

DATABASE TECHNOLOGIES				
CLASS T.E. ( INFORMATION TECHNOLOGY)				SEMESTER VI
HOURS PER WEEK	LECTURES	:	04	
	TUTORIALS	:	--	
	PRACTICALS	:	02	
			<b>HOURS</b>	<b>MARKS</b>
EVALUATION SYSTEM:	THEORY		3	100
	PRACTICAL		--	--
	ORAL		--	25
	TERM WORK		--	25

**Objectives of the course:**

- This course aims to provide continuum to where the first course of databases left off. Design aspects of relational databases are covered.
- Complex data models like OO OR parallel and distributed are introduced.
- The course provides students a good overview of the ideas and the techniques, which are behind recent developments in the fields of data warehousing and Online Analytical Processing (OLAP).

**1. Overview**

Review of relational database systems, ER diagram, SQL.

**2. Integrity and Security**

Domain constraints; referential integrity, assertions; triggers; triggers and Assertions in SQL. Security and Authorization; Authorization in SQL.

**3. Relational Database Design**

First Normal form; pitfalls in relational database design, functional dependencies; decomposition. Desirable properties of decomposition. Boyce – Code normal form; 3rd and 4<sup>th</sup> normal form. Mention of other normal forms.

**4. The ER Model Revisited**

Motivation for complex data types, User Defined Abstract Data Types And Structured Types, Subclasses, Super classes, Inheritance, Specialization and Generalization, Relationship Types of Degree Higher Than Two.

**5. Object-Oriented & Object relational databases**

Object Identity, Object Structure, and Type Constructors, Encapsulation of Operations, Methods, and Persistence, Type Hierarchies and Inheritance, Type extents and Queries, Database Design For An ORDBMS - Nested Relations and Collections; Storage And Access methods, Overview of SQL3.

**6. Parallel and Distributed Databases**

Parallel Query Evaluation; Parallelizing Individual Operations, Sorting, Joins; Distributed Database Concepts, Data Fragmentation, Replication, and Allocation techniques for Distributed Database Design; Query Processing in Distributed Databases; Concurrency Control and Recovery in Distributed Databases.

## **7. Enhanced Data Models for Advanced Applications.**

### **(Overview and Design issues)**

Temporal Databases; Spatial Databases & Geographic Information Systems, Mobile Databases.

## **8. Data Warehousing and OLAP.**

**a) Data Warehouse Basics:** Data Warehouse (DW) Introduction & Overview; Data Marts, DW components; Data warehouse architecture; ETL - Data Transformation – Extracting, Conditioning, cleansing, Scrubbing, Merging, etc.,

**b) OLAP:** Multi-dimensional modeling - Fact table, dimensions, measures, examples; Schema Design – Star and Snowflake; OLAP - OLAP Vs OLTP, ROLAP, MOLAP, HOLAP; tools. OLAP Operations – Rollup, Drill-down, Dice slice, pivot.

### **Text Books:**

1. Elmasri and Navathe, “Fundamentals of Database Systems”, Pearson Education
2. Raghuram Ramakrishnan, Johannes Gerhke, “Database Management Systems” McGraw Hill
3. Kimball, Ralph; Reeves, Laura et al Data warehouse Lifecycle Toolkit: expert methods for designing, developing, and deploying data warehouses - Wiley publications.

### **References:**

1. Korth, Silberchatz, Sudarshan, “Database System Concepts” McGraw Hill
2. C.J.Date, Longman, “Introduction to Database Systems”, Pearson Education
3. Paulraj Ponnian, “Data Warehousing Fundamentals”, John Wiley.

### **Term Work**

Term work shall consist of at least 10 assignments/programming assignments and one written test.

### **Marks**

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| 1. Attendance (Theory and Practical)         | 05 Marks |
| 2. Laboratory work (Experiments and Journal) | 10 Marks |
| 3. Test (at least one)                       | 10 Marks |

The final certification and acceptance of TW ensures the satisfactory performance of laboratory Work and Minimum Passing in the term work.

### **Suggested Experiment List**

1. At least one or two review SQL assignments covering triggers, assertions and authorizations.
2. Object Oriented Queries
3. Case study assignments for OO and OR database.
4. Two mini projects in distributed and parallel databases.
5. Hands on any one good warehousing tool (Oracle/SQL server Analysis tool etc.)
6. A full fledged mini project in which a student will design and implement a data warehouse. The data warehouse must be populated and OLAP queries and operations to be demonstrated for the warehouse.