Anekant Education Society's

TuljaramChaturchand College, Baramati

(Autonomous)

Three Year B.Sc. Degree Program in Computer Science

(Faculty of Science & Technology)

CBCS Syllabus (2019 Pattern)

F.Y. B.Sc.(Computer Science) Sem- II

For Department of Computer Science

Tuljaram Chaturchand College of Arts, Science & Commerce, Baramati

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

Semester-II

Syllabus

(Academic Year 2019-2020, Autonomous)

Course Structure for F. Y. B. Sc. (Computer Science)
Subject: Computer Science

Sem	Paper Code	Title of Paper	No. of Credits	Exam	Marks
I	CSCO1101	Basic Programming using C	2	I / E	60 + 40
	CSCO 1102	DBMS – I	2	I / E	60 + 40
	CSCO1103	Lab Course – I Basics on C	2	I / E	60 + 40
	CSCO1104	Lab Course – II Based on DBMS I	Grade	I/E	60 +40
II	CSCO 1201	Advanced Programming using C	2	I / E	60 + 40
	CSCO 1202	DBMS – II	2	I / E	60 + 40
	CSCO 1203	Lab Course – I Advanced C Prog.	2	I / E	60 + 40
	CSCO1204	Lab Course– II DBMS II (PL/PgSql)	Grade	I/E	60 + 40
		Physical Education	2	----	----

Class : F.Y.B.Sc. (Computer Science)			
Semester I		**Semester II**	
CSCO 1101	Basic Programming using C	CSCO 1201	Advanced Programming using C
CSCO1102	DBMS-I	CSCO 1202	DBMS-II
CSCO1103	Lab Course I : Basics of C	CSCO 1203	Lab Course I : Advanced C
CSCO1104	Lab Course II : DBMS I	CSCO1204	Lab Course II : DBMS II
Physical Education			

Class :S.Y.B.Sc. (Computer Science)			
Semester III		**Semester IV**	
CSCO 2301	Data Structures using C	CSCO2401	Object Oriented Concepts using Java
CSCO2302	Introduction to Web Technology	CSCO2402	Software Engineering
CSCO2303	Lab Course I : Based On CSCO2301	CSCO2403	Lab Course I: Based On 2401
CSCO2304	Lab Course II: based On CSCO2302	CSCO2404	Lab Course II : Based On CSCO2402 with Mini Project
Certificate Course I		Certificate Course II	
Environment Science (EVS) An Educational Trip conduct in IV semester			

Class: T.Y.B.Sc. (Computer Science)			
Semester V		**Semester VI**	
CSCO3501	System Programming &Operating System	CSCO3601	Advanced Operating System
CSCO 3502	Theoretical Computer Science	CSCO3602	Compiler Construction
CSCO3503	Computer Networks - I	CSCO3603	Computer Networks - II
CSCO3504	Web Development – I	CSCO3604	Web Development–II
CSCO3505	Advanced Programming in Java	CSCO3605	Advanced Java Technologies – Frameworks
CSCO3506	Object Oriented Software Engineering	CSCO3606	Software Metrics & Project Management
CSCO3507	Lab Course I: Based on CSCO3501	CSCO3607	Lab Course I: Based on CSCO3601
CSCO3508	Lab Course II: Based on CSCO3505	CSCO3608	Lab Course II: Based on CSCO3605 & Mini Project using JAVA
CSCO3509	Lab Course III: Based on CSCO3504	CSCO3609	Lab Course III: Based on CSCO3604 & Mini Project using PHP.
Certificate Course III		An Educational Trip conduct in this semester.	

Class : F.Y. B. Sc. (Computer Science) (Semester- II)

Subject : Computer Science Paper Code: CSCO1201

Title of Paper: Advanced Programming using C Paper : I

Credit: 2 No. of lectures: 36

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

1. Understand and design Programs through advanced C Concepts
2. Design graphics Programming.

Learning Outcome: Todevelopadvancedas well as Graphics programming capability.

CO1 Develop programs using control structures, pointers, strings, structures and files in 'C'.
CO2. Design and develop solutions to real world problems using C.
CO3. To study advanced concepts of programming using 'C' language.
CO4. To understand complex data types like structure and union.
CO5. To work with files.
CO6. To understand and develop basics of Graphics Programming
CO7. Implement code efficiency.

Units	Topics Contents	No. of Lectures
Unit – I	**Pointers** 1.1 Pointer declaration, initialization 1.2 Dereferencing pointers 1.3 Pointer arithmetic 1.4 Pointer to pointer 1.5 Arrays and pointers 1.6 Functions and pointers – passing pointers to functions, function returning pointers 1.7 Dynamic memory allocation	8
Unit – II	**Strings** 2.1 Declaration and initialization, format specifiers 2.2 Standard library functions 2.3 Strings and pointers 2.4 Array of strings 2.5 Command Line Arguments	6
Unit – III	**Structures and Unions** 3.1 Creating structures 3.2 Accessing structure members (dot Operator) 3.3 Structure initialization 3.4 Typedef 3.5 Array of structures 3.6 Passing structures to functions 3.7 Nested structures 3.8 Pointers and structures 3.9 Self referential structure 3.10 Unions 3.11 Difference between structures and unions	10
Unit – IV	**File Handling** 4.1 Streams 4.2 Types of Files 4.3 Operations on files	6

	4.4 Random access to files	
Unit – V	**C Preprocessor** 4.1 Format of Preprocessor directive 4.2 File Inclusion directive 4.3 Macro substitution, nested macro, augmented macro	2
Unit – VI	**Graphics programming using C** 6.1 Graphics driver and mode 6.2 Drawing simple graphical objects – line, circle, rectangle etc. 6.3 Outputting text, curves & Polygons	4

References:

1. YashavantKanetkar : Let Us C 7th Edition, PBP Publications
2. E Balaguruswamy : Programming in ANSI C 4th 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

Mapping of this course with Programme Outcomes & Justification

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

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

CO1:PO1: As the advanced C programming concepts contribute directly to applying fundamental principles in various applications.
CO2:PO1: - As proficiency in advanced C features enhances the ability to apply fundamental principles in diverse applications.
CO3:PO1: - As mastery in these concepts is essential for applying fundamental principles in a variety of applications.
CO4:PO1: - As proficiency in memory management is crucial for the development of robust applications in different domains.
CO5:PO1: - As file handling is a specific application but may not cover the entire range of computer science applications.
CO6:PO1: - As preprocessor directives contributes to code organization but may not directly cover a wide range of applications.
CO7:PO1: - As graphics programming is a specific application area, and whiles it contributes to a subset of computer science applications; it may not cover the entire range.

CO1:PO2: - As understanding and designing programs with advanced C concepts are crucial for correctly implementing solutions to computational problems.
CO2:PO2: - As the effective use of advanced C features is essential for correctly implementing solutions to computational problems.

CO3:PO2: - As mastery in these concepts contributes directly to the ability to design and implement solutions to computational problems.
CO4:PO2: - As proficiency in memory management is crucial for correctly implementing solutions to computational problems.
CO5:PO2: - As file handling is relevant for certain computational problems but may not be universally applicable.
CO6:PO2: - As using preprocessor directives contributes to code organization, enhancing the documentation aspect of implementing solutions.
CO7:PO2: - As designing graphics programming solutions is a specific application area, and while it contributes to computational problems, it may not cover the entire range of problems addressed in the PO.

CO1:PO3: - As understanding and designing programs with advanced C concepts contribute to a specific aspect of the discipline but may not cover all basics.
CO2:PO3: - As understanding advanced C features is important but may not encompass all the basics of the discipline.
CO3:PO3: - As mastery in these advanced concepts contributes to a specific subset of basics within the discipline.
CO4:PO3: - As proficiency in memory management is a specific skill within the discipline but does not cover all basics.
CO5:PO3: - As file handling is a specific aspect of the discipline but may not represent all basics.
CO6:PO3: - As understanding and using preprocessor directives contribute to code organization, a specific aspect within the basics of the discipline.
CO7:PO3: - As designing graphics programming solutions is a specific application area within the discipline but may not cover all basics.

CO1:PO4: - As understanding and designing programs with advanced C concepts contributes to technical skills, which are part of professional development but may not cover all aspects.
CO2:PO4: - As proficiency in advanced C features directly contributes to technical skills crucial for continued professional development.
CO3:PO4: -As mastery in advanced concepts enhances technical proficiency, supporting continued professional development.
CO4:PO4: -As proficiency in memory management is a technical skill essential for continued professional development.
CO5:PO4: - As file handling is a technical skill that contributes to professional development but may not cover all aspects.
CO6:PO4: - As using preprocessor directives contributes to code organization, a skill beneficial for professional development but not exhaustive.
CO7:PO4: -As designing graphics programming solutions is a specific application area and may not directly cover the broader aspects of professional development.

CO1:PO5: -As advanced C concepts primarily focus on technical skills, and their direct connection to societal and environmental impact may be limited.
CO2:PO5: -As proficiency in advanced C features is more technical and may not directly address societal and environmental impacts.
CO3:PO5: -As mastery in these advanced concepts is technical and may not directly relate to societal and environmental contexts.
CO4:PO5: -As proficiency in memory management is a technical skill that may not directly address societal and environmental impacts.
CO5:PO5: -As file handling is more technical and may not directly connect to societal and environmental contexts.
CO6:PO5: -As using preprocessor directives is technical and may have limited direct relevance to societal and environmental impact.
CO7:PO5: -As designing graphics programming solutions is a specific technical application and may not inherently address societal and environmental concerns.

CO1:PO6: -As understanding and designing programs with advanced C concepts are fundamental to developing proficiency in computing.
CO2:PO6: -As proficiency in advanced C features is essential for developing proficiency in computing.

CO3:PO6: -As mastery in these advanced concepts contributes directly to the practice of computing.
CO4:PO6: -As proficiency in memory management is crucial for the practice of computing.
CO5:PO6: -As file handling is a practical skill directly contributing to the practice of computing.
CO6:PO6: -As using preprocessor directives contributes to code organization, an essential aspect of practicing computing.
CO7:PO6: -As designing graphics programming solutions is a specific application area within the practice of computing but may not cover the entire range of skills required.

CO1:PO7: -As understanding and designing programs with advanced C concepts contribute to technical skills, which are part of the capacity to study independently, but may not directly cover all aspects needed for employment transition.
CO2:PO7: -As proficiency in advanced C features contributes to technical skills necessary for independent study and research but may not cover the full spectrum.
CO3:PO7: -As mastery in these concepts enhances technical proficiency, supporting independent study, but may not directly address all aspects of independent research.
CO4:PO7: -As proficiency in memory management is a technical skill that contributes to independent study but may not cover all aspects of independent research.
CO5:PO7: -As file handling is a technical skill supporting independent study but may not directly cover all aspects of independent research.
CO6:PO7: -As using preprocessor directives contributes to code organization, a skill beneficial for independent study, but may not cover all aspects of independent research.
CO7:PO7: -As designing graphics programming solutions is a specific technical skill that supports independent study but may not encompass all aspects needed for employment transition.

Class : F.Y. B. Sc.(Computer Science) (Semester- II)

Subject : Computer Science **Paper Code : CSCO1202**

Title of Paper: DBMS-II **Paper: II**

Credit: 2 **No. of lectures: 36**

Prerequisites: Knowledge of DBMS

Learning Objectives:-Students successfully completing this course will be able to:

- Understand fundamental concepts of RDBMS (PL/PgSQL)
- Understand data security and its importance
- Understand client server architecture

Learning Outcomes:

CO1. Develop the database design by normalization.
CO2. Knowing functional dependencies and design of the relational database.
CO3. Know the concepts of Time stamping and locking.
CO4. Analyze the recovery system of different databases.
CO5. Apply normalization concept to real world problems.
CO6. Know the information about different databases.
CO7. Understand database integrity & security concept.

Unit	Title & Content	No. Of lecture
Unit I	1. **Relational Database Design** 1.1 Preliminaries 1.2 Normalization (1NF,2NF,3NF,BCNF,4NF, 5 NF) 1.3 Controlling the program flow, conditional statements, loops 1.4 Handling errors and exceptions, Cursors 1.5 Views, Stored Functions, Stored Procedures, Triggers	**12**
Unit II	2 **Transaction Concepts and concurrency control** 2.1 Transaction, properties of transaction, state of the transaction. 2.2 Executing transactions concurrently associated problem in concurrent execution. 2.3 Schedules, types of schedules, Serializability, precedence graph for Serializability. 2.4 Ensuring Serializability by locks, different lock modes, 2PL and its variations. 2.5Basic timestamp method for concurrency, Thomas Write Rule. 2.6Locks with multiple granularity, dynamic database concurrency (Phantom Problem). 2.7 Timestamps versus locking. 2.8 Deadlock handling methods 2.8.1 Detection and Recovery (Wait for graph). 2.8.2 Prevention algorithms (Wound-wait, Wait-die)	**10**
Unit III	3 **Database Integrity and Security Concepts** 3.1 Domain constraints 3.2 Referential Integrity 3.3 Introduction to database security concepts 3.4 Methods for database security 3.4.1Discretionary access control method 3.4.2Mandatory access control and 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.	**06**
Unit IV	4 **Crash Recovery** 4.1 Failure classification 4.2 Recovery concepts 4.3 Log base recovery techniques (Deferred and Immediate update)	**04**

	4.4 Checkpoints 4.5 Recovery with concurrent transactions (Rollback, checkpoints, commit) 4.6 Database backup and recovery from catastrophic failure.	
Unit V	5. **Client-Server Technology** 5.1 Describe client-server computing. 5.2 Evolution of Client - Server information systems. 5.3 Client – Server Architecture benefits. 5.4 Client Server Architecture - Components, Principles, Client Components, Communication middleware components, Database middleware components, Client Server Databases	**04**

References:-

1. Elmasri and Navathe,Fundamentals of Database Systems (4th Ed)

2. HenreyKorth, Sudarshan, Silberschatz,Database System Concepts (4th Ed)

3. Practical PostgreSQL O'REILLY

4. Richard Stones , Neil Matthew,Beginning Databases with PostgreSQL, From Novice to Professional, 2nd Edition, Apress

Mapping of this course with Programme Outcomes

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

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

Justification of PO with CO:

PO1 with all CO's :

CO1 is strongly related to PO1 (weightage 3) as developing database design through normalization directly aligns with applying fundamental principles and methods of Computer Science to a wide range of applications, especially in the context of data modeling.

CO2 is strongly related to PO1 (weightage 3) as understanding functional dependencies and designing relational databases is foundational to applying fundamental principles in Computer Science to various applications.

CO3 is moderately related to PO1 (weightage 2) as knowing concepts of timestamping and locking contributes to understanding the broader principles of database management, though it may not cover the entire spectrum of applying Computer Science principles to different applications.

CO4 is moderately related to PO1 (weightage 2) as analyzing the recovery system of different databases involves understanding database management principles, contributing to the broader goal of applying fundamental principles of Computer Science.

CO5 is moderately related to PO1 (weightage 2) as applying normalization concepts to real-world problems reflects the practical application of fundamental principles, contributing to the application of Computer Science principles in various scenarios.

CO6 is moderately related to PO1 (weightage 2) as knowing information about different databases contributes to a broader understanding of database systems, aligning with the goal of applying fundamental principles to various applications.

CO7 is moderately related to PO1 (weightage 2) as understanding database integrity and security concepts contributes to applying fundamental principles in the realm of database management, though it may not directly cover a wide range of applications.

PO2 with all CO's :
CO1 is moderately related to PO2 (weightage 2) as developing database design through normalization contributes to the broader skills of designing solutions to computational problems, but it may not cover the entire spectrum of computational problem-solving.
CO2 is strongly related to PO2 (weightage 3) as knowing functional dependencies and designing relational databases is a fundamental aspect of designing correct solutions to computational problems.
CO3 is moderately related to PO2 (weightage 2) as knowing concepts of timestamping and locking contributes to understanding the broader principles of database management, which can be relevant in the design and implementation of computational solutions.
CO4 is moderately related to PO2 (weightage 2) as analyzing the recovery system of different databases involves understanding database management principles, which can be valuable in the design and implementation of computational solutions.
CO5 is moderately related to PO2 (weightage 2) as applying normalization concepts to real-world problems reflects the practical application of database design principles, contributing to the skills needed for designing computational solutions.
CO6 is partially related to PO2 (weightage 1) as knowing information about different databases may not directly address the skills required for designing and implementing computational solutions.
CO7 is moderately related to PO2 (weightage 2) as understanding database integrity and security concepts contributes to the overall understanding of database systems, which can be relevant in the design of secure computational solutions.

PO3 with all CO's :
CO1 is moderately related to PO3 (weightage 2) as developing database design through normalization contributes to the understanding of the discipline, but it may not cover the entire breadth of the basics of the discipline.
CO2 is moderately related to PO3 (weightage 2) as knowing functional dependencies and designing relational databases is a fundamental aspect of the discipline, but it may not encompass the full scope of basics.
CO3 is moderately related to PO3 (weightage 2) as knowing concepts of timestamping and locking contributes to understanding the broader principles of database management, which is relevant to the basics of the discipline.
CO4 is moderately related to PO3 (weightage 2) as analyzing the recovery system of different databases involves understanding database management principles, contributing to the basics of the discipline.
CO5 is moderately related to PO3 (weightage 2) as applying normalization concepts to real-world problems reflects the practical application of database design principles, contributing to the understanding of the discipline.
CO6 is partially related to PO3 (weightage 1) as knowing information about different databases may not directly address the foundational basics of the discipline.
CO7 is moderately related to PO3 (weightage 2) as understanding database integrity and security concepts contributes to the overall understanding of database systems, which is part of the basics of the discipline.

PO4 with all CO's :
CO1 is moderately related to PO4 (weightage 2) as developing database design through normalization contributes to foundational knowledge that can support continued professional development, but it may not cover the entire spectrum of preparation.
CO2 is moderately related to PO4 (weightage 2) as knowing functional dependencies and designing relational databases is a fundamental aspect that contributes to the skills required for continued professional development, particularly in database-related tasks.
CO3 is moderately related to PO4 (weightage 2) as knowing concepts of timestamping and locking contributes to understanding the broader principles of database management, which can be valuable for continued professional development.
CO4 is moderately related to PO4 (weightage 2) as analyzing the recovery system of different databases involves understanding database management principles, contributing to the skills needed for continued professional development.

CO5 is moderately related to PO4 (weightage 2) as applying normalization concepts to real-world problems reflects the practical application of database design principles, contributing to the skills needed for continued professional development.
CO6 is partially related to PO4 (weightage 1) as knowing information about different databases may not directly address the broader aspects of preparation for continued professional development.
CO7 is moderately related to PO4 (weightage 2) as understanding database integrity and security concepts contributes to the overall skills needed for continued professional development, especially in the context of secure database management.

PO5 with all CO's :
CO1 is partially related to PO5 (weightage 1) as developing database design through normalization may not inherently address the broader societal and environmental impacts of IT analyst solutions and sustainable development.
CO2 is partially related to PO5 (weightage 1) as knowing functional dependencies and designing relational databases may not directly cover the understanding of societal and environmental contexts and the need for sustainable development.
CO3 is partially related to PO5 (weightage 1) as knowing concepts of timestamping and locking may not directly address the broader impact of IT analyst solutions on society and the environment.
CO4 is partially related to PO5 (weightage 1) as analyzing the recovery system of different databases may not inherently cover the societal and environmental considerations and sustainable development in IT solutions.
CO5 is moderately related to PO5 (weightage 2) as applying normalization concepts to real-world problems can contribute to understanding the practical application of sustainable development in database design.
CO6 is partially related to PO5 (weightage 1) as knowing information about different databases may not directly address the societal and environmental impacts of IT analyst solutions and sustainable development.
CO7 is partially related to PO5 (weightage 1) as understanding database integrity and security concepts may not inherently cover the broader societal and environmental aspects of IT analyst solutions and sustainable development.

PO6 with all CO's :
CO1 is moderately related to PO6 (weightage 2) as developing database design through normalization contributes to proficiency in the practice of computing, particularly in the context of data management.
CO2 is moderately related to PO6 (weightage 2) as knowing functional dependencies and designing relational databases is a fundamental aspect of developing proficiency in the practice of computing.
CO3 is moderately related to PO6 (weightage 2) as knowing concepts of timestamping and locking contributes to understanding the broader principles of database management, which is relevant to proficiency in computing practice.
CO4 is moderately related to PO6 (weightage 2) as analyzing the recovery system of different databases involves understanding database management principles, contributing to proficiency in computing practice.
CO5 is moderately related to PO6 (weightage 2) as applying normalization concepts to real-world problems reflects the practical application of proficiency in computing, particularly in the context of database design.
CO6 is partially related to PO6 (weightage 1) as knowing information about different databases may not directly contribute to proficiency in the practical aspects of computing.
CO7 is moderately related to PO6 (weightage 2) as understanding database integrity and security concepts contributes to proficiency in computing practice, especially in the context of secure database management.

PO7 with all CO's :
CO1 is moderately related to PO7 (weightage 2) as developing database design through normalization can contribute to skills for independent study and research, particularly in the context of database design and management.
CO2 is moderately related to PO7 (weightage 2) as knowing functional dependencies and designing relational databases is a fundamental aspect that can contribute to independent study and research skills, especially in the field of database systems.
CO3 is moderately related to PO7 (weightage 2) as knowing concepts of timestamping and locking contributes to understanding database management principles, which can be valuable for independent study and research.

CO4 is moderately related to PO7 (weightage 2) as analyzing the recovery system of different databases involves understanding database management principles, contributing to skills needed for independent study and research.
CO5 is moderately related to PO7 (weightage 2) as applying normalization concepts to real-world problems reflects the practical application of database design principles, contributing to skills relevant for independent study and research.
CO6 is partially related to PO7 (weightage 1) as knowing information about different databases may not directly address the skills required for independent study and research.
CO7 is moderately related to PO7 (weightage 2) as understanding database integrity and security concepts contributes to skills needed for independent study and research, especially in the context of secure database management.

Class : F.Y. B. Sc.(Computer Science) Semester II

Subject : Computer Science **Paper Code : CSCO1203**

Title of Paper: Lab Course –I (Advanced C) **Paper: III(Lab Course-I)**

Credit: 2 **No. of Practical's : 10 /Semester**

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

1. Design and implement a 'C' programs for different problems
2. Understand use of appropriate Graphics Functions.

Learning Outcome:

CO1: Problem solving and programming capability and develop
CO2: Advanced as well as Graphics programming capability.
CO3: To solve real world computational problems.
CO4: To define and manage data structures based on problem subject domain.
CO5: To work with textual information, characters and strings
CO6: To Manage I/O operations in your C program.
CO7: Design and implement a 'C' programs for different problems

Semester II (Credits – 02) No. of Practicals – 10)	
	Title of Experiment/ Practical
1	Assignment to demonstrate use of pointers.
2	Assignment to demonstrate concept of strings (string& pointers)
3	Assignment to demonstrate array of strings.
4	Assignment to demonstrate use of bitwise operators.
5	Assignment to demonstrate structures and unions.
6	Assignment to demonstrate structures (using array and functions).
7	Assignment to demonstrate command line arguments and preprocessor directives.
8	Assignment to demonstrate file handling (text files & binary files)
9	Assignment to demonstrate graphics programming.
10	C Programming – Case study (Menu Driven Application Base) in Groups

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

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

5. Justification of PO1 to ALL COs :

PO1 with all CO's :
CO1: PO1 Justification: Developing problem-solving and programming capabilities strongly aligns with the application of fundamental principles of Computer Science to various applications.

CO2: PO1 Justification: While advanced programming capabilities are relevant, the direct connection to applying fundamental principles in a wide range of applications is moderately related.

CO3: PO1 Justification: Solving real-world computational problems directly aligns with applying fundamental principles and methods to a wide range of applications.

CO4: PO1 Justification: Defining and managing data structures based on the problem subject domain is integral to applying fundamental principles in various Computer Science applications.

CO5: PO1 Justification: Working with textual information is relevant, but its direct application to a wide range of applications is moderately related.

CO6: PO1 Justification: Managing I/O operations is essential, but its direct connection to the application of fundamental principles is moderately related.

CO7: PO1 Justification: Designing and implementing 'C' programs for different problems strongly aligns with applying fundamental principles to various applications.

PO2 with all CO's:
CO2: PO2 Justification: Developing problem-solving and programming capabilities strongly aligns with the design, correct implementation, and documentation of solutions to significant computational problems.
CO2: PO2 Justification: Advanced and graphics programming capabilities are directly related to designing and implementing solutions to significant computational problems.
CO3: PO2 Justification: Solving real-world computational problems is at the core of designing and correctly implementing solutions to significant computational problems.
CO4: PO2 Justification: Defining and managing data structures based on the problem subject domain is integral to the design and correct implementation of solutions to significant computational problems.
CO5: PO2 Justification: Working with textual information is relevant, but its direct connection to designing solutions to significant computational problems is moderately related.
CO6: PO2 Justification: Managing I/O operations is important but is moderately related to the overall design and correct implementation of solutions to significant computational problems.
CO7: PO2 Justification: Designing and implementing 'C' programs for different problems directly aligns with designing, correctly implementing, and documenting solutions to significant computational problems.

PO3 with all CO's:
CO1: PO3 Justification: Developing problem-solving and programming capabilities is moderately related to imparting an understanding of the basics of the discipline, as it contributes to foundational knowledge.
CO2: PO3 Justification: Advanced and graphics programming capabilities are moderately related to the basics of the discipline, as they build upon foundational programming concepts.
CO3: PO3 Justification: Solving real-world computational problems is moderately related to imparting an understanding of the basics of the discipline, as it involves applying fundamental principles.

CO4: PO3 Justification: Defining and managing data structures is strongly related to imparting an understanding of the basics of the discipline, as it involves fundamental concepts in computer science.
CO5: PO3 Justification: Working with textual information is moderately related to the basics of the discipline, as it involves foundational concepts of data manipulation.
CO6: PO3 Justification: Managing I/O operations is moderately related to imparting an understanding of the basics of the discipline, as it involves fundamental concepts in programming.
CO7: PO3 Justification: Designing and implementing 'C' programs is moderately related to the basics of the discipline, as it involves applying fundamental principles to solve problems.

PO4 with all CO's:
CO1:PO4 Justification: Developing problem-solving and programming capabilities is moderately related to preparing for continued professional development, as it provides a foundational skillset.
CO2: PO4 Justification: Advanced and graphics programming capabilities are moderately related to continued professional development, as they contribute to a deeper and specialized skill set.
CO3: PO4 Justification: Solving real-world computational problems is moderately related to preparing for continued professional development, as it demonstrates practical problem-solving skills.
CO4: PO4 Justification: Defining and managing data structures strongly relates to preparing for continued professional development, as it involves core skills essential for a career in computer science.
CO5: PO4 Justification: Working with textual information is moderately related to preparing for continued professional development, as it involves foundational skills in data manipulation.
CO6: PO4 Justification: Managing I/O operations is partially related to preparing for continued professional development, as it is a fundamental skill but may not directly contribute to the broader aspects of professional development.
CO7: PO4 Justification: Designing and implementing 'C' programs strongly relates to preparing for continued professional development, as it involves practical application of programming skills.

PO5 with all CO's:
CO1:PO5 Justification: Problem-solving and programming capability, while essential, may only partially relate to understanding the societal and environmental impact of IT solutions.
CO2: PO5 Justification: Advanced and graphics programming capabilities may only partially relate to understanding the societal and environmental impact of IT solutions.
CO3: PO5 Justification: Solving real-world computational problems is moderately related to understanding the societal and environmental impact of IT solutions, as it involves practical problem-solving skills.
CO4: PO5 Justification: Defining and managing data structures is moderately related to understanding the societal and environmental impact of IT solutions, as it involves considerations for efficient and sustainable data management.
CO5: PO5 Justification: Working with textual information is moderately related to understanding the societal and environmental impact of IT solutions, as it involves considerations for handling information.
CO6: PO5 Justification: Managing I/O operations, while important, may only partially relate to understanding the societal and environmental impact of IT solutions.
CO7: PO5 Justification: Designing and implementing 'C' programs is moderately related to understanding the societal and environmental impact of IT solutions, as it involves practical application of programming skills that can influence sustainability.
PO6 with all CO's:
CO1:PO6 Justification: Developing problem-solving and programming capabilities strongly relates to developing proficiency in the practice of computing.
CO2: PO6 Justification: Advanced and graphics programming capabilities strongly relate to developing proficiency in the practice of computing, as they contribute to a higher level of expertise.
CO3: PO6 Justification: Solving real-world computational problems strongly relates to developing proficiency in the practice of computing, as it involves applying theoretical knowledge to practical scenarios.
CO4: PO6 Justification: Defining and managing data structures strongly relates to developing proficiency in the practice of computing, as it involves core skills in organizing and manipulating data.
CO5: PO6 Justification: Working with textual information moderately relates to developing proficiency in the practice of computing, as it involves foundational skills in handling information.
CO6: PO6 Justification: Managing I/O operations moderately relates to developing proficiency in the

practice of computing, as it involves essential skills in handling input and output.
CO7: PO6 Justification: Designing and implementing 'C' programs strongly relates to developing proficiency in the practice of computing, as it involves practical application of programming skills.

PO7 with all CO's:
CO1:PO7 Justification: Developing problem-solving and programming capabilities strongly relates to developing the capacity to study and research independently for a successful transition to employment.
CO2: PO7 Justification: Advanced and graphics programming capabilities strongly relate to the capacity for independent study and research, enhancing the skills needed for employment in hardware/software companies.
CO3: PO7 Justification: Solving real-world computational problems strongly relates to the capacity for independent study and research, providing practical skills for transition to employment.
CO4: PO7 Justification: Defining and managing data structures strongly relates to the capacity for independent study and research, crucial for success in hardware/software companies.
CO5: PO7 Justification: Working with textual information moderately relates to the capacity for independent study and research, contributing to foundational skills needed for employment.
CO6: PO7 Justification: Managing I/O operations moderately relates to the capacity for independent study and research, as it involves practical skills relevant to hardware/software employment.
CO7: PO7 Justification: Designing and implementing 'C' programs strongly relates to the capacity for independent study and research, showcasing practical skills applicable to employment in hardware/software companies.

Class : F.Y. B. Sc.(Computer Science) Semester II

Subject : Computer Science **Paper Code : CSCO1204(Grade)**

Title of Paper: Lab Course – II (DBMS II) **Paper : IV(Lab Course-II)**

Credit : Grade **No. of Practical's: 10 /Semester**

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

- Understand SQL with DDL and DML Commands.
- Understand RDBMS concepts.

Learning Outcome:

CO1.To know the RDBMS Concepts and to operate Database Software.
CO2.Understand the advanced database concepts and database management system.
CO3.Apply advanced SQL features like views database Management
CO4.Analyse PL/SQL structures like functions, procedures, cursors and triggers Database applications
CO5.Understand the advanced database concepts and database management system.
CO6.To solve real world computational problems.
CO7.Understand the basic structure.

Semester II No. of Practicals – 10	
	Title of Experiment/ Practical
1	Simple Queries
2	Nested Queries
3	Queries using aggregate functions
4	Queries using Views
5	Cursors
6	Exception Handling
7	Stored Function
8	Triggers
9	Case Study(1)
10	Case Studies (2)

Mapping of this course with Programme Outcomes

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

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

Justification of PO with CO:

PO1 with all CO's :

CO1 is strongly related to PO1 (weightage 3) as knowing RDBMS concepts and operating database software directly aligns with applying fundamental principles of Computer Science to a wide range of applications, especially in the context of data management.

CO2 is strongly related to PO1 (weightage 3) as understanding advanced database concepts and management systems is a fundamental aspect of applying advanced principles and methods of Computer Science to various applications.
CO3 is strongly related to PO1 (weightage 3) as applying advanced SQL features like views directly contributes to applying fundamental principles of Computer Science in the context of database management.
CO4 is moderately related to PO1 (weightage 2) as analyzing PL/SQL structures involves understanding advanced database concepts, contributing to the application of advanced principles of Computer Science in the development of database applications.
CO5 is moderately related to PO1 (weightage 2) as understanding advanced database concepts and management systems contributes to applying advanced principles of Computer Science, especially in the context of database development.
CO6 is moderately related to PO1 (weightage 2) as solving real-world computational problems aligns with applying fundamental principles of Computer Science to a wide range of applications.
CO7 is partially related to PO1 (weightage 1) as understanding the basic structure may not directly address the advanced application of fundamental principles of Computer Science.

PO2 with all CO's :

CO1 is partially related to PO2 (weightage 1) as knowing RDBMS concepts and operating database software may not directly cover the broader aspects of designing, implementing, and documenting solutions to significant computational problems.
CO2 is partially related to PO2 (weightage 1) as understanding advanced database concepts and management systems may not inherently address the skills required for designing and implementing solutions to computational problems.
CO3 is partially related to PO2 (weightage 1) as applying advanced SQL features like views in database management may not encompass the full spectrum of skills needed for designing and implementing solutions to computational problems.
CO4 is partially related to PO2 (weightage 1) as analyzing PL/SQL structures in database applications may not directly align with the skills required for designing and implementing solutions to computational problems.
CO5 is partially related to PO2 (weightage 1) as understanding advanced database concepts and management systems may not directly cover the skills needed for designing and implementing solutions to computational problems.
CO6 is strongly related to PO2 (weightage 3) as solving real-world computational problems directly aligns with the skills needed for designing, implementing, and documenting solutions to significant computational problems.
CO7 is partially related to PO2 (weightage 1) as understanding the basic structure may not directly contribute to the skills required for designing and implementing solutions to computational problems.

PO3 with all CO's :

CO1 is partially related to PO3 (weightage 1) as knowing RDBMS concepts and operating database software may not directly cover the entire breadth of understanding the basics of the discipline.
CO2 is partially related to PO3 (weightage 1) as understanding advanced database concepts and management systems may not inherently address the foundational basics of the discipline.
CO3 is partially related to PO3 (weightage 1) as applying advanced SQL features like views in database management may not encompass the full spectrum of basics of the discipline.
CO4 is partially related to PO3 (weightage 1) as analyzing PL/SQL structures in database applications may not directly align with the foundational basics of the discipline.
CO5 is partially related to PO3 (weightage 1) as understanding advanced database concepts and management systems may not directly cover the foundational basics of the discipline.
CO6 is moderately related to PO3 (weightage 2) as solving real-world computational problems can contribute to understanding the practical application of basics in the discipline.
CO7 is partially related to PO3 (weightage 1) as understanding the basic structure may not directly contribute to the entire breadth of understanding the basics of the discipline.

PO4 with all CO's :

CO1 is partially related to PO4 (weightage 1) as knowing RDBMS concepts and operating database software may contribute to some aspects of professional development but may not cover the entire spectrum of preparation for continued professional development.
CO2 is partially related to PO4 (weightage 1) as understanding advanced database concepts and management systems may contribute to certain aspects of professional development, but it may not encompass the full range of skills and knowledge needed for continued professional development.

CO3 is partially related to PO4 (weightage 1) as applying advanced SQL features like views in database management may contribute to some skills relevant for professional development, but it may not cover all aspects of preparation.
CO4 is partially related to PO4 (weightage 1) as analyzing PL/SQL structures in database applications may contribute to certain skills in professional development, particularly in database-related tasks.
CO5 is partially related to PO4 (weightage 1) as understanding advanced database concepts and management systems may contribute to certain aspects of professional development, but it may not cover the entire spectrum of preparation.
CO6 is moderately related to PO4 (weightage 2) as solving real-world computational problems is directly aligned with preparing for continued professional development, showcasing practical problem-solving skills.
CO7 is partially related to PO4 (weightage 1) as understanding the basic structure may contribute to some foundational knowledge for professional development, but it may not cover all aspects.

PO5 with all CO's :

CO1 is partially related to PO5 (weightage 1) as knowing RDBMS concepts and operating database software may not inherently address the broader impact of IT analyst solutions in societal and environmental contexts or the need for sustainable development.
CO2 is partially related to PO5 (weightage 1) as understanding advanced database concepts and management systems may contribute to certain aspects of the impact of IT analyst solutions, but it may not cover the broader societal and environmental contexts or sustainable development.
CO3 is partially related to PO5 (weightage 1) as applying advanced SQL features like views in database management may not inherently cover the broader impact of IT analyst solutions in societal and environmental contexts.
CO4 is partially related to PO5 (weightage 1) as analyzing PL/SQL structures in database applications may contribute to certain aspects of the impact of IT analyst solutions, but it may not cover the full spectrum of societal and environmental considerations or sustainable development.
CO5 is partially related to PO5 (weightage 1) as understanding advanced database concepts and management systems may contribute to certain aspects of the impact of IT analyst solutions, but it may not address the broader societal and environmental contexts or sustainable development comprehensively.
CO6 is moderately related to PO5 (weightage 2) as solving real-world computational problems can contribute to understanding the practical application of IT analyst solutions and their impact, especially in the context of sustainable development.
CO7 is partially related to PO5 (weightage 1) as understanding the basic structure may contribute to foundational knowledge, but it may not directly address the broader impact of IT analyst solutions in societal and environmental contexts.

PO6 with all CO's :

CO1 is moderately related to PO6 (weightage 2) as knowing RDBMS concepts and operating database software contributes to proficiency in the practical aspects of computing, particularly in the context of data management.
CO2 is moderately related to PO6 (weightage 2) as understanding advanced database concepts and management systems contributes to proficiency in the practical aspects of computing, especially in the context of database systems.
CO3 is moderately related to PO6 (weightage 2) as applying advanced SQL features like views in database management contributes to proficiency in the practical aspects of computing, particularly in the context of database operations.
CO4 is moderately related to PO6 (weightage 2) as analyzing PL/SQL structures in database applications contributes to proficiency in the practical aspects of computing, especially in the context of database development.
CO5 is moderately related to PO6 (weightage 2) as understanding advanced database concepts and management systems contributes to proficiency in the practical aspects of computing, especially in the context of database systems.
CO6 is strongly related to PO6 (weightage 3) as solving real-world computational problems is a direct manifestation of proficiency in the practice of computing.
CO7 is partially related to PO6 (weightage 1) as understanding the basic structure may contribute to foundational knowledge but may not directly address proficiency in the practical aspects of computing.

PO7 with all CO's :

CO1 is partially related to PO7 (weightage 1) as knowing RDBMS concepts and operating database software may contribute to certain foundational skills, but it may not directly address the capacity to study and research independently.

CO2 is partially related to PO7 (weightage 1) as understanding advanced database concepts and management systems may contribute to certain skills relevant for transitioning to employment, but it may not cover the entire spectrum of independent study and research skills.
CO3 is partially related to PO7 (weightage 1) as applying advanced SQL features like views in database management may contribute to certain skills relevant for employment transition, but it may not directly address the capacity for independent study and research.
CO4 is partially related to PO7 (weightage 1) as analyzing PL/SQL structures in database applications may contribute to certain skills relevant for employment transition, but it may not cover the entire spectrum of independent study and research skills.
CO5 is partially related to PO7 (weightage 1) as understanding advanced database concepts and management systems may contribute to certain skills relevant for employment transition, but it may not directly address the capacity for independent study and research.
CO6 is moderately related to PO7 (weightage 2) as solving real-world computational problems can contribute to the development of independent study and research skills, which are valuable for employment transition.
CO7 is partially related to PO7 (weightage 1) as understanding the basic structure may contribute to foundational knowledge, but it may not directly address the capacity for independent study and research.