Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Autonomous)

B.Sc. Degree Program in Computer Science

(Faculty of Science & Technology)

Syllabus

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

For Department of Computer Science

Tuljaram Chaturchand College, Baramati

Choice Based Credit System Syllabus (2022 Pattern)

To be implemented from Academic Year 2022-2023

Programs Outcome For B. Sc. (Computer Science)
(2022 Pattern)

PO1: Apply fundamental principles and methods of Computer Science to a wide range of applications.

PO2: Design, correctly implement and document solutions to significant computational problems.

PO3: Impart an understanding of the basics of our discipline.

PO4: Prepare for continued professional development.

PO5: Understand the impact of the IT analyst solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

PO6: Develop proficiency in the practice of computing.

PO7: Develop the capacity to study and research independently that will help to develop skills for transition to employment in hardware/software companies

Course Structure for F.Y.B.Sc.(Computer Science) (2022 Pattern)

Subject: **Computer Science**

Semester	Paper Code	Title of Paper	No. of Credits	Exam.	Marks
I	UCSCO111	Basic Programming using C	2	I/E	60+40
	UCSCO112	DBMS-I	2	I/E	60+40
	UCSCO113	Lab. Course I : Basic programming using C	2	I/E	60+40
	UCSCO114	Lab. Course II : DBMS I	2	I/E	60+40
II	UCSCO121	Advanced Programming using C	2	I/E	60+40
	UCSCO122	DBMS-II	2	I/E	60+40
	UCSCO123	Lab. Course I : Advanced Programming using C	2	I/E	60+40
	UCSCO124	Lab. Course II : DBMS II	2	I/E	60+40
		Physical Education	2	--	--
		Democracy, Election & Governance	2	--	--

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

Semester-I

Class: F.Y. B. Sc. (Computer Science) (Semester-I) (2022 Pattern)

Subject: Computer Science Paper Code: UCSCO111

Title of Paper: Basic Programming Using C Paper: I

Credit: 2

Course Outcomes:

CO1: Understanding of Basic Programming Concepts
CO2: Problem solving and programming capability.
CO3: Explore algorithmic approaches to problem solving.
CO4: Develop programs using control structures and arrays in 'C'.
CO5: Gain proficiency in C programming syntax and semantics
CO6: Basic Input/ Output Operations
CO7: Ability to Write and Debug C Code

	Chapter and Sub Topics	
Unit – I	Problem-Solving Using Computer 1.1 Problem Solving 1.2 Algorithms & Flowcharts 1.3 Programming Languages 1.4 Problem-Solving Using Machine language Assembly language High level languages	6
Unit – II	**Introduction to C** 2.1 Structure of a C program 2.2 Application Areas 2.3 C Program development life cycle 2.5 Sample programs	2
Unit – III	**C Tokens** 3.1 Keywords 3.2 Identifiers 3.3 Variables 3.4 Constants – character, integer, float, string, escape sequences 3.5 Data types – built-in and user defined 3.6 Operators and Expressions Operator types (arithmetic, relational, logical,assignment, bitwise, conditional, other operators), precedence and associatively rules.	7
Unit – IV	**Control Structures** 4.1 Decision making structures if, if-else, switch-case 4.2 Loop Control structures While, do-while, for	7

	4.3Jumping Statements break, continue and goto 4.4 Nested structures	
Unit – V	**Functions in C** 5.1 What is a function 5.2 Advantages of Functions 5.3 Standard library functions 5.4 User defined functions : Declaration, definition, function call, parameter passing (by value), return keyword 5.5 Scope of variables, storage classes 5.6 Recursion	8
Unit – VI	**Arrays** 6.1 Array Concept 6.2 Types – one, two and multidimensional 6.3 Array Operations - declaration, Initialization, accessing array elements 6.4 Passing arrays to functions **6.5 Array Applications**	6

References:

1. YashavantKanetkar : Let Us C 7th Edition, PBP Publications
2. E Balaguruswamy : Programming in ANSI C 7th Edition, Tata Mc-Graw Hill Publishing Co.Ltd.-New Delhi
3. Brian W. Kernighan and Dennis M. Ritchie : The C Programming Language 2nd Edition, Prentice Hall Publication
4. Herbert Schildt, The Complete Reference to C
5. Harrow,Problem Solving with C
6. Ajay Mittal , Pearson, Programming in C ,A Practical Approach
7. https://www.tutorialspoint.com/cprogramming/index.htm
8. https://www.w3schools.com/c/index.php
9. https://www.guru99.com/c-programming-tutorial.html
10. https://www.geeksforgeeks.org/c-programming-language/
11. https://nptel.ac.in/courses

Course Outcomes	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	3	2
CO2	3	3	3	3	3	3	3
CO3	3	3	3	3	3	3	3
CO4	3	3	2	2	2	2	3
CO5	3	3	2	2	2	3	3
CO6	2	1	1	1	1	2	2
CO7	3	3	2	3	2	3	3

Course Objectives (CO) and Program Outcomes (PO) Mapping:

1. Justification of PO1 to ALL COs :

Justification: Algorithmic approaches to problem-solving are a core part of the fundamental principles in computer science, contributing to their application in various scenarios .

2. Justification of PO2 to ALL COs :

Justification: While basic input/output operations contribute to the overall understanding of program functionality

3.Justification of PO3 to ALL COs :

Proficiency in syntax and semantics is crucial, but it is a specific skill within the broader discipline. It is moderately related as it contributes to the basics but is not the entirety of the discipline.
Basic Input/Output Operations contribute to understanding program functionality,

4. Justification of PO4 to ALL COs :

Problem-solving and programming capability are directly tied to the ability to prepare for continued professional development. These skills are essential for adapting to new challenges and technologies in the professional environment.

5. Justification of PO5 to ALL COs :

Understanding basic programming concepts contributes to the technical foundation required to analyze IT solutions, but the direct impact on societal and environmental contexts may be more indirect.
Problem-solving and programming capability are directly relevant to understanding the impact of IT analyst solutions in societal and environmental contexts. The ability to develop effective solutions aligns with the goal of sustainable development.

6. Justification of PO6 to ALL COs :

Exploring algorithmic approaches enhances problem-solving skills, directly contributing to proficiency in the practice of computing.
Developing programs using control structures and arrays in C contributes to proficiency but is more specific compared to the broader practice of computing.

7. Justification of PO7 to ALL COs :

Problem-solving and programming capability are fundamental for independent study and research, directly aligning with the goal of transitioning to employment in hardware/software companies.
The ability to write and debug code is crucial for independent study, research, and directly aligns with the skills needed for a successful transition to employment in hardware/software companies

Class: F.Y. B. Sc. (Computer Science) (Semester-I)
Subject: Computer Science **Paper Code: UCSCO112**
Title of Paper: DBMS-I **Paper: II**
Credit: 2 **No. of Lectures: 36**

Learning objective: Students successfully completing this course will be able to:

- Understand design and implementation of a database system.
- Study the physical, logical database designs and database modeling.
- Understanding and development for essential DBMS concepts.
- Understand creations, manipulation and querying of data in databases.

Learning Outcomes:

CO1: Master the basics of database concepts and database manage men system
CO2: Model an application's data requirements using conceptual modeling tools like ER model, relational model.
CO3: Write SQL commands to create tables, insert, update, delete and querying data.
CO4: Demonstrate the basic elements of a relational database management system
CO5: Identify the data models for relevant problems.
CO6. Draw Entity-Relationship diagrams to represent simple database application Scenarios.
CO7: Study the hashing, indexing, and file organization systems.

Units	Title & Content	No. Of lecture
Unit I	**1. Introduction to File organization &DBMS** 1.1 Introduction 1.2 Types of file organization 1.3 File system Vs DBMS 1.4 Data models 1.5 Levels of abstraction 1.6 Data independence 1.7 Structure of DBMS 1.8 Users of DBMS 1.9 Advantages of DBMS	**04**
Unit II	**2.Conceptual Design (E-R model)** 2.1 Overview of DB design 2.2 ER data model (entities, attributes, entity sets, relations, relationship sets) 2.3 Additional constraints (Key constraints, Mapping constraints) 2.4 Conceptual design using Remodeling 2.4 Case studies	**10**

Unit III	**3. Relational datamodel** 3.1 Structure of Relational Databases (concepts of a table, a row, a relation, a Tuple, and a key in a relational database) 3.2 Conversion of ER to Relational model 3.3. Integrity constraints (primary key, referential integrity, unique constraint, Null constraint, Check constraint)	**04**
Unit IV	**4. Relational algebra** 4.1 Preliminaries 4.2 Relational algebra (selection, projection set operations, renaming, joins, division) 4.3 Problems.	**04**
Unit V	**5. Introduction to SQL** 5.1 Introduction 5.2 Basic structure 5.3 Set operations 5.4 Aggregate functions 5.5 Null values 5.6 PL/PgSqL: Data types, Language structure	**08**
Unit VI	**6. Operations with SQL** 6.1 Nested Subqueries 6.2 Modifications to Database 6.3 DDL and DML commands with examples 6.4 SQL mechanisms for joining relations (inner joins, outer Joins, and their types) **6.** Examples on SQL (case studies)	**06**

References

1. Shamkant B. Navathe, RamezElmasri,(2010), Database Systems,ISBN:9780132144988,PEARSON HIGHEREDUCATION
2. Richard Stones, Neil Matthew, (2005), Beginning Databases with PostgreSQL: From Novice to Professional, ISBN:9781590594780,Apress
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5. https://www.guru99.com/postgresql-tutorial.html
6. https://sodocumentation.net/postgresql/topic/5299/programming-with-pl-pgsql
7. https://www.tutorialspoint.com/postgresql/index.htm

Mapping of this course with Program Outcomes

Course Outcomes	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	2
CO2	3	2	3	2	2	2	2
CO3	3	2	3	2	2	2	2
CO4	3	2	3	2	2	2	2
CO5	3	2	3	2	2	2	2
CO6	3	2	3	2	2	2	2
CO7	2	2	2	2	2	2	2

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related

1. **Justification of PO1 to ALL CO's:**

CO1: PO1 - Justification: Mastering the basics of database concepts and management systems strongly contributes to applying fundamental principles and methods of Computer Science to a wide range of applications, as databases are fundamental to various computing applications.
CO2: PO1 - Justification: Modeling an application's data requirements using conceptual modeling tools like ER Model and relational model strongly contributes to applying fundamental principles, enabling effective representation and organization of data in diverse applications.
CO3: PO1 - Justification: Demonstrating the basic elements of a relational database management system strongly contributes to applying fundamental principles in computer science, showcasing practical knowledge in managing relational databases.
CO4: PO1 - Justification: Identifying the data models for relevant problems strongly contributes to applying fundamental principles, allowing for the selection of appropriate data models based on the requirements of diverse applications.
CO5: PO1 - Justification: Drawing Entity-Relationship diagrams to represent simple database application scenarios strongly contributes to applying fundamental principles, providing visual representations for effective communication and understanding of database structures.

CO6: PO1 - Justification: Writing SQL commands to create tables, insert, update, delete, and querying data strongly contributes to applying fundamental principles, as SQL is a fundamental language for interacting with relational databases in various applications.
CO7: PO1 - Justification: Studying hashing, indexing, and file organization systems moderately contributes to applying fundamental principles, as it provides additional knowledge relevant to efficient data retrieval and storage, enhancing the application of computer science principles.

2. Justification of PO2 to ALL CO's:

CO1: PO2 - Justification: Mastering the basics of database concepts and management systems moderately contributes to designing, implementing, and documenting solutions to

significant computational problems, as databases are integral to various computational solutions.
CO2: PO2 - Justification: Modeling an application's data requirements using conceptual modeling tools like ER Model and relational model moderately contributes to designing and implementing solutions to computational problems, providing a structured approach to data representation.
CO3: PO2 - Justification: Demonstrating the basic elements of a relational database management system moderately contributes to designing and implementing solutions, showcasing practical knowledge in managing relational databases as part of computational solutions.
CO4: PO2 - Justification: Identifying the data models for relevant problems moderately contributes to designing and implementing solutions, enabling the selection of appropriate data models based on the computational problem at hand.
CO5: PO2 - Justification: Drawing Entity-Relationship diagrams to represent simple database application scenarios moderately contributes to designing and implementing solutions, offering a visual representation for planning and documenting computational solutions involving databases.
CO6: PO2 - Justification: Writing SQL commands to create tables, insert, update, delete, and querying data moderately contributes to designing and implementing solutions, as SQL is a practical language for interacting with databases in various computational contexts.
CO7: PO2 - Justification: Studying hashing, indexing, and file organization systems moderately contributes to designing and implementing solutions, providing additional knowledge relevant to efficient data retrieval and storage as part of computational problem-solving.

3. Justification of PO3 to ALL CO's:
CO1: PO3 - Justification: Mastering the basics of database concepts and management systems strongly contributes to imparting an understanding of the basics of the computer science discipline, providing fundamental knowledge in a core area of the field.
CO2: PO3 - Justification: Modeling an application's data requirements using conceptual modeling tools like ER Model and relational model strongly contributes to imparting an understanding of the basics of the discipline, involving structured approaches to data representation in various applications.
CO3: PO3 - Justification: Demonstrating the basic elements of a relational database management system strongly contributes to imparting an understanding of the basics, as it involves practical knowledge in managing relational databases, a key component in the field of computer science.

CO4: PO3 - Justification: Identifying the data models for relevant problems strongly contributes to imparting an understanding of the basics, involving the selection of appropriate data models based on the computational problem, which is fundamental to the discipline.
CO5: PO3 - Justification: Drawing Entity-Relationship diagrams to represent simple database application scenarios strongly contributes to imparting an understanding of the basics, providing visual representation skills crucial in computer science.

CO6: PO3 - Justification: Writing SQL commands to create tables, insert, update, delete, and querying data strongly contributes to imparting an understanding of the basics, as SQL is a practical language for interacting with databases, an essential aspect of computer science.
CO7: PO3 - Justification: Studying hashing, indexing, and file organization systems moderately contributes to imparting an understanding of the basics, offering additional knowledge relevant to efficient data retrieval and storage in computer science applications.

4. Justification of PO4 to ALL CO's:

CO1: PO4 - Justification: Mastering the basics of database concepts and management systems moderately contributes to preparing for continued professional development by providing foundational knowledge in a core area of the computer science discipline.
CO2: PO4 - Justification: Modeling an application's data requirements using conceptual modeling tools like ER Model and relational model moderately contributes to preparing for continued professional development, offering structured approaches to data representation essential for ongoing growth in the field.
CO3: PO4 - Justification: Demonstrating the basic elements of a relational database management system moderately contributes to preparing for continued professional development, showcasing practical knowledge in managing relational databases, a skill relevant for professional advancement.
CO4: PO4 - Justification: Identifying the data models for relevant problems moderately contributes to preparing for continued professional development, involving the selection of appropriate data models based on the computational problem, a skill valuable for ongoing professional growth.
CO5: PO4 - Justification: Drawing Entity-Relationship diagrams to represent simple database application scenarios moderately contributes to preparing for continued professional development, as it hones visual representation skills crucial for effective communication and collaboration in a professional setting.
CO6: PO4 - Justification: Writing SQL commands to create tables, insert, update, delete, and querying data moderately contributes to preparing for continued professional development, as SQL proficiency is a practical skill valuable for various professional roles.
CO7: PO4 - Justification: Studying hashing, indexing, and file organization systems moderately contributes to preparing for continued professional development, offering additional knowledge relevant to efficient data management, a skill beneficial for ongoing career advancement

5. Justification of PO5 to ALL CO's:

CO1: PO5 - Justification: Mastering the basics of database concepts and management systems moderately contributes to understanding the impact of IT analyst solutions in societal and environmental contexts, as databases are integral to various IT solutions with potential societal and environmental implications.
CO2: PO5 - Justification: Modeling an application's data requirements using conceptual modeling tools like ER Model and relational model moderately contributes to understanding the impact, involving structured approaches to data representation that may influence societal and environmental considerations in IT solutions.

CO3: PO5 - Justification: Demonstrating the basic elements of a relational database management system moderately contributes to understanding the impact, showcasing practical knowledge in managing relational databases, a skill relevant to the societal and environmental implications of IT solutions.
CO4: PO5 - Justification: Identifying the data models for relevant problems moderately contributes to understanding the impact, as selecting appropriate data models is essential for developing IT solutions that align with societal and environmental considerations.
CO5: PO5 - Justification: Drawing Entity-Relationship diagrams to represent simple database application scenarios moderately contributes to understanding the impact, providing visual representation skills that can aid in conveying complex IT solutions in societal and environmental contexts.
CO6: PO5 - Justification: Writing SQL commands to create tables, insert, update, delete, and querying data moderately contributes to understanding the impact, as proficiency in SQL is crucial for developing IT solutions with societal and environmental awareness.
CO7: PO5 - Justification: Studying hashing, indexing, and file organization systems moderately contributes to understanding the impact, offering additional knowledge relevant to efficient data management that can have implications for societal and environmental sustainability.

6. Justification of PO6 to ALL CO's:

CO1: PO6 - Justification: Mastering the basics of database concepts and management systems moderately contributes to developing proficiency in the practice of computing, as databases are integral to various computing practices.
CO2: PO6 - Justification: Modeling an application's data requirements using conceptual modeling tools like ER Model and relational model moderately contributes to developing proficiency, involving structured approaches to data representation that enhances proficiency in computing practices.
CO3: PO6 - Justification: Demonstrating the basic elements of a relational database management system moderately contributes to developing proficiency, showcasing practical knowledge in managing relational databases, a skill relevant to computing practices.
CO4: PO6 - Justification: Identifying the data models for relevant problems moderately contributes to developing proficiency, as selecting appropriate data models is essential for effective problem-solving in computing practices.
CO5: PO6 - Justification: Drawing Entity-Relationship diagrams to represent simple database application scenarios moderately contributes to developing proficiency, providing visual representation skills that aid in effective communication and understanding in computing practices.
CO6: PO6 - Justification: Writing SQL commands to create tables, insert, update, delete, and querying data moderately contributes to developing proficiency, as SQL proficiency is crucial for effective data manipulation and retrieval in computing practices.
CO7: PO6 - Justification: Studying hashing, indexing, and file organization systems moderately contributes to developing proficiency, offering additional knowledge relevant to efficient data management that enhances proficiency in computing practices.

7. Justification of PO7 to ALL CO's:

CO1: PO7 - Justification: Mastering the basics of database concepts and management systems moderately contributes to developing the capacity to study and research independently, providing foundational knowledge that supports independent exploration in the field.

CO2: PO7 - Justification: Modeling an application's data requirements using conceptual modeling tools like ER Model and relational model moderately contributes to developing the capacity for independent study and research, offering structured approaches to data representation that can be independently explored.

CO3: PO7 - Justification: Demonstrating the basic elements of a relational database management system moderately contributes to developing the capacity for independent study and research, showcasing practical knowledge in managing relational databases that can be further explored independently.

CO4: PO7 - Justification: Identifying the data models for relevant problems moderately contributes to developing the capacity for independent study and research, as it involves selecting appropriate data models, which can be explored independently for various computational problems.

CO5: PO7 - Justification: Drawing Entity-Relationship diagrams to represent simple database application scenarios moderately contributes to developing the capacity for independent study and research, providing visual representation skills that can be independently applied and explored.

CO6: PO7 - Justification: Writing SQL commands to create tables, insert, update, delete, and querying data moderately contributes to developing the capacity for independent study and research, as SQL proficiency enables independent exploration in data manipulation and retrieval.

CO7: PO7 - Justification: Studying hashing, indexing, and file organization systems moderately contributes to developing the capacity for independent study and research, offering additional knowledge for independent exploration in efficient data management.

Class: F.Y. B. Sc. (Computer Science) (Semester-I) (2022 Pattern)

Subject: Computer Science Paper Code: UCSCO113

Title of Paper: Lab Course-Basic Programming Using C Paper: I

Credit: 2 No. of Lectures: 36

Course Outcomes:

CO1: Problem solving and programming capability.

CO2: Apply C programming concepts to real-world problems

CO3: Gain a foundation for advanced programming concepts

CO4: Develop debugging and error handling skills.

CO5: Understand the fundamentals of C programming language:

CO6: Develop problem-solving skills

CO7: Gain proficiency in C programming syntax and semantics

PAPER CODE : UCSCO113 PAPER – III : Lab Course I: Basic Programming Using C (Credits – 02 No. of Practicals – 10)	
	Title of Experiment/ Practical
1	Assignment to demonstrate use of data types, simple operators & expressions.
2	Assignment to demonstrate decision making statements (if and if-else, nested structures)
3	Assignment to demonstrate decision making statements (switch - case)
4	Assignment to demonstrate use of simple loops
5	Assignment to demonstrate use of nested loops
6	Assignment to demonstrate menu driven programs.
7	Assignment to demonstrate writing C programs in modular way (use of user defined functions)
8	Assignment to demonstrate recursive functions.
9	Assignment to demonstrate use of arrays (1-d arrays) and functions
10	Assignment to demonstrate use of arrays (2-d arrays) and functions

Course Outcomes	**Programme Outcomes (POs)**						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	3	3	3	2	3	2
CO2	3	3	3	3	2	3	3
CO3	3	3	3	3	2	3	3
CO4	2	2	2	2	1	2	2
CO5	3	2	2	2	1	3	2
CO6	2	1	1	1	1	2	1
CO7	2	2	2	2	1	3	3

Course Objectives (CO) and Program Outcomes (PO) Mapping:

Justification: Understanding basic programming concepts is fundamental to applying the principles and methods of Computer Science to various applications.

Justification: The ability to solve problems and program effectively is a fundamental application of Computer Science principles.

Justification: Algorithmic approaches are a fundamental aspect of Computer Science, applied in a wide range of applications.

Justification: While developing programs using control structures and arrays is a crucial programming skill, its direct application to a wide range of applications might be more moderate compared to broader concepts.

Justification: Proficiency in programming syntax and semantics is essential for applying Computer Science principles effectively.

Justification: Basic Input/Output Operations are essential, but their direct application to a wide range of applications may be moderate compared to more foundational concepts.

Justification: While writing and debugging code is an important skill, its direct connection to a wide range of applications might be more moderate compared to broader principles.

Justification: A solid understanding of basic programming concepts is crucial for designing and implementing solutions to computational problems.

Justification: Problem-solving and programming capability are directly tied to designing and implementing solutions to computational problems.

Justification: Exploring algorithmic approaches is a key aspect of designing efficient solutions to computational problems.

Justification: While developing programs with control structures and arrays is important, the direct link to designing solutions to significant computational problems may be more moderate compared to broader concepts.

Justification: Proficiency in syntax and semantics is essential, but its direct relation to designing solutions to significant computational problems might be more moderate compared to broader principles.

Justification: While basic I/O operations are important, their direct connection to designing solutions to significant computational problems is partial.

Justification: Writing and debugging code are important skills but are more moderately related to the overall process of designing solutions to significant computational problems.

Justification: A strong understanding of basic programming concepts is fundamental to imparting an understanding of the basics of the computer science discipline.

Justification: Problem-solving and programming capability are essential components of the basics of the computer science discipline.

Justification: Exploring algorithmic approaches is a core aspect of understanding the basics of computer science.

Justification: While developing programs is important, its direct relation to understanding the basics of the discipline might be more moderate compared to broader concepts.

Justification: Proficiency in syntax and semantics is crucial, but its direct connection to understanding the basics of the discipline may be more moderate compared to broader principles.

Justification: While basic I/O operations are important, their direct connection to understanding the basics of the discipline is partial.

Justification: Writing and debugging code are important skills, but their direct relation to understanding the basics of the discipline may be more moderate.

Justification: A strong understanding of basic programming concepts is foundational for continued professional development in the field of computer science.
Justification: Problem-solving and programming capability are crucial skills that directly contribute to an individual's readiness for continued professional development.
Justification: Exploring algorithmic approaches is an essential skill that enhances an individual's ability to address complex problems, contributing to professional development.
Justification: While developing programs is important, its direct connection to continued professional development might be more moderate compared to broader concepts.
Justification: Proficiency in syntax and semantics is valuable, but its direct relation to continued professional development may be more moderate compared to broader principles.
Justification: Basic I/O operations are important, but their direct connection to continued professional development is partial.
Justification: Writing and debugging code are important skills, but their direct relation to continued professional development may be more moderate.
Justification: While a foundational understanding of programming concepts is essential, the direct connection to understanding the societal and environmental impact may be more moderate compared to broader concepts.
Justification: Problem-solving and programming capability contribute to IT solutions, but their direct relation to societal and environmental impact might be more moderate compared to broader considerations.
Justification: Exploring algorithmic approaches is important, but the direct connection to societal and environmental impact may be more moderate compared to broader considerations.
Justification: Developing programs is a technical skill, but its direct connection to societal and environmental impact may be partial compared to broader considerations.
Justification: Proficiency in syntax and semantics is essential but may have a partial connection to the broader societal and environmental impact.
Justification: Basic I/O operations are fundamental but may only partially contribute to understanding the broader societal and environmental impact.
Justification: Writing and debugging code are technical skills, but their direct relation to societal and environmental impact may be partial compared to broader considerations.
Justification: A solid understanding of basic programming concepts is foundational for developing proficiency in the practice of computing.
Justification: Problem-solving and programming capability are core skills that directly contribute to proficiency in the practice of computing.
Justification: Exploring algorithmic approaches is crucial for developing proficiency in the practice of computing, as it enhances problem-solving skills.
Justification: Developing programs is important, and it contributes to proficiency in the practice of computing, but its direct connection may be more moderate compared to broader concepts.
Justification: Proficiency in syntax and semantics is essential for developing proficiency in the practice of computing.
Justification: Basic Input/Output Operations are fundamental, but their direct connection to the broader proficiency in the practice of computing may be more moderate.
Justification: Writing and debugging code are core skills that directly contribute to proficiency in the practice of computing.
Justification: While a foundational understanding of programming concepts is important, the direct connection to independent study and research for employment transition may be more moderate compared to broader considerations.

Justification: Problem-solving and programming capability are essential skills that directly contribute to independent study and research for a successful transition to employment in the tech industry.
Justification: Exploring algorithmic approaches enhances problem-solving skills and contributes directly to the capacity for independent study and research, supporting the transition to employment.
Justification: Developing programs is important, but its direct connection to independent study and research for employment transition may be more moderate compared to broader concepts.
Justification: Proficiency in syntax and semantics is crucial, but its direct relation to independent study and research for employment transition may be more moderate compared to broader principles.
Justification: Basic Input/Output Operations are fundamental, but their direct connection to independent study and research for employment transition may be partial.
Justification: Writing and debugging code are core skills that directly contribute to independent study and research for a successful transition to employment in hardware/software companies.

F.Y. B. Sc. (Comp. Sci.) Practical Lab Course -II (Semester-I)
(2022 Pattern)

Subject: Computer Science — Paper Code: UCSCO114
Title of Paper: Lab Course-II on DBMS-I — Paper : IV
Credit: 2 — No. of Practicals:10

Learning objective: Students successfully completing this course will be able to:

- Understand design and implementation of a database system.
- Study the physical, logical database designs and database modeling.
- Understanding and development for essential DBMS concepts.
- Understand creations, manipulation and querying of data in databases.

Learning Outcomes:

CO1: Master the basics of database concepts and database management system
CO2: Write, debug, and execute SQL Queries using PostgreSQL.
CO3: Model an application's data requirements using conceptual modeling tools like ER model, relational model.
CO4: Write SQL commands to create tables, insert, update, delete and querying data.
CO5: Identify the data models for relevant problems.
CO6: Draw Entity-Relationship diagrams to represent simple database application Scenarios
CO7:Study the hashing, indexing, and file organization systems.

Sr. No.	Title of Experiment/ Practicals
1	Create simple tables, with only the primary key Constraint
2	Create more than one table with integrity constraint
3	Create more than one table, with referential integrity constraint.
4	Drop a table from database, Alter the table.
5	Insert/Update/Delete statements.
6	Query for the tables using simple form of Select Statement
7	Query solving for table operations (Aggregate function)
8	Nested Query solving for table operations (Union, Intersect, Except)
9	Nested Query solving for table operations (Set membership, Cardinality, Comparison)
10	Small Case Studies.

Operating Environment: For 'PostgreSQL' Programming: PostgreSQL 10 Windows 7 Windows 8 64Bit Version.

Mapping of this course with Programme Outcomes

Course Outcomes	**Programme Outcomes (POs)**						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	2	2	2	2
CO2	2	3	2	2	2	2	2
CO3	2	2	3	2	2	2	2
CO4	3	2	2	3	3	2	2
CO5	1	1	1	1	1	1	1
CO6	1	1	1	1	1	1	1
CO7	3	2	3	2	2	2	2

Weight: 1 - Partially related 2 - Moderately Related 3 - Strongly related

Justification of PO with CO:

1. **PO1 with all CO's :**

   CO1 is strongly related to PO1 (weightage 3) as mastering the basics of database concepts and database management systems aligns with applying fundamental principles and methods of computer science to a wide range of applications.

   CO2 is moderately related to PO1 (weightage 2) as writing, debugging, and executing SQL queries using PostgreSQL is a specific skill that contributes to the broader application of fundamental principles and methods of computer science.

   CO3 is moderately related to PO1 (weightage 2) as modeling an application's data requirements using conceptual modeling tools aligns with applying fundamental principles and methods of computer science, especially in the context of database design.

   CO4 is strongly related to PO1 (weightage 3) as knowing DBMS concepts and operating database software is fundamental to applying computer science principles in various applications.

   CO5 is partially related to PO1 (weightage 1) as identifying and describing the components of internet infrastructure may not directly contribute to applying fundamental principles and methods of computer science in a wide range of applications.

   CO6 is partially related to PO1 (weightage 1) as applying web technologies to create and navigate web content is specific to web development and may not directly cover the broader application of fundamental computer science principles.

   CO7 is strongly related to PO1 (weightage 3) as mastering the basics of database concepts and management systems is fundamental to applying computer science principles in various applications.

2. **PO2 with all CO's :**

   CO1 is moderately related to PO2 (weightage 2) as mastering the basics of database concepts and database management systems is foundational to designing and implementing solutions to computational problems, but it may not cover the entire spectrum of designing and implementing solutions.

CO2 is strongly related to PO2 (weightage 3) as writing, debugging, and executing SQL queries using PostgreSQL is a specific skill directly related to the design and implementation of database solutions, which is crucial for solving computational problems.

CO3 is moderately related to PO2 (weightage 2) as modeling an application's data requirements using conceptual modeling tools aligns with designing and implementing solutions to computational problems, particularly in the context of database design.

CO4 is moderately related to PO2 (weightage 2) as knowing DBMS concepts and operating database software provides a foundational understanding that contributes to designing and implementing solutions to computational problems, but it may not cover the entire process.

CO5 is partially related to PO2 (weightage 1) as identifying and describing the components of internet infrastructure may not directly contribute to designing and implementing solutions to computational problems.

CO6 is partially related to PO2 (weightage 1) as applying web technologies to create and navigate web content is specific to web development and may not directly cover the broader process of designing and implementing solutions to computational problems.

CO7 is moderately related to PO2 (weightage 2) as mastering the basics of database concepts and management systems is foundational to designing and implementing solutions to computational problems, especially those involving databases.

3. **PO3 with all CO's :**

CO1 is strongly related to PO3 (weightage 3) as mastering the basics of database concepts and database management systems is fundamental to imparting an understanding of the basics of the computer science discipline.

CO2 is moderately related to PO3 (weightage 2) as writing, debugging, and executing SQL queries using PostgreSQL is a specific skill that contributes to the broader understanding of the basics of computer science, especially in the context of databases.

CO3 is strongly related to PO3 (weightage 3) as modeling an application's data requirements using conceptual modeling tools aligns directly with imparting an understanding of the basics of the computer science discipline, particularly in the context of data modeling.

CO4 is moderately related to PO3 (weightage 2) as knowing DBMS concepts and operating database software contributes to foundational knowledge that can be part of imparting an understanding of the basics of the computer science discipline.

CO5 is partially related to PO3 (weightage 1) as identifying and describing the components of internet infrastructure may not directly contribute to imparting an understanding of the basics of computer science.

CO6 is partially related to PO3 (weightage 1) as applying web technologies to create and navigate web content is specific to web development and may not directly cover the broader understanding of the basics of computer science.

CO7 is strongly related to PO3 (weightage 3) as mastering the basics of database concepts and management systems aligns directly with imparting an understanding of the basics of the computer science discipline, especially in the context of databases.

4. **PO4 with all CO's :**

   CO1 is moderately related to PO4 (weightage 2) as mastering the basics of database concepts and management systems can contribute to foundational knowledge that supports continued professional development, but it may not cover the entire spectrum of preparation for professional development.

   CO2 is moderately related to PO4 (weightage 2) as writing, debugging, and executing SQL queries using PostgreSQL is a specific skill that can contribute to the preparation for professional development, particularly in roles involving database development.

   CO3 is moderately related to PO4 (weightage 2) as modeling an application's data requirements using conceptual modeling tools aligns with preparation for professional development, especially in roles requiring data modeling skills.

   CO4 is strongly related to PO4 (weightage 3) as knowing DBMS concepts and operating database software is fundamental to the preparation for continued professional development, especially in roles involving database management.

   CO5 is partially related to PO4 (weightage 1) as identifying and describing the components of internet infrastructure may not directly contribute to the preparation for continued professional development.

   CO6 is partially related to PO4 (weightage 1) as applying web technologies to create and navigate web content is specific to web development and may not directly cover the broader spectrum of preparation for professional development.

   CO7 is moderately related to PO4 (weightage 2) as mastering the basics of database concepts and management systems aligns with preparation for continued professional development, especially in roles involving database-related tasks.

5. **PO5 with all CO's :**

   CO1 is moderately related to PO5 (weightage 2) as mastering the basics of database concepts and management systems may indirectly contribute to understanding the impact of IT analyst solutions in societal and environmental contexts, but it may not be the primary focus.

   CO2 is moderately related to PO5 (weightage 2) as writing, debugging, and executing SQL queries using PostgreSQL may not directly contribute to understanding the impact of IT analyst solutions in societal and environmental contexts, but it is a technical skill that can be applied in various scenarios.

   CO3 is moderately related to PO5 (weightage 2) as modeling an application's data requirements using conceptual modeling tools aligns with understanding the impact of IT analyst solutions, especially in the context of data modeling for societal and environmental considerations.

   CO4 is moderately related to PO5 (weightage 2) as knowing DBMS concepts and operating database software may contribute indirectly to understanding the impact of IT analyst solutions, particularly in roles involving database management for sustainable development.

   CO5 is strongly related to PO5 (weightage 3) as identifying and describing the components of internet infrastructure directly aligns with understanding the impact of IT analyst solutions in societal and environmental contexts, especially considering the role of internet infrastructure in global connectivity.

CO6 is partially related to PO5 (weightage 1) as applying web technologies to create and navigate web content may not be the primary focus in understanding the impact of IT analyst solutions in societal and environmental contexts.

CO7 is moderately related to PO5 (weightage 2) as mastering the basics of database concepts and management systems may contribute to understanding the impact of IT analyst solutions, particularly in roles involving database-related tasks for sustainable development.

6. **PO6 with all CO's :**

CO1 is moderately related to PO6 (weightage 2) as mastering the basics of database concepts and management systems contributes to proficiency in computing, but it may not cover the entire spectrum of computing practice.

CO2 is moderately related to PO6 (weightage 2) as writing, debugging, and executing SQL queries using PostgreSQL is a specific skill that contributes to proficiency in computing, especially in roles involving database-related tasks.

CO3 is moderately related to PO6 (weightage 2) as modeling an application's data requirements using conceptual modeling tools aligns with proficiency in computing, particularly in the context of data modeling for computational practice.

CO4 is moderately related to PO6 (weightage 2) as knowing DBMS concepts and operating database software contributes indirectly to proficiency in computing, especially in roles involving database management for computational tasks.

CO5 is partially related to PO6 (weightage 1) as identifying and describing the components of internet infrastructure may not be the primary focus in developing proficiency in the practice of computing.

CO6 is partially related to PO6 (weightage 1) as applying web technologies to create and navigate web content is specific to web development and may not directly cover the broader spectrum of proficiency in computing.

CO7 is moderately related to PO6 (weightage 2) as mastering the basics of database concepts and management systems contributes to proficiency in computing, especially in roles involving database-related tasks.

7. **PO7 with all CO's :**

CO1 is moderately related to PO7 (weightage 2) as mastering the basics of database concepts and management systems can contribute to independent study and research skills, especially in roles requiring database-related tasks.

CO2 is moderately related to PO7 (weightage 2) as writing, debugging, and executing SQL queries using PostgreSQL is a specific skill that can contribute to independent study and research, particularly in roles involving database-related tasks.

CO3 is moderately related to PO7 (weightage 2) as modeling an application's data requirements using conceptual modeling tools aligns with independent study and research, especially in the context of data modeling for applications.

CO4 is moderately related to PO7 (weightage 2) as knowing DBMS concepts and operating database software contributes to independent study and research skills, particularly in roles involving database management.

CO5 is partially related to PO7 (weightage 1) as identifying and describing the components of internet infrastructure may not be the primary focus in developing skills for independent study and research in hardware/software companies.
CO6 is partially related to PO7 (weightage 1) as applying web technologies to create and navigate web content is specific to web development and may not be the primary focus in developing skills for independent study and research.
CO7 is moderately related to PO7 (weightage 2) as mastering the basics of database concepts and management systems contributes to skills for independent study and research, especially in roles involving database-related tasks.