FR. CONCEICAO RODRIGUES COLLEGE OF ENGINEERING
Father Agnel Ashram, Bandstand, Bandra-west, Mumbai-50
Department of Information Technology

B.E. (I.T.) (Semester III) (2018-2019)
Lesson Plan

Subject: Database Management Systems   Credits:

Syllabus:

Course Code	Course Name	Theory	Practical	Tutorial	Theory	Oral & Practical	Tutorial	Total
ITC304	Database Management Systems	04	--	--	04	--	--	04

Course Code	Course Name	Examination Scheme							
		Theory Marks				Term Work	Oral & Practical	Oral	Total
		Internal assessment			End Sem Exam				
		Test1	Test 2	Avg. of two Tests					
ITC304	Database Management Systems	20	20	20	80	--	--	--	100

Course Objectives: Students will try:

1. To describe a sound introduction to the discipline of database management systems.
2. To give a good formal foundation on the relational model of data and usage of Relational Algebra
3. To introduce the concepts of basic SQL as a universal Database language
4. To enhance knowledge to advanced SQL topics like embedded SQL, procedures connectivity through JDBC
5. To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
6. To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques.

Course Outcomes: Student should be able to:

1. Explain the features of database management systems and Relational database
2. Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra
3. Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
4. Retrieve any type of information from a data base by formulating complex queries in SQL.
5. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
6. Build indexing mechanisms for efficient retrieval of information from a database

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Detailed syllabus:

Sr. No.	Module	Detailed Content	Hours	CO Mapping
0	Prerequisites	Basic knowledge of operating systems and file systems, Any programming	02	

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		knowledge		
I	Introduction Database Concepts	Introduction, Characteristics of databases, File system V/s Database system, Users of a Database system Data Models, Schemas, and Instances, Three-Schema Architecture and Data Independence, Database Administrator (DBA), Role of a DBA	05	CO 1
II	Entity– Relationship Data Model	Conceptual Modeling of a database, The Entity-Relationship (ER) Model, Entity Types, Entity Sets, Attributes, and Keys, Relationship Types, Relationship Sets, Weak Entity Types Generalization, Specialization and Aggregation, Extended Entity-Relationship (EER) Model.	09	CO 2
III	Relational Model and Relational Algebra	Introduction to Relational Model, Relational Model Constraints and Relational Database Schemas, Concept of Keys: Primary Kay, Secondary key, Foreign Key, Mapping the ER and EER Model to the Relational Model, Introduction to Relational Algebra, Relational Algebra expressions for • Unary Relational Operations, • Set Theory operations, • Binary Relational operation Relational Algebra Queries	09	CO 2
IV	Structured Query Language (SQL)	Overview of SQL , Data Definition Commands, Set operations , aggregate function , null values, , Data Manipulation commands, Data Control commands , Views in SQL, Complex Retrieval Queries using Group By, Recursive Queries, nested Queries ; Referential integrity in SQL. Event Condition Action (ECA) model (Triggers) in SQL; Database Programming with JDBC, Security and authorization in SQL Functions and Procedures in SQL and cursors.	10	CO 3, CO 4
V	Relational– Database Design	Design guidelines for relational schema, Functional Dependencies, Definition of Normal Forms- 1NF, 2NF, 3NF, BCNF, Converting Relational Schema to higher normal forms.	08	CO 5

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VI	Storage and Indexing	Operation on Files; hashing Techniques; Types of Indexes: Single-Level Ordered Indexes; Multilevel Indexes; Overview of B-Trees and B+-Trees; Indexes on Multiple Keys.	09	CO 6

Text Books:

1. Korth, Slberchatz,Sudarshan, "Database System Concepts", 6th Edition, McGraw – Hill
2. Elmasri and Navathe, " Fundamentals of Database Systems", 6th Edition, PEARSON Education.
3. G. K. Gupta :"Database Management Systems", McGraw – Hill

References:

1. Raghu Ramkrishnan and Johannes Gehrke, " Database Management Systems",TMH
2. Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom "Database System Implementation", Pearson Ltd. 1/ e
3. Thomas M. Connolly Carolyn Begg, Database Systems : A Practical Approach to Design, Implementation and Management, 4/e, Pearson Education.

Assessment:

Internal Assessment for 20 marks:
Consisting of **Two Compulsory Class Tests**
Approximately 40% to 50% of syllabus content must be covered in First test and remaining 40% to 50% of syllabus contents must be covered in second test.

End Semester Examination: Some guidelines for setting the question papers are as:
- Weightage of each module in end semester examination is expected to be/will be proportional to number of respective lecture hours mentioned in the syllabus.
- Question paper will comprise of total **six questions, each carrying 20 marks.**
- **Q.1 will be compulsory and should cover maximum contents of the syllabus.**
- **Remaining question will be mixed in nature** (for example if Q.2 has part (a) from module 3 then part (b) will be from any other module. (Randomly selected from all the modules.)
- Total **four questions** need to be solved.

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Subject: Database Management Systems   Credits:

Course Outcomes:

Sr.No.	Course Outcome Statement
1	Explain the features of database management systems and Relational database
2	Design conceptual models of a database using ER modeling for real life applications and also construct queries in Relational Algebra
3	Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.
4	Retrieve any type of information from a data base by formulating complex queries in SQL.
5	Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
6	Build indexing mechanisms for efficient retrieval of information from a database

CO-PO and CO-PSO Mapping

Course Name	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2				1							3	1	
CO2		2	3		2				2	2		2	1	1
CO3	1			3	2									1
CO4	1			3	2									1
CO5		2	3	1								2	1	
CO6	2		1	1								1	1	1

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Subject: Database Management Systems   Credits:

CO Assessment tools with target.

	Direct Methods								Indirect Methods
	Test1	Assig1	Lab Work	Test2	Assig2	University Theory Result	University Oral Result	MCQ	Course Exit Survey
CO1	30%	30%	10%	-	-	20%	10%	-	100%
CO2	30%	30%	10%	-	-	10%	20%	-	100%
CO3	20%	20%	40%			10%	10%	-	100%
CO4	-	-	10%	30%	20%	30%	10%	-	100%
CO5	-	-	20%	30%	20%	20%	10%	-	100%
CO6	-	-	10%	30%	20%	20%	20%	-	100%

Lecture Plan:

No of classes Planned:	26		No of Classes taken:	30	

Sr. No.	Topic Planned	Planned Date	Actual Date	Delivery Mechanisms
1.	Introduction to database, Characteristics of databases, File system V/s Database System	01/08/18	01/08/18	Board
2.	Users of Database System, Data Models, Schemas and Instances, Three Level Schema	02/08/18	02/08/18	Board
3.	Architecture and Data Independence, Database Administrator (DBA), Role of DBA	06/08/18	03/08/18	Board

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Subject: Database Management Systems   Credits:

4.	Conceptual Modeling of a database, E-R Model, Entity Types, Entity Sets	07/08/18	04/08/18 Monday Schedule	Board
5.	Attributes and Keys, Relationship Types, Relationship Sets, Weak Entity Types	08/0818	06/08/18	Board
6.	Generalization, Specialization and Aggregation, EER Model	09/08/18	07/08/18	Board
7.	Introduction to Relational Model, Relational Model Constraints, and Relational Database Schemas	20/08/18	08/08/18	Board
8.	Concept of Keys: Primary key, Secondary Key, Foreign Key	21/08/18	09/08/18	Board
9.	Mapping the ER and EER, Model to the Relational Model	23/08/18	20/08/18	Board
10.	Introduction to Relational Algebra, Relational Algebra Expressions for • Unary Relational Operations • Set Theory Operations • Binary Relational Operation	27/08/18	20/08/18	Board
11.	Relational Algebra Queries	28/08/18	21/08/18	Board
12.	Overview of SQL, Data Definition Commands, Set Operations	29/08/18	23/08/18	Board
13.	Aggregate Functions, Null Values, Data Manipulation Commands, Data Control Commands	30/08/18	27/08/18	Board
14.	Views in SQL, Complex retrieval Queries using Group By	03/09/18	28/08/18	Board
15.	Recursive Queries, Nested Queries	04/09/18	29/08/18	Board
16.	Referential Integrity in SQL, ECA model (Triggers) in SQL	05/09/18	30/08/18	Board

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Subject: Database Management Systems   Credits:

17.	Database Programming with JDBC, Security and Authorization in SQL	06/09/18	04/09/18	Board + PPT
18.	Functions and Procedures in SQL, Cursors	10/09/18	04/09/18	Board
19.	Design guidelines for relational schema,	11/09/18	05/09/18	Board
20.	Functional dependencies, Candidate Keys, Decomposition	12/09/18	06/09/18	Board
21.	Definition of Normal Forms: 1NF, 2NF, 3NF, BCNF	18/09/18	10/09/18	Board
22.	Converting Relational Schema to Higher Normal Forms	19/09/18	11/09/18	Board
23.	Operations on Files, Hashing Techniques	24/09/18	12/09/18	Board
24.	Types of Indexes: Single-Level Ordered Indexes; Multilevel indexes	25/09/18	18/09/18	Board
25.	Overview of B-Trees and B+ Trees	26/09/18	19/09/18	Board
26.	Indexes on Multiple Keys	27/09/18	24/09/18	Board
27.	Revision on ER and EER Diagram		25/09/18	Board
28.	Revision on SQL		26/09/18	PPT
29.	Revision on Normalization		27/09/18	Board
30.	Revision on Functional Dependency		01/10/18	Board

Assignments:

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Subject: Database Management Systems   Credits:

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Assignment No. 1

SEMESTER/BRANCH: III/SE (I.T.)

SUBJECT: DBMS (ITC304)   Date of Submission: 25/09/2018

ITC304.1	Explain the features of database management systems and Relational database.
ITC304.2	Design conceptual models of a database using ER modelling for real life applications and also construct queries in Relational Algebra
ITC304.3	Create and populate a RDBMS for a real-life application, with constraints and keys, using SQL.

1	Explain in detail different database users.	ITC304.1
2	Explain DBMS architecture in detail.	ITC304.1
3	Draw an EER diagram for School Management System showing constraints on Generalization, Specialization and Aggregation	ITC304.2
4	Explain different Relational Algebra Operators with suitable examples.	ITC304.2
5	Consider the following database: Student (snum : integer, sname : string, major: string, level: string, age: integer) Class (name : string, meets_at: string, room: string, fid : integer) Enrolled (snum: integer, cname : string) Faculty (fid : integer, fname : string, deptid : integer) Write the following queries in SQL.	ITC304.3

Student (snum : integer, sname : string, major: string, level: string, age: integer)

Class (name : string, meets_at: string, room: string, fid : integer)

Enrolled (snum: integer, cname : string)

Faculty (fid : integer, fname : string, deptid : integer)

Write the following queries in SQL.

    i. Find the names of all Juniors (level = JR) who are enrolled in a class taught by I. Teach.

    ii. Find the age of the oldest student who is either a History major or enrolled in a course taught by I. Teach.

    iii. Find the names of all classes that either meet in room RI28 or have five or more students enrolled.

    iv. Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five.

    v. For each level, print the level and the average age of students for that level.

    vi. For all levels except JR, print the level and the average age of students for that level.

    vii. For each faculty member that has taught classes only in room R128, print the faculty member's name and the total number of classes she or he has taught.

    viii. Find the names of students not enrolled in any class.

| 6 | Explain Recursive and Nested Queries with suitable example. | ITC304.3 |

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Subject: Database Management Systems   Credits:

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Assignment No. 2

SEMESTER/BRANCH: III/SE (I.T.)

SUBJECT: DBMS (ITC304)   **Date of Submission: 03/10/2018**

ITC304.4	Retrieve any type of information from a data base by formulating complex queries in SQL.
ITC304.5	Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database.
ITC304.6	Build indexing mechanisms for efficient retrieval of information from a database.

1	Explain Cursors and its types with suitable example.	ITC304.4
2	Explain the difference between stored procedure and stored function in SQL with example.	ITC304.4
3	Consider the schema R = (V, W, X, Y, Z) suppose the following FDs hold: $F = \{Z \rightarrow V, W \rightarrow Y, XY \rightarrow Z, V \rightarrow WX\}$ State whether the following decomposition of schema R is loss-less join decomposition. Justify your answer.	ITC304.5
4	Consider the following database	ITC304.5

Full Names	Physical Address	Movies rented	Salutation	Category
Janet Jones	First Street Plot No 4	Pirates of the Caribbean, Clash of the Titans	Ms.	Action, Action
Robert Phil	3rd Street 34	Forgetting Sarah Marshal, Daddy's Little Girls	Mr.	Romance, Romance
Robert Phil	5th Avenue	Clash of the Titans	Mr.	Action

Convert the above database into 1NF, 2NF, 3NF and BCNF.

5	Explain different indexing types in database management system.	ITC304.6
6	Explain different hashing techniques with suitable example.	ITC304.6