operations in SQL

SYLLABUS OF DSC-1

Unit 1: Introduction to DBMS**[5 Hours]**

- 1.1. Introduction
- 1.2. Levels of abstraction & data independence
- 1.3. Structure of DBMS
- 1.4. Users of DBMS
- 1.5. Advantages of DBMS

Unit 2: Conceptual Design**[10 Hours]**

- 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

Unit 3: Basics SQL**[07 Hours]**

- 3.1 Introduction to query languages
- 3.2 Basic structure
- 3.4 DDL Commands
- 3.5 DML Commands
- 3.6 Forms of a basic SQL query(Expression and strings in SQL)
- 3.7 Set operations
- 3.8 Aggregate Operators and functions
- 3.9 Date and String functions
- 3.10 Null values
- 3.11 Nested Sub queries
- 3.12 SQL mechanisms for joining relations
(inner joins, outer joins and their types)
- 3.13 Views

Unit 4: Advanced SQL**[08 Hours]**

- 4.1 Introduction to Relational-Database Design(undesirable properties of an RDB design)
- 4.2 Functional Dependency (Basic concepts, F+, Closure of an Attribute set , Armstrong's axioms)
- 4.3 Concept of Decomposition Desirable Properties of Decomposition (Lossless join, Lossy join, Dependency Preservation)
- 4.4 Concept of normalization, Normal Forms (1NF,2NF,3NF and BCNF) Examples.
- 4.5 Keys Concept with Examples: Candidate Keys and Super Keys, Algorithm to find the super keys /primary key for a relation

ESSENTIAL/RECOMMENDED READINGS:

1. How to solve it by Computer, R.G. Dromey, Pearson Education.
2. Problem Solving and Programming Concept, Maureen Sprankle,7th Edition, Pearson Publication.
3. C: The Complete Reference, Schildt Herbert, 4th edition, McGraw Hill.
4. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard.
- 5.<https://www.geeksforgeeks.org/dbms/>
- 6.<https://www.tutorialspoint.com/dbms/>

DISCIPLINE SPECIFIC CORE COURSE**(CS-MJ-113P) Practical Course Based on
CS-MJ-111T and CS-MJ-112T**

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-MJ-113P Practical course Based on CS-MJ-111T and CS- MJ-112T	02	--	02

LEARNING OBJECTIVES:**The Learning Objectives of this course area follows:**

1. Solve simple computational problems using modular design and basic features of the 'C' language.
2. Understand basic database management operations.
3. Design E-R Model for given requirements and convert the same into database tables.

COURSE OUTCOMES:

After completion of this course student will able to;

CO-1: Devise pseudo codes and flowchart for computational problems.

CO-2: Write, debug and execute simple programs in 'C'.

CO-3: Create database tables in PostgreSQL.

CO-4: Write and execute simple, nested queries.

Problem Solving and C programming:

Assignment 1. Problem Solving using Pseudo code and Flowchart, Simple programs, Understanding errors and error handling.

Assignment 2. Decision Making Control Structures.

Assignment 3. Loop Control Structures

Assignment 4. Functions (User Defined functions, Library functions and Recursion).

Assignment 5. Arrays (1-D and 2-D).

Database Management Systems:

Assignment 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).

Assignment 2. To create more than one table, with referential integrity constraint, PK constraint.

Assignment 3. 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

Assignment 4. To drop a table, alter schema of a table, insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)

Assignment 5. To query the tables using simple form of select statement Select <field-list> from table [where <condition> order by <field list>] Select <field-list, aggregate functions > from table [where <condition> group by <> having <> order by <>]

Assignment 6. To query table, using set operations (union, intersect)

Assignment 7. To query tables using nested queries (use of 'Except', exists, not exists, all clauses)

Assignment 8. To create views.

VOCATIONAL SKILL COURSE
(CS-VSC-114T) Introduction to Web Technology

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-VSC-114T Introduction to Web Technology	02	02	--

Course Objectives:

1. To learn and design static Web Site using HTML different tags.
2. To define styles for web pages using CSS.

COURSE OUTCOMES:

After completion of this course student will able to;

CO-1: When students complete Webpages with HTML & CSS,

CO-2: They will be able to: Author webpages with well-structured HTML and correct CSS layout/styling patterns.

CO-3: Personalize web pages using text formatting, graphics, audio, and video elements.

Unit 1: Overview

[08 Hours]

- 1.1 Introduction to web technology. What is Web Development?
- 1.2 Introduction to Web server, Web browser, Web Protocols (HTTP, TCP/IP, UDP, FTP, SMTP, SOAP)
- 1.3 Web development: Frontend, backend
- 1.4 Front End Frameworks and Libraries: HTML, CSS, JavaScript
- 1.5 Back End Frameworks and Technology: PHP, Node JS, Python, Ruby, Java, DBMS

Unit 2: Introduction to HTML

[12 hours]

- 2.1 HTML features
- 2.2 HTML Structure
- 2.3 HTML Tags
- 2.4 Commenting Codes
- 2.5 Formatting and Fonts
- 2.6 Anchors, Hyperlinks
- 2.7 Backgrounds
- 2.8 HTML Lists, Tables, Frames
- 2.9 HTML Forms
- 2.10 HTML Graphics
- 2.11 HTML SVG-Basics
- 2.12 HTML Canvas Basics

Unit 3: Introduction to CSS

[10 hours]

- 3.1 Need for CSS
- 3.2 Introduction to CSS
- 3.3 Basic Syntax and structure
- 3.4 Inline styles
- 3.5 Embedding Style sheets
- 3.6 Linking External Style
- 3.7 Background Styles
- 3.8 Manipulating Text
- 3.9 Margins and Padding
- 3.10 Positioning using CSS

ESSENTIAL/RECOMMENDED READINGS:

1. HTML Black Book by Steven Holzner, Dremtech press.
2. The Complete Reference by Thomas A. Powell, McGraw-Hill
3. <https://www.w3schools.com/>
4. <https://www.geeksforgeeks.org/html-introduction/>

SKILL ENHANCEMENT COURSE
(CS-SEC-115T) Basics of Scripting

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-SEC-115T Basics of Scripting	02	02	--

Course Objectives:

1. Understand the JavaScript language and the Document Object Model
2. Develop the skill and knowledge of client-side programming.
3. Validate data before sending out a request.

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

1. Create web pages to work on objects and respond to events.
2. Apply special effects to web pages.
3. Creating cookies that can be used to store and retrieve information from the user's computer.

Unit 1: Fundamentals of JavaScript:**[03 Lect.]**

- 1.1 Introduction to JavaScript
- 1.2 Advantages and disadvantages of JavaScript
- 1.3 Client-side JavaScript 1.4 JavaScript development tools.

Unit 2: JavaScript Basics:**[06 Lect.]**

- 2.1. Syntax
- 2.2. Variables
- 2.3. Operators
- 2.4. If-Else
- 2.5. Switch-case
- 2.6. Loop statements: While , for, for-in Loop control: break, continue
- 2.7. Functions
- 2.8. Events

Unit 3: JavaScript Cookies: [04 Lect.]

- 3.1 What are Cookies?
- 3.2 How it Works?
- 3.3 Storing Cookies
- 3.4 Reading Cookies
- 3.5 Setting Cookies Expiry Date
- 3.6 Deleting a Cookie

Unit 4: Interacting with user: [03 Lect.]

- 4.1 Alert Dialog Box
- 4.2 Confirmation Dialog Box
- 4.3 Prompt Dialog Box

Unit 5: JavaScript Objects and Methods: [08 Lect.]

- 5.1 Objects
- 5.2 Number
- 5.3 Boolean
- 5.4 String
- 5.5 Arrays
- 5.6 Date
- 5.7 Math
- 5.8 RegExp
- 5.9 DOM

Unit 6: Form Validation: [06 Lect.]

- 6.1 Basic Form Validation
- 6.2 Data Format Validation

ESSENTIAL/RECOMMENDED READINGS:

1. Programming JavaScript Applications: Robust Web Architecture with Node, HTML5, and Modern JS Libraries, O'Reilly, Eric Ebbott
2. TutorialspointSimplyeasyLearning, "JavaScript Language"
3. <https://www.w3schools.com/js/>
4. <https://www.tutorialspoint.com/javascript/>

SKILL ENHANCEMENT COURSE**(CS-IKS-116T)****History of Science and Technology in India**

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-IKS-116T History of Science and Technology in India	02	02	--

Course Objectives:

1. To make students aware of history of computing in Ancient India.
2. Understand the origin and growth of mathematics in ancient India.
3. Assess the growth of engineering in ancient India.
4. To study the impact of modern science in India upon Indian and their early response.

Learning outcomes on completion of this course, students will be able to:

1. Discuss the mathematical knowledge of Indian in the ancient period.
2. Discuss contributions of India to the world in the field of Mathematics and other Sciences.
3. Discuss impact of modern science in India upon Indian and their early response.

Unit 1: Science and Technology- The Beginning [04 Lect.]

- 1.1. Development in different branches of Science in Ancient India: Astronomy, Mathematics, Engineering and Medicine, Computing Science

Unit 2: Prominent scientist of India since beginning and their achievement [04 Lect.]

- 2.1. Mathematics and Astronomy: Aryabhatta, Bhaskaracharya ,Nagarjuna.
- 2.2. Scientists of Modern India: SrinivasRamanujan ,C.V. Raman, Jagdish Chandra Bose, HomiJehangirBhabha and Dr. Vikram Sarabhai.

Unit 3: Developments in Science and Technology in Colonial India [10 Lect.]

- 3.1. Indian Response to new Scientific Knowledge, Science and Technology in Modern India:
- 3.2. Development of research organizations like CSIR and DRDO

- 3.3. 3.Establishment of Atomic Energy Commission; Launching of the Space satellites.

Unit 4 : Developments in Science and Technology in Computing Science in India [12 L]

- 4.1. Introduction to Computing Science
- 4.2. Definition of computer
- 4.3. Earliest Computer
- 4.4. History and evaluation of computers.
- 4.5. The Mechanical Era.
- 4.6. The First Computer.
- 4.7. Introduction to generations of Computers.
- 4.8. Computer Types
- 4.9. Number systems

ESSENTIAL/RECOMMENDED READINGS:

1. Taher, M., Educational Developments in the Muslim World, Dehli, 1997.
2. Rogers, A., Tuzuk-i-Jahangiri -Or Memoirs Of Jahangir, London, 1914.
3. Agrawala , V.S., India as Known to Panini, Lucknow University, 1953.
4. Cunningham , Alexander , The Ancient Geography o f India. Indological Book House, Varanasi, 1963.
5. Angelo , Josepha., The Dictionary of Space Technology. Frederick Muller Ltd., London, 1982.
6. Krishnan , K.S., The New Era o f Science. Publications Division, Ministry of Information and Broadcasting, Govt, of India, New Delhi, 1957
7. Chatterji , S. Kumar (Ed.), The Cultural Heritage of India. Vol. V. The Ramakrishna MissionInstitute of Culture, Calcutta, 1978
8. ComputingScienceinancientIndiabyT.N.Rao,SubhashKak,MeruPublication.

Online Resources:

1. <https://en.m.wikipedia.org>
2. <https://www.thebetterindia.com>
3. <https://education.sakshi.com>

Syllabus for F. Y. B. Sc. (Computer Science)

Semester: II

DISCIPLINE SPECIFIC CORE COURSE (CS-MJ-121T): Advanced 'C' Programming

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS -MJ-121T Advanced 'C' Programming	02	02	--

LEARNING OBJECTIVES:

The Learning Objectives of this course are as follows:

1. To study advanced concepts of programming using the 'C' language.
2. To understand code organization with complex data types and structures.
3. To work with files.

COURSE OUTCOMES:

After completion of this course student will able to;

CO1: Develop modular programs using control structures, pointers, arrays, strings and structures

CO2: Design and develop solutions to real world problems using C.

SYLLABUS OF DSC-1

Unit-1: Pointers

[07 Hours]

- 1.1. Introduction to Pointers.
- 1.2. Declaration, definition, initialization, dereferencing.
- 1.3. Pointer arithmetic.
- 1.4. Relationship between Arrays & Pointers- Pointer to array, Array of pointers.
- 1.5. Multiple indirection (pointer to pointer).

1.6. Functions and pointers- Passing pointer to function, Returning pointer from function, Function pointer.

1.7. Dynamic memory management- Allocation(malloc(),calloc()), Resizing(realloc()), Releasing(free()).,

1.8. Memory leak, dangling pointers.

1.9. Types of pointers.

Unit-2: Strings

[08 Hours]

2.1 String Literals, string variables, declaration, definition, initialization.

2.2 Syntax and use of predefined string functions

2.3 Array of strings.

2.4. Strings and Pointers

2.5. Command line arguments.

Unit-3: Structures and Unions.

[05 Hours]

3.1. Concept of structure, definition and initialization, use of typedef.

3.2. Accessing structure members.

3.3. Nested Structures

3.4. Arrays of Structures

3.5. Structures and functions- Passing each member of structure as a separate argument, Passing structure by value / address.

3.6. Pointers and structures.

3.7. Concept of Union, declaration, definition, accessing union members.

3.8. Difference between structures and union.

Unit-4: File Handling

[05 Hours]

4.1. Introduction to streams.

4.2. Types of files.

4.3. Operations on text files.

4.4. Standard library input/output functions.

4.5. Random access to files.

Unit-5: Preprocessor**[05 Hours]**

- 6.1. Role of Preprocessor
- 6.2. Format of preprocessor directive
- 6.3. File inclusion directives (#include)
- 6.4. Macro substitution directive, argumented and nested macro
- 6.5. Macros versus functions

ESSENTIAL/RECOMMENDED READINGS:

1. C: The Complete Reference, Schildt Herbert, 4th edition, McGraw Hill
2. A Structured Programming Approach Using C, Behrouz A. Forouzan, Richard F. Gilberg, Cengage Learning India
3. The 'C' programming language, Brian Kernighan, Dennis Ritchie, PHI
4. Programming in C ,A Practical Approach, Ajay Mittal , Pearson
5. Programming with C, B. Gottfried, 3rd edition, Schaum's outline Series, Tata McGraw Hill.
6. Programming in ANSI C, E. Balagurusamy, 7th Edition, McGraw Hill.

DISCIPLINE SPECIFIC CORE COURSE (CS-MJ-122T): Relational Database Management Systems

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-MJ-122T Relational Database Management Systems	02	02	--

LEARNING OBJECTIVES:

The Learning Objectives of this course are as follows:

1. To teach fundamental concepts of RDBMS (PL/PgSQL)
2. To teach database management operations
3. To Be familiar with the basic issues of transaction processing and concurrency control
4. To teach data security and its importance

COURSE OUTCOMES:

After completion of this course student will able to;

- CO1:** Design E-R Model for given requirements and convert the same into database tables.
- CO2:** Use database techniques such as SQL & PL/SQL.
- CO3:** Explain transaction Management in relational database System.
- CO4:** Use advanced database Programming concepts

SYLLABUS OF DSC-1

Unit-1: Relational Database Design Using PLSQL

[08 Hours]

- 1.1 Introduction to PLSQL
- 1.2 PL/PgSQL: Data types, Language structure
- 1.3 Controlling the program flow, conditional statements, loops
- 1.4 Stored Procedures
- 1.5 Stored Functions

1.6 Handling Errors and Exceptions

1.7 Cursors

1.8 Triggers

Unit-II: Transaction Concepts and concurrency control [07 Hours]

2.1 Describe a transaction, properties of transaction, state of the transaction.

2.2 Executing transactions concurrently associated problem in concurrent execution.

2.3 Schedules, types of schedules, concept of Serializability, 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), Deadlock Detection and Recovery (Wait for graph).

Unit-III: Database Integrity and Security Concepts [08 Hours]

3.1 Domain constraints

3.2 Referential Integrity

3.3 Introduction to database security concepts

3.4 Methods for database security

3.4.1 Discretionary access control method

3.4.2 Mandatory access control

3.4.3 Role base access control for multilevel security.

3.5 Use of views in security enforcement.

3.6 Overview of encryption technique for security.

3.7 Statistical database security.

Unit-IV: Crash Recovery [07 Hours]

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

ESSENTIAL/RECOMMENDED READINGS:

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, RamezElmasri, PEARSON HIGHER EDUCATION
4. Fundamentals of Database Systems, By: Elmasri and Navathe, 4th Edition
Practical PostgreSQL O'REILLY
5. Database Management Systems, Raghu Ramakrishna 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

DISCIPLINE SPECIFIC CORE COURSE
(CS-MJ-123P) Practical Based on CS-MJ-121T & CS-MJ-122T

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-MJ-123P Practical Based on CS-MJ-121T & CS-MJ-122T	02	--	02

LEARNING OBJECTIVES:

The Learning Objectives of this course are as follows:

1. To solve real world computational problems.
2. To perform operations on relational database management systems.

COURSE OUTCOMES:

After completion of this course student will able to;

CO-1: Write, debug and execute programs using advanced features in 'C'.

CO-2: To use SQL & PL/SQL.

CO-3: To perform advanced database operations.

A) Advanced C Programming:

Assignment 1. Simple Pointers.

- a) Pointer initialization and use of pointers.
- b) Pointer Arithmetic.

Assignment 2. Dynamic Memory Allocation.

Assignment 3. String handling using standard library functions.

Assignment 4. Structure and Unions.

Assignment 5. File Handling.

Assignment 6. C Pre-processors

B) Relational Database Management Systems:**Assignment 1: Stored Procedure**

- 1) A Simple Stored Procedure
- 2) A Stored Procedure with IN, OUT and IN/OUT parameter

Assignment 2: Stored Function

- 1) A Simple Stored Function
- 2) A Stored Function that returns
- 3) A Stored Function recursive

Assignment 3: Cursors

- 1) A Simple Cursor
- 2) A Parameterize Cursor

Assignment 4: Exception Handling

- 1) Simple Exception- Raise Debug Level Messages
- 2) Simple Exception- Raise Notice Level Messages
- 3) Simple Exception- Raise Exception Level Messages

Assignment 5: Triggers

- 1) Before Triggers (insert, update, delete)
- 2) After Triggers (insert, update, delete)

VOCATIONAL SKILL COURSE
(CS-VSC-124P) Introduction to Web Technology Lab

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-VSC-124P Introduction to Web Technology Lab	02	02	--

Assignments of Web Designing:

PRACTICAL 1 Introduction to HTML. Create a Basic HTML File

PRACTICAL 2 Create a Static Webpage Using Table Tags Of HTML

PRACTICAL 3 Create a Static Web Page Which Defines All Text Formatting Tags of HTML In Tabular Format

PRACTICAL 4 Create Webpage Using List Tags Of HTML

PRACTICAL 5 Create Webpage To Include Image Using HTML Tag

PRACTICAL 6 Create Employee Registration Webpage Using HTML Form Objects

PRACTICAL 7 HTML Tags - Headings, Paragraphs, Line Break, Colors, Fonts, Links, Images, List, Tables And Frames

PRACTICAL 8 Creating Forms By Using HTML And HTML5 Tags

PRACTICAL 9 Styling HTML Pages Using CSS

SKILL ENHANCEMENT COURSE (CS-SEC-125T)

Web designing using Bootstrap

Course Title & Course Code	Credits	Credit distribution of the course	
		Theory	Practical
CS-SEC-125T Web designing using Bootstrap	02	02	--

Overview: Bootstrap is a sleek, intuitive, and powerful, mobile first front-end framework for faster and easier web development. It uses HTML, CSS and JavaScript.

Course Objectives:

1. Built-in Support for layout, grids, fluid grids, and responsive designs.
2. Pre-built CSS: Contains global CSS classes for typography, tables, grids, forms, buttons, images, and more
3. Components: Contains lots of reusable components including Icons, Dropdowns, Navbars, Breadcrumbs, Popovers, Alerts, and many more.

Pre-requisite: An intermediate knowledge on HTML and CSS.

Learning Outcomes:

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

1. Understand global Bootstrap CSS classes for images, typography, tables, grids, forms, buttons, and more
2. Be able to *design website* efficiently and effectively.

Unit 1:-Introduction to What is Bootstrap Framework**[15]**

- 1.1 Why Bootstrap
- 1.2 History of Bootstrap
- 1.3 Advantages of Bootstrap Framework
- 1.4 What is Responsive web page
- 1.5 How to remove Responsiveness
- 1.6 Major Features of Bootstrap
- 1.7 What is Mobile-First Strategy

1.8 Setting up Environment

1.9 How to apply Bootstrap to Applications

Unit 2: - Bootstrap Grid

[10]

2.1 What is Bootstrap Grid

2.2 How to apply Bootstrap Grid

2.3 What is Container

2.4 What is Bootstrap Tables?

2.5 What is Bootstrap Form Layout?

2.6 What is Bootstrap Button?

2.7 Advantages of Bootstrap Grid

2.8 How to Display responsive Images

2.9 How to change class properties

2.10 How to use readymade themes

2.11 How display images in different styles like Circle shape etc

Unit 3: - Bootstrap Components

[05]

3.1 What is Bootstrap Components?

3.2 Why Bootstrap Components

3.3 Advantages of Bootstrap Components

ESSENTIAL/RECOMMENDED READINGS:

1. Bootstrap by Jake Spurlock Publisher(s): O'Reilly Media, Inc.
2. Step by Step Bootstrap
3. A Quick Guide to Responsive Web Development Using
4. Bootstrap 3ByRiwantoMegosinarso
5. <https://www.javatpoint.com/what-is-bootstrap>
6. <https://www.getbootstrap.com>