

FR. Conceicao Rodrigues College of Engineering

Father Agnel Ashram, Bandstand, Bandra - west, Mumbai-50

Department of Computer Engineering

(2020-2021)

Course Outcomes & Assessment Plan

CLASS-SEM: S.E.(COMPUTER) – B DIVISION

COURSE NAME: *Database Management Systems* (DBMS) TOTAL CREDITS :3+1=4

SUBJECT CODE	SUBJECT NAME	Credits
CSC403	Database Management Systems (DBMS)	3

Lab Code	Lab Name	Credits
CSL402	Database Management System Lab	1

Professor : Ms. Dipali Koshti

PAC Members:	Head Of Department:
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Syllabus:

Module		Content	Hrs
1		Introduction Database Concepts	3
	1.1	Introduction, Characteristics of databases, File system v/s Database system, Data abstraction and data Independence, DBMS system architecture, Database Administrator	
2		Entity–Relationship Data Model	6
	2.1	The Entity-Relationship (ER) Model: Entity types: Weak and strong entity sets, Entity sets, Types of Attributes, Keys, Relationship constraints: Cardinality and Participation, Extended Entity-Relationship (EER) Model: Generalization, Specialization and Aggregation	
3		Relational Model and relational Algebra	8
	3.1	Introduction to the Relational Model, relational schema and concept of keys. Mapping the ER and EER Model to the Relational Model, Relational Algebra-operators, Relational Algebra Queries.	
4		Structured Query Language (SQL)	6
	4.1	Overview of SQL, Data Definition Commands, Integrity constraints: key constraints, Domain Constraints, Referential integrity , check constraints, Data Manipulation commands, Data Control commands, Set and string operations, aggregate function-group by, having, Views in SQL, joins, Nested and complex queries, Triggers	
5		Relational-Database Design	6
	5.1	Pitfalls in Relational-Database designs, Concept of normalization, Function Dependencies, First Normal Form, 2NF, 3NF, BCNF.	
6		Transactions Management and Concurrency and Recovery	10
	6.1	Transaction concept, Transaction states, ACID properties, Transaction Control Commands, Concurrent Executions, Serializability-Conflict and View, Concurrency Control: Lock-based, Timestamp-based protocols, Recovery System: Log based recovery, Deadlock handling	

Textbooks:

1	Korth, Slberchatz, Sudarshan, Database System Concepts, 6 th Edition, McGraw Hill
2	Elmasri and Navathe, Fundamentals of Database Systems, 5 th Edition, Pearson Education
3	Raghu Ramkrishnan and Johames Gehrke, Database Management Systems, TMH

References:

1	Peter Rob and Carlos Coronel, Database Systems Design, Implementation and ManagementI, Thomson Learning, 5 th Edition.
2	Dr. P.S. Deshpande, SQL and PL/SQL for Oracle 10g, Black Book, Dreamtech Press.
3	G. K. Gupta, Database Management Systems, McGraw Hill, 2012

Course Outcomes:

Upon completion of this course students will be able to:

CO-CODE	Course Outcomes	Blooms T.
CSC403.1	Demonstrate the fundamental concepts of database systems	Comprehension
CSC403.2	Design conceptual model for a real world problem using ER diagram and convert it to a relational model.	Apply and Design
CSC403.3	Design and querying database using SQL and Relational algebra.	Apply and Design
CSC403.4	Analyze and apply concepts of normalization to relational database design.	Analyze, Apply
CSC403.5	Apply the concept of transaction, concurrency and recovery to the relational database.	Comprehension, Apply

Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1 (Engg Know)	PO2 (Ana)	PO3 (De sign)	PO4 (inve stiga)	PO5 (tools)	PO6 (engg Soci)	PO7 (Env)	PO8 (Eth)	PO9 (ind/ Team)	PO10 (comm.)	PO11 (PM)	PO12 (life Long)
CSC403.1	3											
CSC403.2	3	3	3						3	2	2	2
CSC403.3	3	3	3		3				3	2	2	2
CSC403.4	3	3	3						2	3	3	2
CSC403.5	3	3	3						2	2	2	
Course To PO												

CO	PSO1(real word challenges)	PSO2(design and implement)
CSC403.1	3	
CSC403.2	3	3
CSC403.3	3	3
CSC403.4	3	3
CSC403.5	3	
Course to PSO		

Justification

PO1: All COs are mapped to PO1 because engineering graduates will be able to apply the knowledge of DBMS fundamentals to solve complex engineering problems.

PO2: CSC403.2-CSC403.5, are mapped to PO2 because the students analyze a database system.

PO3: CSC403.2-CSC403.5, are mapped to PO3 because the students design a database system using Relational Model.

PO5: CO404.3 is mapped to this PO5 because the students use the postgresql por MySQL database software to query the database and do query optimization.

PO9: CSC403.2-CSC403.5, are mapped to this PO9 because the students work in a team to develop the mini project database system.

PO10: CSC403.2-CSC403.5, are mapped to this PO10 because Students communicate effectively on MINI project aspects by writing reports, and giving PPT

PO11: CSC403.2-CSC403.5, are mapped to this PO11 because students demonstrate the knowledge and concept applied to MINI project as a team leader or group member.

PO12: CSC403.2-CSC403.4, are mapped to this PO12 because students develop the ability to handle and to think independently using the concepts of ER diagram to learn futuristic subjects.

PSO1: All COs are mapped to PSO1 because the graduates will be able to apply fundamental knowledge of DBMS to provide databases for real world problems.

PSO2: CSC403.2-CSC403.4, are mapped to PSO2 because the students design and implement the mini project using the knowledge of database concepts of ER modeling, relational modeling and SQL.

CO Assessment Tools:

CSC403.1: Demonstrate the fundamental concepts of database systems

Direct Method Tools (dm)	Wt=80%
Lab (lab)	0.1
Quiz	0.2
Mini project	0.1
UnitTest1 (ut1)	0.2
End Sem Marks(Theory) (uth)	0.2
End Sem Marks(practical and oral) (utpra)	0.2
Indirect Method Tools(idm)	Wt=20%
Course Exit Survey (C03idm)	
<u>$CSC403.1 = 0.8 * CSC403.1dm + 0.2 * CSC403.1idm$</u>	

CSC403.2: Design conceptual model for a real world problem using ER diagram and convert it to relational model

Direct Method Tools (dm)	Wt=80%
Lab (lab 1-2)	0.2
Mini project	0.2
UnitTest1(ut1)	0.2
End Sem Marks(Theory) (uth)	0.2
End Sem Marks(practical) (utpra)	0.2
Indirect Method Tools(idm)	Wt=20%
Course Exit Survey (C03idm)	
<u>CSC403.2= 0.8* CSC403.2dm + 0.2* CSC403.2idm</u>	

CSC4033 : Design and querying database using Relational algebra and SQL

Direct Method Tools (dm)	Wt=80%
Lab (lab)	0.4
Assignment (Assignment1)	0.1
Mini project	0.2
UnitTest1(ut1 + ut2)	0.1
End Sem Marks(Theory) (uth)	0.1
End Sem Marks(practical) (utpra)	0.1
Indirect Method Tools(idm)	Wt=20%
Course Exit Survey (C03idm)	
<u>CSC403.4= 0.8* CSC403.4dm + 0.2* CSC5403.4idm</u>	

CSC403.4 : Analyze and apply concepts of normalization to relational database design.

Direct Method Tools (dm)	Wt=80%
Assignment (Assignment2)	0.2
Mini project	0.2
UnitTest2(ut2)	0.2
End Sem Marks(Theory) (uth)	0.2
End Sem Marks(practical) (utpra)	0.2
Indirect Method Tools(idm)	Wt=20%
Course Exit Survey (C03idm)	
<u>CSC502.5= 0.8* CSC502.5dm + 0.2* CSC502.5idm</u>	

CSC403.5: Apply the concept of transaction, concurrency and recovery to the relational database.

Direct Method Tools (dm)	Wt=80%
Lab	0.2
Mini project	0.2
UnitTest2(ut2)	0.2
End Sem Marks(Theory) (uth)	0.2
End Sem Marks(practical) (utpra)	0.2
Indirect Method Tools(idm)	Wt=20%
Course Exit Survey (C03idm)	
<u>CSC403.6= 0.8* CSC403.6dm + 0.2* CSC403.6idm</u>	

Course Outcomes Target:

Upon completion of this course students will be able to:

CO-CODE	Course Outcomes	Blooms T.	Target 2018-19
CSC403.1	Demonstrate the fundamental concepts of database systems	Comprehension	2.5
CSC403.2	Design conceptual model for a real world problem using ER diagram and convert it to relational model	Apply and Design	2.5
CSC403.3	Design and querying database using relational algebra and SQL.	Apply and Design	2.5
CSC403.4	Analyze and apply concepts of normalization to relational database design.	Analyze, Apply	2.5
CSC403.5	Apply the concept of transaction, concurrency and recovery to the relational database.	Comprehension, apply	2.5

Content Beyond Syllabus:

Distributed Databases

Curriculum Gap:

Distributed Database system and NOSQL is not included in this revised syllabus of 2019. It is important from the perspective of Data mining and warehouse where system need to integrate heterogeneous / homogenous databases from different locations. Mapped with PO12 AND PSO2.

Lab Experiments:

No.	List of experiments	CO mapping
1	Identify the case study and detail statement of problem. Design an Entity-Relationship (ER) / Extended Entity-Relationship (EER) Model.	CSC403.2
2	Mapping ER/EER to Relational schema model.	CSC403.2
3	Create and populate database using Data Definition Language (DDL) and DML Commands for you're the specified System.	CSC403.3
4	Perform Simple queries, Date operations.	CSC403.3
5	Apply Integrity Constraints for the specified system.(Part1,2,3)	CSC403.3
6	Perform Join operations and Complex queries	CSC403.3
7	Perform nested sub-queries in SQL	CSC403.3
8	PL/SQL and procedure.	CSC403.3
9	Function and Triggers	CSC403.3
10	Transaction and Concurrency control	CSC403.5
11	Innovative Expt. – Distributed database	
12	Mini project- Creating a 2/3-tier client-server database applications using JDBC/ODBC	CSC403.1 – CSC403.5

Rubrics for Experiment Grading of DBMS Expt. 1 and 2

Indicator	Poor	Average	Good
Timeliness Maintains assignment deadline (3)	Assignment not done (0)	One or More than One week late (1-2)	Maintains deadline (3)
Completeness and neatness Complete all parts of ER diagram(3)	N/A	< 80% complete (1-2)	100% complete (3)
Originality Extent of plagiarism(2)	Copied it from someone else(0)	At least few parts of diagram have been done without copying(1)	Assignment has been solved completely without copying (2)
Knowledge In depth knowledge assi	Unable to answer 2 questions(0)	Unable to answer 1 question (1)	Able to answer 2 questions (2)

Rubrics for Experiment Grading of DBMS Expt. 3 to 10

Indicator	Excellent	Good	Average
Timeline (2)	submitted on time or early (2)	Submitted in same week (1)	Submitted in next week (0)
DDL/DML/TCL Commands(2)	Applies all DDL/DML/TCL commands with all specified constraint successfully (2)	Not able to enforce few constraints or not able to write proper TCL commands (1)	Tables created without constraints or Failed to implement transaction (0.5)
Applies Appropriate SQL / PLSQL (3)	Able to apply optimized SQL/PLSQL query (3)	Able to apply appropriate SQL/PLSQL query and getting correct output (2)	Able to solved few queries or queries with partially correct output (1)
Knowledge In depth knowledge of the topic(2)	Unable to answer 2 questions(0)	Unable to answer 1 question (1)	Able to answer 2 questions (2)

Mini-Project:

Students to work in a group of minimum two and maximum three students for a Mini project. Students have to select the problem statement addressing the real-world problems preferably keeping in mind societal, health an environmental issue. Analyze the problem and develop solution for the same by applying the concept learnt in theory and laboratory. The students' progress on their project will be discussed in the practical session. Finally, at the time of submission the students will present the demonstration of their project.

Mini-Project Schedule:

Sr. No	Topic	submission
1	Abstract Submission	3rd week of Feb 2021
2	Project Approval	4 th week of Feb 2021
3	First Review	10 th – 12 th April 2021
4	Final Demonstration	2 nd week of May
5	Report Submission	2 nd week of May

Rubrics for Mini-project grading

Indicator	Poor	Average	Good	Excellent
Timeline(1)	More than two sessions late (0)	Two sessions late (0)	One session late (0.5)	Early or on time (1)
Analysis and Design (3)	Lack of analysis and Incorrect design (0)	Lack of proper analysis and Pitfalls in design (1)	Enough Analysis done with correct basic design (2)	Through Analysis of the problem statement and detailed Design (3)
Implementation of advanced SQL(4)	Implemented only basic queries (1)	Implemented Nested queries and Complex queries, with Views(2)	Nested queries and Complex queries, with Views and Triggers(3)	Views and Triggers, Functions , cursor and procedure with proper validation(4)
Mini Project Report(2)	Important content / diagrams missing with major grammatical /spelling mistakes. (0.5)	Moderately organized, many mistakes in diagram/content (1)	Well organized, includes all sections of reports, but few mistakes in diagrams/content. (1.5)	Well organized, includes all sections of reports without any grammatical and spelling mistakes (2)

Rubrics for the Assignments:

Assignment1 (Maps to CSC403.1)

Indicator	Excellent	Good	Average
Timeline (2)	submitted on time or early (2)	Submitted in same week (1)	Submitted in next week (0)
DDL and DML Commands(2)	Applies all DDL commands with all specified constraint successfully (2)	Not able to enforce few constraints (1)	Tables created without constraints (0.5)
Understands the Relational algebra(3)	Explains why procedures are appropriate for relational algebra(3)	Applies Appropriate Relational algebraic symbols for all queries (2)	Applies Appropriate Relational algebraic symbols <50% (1)
Applies Appropriate SQL (3)	Able to apply optimized SQL query (3)	Able to apply appropriate SQL query and getting correct output (2)	Able to solve few queries or queries with partially correct output (1)

Assignments2 (Maps to CSC403.4)

Indicator	Excellent	Good	Average
Timeline (2)	submitted on time or early (2)	Submitted in same week (1)	Submitted in next week (0)
Understands the Normalization types (4)	Explains why Understands the Normalization types (4)	Understands the all types Normalization (3)	Understands some form of Normalization types < 50% (2)
Applies Appropriate Normalization (4)	Explains why Normalization appropriate for given problem(4)	Applies Normalization appropriate for given problem (3)	Applies some part of Normalization appropriate for given problem (2)

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Department of Computer Engineering

(2020-2021)

Lesson Plan

CLASS-SEM: S.E.- COMP (B-DIV)

Credits-4

SUBJECT: *Database Management Systems* (DBMS)

SUBJECT CODE- CSC403

Professor : Dipali Koshti

Modes of Content Delivery:

i	Online Teaching	v	Self Learning Online Resources	Ix	Industry Visit/Technical Paper presentation in class
ii	Tutorial	vi	Slides, PPT	X	Group Discussion
iii	Remedial Coaching	vii	Simulations/Demonstrations	xi	Seminar
iv	Lab Experiment	viii	Expert Lecture	xii	Case Study

Lect. No.	Chap. no	Portion to be covered	Planned date	Actual date	Content Delivery Method/Learning Activities
Module 1 : Introduction Database Concepts					
1	1.1	Introduction, File system V/s Database system, adv and disadv.	25-01-2021		Online Teaching, PPT
2	1.2	Characteristics of databases, Users of Database system, Roles of Database Administrator	27-01-2021		Online Teaching, PPT
3	1.3	Data Independence and data abstraction , DBMS Architecture , Schema, Instance.	28-01-2021		Online Teaching, PPT
Module 2 :Entity–Relationship Data Model					
4	1.4	ER Diagrams basics: Entity, Attribute, Relationship etc.	29-01-2021		Online Teaching, PPT
5	2.1	Entity types: Weak and strong entity sets, Entity sets, Types of Attributes, Keys. Examples of each.	01-02-2021		Online Teaching, Lab Experiment
6	2.2	Relationship constraints: Cardinality and Participation, Problem statement for ER diagram.	03-02-2021		Online Teaching, Lab Experiment
7	2.3	ER Diagrams, Explanation plus problem statement	04-02-2021		Online Teaching, Lab Experiment/ Video1

8	2.4	EER : Specialization & Generalization Convert Problem statements into ER Diagram	05-02-2021		Online Teaching, Lab Experiment
Module 3 : Relational Model and relational Algebra					
9	3.1	Introduction to the Relational Model, relational schema and concept of keys	08-02-2021		Online Teaching, PPT
10	3.2	Mapping the ER and EER Model to the Relational Model	10-02-2021		Online Teaching
11	3.3	Relational Algebra – unary and set operations, Relational Algebra Queries.	11-02-2021		Online Teaching
12	3.4	Problems based on Relational Algebra	12-02-2021		Online Teaching
Module 4: Structured Query Language (SQL)					
13	4.1	Overview of SQL, DDL commands: CREATE, DROP, ALTER , TRUNCATE, RENAME	15-02-2021		Online Teaching, PPT, Lab Experiment, Demonstration
14	4.2	DML commands – SELECT, UPDATE, INSERT, DELETE	17-02-2021		Online Teaching, Lab Experiment, PPT Demonstration
15	4.3	Integrity constraints: key constraints, Domain Constraints, Referential integrity , check constraints,	18-02-2021 (22 nd to 27 th PR)		Online Teaching, Lab Experiment, PPT, Demonstration
16	4.4	DML- Aggregate Functions, Simple Sub queries, GroupBy , order by Having	1-3-2021		Online Teaching, Lab Experiment, Demonstration
17	4.5	String operations, Sql SET Operations . Sql Queries with IN,ANY,ALL,BETWEEN, NOT BETWEEN,IS NULL, IS NOT NULL.	3-3-2021		Online Teaching, Lab Experiment
18	4.6	SQL JOINS (INNER ,OUTER(LEFT RIGHT FULL), NATURAL, CROSS)	4-3-2021		Online Teaching, Lab Experiment, Demonstration, Video2
19	4.7	Simple Nested and complex queries, Nested sub queries with SOME, ANY, ALL, EXISTS, NOT EXISTS	5-3-2021 (8 th TO 10 th UT)		Online Teaching, Lab Experiment, PPT
20	4.8	Nested and complex queries examples, Views in SQL,	12-3-2021		Online Teaching, self learning online resources, Demonstration

21	4.9	Complete Hands Practice on University Database with all types of queries	15-3-2021		Online Teaching, Lab Experiment, Demonstration
22	4.10	Triggers	17-3-2021		Online Teaching, Lab Experiment, Demonstration
Module 5 : Relational-Database Design					
23	5.1	Pitfalls in relational Database designs , Concept of Normalization	18-3-2021		Online Teaching, PPT
24	5.2	Function dependencies, Identifying candidate keys from given FD's	19-03-2021 (22 nd To 26 th PR)		Online Teaching, PPT, Video3
25	5.3	Need of normalization, Lossless join and Functional dependency preserving property.	31-04-2021		Online Teaching , PPT
26	5.4	Normal Forms- 1NF, 2 NF,3NF	01-04-2021		Online Teaching ,PPT
27	5.5	BCNF, Examples on 1NF,2NF,3NF,BCNF and Finding Candidate keys.	5-04-2021		Open Discussion with Students , ,PPT
28	5.6	More problems on Normalization	7-04-2021		Online Teaching, Lab Experiment
Module 6: Transaction Management, Concurrency and Recovery					
29	6.1	Transaction concept, Transaction states, ACID properties.	8-04-2021		Online Teaching,PPT
30	6.2	Transaction Control Commands, Concurrent Executions,	9-04-2021 (12 th To 16 th PR)		Online Teaching,PPT
31	6.3	Serializability-Conflict and View	19-04-2021		Online Teaching,PPT
32	6.4	Concurrency Control: Lock based protocols	22-04-2021		Online Teaching,PPT
33	6.5	Concurrency Control: Timestamp-based protocols	23-04-2021 (26 th to 28 th UT2)		Online Teaching,PPT
34	6.6	Recovery System: Failure Classification	29-04-2021		Online Teaching,PPT

35	6.7	Log based recovery	30-04-2021 (3 rd To 7 th PR)		Online Teaching, Lab Experiment
36	6.8	ARIES, Shadow paging.	10-05-2021		Online Teaching, Lab Experiment
37	6.9	Deadlock handling	12-05-2021		Online Teaching
38		Solving University Question paper	13-05-2021		Online Teaching
39		Content Beyond syllabus - Advanced SQL , NO SQL	17-05-2021		Online Teaching
40		Content Beyond Syllabus- Distributed databases	19-04-2021		Online Teaching

Text Books/ Reference Books:

Text Books:

1. Korth, Silberchatz, Sudarshan, : "Database System Concepts", 6th Edition, McGraw – Hill
2. Elmasri and Navathe, " Fundamentals of Database Systems", 5th Edition, PEARSON Education.
3. Peter Rob and Carlos Coronel, " Database Systems Design, Implementation and Management", Thomson Learning, 5th Edition.
4. G. K. Gupta : "Database Management Systems", McGraw – Hill.

Reference Books:

1. Peter Rob and Carlos Coronel, Database Systems Design, Implementation and Management, Thomson Learning, 5th Edition.
2. Dr. P.S. Deshpande, SQL and PL/SQL for Oracle 10g, Black Book, Dreamtech Press.
3. G. K. Gupta, Database Management Systems, McGraw Hill, 2012

Online Resources:

1. <https://nptel.ac.in/courses/106/105/106105175/>
2. https://swayam.gov.in/nd1_noc19_cs46/preview
3. <https://www.classcentral.com/course/swayam-database-management-system-9914>
4. <https://www.mooc-list.com/tags/dbms>

Other useful Resources:

- 1) <https://www.db-book.com/db6/slide-dir/index.html>- Korth, Silberchatz, Sudarshan, 6th Edition
- 2) <http://www.tutorialspoint.com/sql/> (Weak students)
- 3) <https://www.w3schools.com/sql/default.asp> (Average students)
- 4) <http://www.mysqltutorial.org/> or <https://www.tutorialspoint.com/postgresql/MySQL>
- 5) <https://academy.vertabelo.com/course/standard-sql-functions#> (Strong students)
- 6) www.postgresqltutorial.com
- 7) <https://www.freeprojectz.com/entity-relationship-diagram>
- 8) https://www.w3schools.com/sql/sql_any_all.asp
- 9) <https://www.geeksforgeeks.org/sql-all-and-any/>

Videos

1. ER Diagram Mapping- [https://www.youtube.com/watch?v=WSNqcYqByFk\(NPTEL\)](https://www.youtube.com/watch?v=WSNqcYqByFk(NPTEL))
2. Functional dependency and Normal Form -
[https://www.youtube.com/watch?v=YD8dhOmuVnY\(NPTEL\)](https://www.youtube.com/watch?v=YD8dhOmuVnY(NPTEL))
3. SQL Joins Tutorial for Beginners - Inner Join, Left Join, Right Join, Full Outer Join:
<https://www.youtube.com/watch?v=2HVMiPPuPIM> (Youtube Video)

1. Students should focus on following points to Learn **SQL online**
 - Basic SQL commands to manipulate data stored in relational databases
 - The most commonly used SQL commands to query a table in a database
 - Using SQL to perform calculations during a query
 - Querying multiple tables using joins
 - Explore more about Triggers and functions and procedures
