**Department of Computer Science and Engineering**
**National Institute of Technology Tiruchirappalli**

| **1. Course Outline** | | | |
|---|---|---|---|
| **Course Title** | Database Management and Systems | | |
| **Course Code** | CSPC33 | | |
| **Department** | CSE | **No. of Credits** | 3 |
| **Pre-requisites Course Code** | NIL | **Faculty Name** | Dr. E. Sivasankar<br>Dr. M. Brindha |
| **E-mail** | sivasankar@nitt.edu<br>brindham@nitt.edu | Telephone No: | 0431-2503213 |
| **Course Type** | Core Course | | |

**2. Course Overview**

Database management system course describes the concepts and techniques for effective storage and retrieval of data in an information repository.

**3. Course Objectives**

- To learn data models, conceptualize and depict a database system using ER diagram.
- To understand the internal storage structures in a physical DB design.
- To know the fundamental concepts of transaction processing techniques.

**4. Course Outcomes (CO)**

- Ability to install, configure, and interact with a relational database management system.
- Ability to master the basics of SQL and construct queries using SQL.
- Ability to design and develop a large database with optimal query processing.

| **5. Course Outcome (CO)** | **Aligned Programme Outcome (PO)** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** |
| Ability to Install, configure, and interact with a relational database management system | S | B | M | S | B | B | M | B |
| Ability to master the basics of SQL and construct queries using SQL | S | B | M | S | B | M | M | B |
| Ability to design and develop a large database with optimal query processing | S | M | S | S | M | S | M | B |

S = 0.6 M = 0.4 B = 0.0

| 6. Course Teaching and Learning Activities | | | | | | | |
|---|---|---|---|---|---|---|---|
| L. No | Title | Type | | Mode of delivery | | | |
| | | L | T | C&T | PPT | VL/VC | DEMO |
| **UNIT I** | | | | | | | |
| 1. | Introduction, Purpose of Database System | √ | | √ | | | |
| 2. | Views of data, data models | √ | | √ | | | |
| 3. | Three schema architecture of DBMS | √ | | √ | | | |
| 4. | Components of DBMS | √ | | √ | √ | | |
| 5. | E/R Model - Conceptual data modeling | √ | | √ | √ | | |
| 6. | Entities, entity types, attributes, relationships | √ | | √ | √ | | |
| 7. | Relationship types, E/R diagram notation | √ | | √ | √ | | |
| 8. | Examples | √ | | | | | √ |
| **UNIT II** | | | | | | | |
| 9. | Relational Data Model - Concept of relations | √ | | √ | √ | | |
| 10. | Schema - instance distinction, keys, referential integrity and foreign keys | √ | | √ | √ | | |
| 11. | Introduction to SQL | √ | | √ | √ | | |
| 12. | Data definition language in SQL | √ | | √ | √ | | |
| 13. | Table, key and foreign key definitions, update behaviors | √ | | √ | √ | | |
| 14. | Data Manipulation Language in SQL, Querying in SQL | √ | | √ | √ | | |
| 15. | Notion of aggregation, aggregation functions group by and having clauses, embedded SQL | √ | | √ | √ | | |
| 16. | Working with joins in SQL | √ | | √ | √ | | |
| 17. | DCL, Exercise problems | √ | | √ | √ | | |
| **UNIT III** | | | | | | | |
| 18. | Database Design: Dependencies and Normal forms | √ | | √ | √ | | |
| 19. | Dependency theory -functional dependencies | √ | | √ | √ | | |
| 20. | Armstrong's axioms for FD's, closure of a set of FD's, minimal covers | √ | | √ | √ | | |
| 21. | Definitions of 1NF, 2NF, 3NF and BCNF | √ | | √ | √ | | |
| 22. | Decompositions and desirable properties of them | √ | | √ | √ | | |
| 23. | Algorithms for 3NF and BCNF | √ | | √ | | | |
| 24. | Normalization, 4NF, and 5NF | √ | | √ | | | √ |
| **UNIT IV** | | | | | | | |
| 25. | Transaction processing and Error recovery | √ | | √ | √ | | |
| 26. | Transactions: -concepts of transaction | √ | | √ | √ | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | processing, ACID properties | | | | | | |
| 27. | Concurrency control, locking based protocols for concurrency control | √ | | √ | √ | | |
| 28. | Error recovery and logging | √ | | √ | √ | | |
| 29. | Undo -redo logging | √ | | √ | √ | | |
| 30. | Recovery methods | √ | | √ | √ | | |
| **UNIT V** | | | | | | | |
| 31. | Data Storage and Indexes | √ | | √ | √ | | |
| 32. | File organizations, primary, secondary Index structures | √ | | √ | √ | | |
| 33. | Various index structures-hash-based, dynamic hashing techniques | √ | | √ | √ | | |
| 34. | Multi-level indexes | √ | | √ | √ | | |
| 35. | B+ trees | √ | | √ | √ | | |

**7. Course Assessment Methodology**

| Sl. No | Mode of Assessment | Week/Date | Duration | Marks |
|---|---|---|---|---|
| 1. | Cycle Test - 1 | 6th week | 1 Hour | 20 |
| 2. | Cycle Test - 2 | 12th week | 1 Hour | 20 |
| 3. | Assignment | 4th,10th weeks | | 10 |
| 4. | End Semester Exam | November 2nd Week | 3 Hours | 50 |
| | | | Total | 100 |

**8. Essential Readings (Textbooks, Reference books, Websites, Journals, etc.)**

**Text Books**


1. A.Silberschatz, Henry F.Korth and S.Sudharshan, "Database System Concepts", 5th Edition, Tata McGraw Hill, 2006.
2. C. J. Date, A. Kannan and S. Swamynathan, "An Introduction to Database Systems", 8th Edition, Pearson Education, 2006.


**Reference Books**


1. Ramez Elmasri and Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson/Addision wesley, 2007.
2. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2003.
3. S.K.Singh, "Database Systems Concepts, Design and Applications", First Edition, Pearson Education, 2006.

## COURSE EXIT SURVEY

**1. Students' feedback through class committee meetings**

**2. Feedback questionnaire collected from students through MIS before end semester examination**

## COURSE POLICY

1. All the students are expected to attend all the contact hours. Anyhow students who fall short of 75% attendance to the contact hours are not eligible to appear for the final written examination of 50% weightage.

2. For valid reasons, students who fall on 50-75% attendance range have to attend a compensatory examination and have to attain more than 50%. Those who have secured less than 50% are not eligible to appear for the final written examination of 50% weightage.

3. Flexibility is given to the students to fix the date for each mode of evaluation convenient to all the students. In case of emergency, the student may submit compensatory assignments on submission of appropriate documents as proof. Compensatory assessments would be framed according to the time frame available and the assessment task missed by the students.

4. Relative grading adhering to the instructions from the office of the Dean (Academic) will be adopted for the course.

5. In case of any student found guilty indulging in any mal practice, he/she will be awarded no marks in that particular assessment. If found using mobile phones or any other gadgets for any mal-practice during the final written examination, the answer sheet of the student will not be evaluated and will be awarded ZERO marks in the final written examination.

## ADDITIONAL COURSE INFORMATION

1. The Course Coordinator is available for consultation during the time intimated to the students then and there.

## For Senate's Consideration

**(E.SIVASANKAR)**
**( M. BRINDHA)**
Course Faculty

Class Committee Chairperson

**(R. LEELA VELUSAMY)**
HoD