Suggested Teaching Guidelines for

Data Collection and DBMS (Principles, Tools & Platforms)
PG-DBDA September 2021

Duration: 40 classroom hours + 40 Lab hours

Objective: To reinforce knowledge of RDBMS and facilitate handson experience on SQL &NoSQL.

Prerequisites: Knowledge of Object-Oriented concepts.

Evaluation method: Theory exam– 40% weightage

Lab exam – 40% weightage

Internal exam – 20% weightage

List of Books / Other training material

Textbook:

1. MongoDB in Action by DreamTech

Reference:

1. MongoDB - The definitive guide - by Oreilly
2. The Definitive Guide –MongoDB by Kristina Chodorow
3. MongoDB Aggregation Framework Principles and Examples by John Lynn
4. Getting Started with NoSQL by Gaurav Vaish
5. Database System Concept by Henry Korth, S.Sudarshan & Abraham Silberschatz
6. Relational Database Design and Implementation: Clearly Explained, Third Edition
7. Beginning Database Design Solutions
8. Database Modeling and Design: Logical Design, Fifth Edition
9. Introduction to Database Management System

Note: Each session having 2 Hours

Session 1:

Lecture

- Database Concepts (File System and DBMS)
  - What is file system, its need?
  - What is DBMS, its need
  - Codd's 12 rules for RDBMS

Lab Assignment:

- Read and understand the concepts of File System, DBMS & RDBMS.

Session 2:

Lecture

- Database Storage Structure
  - Table Space
  - Control File
  - Data file
- Structured and Unstructured Data
- Introduction to Data Collection like what is data collection.
- The tools and how data can be gathered in a systematic fashion

Lab Assignment:

- Read and understand the related chapters.

Session 3:
Lecture

- Introduction to SQL
- DDL Commands
- DML & DCL Commands

Lab Assignment:

- DDL Commands: Create/Alter/Drop/Grant/Revoke
- DML Commands: Select/Insert/Update/Delete/Truncate
- DCL Commands: RollBack Commit

Session 4:
Lecture

- Grouping Things Together (Group by, Having)
- Sorting Data (Order By)
- Advance Subqueries (Correlated Sub query, Outer Joins)

Lab Assignment:

- Queries containing Group By, Having Clause,
- Order by
- Correlated Queries, SubQueries, Outer Joins

Session 5 & 6:
Lecture

- Constructs in SQL
- Data collection
- Designing Database Schema
- Normal Forms and ER Diagram
- Relational DB modelling
- Stored Procedures
- Gathering Data in Systematic fashion

Session 7:
Lecture

- Views
- Triggers

Session 8:
Lecture

- Data WareHousing Concepts and Introduction to Tools
- Tools related to Data Warehousing
- Different algorithms related to Data Warehouse
- Importance and its Applications

Lab Assignment:

- Read and understand the related chapters.

Session 9:

Lecture

- NOSQL
  - Introduction to NoSQL
  - Difference between a RDBMS and a NoSQL database
  - Understanding the Storage Architecture
  - Working with Column-Oriented Databases
  - Document Store Internals

Lab Assignment:

- Read and understand the related chapters.

Session 10:

Lecture

- Practical Design of NoSQL
- NOSQL
  - Schema structure for Oracle NoSQL database
  - Changing Document Databases
  - Schema Evolution in Column-Oriented Databases
  - Data Evolution in Key/Value Stores

Lab Assignment:

- Practice Questions including Column-Oriented Databases

Session 11:

Lecture

- Introduction to MongoDB (NoSQL)
  - Performing CRUD Operations
  - Creating Records
  - Accessing Data
  - Updating and Deleting Data
  - Working with Language Bindings
  - Querying NoSQL Stores
  - Similarities Between SQL and MongoDB Query Features
  - Accessing Data from Column-Oriented Databases Like HBase
  - Querying Redis Data Stores

Lab Assignment:

- Readand apply CRUD Operations.

Session 12 &13:

Lecture

- Introduction to MongoDB
  - What are MongoDB Internals

- Essential Concepts behind a Database Index
- Indexing and Ordering in MongoDB
- Creating and Using Indexes in MongoDB

Lab Assignment:

- Practice to create and using Indexes in MongoDB

Session 14:

Lecture

- MongoDB Queries
  - Create Operations
  - Read Operations
  - Data Aggregation Operations
  - Update Operations

Lab Assignment:

- Insert,Find, FindOne, logical Operators, Distinct, Group, Upsert, Update, Remove.

Session 15:

Lecture

- Data Model XML
- Querying and transformation
- Tools - OLTP and OLAP

Lab Assignment:

- Read and understand the related chapters

Session 16:

Lecture

- Introduction to Cassendra
- Comparison between Cassendra and MongoDB
- Architecture
- Cqlsh
- Shell Commands

Lab Assignment:

- Read and understand the related chapters

Session 17:

Lecture

- Table Operation (Create, Alter, Drop, Truncate, Index creation, Index deletion, Batch)

Lab Assignment:

- Read and understand the related chapters

Session 18:

Lecture

- CRUD Operation
  - Create

- Update
- Read
- Delete

- CQL Types
  - CQL Datatypes
  - CQL Collections
  - User Defined Datatypes

Lab Assignment:
Read and understand the related chapters

Session 19:
Lecture

- Data Driven Decisions
- Enterprise Data Management
  - Data Preparation
  - Data Cleaning

Lab Assignment:

- Read and understand the related chapters

Session 20:
Lecture

- Connecting DB's with Python
- Working with DB's using Python
- Accessing and Manipulating DB's

Lab Assignment:

- Read and understand the related chapters