***JSPM’s Narhe Technical Campus, Narhe, Pune-411041***

***MCA Department***

***AY : 2021-22, Sem - II***

***T-L-A (Teaching-Learning-Assessment) Plan***

**Name of Faculty : Deepika Sarwate Subject : Advanced DBMS (IT-24)**

**Class : MCA SY course file Planned Duration : (48 Lectures)**

**SPPU Exam : I(25 M), E(50 M) Credits : 3**

**Course Outcomes :**

**Students should be able to**

***CO1 :*** Describe the core concepts of DBMS and various databases used in real applications(Understand)

***CO2 :*** *Design relational database using E-R model and normalization (Apply)*

***CO3 :*** *Demonstrate XML database and non procedural structural query languages for data access (Apply)*

***CO4 :*** Explain concepts of Parallel, Distributed and Object-Oriented Databases and their applications (Understand)

***CO5 :*** *Apply transaction management, recovery management, backup and security – privacy*

*concepts for database applications (Apply)*

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| ***Sr. No.*** | ***Description*** | ***Duration*** | ***Planned Date*** | ***Actual Date*** | ***CO*** | ***Teaching Method*** | ***Teaching Model (physical / online)*** | ***Student Learning Material*** | | ***Student Activity*** | | ***Relevant short video link*** | | ***Assessment Tool*** | |
| ***Prerequisites*** | | | | | | | | | | | | | | | |
| ***Unit I - Introduction DBMS – Concepts & Architectures*** | | | | | | | | | | | | | | | |
| 1. | Database and Need for DBMS, Characteristics of  DBMS | 1 hr | 11 /05 | 11 /05 | CO1 | Interactive learning | Concept Attainment | Notes & video on DBMS concept | | Assignment | | https://youtu.be/3EJlovevfcA | | Mid Term Test &  MCQ test | |
| 2. | Database 3-tier schema (ANSI/SPARC) and  system architecture of DBMS. | 1hr | 13/05 | 13/05 | CO1 | Interactive learning | Inductive Thinking | Notes & Book 1 | | Assignment | | <https://youtu.be/CZfmqC9dMJA> | |
| 3. | Views of data- Schemas and instances, Data  Independence | 1hr | 16/05 | 16/05 | CO1 | Interactive learning | Concept Attainment | Notes & video | |  | | https://youtu.be/kawRbAyNSRo | |
| 4. | Centralized, Client-Server system, Transaction  servers, Data servers, Cloud based servers | 1 hr | 18/05 | 18/05 | CO1 | Collaborative Learning (TPS) | Concept Attainment | Notes and Books 1, 2 | |  | | https://youtu.be/dftMGbbULhE | |
| ***Unit II- Data Modelling and Interactive learningRelational Database Design*** | | | | | | | | | | | | | |
| 5. | Data Modelling using ER Diagram: Representation  of Entities, Attributes, Relationships and their  Type | 1 hrs | 20/05 | 20/05 | CO2 | Interactive learning, Project Based Learning | inquiry Training Model | Notes & Book 1 and Video | | Case Stydies on live projects | | <https://youtu.be/b-D1D35R4io>  <https://youtu.be/F_xDqBa5w-s> | |
| 6. | Cardinality, Generalization, Specialization,  Aggregation | 1 hrs | 23/05 | 23/05 | CO2 | Collaborative Learning | Concept Attainment | Notes & Books 1, 2, | |  | | <https://youtu.be/3HIX92Ce1Uo> | |
| 7. | Relational data model: Structure of Relational  Database Model | 1 hrs | 25/05 | 25/05 | CO2 | Concept AttainmentConcept Interactive learningInteractive learningAttainmentConcept Attainment | Concept Attainment | Notes & Books 1, 2, and video | | Assignment | | <https://youtu.be/Q45sr5p_NmQ> | |  | |
| 8. | Types of keys, Referential  Integrity Constraints | 1 hrs | 27/5 |  | CO2 | Concept Attainment | Inductive Thinking | Notes & Books 1, 2, and video | |  | | <https://youtu.be/rXaxmKFvfmY> | |  | |
| 9. | Codd’s rules | 1 hrs | 30/05 |  | CO2 | Concept Attainment | Concept Attainment | Notes & Books 1, 2, and video | |  | | <https://youtu.be/OJPnVbD74KI> | |  | |
| 10. | Database Design using E-R, E-R to Relational | 1 hrs | 01/06 |  | CO2 | Experiential Learning | Inquiry Training Model | Notes & Books 1, 2, and video | | Assignment | |  | |  | |
| 11. | Normalization – Normal forms based on primary  (1 NF, 2 NF) | 1 hrs | 03/06 |  | CO2 | Experiential Learning | Concept Attainment | Notes & Books 2 | |  | |  | |  | |
| 12. | Normalization – Normal forms based on primary  (3 NF, 4 NF) | 1 hrs | 06/06 |  | CO2 | Experiential Learning | Concept Attainment | Notes & Books 2 | |  | |  | |  | |
| ***Unit III - Transaction and Concurrency control*** | | | | | | | | | | | | | | | |
| 13 | **Concept of transaction, ACID properties, States**  **of transaction** | 1 hr | 08/06 |  | CO3 | Interactive learning | Concept Attainment | Notes & Books 1, 3 | |  | |  | | Mid Term Test &  MCQ test | |
| 14 | Concurrency control, Problems in concurrency  controls | 1 hr | 10/06 |  | CO3 | Interactive learning | Concept Attainment | Notes & Video practical examples | | Assignment | | <https://youtu.be/abLIS6BX964> | |
| 15 | Scheduling of transactions, Serializability and  testing of serilaizibity | 1 hrs | 13/06 |  | CO3 | Experiential Learning | Concept Attainment | Notes & practical examples | | Assignment | | <https://youtu.be/h3LekjFg2uY> | |
| 16 | Lock-based Protocol and Time stamp-basedordering protocols | 1 hr | 15/06 |  | CO3 | Interactive learning | Concept Attainment | Notes & practical examples | |  | |  | |
| 17 | Deadlock Handling | 1 hrs | 17/06 |  | CO3 | Interactive learning | Concept Attainment | Notes & practical examples | | Assignment | |  | |
| 18 | Examples of Deadlock Handling. | 1 hrs | 20/06 |  | CO3 | Experiential Learning | Concept Attainment | Notes & practical examples | |  | | <https://youtu.be/ee-wg9q29f0> | |
| ***Unit IV - Parallel Databases*** | | | | | | | | | | | | | | | |
| 19 | Introduction to Parallel Databases | 1 hrs | 22/06 |  | CO4 | Interactive learning | Concept Attainment | Notes & Books 1, 2 | |  | |  | | Mid Term Test &  MCQ test | |
| 20 | Parallel Database Architecturesrs |  | 24/06 |  | CO4 | Interactive learning | Concept Attainment | Notes & Books 1, 2 | |  | |  | |
| 21 | I/O parallelism | 1 hrs | *24/06* |  | CO4 | Interactive learning | Concept Attainment | Notes & Books 1, 2,5 | | Assignment | |  | |
| 22 | Inter-query and Intra-query parallelism | 1 hrs | 27/06 |  | CO4 | Collaborative Learning (TPS) | Inductive Thinking | Notes & Books 1,2 | |  | |  | |
| 23. | Inter-operational and Intra-operational  parallelism | 1 hrs | 27/06 |  | CO4 | Interactive learning | Inductive Thinking | Notes & Books 1,2 | | Assignment | |  | |
| 24. | Key elements of parallel database processing:  Speed-up, Scale-up Synchronization and Locking | 1 hrs | 29/06 |  | CO4 | Interactive learning | Inductive Thinkin | Notes ,examples& Books | | Assignment | |  | |
| ***Unit V – Distributed Databases*** | | | | | | | | | | | | | | | |
| 25 | Introduction to Distributed Database System | 1 hr | 29/06 |  | CO4 | Experiential Learning | Concept Attinment | | Notes & Books 5 | |  | |  | | End Term Test &  MCQ test |
| 26 | Homogeneous and Heterogeneous Databases | 1 hrss | 01/07 |  | CO4 | Interactive learning & Collaborative Learning | Concept Attainment | | Notes & Books 4,5 | | Assignment | |  | |
| 27 | Distributed data storage (Fragmentation and  Replication) | 1 hr | 01/07 |  | CO4 | Interactive learning | Concept Attainment | | Notes & Books 1,5 | |  | |  | |
| 28 | Distributed transactions | 1 hr | 04/07 |  | CO4 | Interactive learning | Concept Attainment | | Notes & Books 1,5 | |  | |  | |
| 29 | Concurrency control schemes in DDBMS | 1 hrs | 04/07 |  | CO4 | Interactive learning & Collaborative Learning | Concept Attainment | | Notes & Books 2,5 | | Assignment | |  | |
| 30 | Commit protocols 2 phase and 3 Phase Commit  Protocol | 1hr | 06/07 |  | CO4 | Interactive learning & Collaborative Learning | Concept Attainment | | Notes & Books 1,5 | |  | |  | |
| ***Unit VI – Object Oriented Databases & Applications*** | | | | | | | | | | | | | | | |
| 31 | Overview of Object- Oriented Database concepts  & characteristics Database design for OODBMS – Objects, | 1 hrs | 08/07 |  | CO4 | Experiential Learning | Concept Attainment | Notes and video | | Assignment | |  | | End Term Test &  MCQ test | |
| 32 | OIDs  and reference type  6.3. Spatial data and Spatial indexing (Any two  techniques) | 1 hr | 08/07 |  | CO4 | Interactive learning | Concept Attainment | Notes and Books | | Case study | |  | |
| 33 | Mobile Database: Need, Structure, Features,  Limitations and Applications. Temporal databases, temporal aspects valid  time | 1 hr | 08/07 |  | CO4 | Interactive learning | Concept Attainment | Notes & Video | | Assignment | |  | |
| 34 | transaction time or decision time  ,Multimedia Database: Architecture, Type and  Characteristics | 1 hrs | 08/07 |  | CO4 | Interactive learning | Concept Attainment | Notes & Video | |  | |  | |
| ***UNIT-VII Crash Recovery and Backup*** | | | | | | | | | | | | | |
| 35 | Failure classifications | 1 hrs | 11/07 |  | CO5 | Interactive learning |  | Notes and 32 mins video on | | Case study on control of | | <https://youtu.be/eq2EMu1Mh-w> | |
| 36 | Recovery & Atomicity | 1 hrs | 11/07 |  | CO5 | Interactive learning | Concept Attainment | Notes & Book 1, 2 | |  | |  | |
| 37 | Log based recovery | 1 hrs | 11/07 |  | CO5 | Interactive learning | Concept Attainment | Notes & Book 1, 2 | | Assignment | |  | |
| 38 | Checkpoint and Shadow Paging in Data recovery | 1 hrs | 13/07 |  | CO5 | Experiential Learning | Concept Attainment | Notes & Book 1, 2 | |  | |  | |
|  | Database backup and types of backups | 1 hrs | 13/07 |  | CO5 | Interactive learning | Concept Attainment | Notes & Book 1, 2 | | Assignment | |  | |
| ***Unit VIII– Security and Privacy*** | | | | | | | | | | | | | | | |
| 39 | Database security issues | 1 hrs | 15/07 |  | CO5 | Interactive learning | Inductive Thinking | | Notes & Book 4 | |  | |  | | End Term Test &  MCQ test |
| 40 | Discretionary access control based on grant &  revoking privilege | 1 hr | 15/07 |  | CO5 | Interactive learning | Inductive Thinking | | Notes & Book 4 | |  | |  | |
| 41 | Mandatory access control and role-based access  control for multilevel security | 1 hr | 18/07 |  | CO5 | Interactive learning | Inductive Thinking | | Notes & Book 4 | | Assignment | | <https://youtu.be/q_4VErC7bwA> | |
| 42 | Encryption & public key infrastructures | 1 hrs | 18/07 |  | CO5 | Interactive learning | Inductive Thinking | | Notes & Book 4 | |  | |  | |
| ***UNIT IX- NO-SQL Database*** | | | | | | | | | | | | | | | |
| 43 | Introduction, Types of NOSQL | 1 hrs | 20/07 |  | CO5 | Interactive learning | Concept Attainment | | Notes & Book 4 | | Assignment | | <https://youtu.be/99huTxCEqbg> | |  |
| 44 | Need of NoSQL  databases, Use Cases | 1 hrs | 22/07 |  | CO5 | Interactive learning | Concept Attainment | | Notes & Book 1,2 | |  | |  | |  |
|  | ***Total hrs*** | ***44 hrs*** |  |  |  |  |  | |  | |  | |  | |  |

***Relevant Online Courses***

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| --- | --- | --- | --- | --- | --- |
| ***Sr. No.*** | ***Name of Course*** | ***Name of Faculty*** | ***Course offered by*** | ***Duration of Course*** | ***Remarks*** |
| 1 | Data base management | - | Swayam-NPTEL | 8 weeks | Scheduled Course. Available in each sem |
| 2 | https://www.coursera.org/learn/introduction-to-nosql-databases | - | courser.org | 4 weeks | Scheduled Course. Available in each sem |
| 3 | https://www.coursera.org/learn/database-management | - | courser.org | 5 weeks | Available 365 days. (24x7) Too much flexibility. |

***Books :***

1. Database System Concepts by Abraham Silberschatz, H. Korth, Sudarshan
2. Introduction to database systems C.J. Date, Pearson.
3. Fundamentals of Database Systems by Elmasri Navathe
4. Principles of Database Management James Martin, PHI

Deepika A.Sarwate Dr. S.S.Solanki

Subject Teacher Dean(MCA)

Copy To:

1. Academic Monitoring Coordinator (AMC)
2. Module Coordinator

***For Information - Project Based Learning***

***Various Teaching Methods :***

* + - 1. Interactive Learning (Interaction with students by asking questions in between. Students participation is must)
      2. Collaborative Learning

1. TPS (Think Pair Share – 2 students in a team : Good for numerical based subjects)
2. FBM (Four Board Method – can effectively implement in practical session)
3. Inquiry Training ModelGame Pedagogy
   * + 1. Peer Learning (learning from other students in the class / outside the class. Good for numerical based subjects)
       2. PBL (Problem Based Learning / Project Based Learning) (Real life problems / mini projects)
       3. Experiential Learning (Learning from ind visit / Mnemonic / fishbowl / tutor-tutee / asking questions by students to students etc)
       4. Flipped Classroom Learning (Lectures become homework and class time is used for collaborative student work)

***Various Teaching Models :***

Concept Attainment

Inductive Thinking

Inquiry Training Model

Flipped Classroom Model

Advanced Organizer Model

***Online Teaching Models :*** Faculties can watch, study and then explain to the students, the videos / photos / models / animations regarding concepts

and / or applications of the relevant topics, available on You tube, Google or any other online platform.

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