CO 4. To analyze and design relational database schema using decomposition and normalization techniques.

CO 5. To develop a database using DDL for an organization and apply DML commands to express various queries on the database as per user requirements.

CO 6. To recognize and comprehend the functional issues of DBMS like transaction management and database recovery.

8. **Brief List of Topics to Be Covered: (L: Lecture, P: Laboratory)**

Contact hour	***Topics to be covered***	***Remarks (if any)***
Week#1:		
L-01	Introduction to the course and its motivation. Course description, objective, credit, grading pattern, class and Lab session of the course. NBA provided program outcomes and departmental specific program specific outcomes.	**(Chapter1)**, Silberschatz, Korth & Sudharsan, **(Chapter1)**, Alan Beaulieu
L-02	Introduction to DBMS:- Data, Database, Database system, Application, Disadvantages of conventional File System, Advantages of Database approach on File system	**(Chapter1)**, Silberschatz, Korth & Sudharsan
L-03	Three level Data abstraction, Schema, Instances, Data Independence	**(Chapter1)**, Silberschatz, Korth & Sudharsan
P-01	Assignment 1: Practicing DDL and DML Commands used for table creation and insertion	**(Chapter3)**, Silberschatz, Korth & Sudharsan, **(Chapter2)**, Alan Beaulieu
Week#2:		
L-04	Database Languages: DDL, DML, Database users, DBA,	**(Chapter1)**, Silberschatz, Korth & Sudharsan
L-05	Data Models: ER model, Relational Model, Network model, hierarchical model, Object based data model, semistructured data model, Relational databases, Database Design	**(Chapter1)**, Silberschatz, Korth & Sudharsan

L-06	Overall DB system architecture, Data Storage and querying Two tier and three tier architecture	**(Chapter1)**, Silberschatz, Korth & Sudharsan
P-02	Assignment 2: Practicing DDL and DML commands for writing queries	**(Chapter3)**, Silberschatz, Korth & Sudharsan, **(Chapter3)**, Alan Beaulieu
Week#3:		
L-07	ER Model:- Entity, attribute, Entity set, Relationship, Relationship set, degree of relationship set, types of attributes with examples	**(Chapter 7)**, Silberschatz, Korth & Sudharsan
L-08	Mapping cardinalities Participation constraint, Database Keys: - Super key, Candidate key, Primary key, Alternate Key, Secondary key	**(Chapter 2,7)**, Silberschatz, Korth & Sudharsan
L-09	Foreign key, Referential integrity, Key attributes of relationship set, Strong, Weak entity, Identifying relationship	**(Chapter7)**, Silberschatz, Korth & Sudharsan
P-03	Assignment 2 contd.	**(Chapter3)**, Silberschatz, Korth & Sudharsan, **(Chapter4)**, Alan Beaulieu
Week#4:		
L-10	EER Features:- Specialization, Generalization, ISA relationship , Constraints on Specialization, Generalization, Aggregation	**(Chapter7)**, Silberschatz, Korth & Sudharsan
L-11	Designing an ER diagram using EER and ER features as a case study	**(Chapter7)**, Silberschatz, Korth & Sudharsan

L-12	Relational database:- What is a Relation, Different features of a Relation(Attribute, Domain, Null value, Tuple), Relational Schema , Relational Database Constraints	**(Chapter 2,7)**, Silberschatz, Korth & Sudharsan
P-04	Assignment 3: Practicing SQL queries using SQL operators, Aggregate and Scalar functions	**(Chapter3)**, Silberschatz, Korth & Sudharsan, **(Chapter6)**, Alan Beaulieu
Week#5:		
L-13	Mapping ER model to Relational Model with examples and case study	**(Chapter7)**, Silberschatz, Korth & Sudharsan
L-14	Relational Database Design:- Anomalies in Database (Insertion, Deletion, Updation Anomalies with examples), Normalization concept, Decomposition Method,	**(Chapter8)**, Silberschatz, Korth & Sudharsan
L-15	Functional Dependencies, Trivial functional dependency, Inference Rules for FDs, Closure of FD	**(Chapter8)**, Silberschatz, Korth & Sudharsan
P-05	Assignment 3 contd.	**(Chapter3)**, Silberschatz, Korth & Sudharsan, **(Chapter7)**, Alan Beaulieu
Week#6:		
L-16	Attribute closure, Extraneous attribute, Canonical Cover	**(Chapter8)**, Silberschatz, Korth & Sudharsan
L-17	Decomposition, Properties of Decomposition, Loss less decomposition, Dependency preserving decomposition,	**(Chapter8)**, Silberschatz, Korth & Sudharsan

L-18	Normalization, INF, Second normal form	**(Chapter8)**, Silberschatz, Korth & Sudharsan
P-06	Assignment 3 contd.	**(Chapter3)**, Silberschatz, Korth & Sudharsan, **(Chapter8)**, Alan Beaulieu
Week#7:		
L-19	3NF, BCNF, comparison of 3NF with BCNF	**(Chapter8)**, Silberschatz, Korth & Sudharsan
L-20	Multivalued dependency, inference rules to find closure of multivalued dependency set	**(Chapter8)**, Silberschatz, Korth & Sudharsan
L-21	4NF,Problems based on normalization, Denormalization	**(Chapter8)**, Silberschatz, Korth & Sudharsan
P-07	Assignment 4: Table creation using Database Constraints	**(Chapter4)**, Silberschatz, Korth & Sudharsan, **(Chapter13)**, Alan Beaulieu
Week#8:		
L-22	Relational Query Language:- Procedural and Non- Procedural query language, Relational Algebra :- Selection, Projection, union	**(Chapter6)**, Silberschatz, Korth & Sudharsan
L-23	Relational algebra queries based on Set difference, Cartesian product, Rename	**(Chapter6)**, Silberschatz, Korth & Sudharsan

L-24	Relational algebra queries based on Set intersection, Assignment, , Natural Join, Extended relational algebra operations	**(Chapter6)**, Silberschatz, Korth & Sudharsan
P-08	Assignment 4 contd.	**(Chapter4)**, Silberschatz, Korth & Sudharsan, **(Chapter13)**, Alan Beaulieu
Week#9:		
L-25	Queries using Tuple relational calculus, Natural Join in TRC	**(Chapter6)**, Silberschatz, Korth & Sudharsan
L-26	Domain Relational Calculus, Natural Join in Domain relational calculus	**(Chapter6)**, Silberschatz, Korth & Sudharsan
L-27	Transaction, ACID Properties of transaction, States of Transaction	**(Chapter14)**, Silberschatz, Korth & Sudharsan
P-09	Assignment 5: Practicing DML commands using sub queries and Join	**(Chapter4)**, Silberschatz, Korth & Sudharsan, **(Chapter4,9)**, Alan Beaulieu
Week#10:		
L-28	Transaction Schedule, serial and concurrent schedule, Serializability	**(Chapter14)**, Silberschatz, Korth & Sudharsan
L-29	Conflict Serializability, View serializability	**(Chapter14)**, Silberschatz, Korth & Sudharsan

L-30	Recoverability, Recoverable and Cascadeless Schedule with example	**(Chapter14)**, Silberschatz, Korth & Sudharsan
P-10	Assignment 5 contd.	**(Chapter4)**, Silberschatz, Korth & Sudharsan, **(Chapter5,10)**, Alan Beaulieu
Week#11:		
L-31	Concurrency control: Need, Lock based concurrency control, 2 phase locking protocol, strict and rigorous 2 phase locking protocol	**(Chapter15)**, Silberschatz, Korth & Sudharsan
L-32	Time-Stamp-based concurrency control, Multi version Scheme protocol, advantages and performance	**(Chapter15)**, Silberschatz, Korth & Sudharsan
L-33	Recovery System:- DB storage and failure, Log-based Recovery , REDO and UNDO operations	**(Chapter16)**, Silberschatz, Korth & Sudharsan
P-11	Assignment 6: Project Based on Database Connectivity	**(Chapter5)**, Silberschatz, Korth & Sudharsan,
Week#12:		
L-34	Recovery in Deferred Database Modification and Immediate Database Modification, Check Pointing	**(Chapter16)**, Silberschatz, Korth & Sudharsan
L-35	Storage and access Strategies : ordered Indices, primary and secondary index, dense and sparse index, multilevel indexing	**(Chapter11)**, Silberschatz, Korth & Sudharsan
L-36	B+-tree index file, Hashing, Hash function and hashed files, Hashed index	**(Chapter11)**, Silberschatz, Korth & Sudharsan

P-12	Assignment 6 contd.	**(Chapter5)**, Silberschatz, Korth & Sudharsan,
Week#13:		
L-37	Query Processing; Overview, Measures of query cost, Selection operation, Sorting, join operation, Evaluation of query cost.	**(Chapter12)**, Silberschatz, Korth & Sudharsan
L-38	Query Optimization: Overview, Transformation of Relational expressions	**(Chapter13)**, Silberschatz, Korth & Sudharsan
L-39	Estimating statistics of expression results, Choice of evaluation plan	**(Chapter13)**, Silberschatz, Korth & Sudharsan
P-13	Assignment 6 contd.	**(Chapter5)**, Silberschatz, Korth & Sudharsan,
Week#14:		
L-40	Database System Architectures	**(Chapter17)**, Silberschatz, Korth & Sudharsan