ITA5008	Database Technologies	L	T	P	J	C
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Pre-requisite	**Nil**	**Syllabus version**				
		v. 1.0				

Course Objectives:

1. To design conceptual and implementation schema of a database.
2. To implement and manipulate relational and object-relational database using SQL and PL/SQL
3. To introduce the concept of distributed database, parallel database, multimedia database and semi-structured and unstructured database.

Expected Course Outcomes:

1. Design conceptual and implementation schema of a database
2. Learn how to implement relational database schema and manipulate the same using SQL and PL/SQL
3. Improve the database design by normalization.
4. Learn how to implement object-relational schema and manipulate the same using SQL
5. Learn concept of distributed database and parallel database
6. Learn concept of XML database and an overview of NoSQL database models
7. Expose to the idea of multimedia database along with some implementation aspects of the same using SQL

Student Learning Outcomes (SLO)	**2,7,9**

Module:1	**Database Introduction & Design Techniques**	**8 hours**

Introduction to Database Systems, DBMS Architecture, Introduction to Data Modeling, ER Model, EER Model -Specialization/Generalization, Aggregation, Composition, Relational model-algebra operations, ER,EER to Relational Model.

Module:2	**Advanced Design Technique -Normalization**	**8 hours**

Normalization – Informal Guidelines, Functional dependencies, decomposition algorithms , Normal Forms up to 5NF, SQL - Basic & Advanced Operations, Query Processing,Query optimization, Storage and File organization

Module:3	**Distributed Database**	**6 hours**

Concepts, advantages, types, functions, architecture, data allocation, fragmentation, replication, transparencies, Date's rules, transaction management, concurrency control, dead lock, recovery-2PC, 3PC.

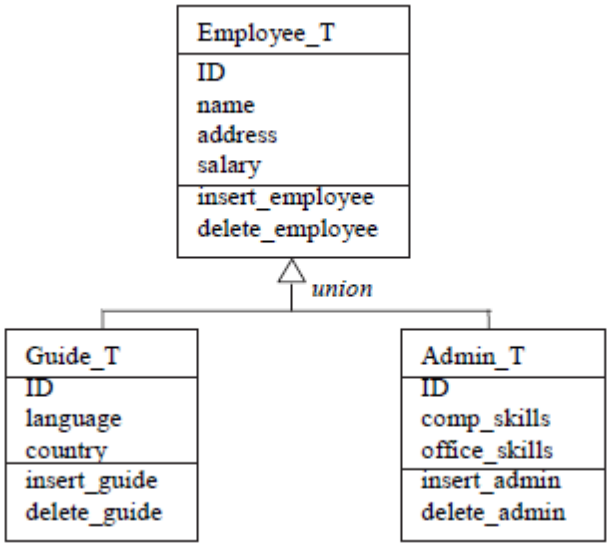
Module:4	**Parallel DBMS**	**6 hours**

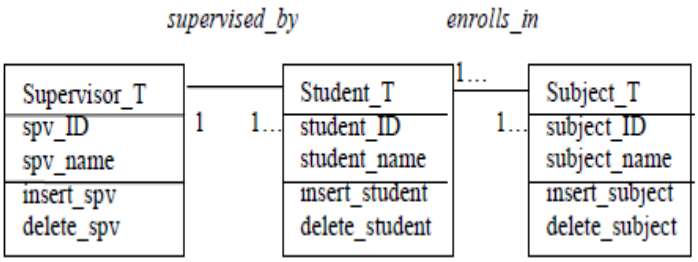
Partition techniques, Architecture, Parallel algorithms for sorting, Parallel join, Parallel Queries.

Module:5	**Object Relational DBMS**	**6 hours**
Overview,Complex Data Types, ODBMS & ORDBMS, Structured Types and Inheritance in SQL, Table Inheritance, Object-Identity and Reference Types in SQL.		
Module:6	**Semi structured & Unstructured data base**	**6 hours**
OEM, Overview of XML, DTD, XML schema, XML query languages, XML related technologies,XML and databases, Unstructured database – NOSQL an Overview		
Module:7	**Multimedia Database**	**3 hours**
Multimedia sources, issues, Multimedia database applications Multimedia database queries-LOB in SQL.		
Module:8	**Contemporary issues**	**2 hours**
Expert Talk		
	Total Lecture hours:	**45 hours**

Text Book(s)	
1.	Thomas M. Connolly and Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation, and Management, 2015, 6th Edition, Pearson India.
Reference Books	
1.	RamezElmasri&B.Navathe: Fundamentals of database systems, 2014, 7th Edition, Addison Wesley.
2	S.K.Singh, Database Systems: Concepts, Design & Applications, 2011, 2nd Edition, Pearson education.
3	Raghu Ramakrishnan and Johannes Gehrke: Database Management Systems, 2003, 3rd Edition, McGraw Hill.
4	Joe Fawcett, Danny Ayers, Liam R. E. Quin: Beginning XML, 2012, 5th Edition, Wiley India Private Limited.
5	Abraham Silberschatz, S. Sudarshan, Henry F. Korth: Database System Concepts, 2011, 6th Edition, Tata McGraw - Hill Education.

List of Challenging Experiments (Indicative)		
1.	Creating applications with RDBMS a) Table creation with constraints, alter schema ,insert values, aggregate functions, simple and complex queries with joins b) PLSQL-PROCEDURES,CURSORS,FUNCTIONS,TRIGGERS	6 hours
2.	a) Design the XML elements to hold the membership information for a Computer Club, (i) Construct a Well formed XML Document to hold the elements for 5 students (ii) Construct and link to a CSS to display the 5 students b) Create an XML file for a credit card statement Create a data schema for a credit card statement Answer the following questions using XPath	6 hours

	1. List all customers 2. Select all customers in Sweden. 3. Who made payments on 2003-12-04? 4. Select all customers in Sweden sorted by customer name.	
3.	Create applications with ORDBMS i) Giant Travel is a well-known travel agency that operates guided tours. With offices around the world, they maintain accurate and detailed employee data. The employee data are kept in an object Employee_T and can be divided into two child objects: Guide_T and Admin_T. An employee can be categorized as a guide or an administration staff, but he or she can also be both. This is important because in the peak season, an administration worker might be needed to guide the tours and vice versa. The objects and the attributes are shown below  Createthe tables for each object have been created; write the implementation of insertion into and deletion from tables Employee and Guide. ii) The following figure shows the relationship among objects Supervisor_T, Student_T, and Subject_T in a university. A student can take many subjects, and a subject can be taken by many students. For every subject a student takes, there is a mark given. In another relationship, a student can be supervised by only one supervisor, but a supervisor can supervise many students. Create the objects and the tables from these objects a) Write generic methods to insert into and delete from table Enrolls_ In. b. Write generic member methods to insert into and delete from table Supervisor.	6 hours



Supervisor	
Spv_ID	**Spv_Name**
1001	Steve Donaldson
1003	Erin Goldsmith
1007	Tony Wibowo

Student	
Student_ID	**Student_Name**
11013876	Robert Tan
11014832	Julio Fernandez
11014990	Colin Brown

Subject	
Subject_ID	**Subject_Name**
CSE31DB	Database System
CSE31UIE	User Interface Engineering
CSE42ADB	Advanced Database

Enrolls_In		
Student_ID	**Subject_Code**	**Mark**
11013876	CSE31DB	86
11013876	CSE31UIE	90
11014832	CSE31ADB	78
11014990	CSE31DB	74
11014990	CSE31UIE	70

Set up a distributed database and create tables ,insert values ,fragment the data and apply queries

i) Assume we have a global conceptual schema that contains the following table with the key underlined: Employee (Eno,Ename,Title,Dno). Also assume that we horizontally fragment the table as follows:

Employee1(Eno;Ename; Title;Dno), where 1<= Dno<=10
Employee2(Eno;Ename; Title;Dno), where 11 <= Dno<=20
Employee3(Eno;Ename; Title;Dno), where 21 <= Dno<=30

In addition, assume we have 4 sites that contain the following fragments:
Site1 has Employee1

	Site2 has Employee2 *Site3 has Employee2 and Employee3* *Site4 has Employee1* Implement at least 5 suitable queries using suitable database system on Employee fragments. ii) We are given the following three relations with their keys underlined: *Supplier(Sno,Sname,City,State)* *Part(Pno,Pname,Color)* *Supplier-Part(Sno,Pno,Qty).* We know that Suppliers can supply many Parts and many Suppliers can supply a Part. Assume the Supplier table is horizontally fragmented using the predicates: State =Maharashtra and State = Karnataka. We can also assume that Suppliers are evenly located in only those two states. In addition, the Part table is horizontally fragmented using the predicates: 1<= Pno<=100,101<=Pno<=200, 201<=Pno<=300, 301<=Pno<=400, 401<=Pno<=500. Part numbers are continuous from 1 to 500, inclusive. Now we are to horizontally fragment the Supplier- Part relation according to your choice. Implement at least 5 suitable queries using suitable database system.	
4.	Consider we have the following relation EMP(EmpId, Name, Location, Sal, DOB, Dept.) For security reasons salary information for employees needs to be maintained at Company Headquarter Server located in Mumbai. Write the procedure for doing the above activity and fire suitable queries on the separated/fragmented data.	6 hours
5.	Suppose we have the following Database CUSTOMER (CID, CNAME, STREET, CCITY); BRANCH (BNAME, ASSETS, BCITY); ACCOUNT (A#, CID, BNAME, BAL); LOAN (L#, CID, BNAME, AMT); TRANSACTION (TID, CID, A#, Date, AMOUNT); Suppose we want to retrieve the name of all customers who have one or more accounts in branches in the city of Mumbai. Write the all possible SQL	6 hours

	statement for this query. Do optimization of all alternative statements using total cost and response time as measure of resources consumption.	
	Total Laboratory Hours	**30 hours**

Recommended by Board of Studies	05-03-2016		
Approved by Academic Council	40th	Date	18-03-2016