Course Level Assessment

Questions Course Outcome 1 (CO1):

1. Creation of a database using DDL commands including integrity constraints. (K6)
2. Create an application to apply Data Manipulation Language (DML) commands to modify the database. (K6)
3. Apply DCL and TCL commands to impose restrictions on databases. (K3)
4. Create an application to retrieve data from databases using select, views. (K6)
5. Create an application to use joins for query optimization. (K6)

Course Outcome 2 (CO2):

1. Construct PL/SQL code for sample databases. (K6)

Course Outcome 3(CO3):

1. Compare relational and non-relational databases. (K5)
2. Understand the installation and configuration of NoSQL Databases. (K2)

Course Outcome 4 (CO4):

1. Build sample collections/documents to perform query operations. (K6)

Course Outcome 5 (CO5):

1. Build sample collections/documents to perform the shell commands like replica set, indexing etc. (K6)

Course Outcome 6 (CO6):

1. Develop sample applications using any of the front end tools and NoSQL. (K6)
2. Usage of concerned Online/Cloud Storage Management Systems like MongoDB Atlas, Cassandra DataStax etc. (K6)
3. Deployment of NoSQL in Cloud: Google Bigtable/ Amazon DynamoDB/ Azure Cosmos DB. **(**K6**)**

Syllabus

1. An overview of relational database design using MySQL/ MariaDB/ PostgreSQL etc. (Apply the following basic queries on an Employee/ Student database etc.)
    a. DDL Commands
    b. DML Commands
    c. Imposing restrictions on database (DCL & TCL Commands)
    d. Accessing database (SELECT, Filtering using WHERE, HAVING, GROUP BY, ORDER BY Clauses, Subquery and View)
    e. Optimizing databases (Join, Aggregate & Set operations, Other operators like arithmetic, logical, special etc.)
2. PL/SQL Programs (Trigger, Cursor, Stored Procedures and Functions)
3. Introduction to NoSQL Databases.
    a. Installation and configuration of any one of the NoSQL databases - MongoDB/ Cassandra/ HBase/ CouchDB/ Amazon DynamoDB/ Redis/ Neo4j etc.
4. Designing Databases using NoSQL
5. Query Processing
    a. Performing CRUD operations
    b. Retrieving Data from a NoSQL database
    c. Usage of aggregate functions, regular expressions etc.
6. NoSQL Administration
    a. Security, Monitoring & Backup
    b. Create Users and Roles
7. NoSQL shell commands
    a. Perform Sharding, Replication (Master-Slave/ Master-Less/ Peer-to-Peer Architectures), Clustering, Partitioning, Indexing (Corresponding to the selected NoSQL Database)

8. Deployment
    a. Local Deployment
        i. NoSQL and Front-End: PHP/Java/Python (MongoDB/ Cassandra etc.)
    b. Cloud Deployment
        i. NoSQL and Cloud: Amazon DynamoDB/ Google Bigtable/ Azure Cosmos DB
        ii. Familiarization of Atlas/ DataStax corresponding to the selected NoSQL Database
9. ***Micro project:*** *Students can be given a group micro project, so that they learn to work in a team environment.*

Text Books

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan," ***Database System Concepts***", McGraw Hill Education, 6th Edition (2011)
2. Guy Harrison, "***Next Generation Databases: NoSQL, NewSQL, and Big Data***", Apress, 1st Edition (14 December 2015)

Reference Books

1. Raghu Ramakrishnan and Johannes Gehrke, "***Database Management Systems***", McGraw Hill, 3rd Edition (2014).
2. HBase: The Definitive Guide. Lars George O'Reilly Media; August 2011, ISBN: 9781449315771
3. Shashank Tiwari. Professional NoSQL. John Wiley and Sons. ISBN: 978-0-470-94224-6.
4. MongoDB Administrator's Guide, Cyrus Dasadia, October 2017, Packet Publishing ISBN: 9781787126480
5. Cassandra: The Definitive Guide Distributed Data at Web Scale, 1st Edition, Eben Hewitt, Jeff Carpenter, O'Reilly Media; November 2010