INSTITUTE	FACULTY OF ENGINEERING AND TECHNOLOGY
PROGRAM	BACHELOR OF TECHNOLOGY (COMPUTER SCIENCE AND ENGINEERING -CYBER SECURITY)
SEMESTER	3
COURSE TITLE	DATABASE MANAGEMENT SYSTEMS & SECURITY
COURSE CODE	01CC0301
COURSE CREDITS	4

Objective:

1 The objective of this course is to introduce students to the foundational principles of relational databases, SQL operations, and secure database design, while also familiarizing them with emerging threats such as insider attacks, SQL/NoSQL injections, malware, and denial-of-service attacks. The course aims to enable students to implement effective security controls and industry best practices to safeguard databases in real-world scenarios. It further provides in-depth understanding of security models, compliance standards, and modern tools used for evaluating and enforcing database security. Through hands-on practice in MySQL Workbench and Microsoft Azure Cloud, students will develop practical skills in areas like access control, encryption, auditing, real-time monitoring, and threat detection.

Course Outcomes: After completion of this course, student will be able to:

1 Apply SQL operations to design and manage relational databases.
2 Identify and analyze database security threats and vulnerabilities.
3 Implement security controls and best practices for database protection.
4 Evaluate database security models and their effectiveness in preventing threats.
5 Configure SQL Server for secure access, encryption, and auditing.

Pre-requisite of course:1. Understanding of data. 2. SQL (Structured Query Language). 3. Relational Database Concepts.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	2	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**INTRODUCTION TO DATABASE** SQL (STRUCTURED QUERY LANGUAGE): Introduction to SQL, What is SQL?, SQL Syntax,SQL Data Types, SQLOperators,, SQL Expressions,SQL Comments, Comparison between Tables and Views SQL.RDBMS (RELATIONAL DATABASE MANAGEMENT SYSTEM) Introduction to Views, Logical View of Data, Keys, Integrity Rules, Data Independence, Security, Updates on Views, , Relational Database Design, Features of Good Relational Database Design, Atomic Domain & Normalization (1NF, 2NF, 3NF, BCNF) –Null Values,Joined Relations, Triggers.	9
2	**DATABASE SECURITY THREATS** What is Database Security,, Database Security Threats ,, Insider Threats, Human Error, Exploitation of Database Software Vulnerabilities, SQL / No SQL Injection Attacks, Buffer Overflow Attacks, Denial of Service (DoS / DDoS) Attacks, , Malware Attacks.	8
3	**DATABASE SECURITY CONTROLS** Growing Data Volumes,, Distributed Infrastructure, Increasingly Tight Regulatory Requirements,, Cyber Security Skills Shortage,, How Can You Secure Your Database Server: Ensure Physical Database,, Security: Lock Down Accounts and Privileges - Regularly Patch Database Servers - Disable Public Network Access ., Database Security Best Practices - Use Web Application and Database Firewalls – Use Real-Time Database Monitoring .	12
4	**SECURITY MODELS** Introduction to Database Security Models ,, Why Database Security is Important ,, Common Threats and Challenges, Data protection tools and Platforms,, Control Methods of Database Security, Database Security Approaches, Principles of SQL Server Security, Best use of Database Security, Tools Required for Database Security.	8
5	**SQL SERVER SECURITY** Column Level Protection,, Row Level Protection,, File Encryption, Auditing & Reporting, Identities & Authentication, Data lineage & Data Integrity,, Security Assessment Tools & Evaluation,, Common SQL Threat, Infrastructure Threats	8
Total Hours		**45**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical 1** Create the account in MySQL Workbench with all the necessary Fields.	2

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
2	**Practical 2** Create 3 tables of Admin, Customer & Visitor with all the necessary Fields like ID, NAME, & Other Required & Necessary Details as per the Required.	2
3	**Practical 3** Implement Server Creation in MySQL Workbench.	2
4	**Practical 4** Add & Use all the necessary steps for Users and Privileges.	2
5	**Practical 5** Create one System Variables with different names in series and check the Status of it according to that Variables	2
6	**Practical 6** Perform the Operation of Data Export in MySQL Workbench	2
7	**Practical 7** Create one Operation for Data Import of many records like multiple tables, and check it with your Email Id.	2
8	**Practical 8** Deploy one Reverse Engineer operation and try various operations like Add, Deleting and Update of Data in it and also try to Recover it.	2
9	**Practical 9** Check out all the Operations and Manage all connections in MySQL Workbench.	2
10	**Practical 10** Create one Performance Reports & Schema Setup for the Data that is used while performing the various Operations in the MySQL Workbench.	2
11	**Practical 11** Create one Microsoft Azure Cloud Account with all required Credentials Details.	2
12	**Practical 12** Perform the operation of Row Level Protection in Microsoft Azure Cloud.	2
13	**Practical 13** Deploy the operation of Column Level Protection in Microsoft Azure Cloud	2
14	**Practical 14** Create one operation and find Common SQL Threats in Microsoft Azure Cloud and create a report of all the Threats.	2
15	**Practical 15** Identify and find all the Infrastructure Threats including the Services that are present in Microsoft Azure Cloud including all Services in it.	2
	Total Hours	**30**

Textbook :

1 Oracle Database Application Security, Osama Mustafa, Robert P. Lockard, Apress, 2019

References:

1 Implementing Database Security and Auditing, Implementing Database Security and Auditing, Ron Ben Natan, Elsevier, 2005

2 Oracle Database 12c Security, Oracle Database 12c Security, David Knox (Author), Scott Gaetjen (Author), William Maroulis (Author)., McGraw Hill Professional, 2015

3 Practical Oracle Security, Practical Oracle Security, Josh Shaul (Author), Aaron Ingram (Author), Syngress, 2011

4 Introduction to SQL and Database Programming, Introduction to SQL and Database Programming, Rebecca Robson., -, -

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	10.00	50.00	15.00	15.00	0.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board,may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory or class-room.

Supplementary Resources:

1 https://www.w3schools.com/sql/

2 https://sqlbolt.com/