

**EC722PE: DATABASE MANAGEMENT SYSTEMS (PE – IV)**  
**COURSE PLANNER**

**Course Overview:**

This course introduces the core principles and techniques required in the design and implementation of database systems. This course focus on relational database management systems, including database design theory: E-R modeling, data definition and manipulation languages, database security and administration. It also covers essential DBMS concepts such as: Transaction Processing, Concurrency Control and Recovery and various types of databases like distributed database, and intelligent database, Client/Server. Students undertake a semester project to design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS. It also provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications.

**Prerequisites:**

Data Structures

**Course Objectives:**

At the end of the course, the students will be able to:

- *Understand* the basic concepts and the applications of database systems.
- *Master* the basics of SQL and construct queries using SQL.
- *Understand* the relational database design principles.
- *Familiar* with the basic issues of transaction processing and concurrency control.
- *Familiar* with database storage structures and access techniques.

**Course Outcomes:**

S. No.	Course Outcomes (CO)	Knowledge Level (Blooms Level)
After completing this course the student must demonstrate the knowledge and ability to:		
CO1	<i>Demonstrate</i> the basic elements of a relational database management system.	Application ( Level 2)
CO2	<i>Identify</i> the data models for relevant problems.	Remember( Level 1)
CO3	<i>Design</i> entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.	Analyze, Create ( Level 4, Level 6)
CO4	<i>Demonstrate</i> their understanding of key notions of query evaluation and optimization techniques.	Application ( Level 2)
CO5	<i>Extend</i> normalization for the development of application software's.	

### How Program Outcomes are assessed:

Program Outcomes (PO)		Level	Proficiency assessed by
PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Assignments, Tutorials, Mock Tests
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	Assignments, Tutorials
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	3	Assignments, Tutorials, Mock Tests
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	3	Assignments, Tutorials, Mock Tests
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	3	Assignments, Tutorials, Mock Tests
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	-	-
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	-	-
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	-	-
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	-	-
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	-	-
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	-	-
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long	-	-

Program Outcomes (PO)	Level	Proficiency assessed by
learning in the broadest context of technological change.		

### **How Program Specific Outcomes are Assessed:**

Program Specific Outcomes (PSO)		Level	Proficiency assessed by
PSO1	<b>Software Development and Research Ability:</b> Ability to understand the structure and development methodologies of software systems. Possess professional skills and knowledge of software design process. Familiarity and practical competence with a broad range of programming language and open source platforms. Use knowledge in various domains to identify research gaps and hence to provide solution to new ideas and innovations.	3	Assignments, Tutorials, Mock Tests
PSO2	<b>Foundation of mathematical concepts:</b> Ability to apply the acquired knowledge of basic skills, principles of computing, mathematical foundations, algorithmic principles, modeling and design of computer-based systems in solving real world engineering Problems.	2	Assignments, Tutorials
PSO3	<b>Successful Career:</b> Ability to update knowledge continuously in the tools like Rational Rose, MATLAB, Argo UML, R Language and technologies like Storage, Computing, Communication to meet the industry requirements in creating innovative career paths for immediate employment and for higher studies.	3	Assignments, Tutorials, Mock Tests

**1: Slight (Low) 2: Moderate (Medium)**

**3: Substantial (High)**

**- : None**

### **Course Content:**

#### **UNIT - I**

**Database System Applications:** A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS

**Introduction to Database Design:** Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design With the ER Model

#### **UNIT - II**

**Introduction to the Relational Model:** Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

#### **UNIT - III**

**SQL: Queries, Constraints, Triggers:** form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

**Schema Refinement:** Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multi-valued dependencies, FOURTH normal form, FIFTH normal form.

#### **UNIT - IV**

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log-Based Recovery, Recovery with Concurrent Transactions.

#### **UNIT - V**

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations, Indexes and Performance Tuning, Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

#### **Text Books**

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, *Tata McGraw Hill* 3rd Edition
2. Database System Concepts, Silberschatz, Korth, *McGraw hill*, V edition.

#### **Reference Books**

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7thEdition.
2. Fundamentals of Database Systems, ElmasriNavrate, *Pearson Education*
3. Introduction to Database Systems, C. J. Date, *Pearson Education*

#### **COURSE PLAN (WEEK-WISE):**

Lecture No.	Unit No.	Topics to be covered	Content to be covered under each topic	Link for PDF	LINK FOR Small Projects/ Numericals(if)	Course learning outcomes	Teaching Methodology	Reference
1	1	Unit1:A Historical Perspective	<ul style="list-style-type: none"> <li>Basics of DBMS</li> <li>Evolution</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS</a>	To understand the A Historical Perspective	PPT	Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata McGraw Hill 3rd Edition,
2		File Systems versus a DBMS, the Data Mode	<ul style="list-style-type: none"> <li>Types</li> <li>Method</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS</a>	To understand the File Systems versus a DBMS, the Data Mode	PPT	
3		Data Independence	<ul style="list-style-type: none"> <li>Data Types</li> <li>Category</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS</a>	To study Data Independence	PPT	
4		Structure of a DBMS	<ul style="list-style-type: none"> <li>Structure of data types</li> <li>Entry</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS</a>	To study various Structure of a DBMS	PPT	

				5vDwt2y Ue	xxZ7PIJ xOAIS LBfcPS		
5	Database Design and ER Diagrams	<ul style="list-style-type: none"> <li>Data independence</li> <li>Diagram</li> </ul>		<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS</a>	To understand Structure of a DBMS	Chalk and Talk
8	Entities, Attributes, and Entity	<ul style="list-style-type: none"> <li>Attributes</li> <li>Entry in DBMS</li> </ul>		<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS</a>	To evaluate Entities, Attributes, and Entity DBMS	Chalk and Talk
9	Sets, Relationships and Relationship Sets	<ul style="list-style-type: none"> <li>Relational database</li> <li>Types</li> </ul>		<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS</a>	To understand Sets, Relationships and Relationship Sets DBMS	PPT
10	Instruction formats	<ul style="list-style-type: none"> <li>Format of DBMS</li> <li>Types</li> </ul>		<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAISLBfcPS</a>	To understand and analyze the Instruction formats	PPT

11	Additional Features of the ER Model,	<ul style="list-style-type: none"> <li>• Model</li> <li>• Types</li> <li>• Features</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAILBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAILBfcPS</a>	To understand Additional Features of the ER Model	PPT
12	Conceptual Design	<ul style="list-style-type: none"> <li>• Design process</li> <li>• Method</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAILBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAILBfcPS</a>	To evaluate Conceptual Design	PPT
13	With the ER Model	<ul style="list-style-type: none"> <li>• ER Model</li> <li>• Description of model</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAILBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAILBfcPS</a>	To understand With the ER Model	PPT
14	Bridge Class-I		<a href="https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe">https://drive.google.com/drive/u/4/folders/1uYEAd3IwNmWrtWBOa_Jg4IL5vDwt2yUe</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAILBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAILBfcPS</a>		PPT
15	<b>MOCK TEST-1</b>					
16	<b>Student Presentations</b>					

17		<b>Student Presentations</b>						
18	2	Unit2: Integrity constraint over relations	<ul style="list-style-type: none"> <li>Constraint types</li> <li>Category</li> </ul>	https://drive.google.com/drive/u/4/folders/1YyBe3uyzJXjJEX5kyu xqbesZl WunNjak	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS</a>	To Analyze Integrity constraint over relations	PPT	Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata McGraw Hill 3rd Edition
19		enforcing integrity constraints	<ul style="list-style-type: none"> <li>Data Types</li> <li>Method</li> </ul>	https://drive.google.com/drive/u/4/folders/1YyBe3uyzJXjJEX5kyu xqbesZl WunNjak	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS</a>	To Analyze enforcing integrity constraints	PPT	
20		querying relational data		https://drive.google.com/drive/u/4/folders/1YyBe3uyzJXjJEX5kyu xqbesZl WunNjak	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS</a>	To Understand the querying relational data	PPT	
21		logical data base design,	<ul style="list-style-type: none"> <li>Data Types</li> <li>Method</li> </ul>	https://drive.google.com/drive/u/4/folders/1YyBe3uyzJXj	<a href="https://drive.google.com/drive/u/4/folders/">https://drive.google.com/drive/u/4/folders/</a>	To Understand the logical data base design,	Chalk and Talk	



				JEX5kyu xqbesZl WunNjak	<b>1_3djV xB2r7 MMum xxZ7Pl JxOAI SLBfcP S</b>			
22	introduction to views	<ul style="list-style-type: none"> <li>Views type</li> <li>Description</li> </ul>		https://drive.google.com/drive/u/4/folders/1YyBe3uyzJXjJEX5kyu xqbesZl WunNjak	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS</a>	To Understand the introduction to views	PPT	
23	destroying/altering tables and views	<ul style="list-style-type: none"> <li>Table types</li> <li>Category</li> </ul>		https://drive.google.com/drive/u/4/folders/1YyBe3uyzJXjJEX5kyu xqbesZl WunNjak	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS	To know how to write destroying/altering tables and views	PPT	
24	Relational Algebra	Category		https://drive.google.com/drive/u/4/folders/1YyBe3uyzJXjJEX5kyu xqbesZl WunNjak	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS	To know Relational Algebra	PPT	
25	Tuple relational Calculus, Domain relational calculus	<ul style="list-style-type: none"> <li>Relational calculus</li> <li>Types</li> </ul>		https://drive.google.com/drive/u/4/folders/1YyBe3uyzJXjJEX5kyu	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7	To evaluate Tuple relational Calculus, Domain relational calculus	Chalk and Talk	

				xqbesZl WunNjak	MMum xxZ7PlJ xOAIS LBfcPS			
26		UNIT 3 :form of basic SQL query, UNION, INTERSECT, and EXCEPT	<ul style="list-style-type: none"> <li>• SQL types</li> <li>• Category</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRwxSPZy2q JbK_NJT">https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRwxSPZy2q JbK_NJT</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAISLBfcPS</a>	To evaluate form of basic SQL query, UNION, INTERSECT, and EXCEPT	PPT	
27	<b>Bridge Class-II</b>							
28	<b>Student Presentations</b>							
29		Nested Queries	<ul style="list-style-type: none"> <li>• NEted queries types</li> <li>• Category</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRwxSPZy2q JbK_NJT">https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRwxSPZy2q JbK_NJT</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAISLBfcPS</a>	Understand Nested Queries	PPT	
30		aggregation operators,	<ul style="list-style-type: none"> <li>• Operator types</li> <li>• Category</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRwxSPZy2q JbK_NJT">https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRwxSPZy2q JbK_NJT</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAISLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAISLBfcPS</a>	To know how to aggregation operators	PPT	The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed.

31		NULL values, complex integrity constraints in SQL	<ul style="list-style-type: none"> <li>SQL types</li> <li>Category</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	To know how to NULL values, complex integrity constraints in SQL	PPT
32		triggers and active data bases	<ul style="list-style-type: none"> <li>Data type</li> <li>Models</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	To understand triggers and active data bases	Chalk and Talk
33	3	Problems caused by redundancy, decompositions	<ul style="list-style-type: none"> <li>Redundancy types</li> <li>Category</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	To understand Problems caused by redundancy, decompositions Communication Standards	PPT
34		problems related to decomposition, reasoning about functional dependencies	<ul style="list-style-type: none"> <li>Decomposition method</li> <li>Category</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	To understand the Problems caused by redundancy, decompositions	PPT

				JbK_NJT	MMum xxZ7Pl JxOAI SLBfcP S			
35		FIRST, SECOND, THIRD normal forms	<ul style="list-style-type: none"> <li>Views type Description</li> </ul>	https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRw xSPZy2q JbK_NJT	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S	To understand the FIRST, SECOND, THIRD normal forms	PPT	
36		BCNF, lossless join decomposition	<ul style="list-style-type: none"> <li>Views type Description</li> </ul>	https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRw xSPZy2q JbK_NJT	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S	To understand Inter BCNF, lossless join decomposition	PPT	
37		multi-valued dependencies	<ul style="list-style-type: none"> <li>Views type Description</li> </ul>	https://drive.google.com/drive/u/4/folders/1y_r9eyGL8tD DvctcRw xSPZy2q JbK_NJT	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S	To understand multi-valued dependencies	Chalk and Talk	
38		FOURTH normal form, FIFTH normal	<ul style="list-style-type: none"> <li>Views type Description</li> </ul>	https://drive.google.com/drive	https://drive.google.c	To understand the FOURTH	Chalk and Talk	Database System Concepts,

		form.		e/u/4/folders/1y_r9eyGL8tD DvctcRw xSPZy2q JbK_NJT	om/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS	normal form, FIFTH normal form		<b>Silberschatz, Korth, McGraw Hill, V edition</b>
39		Unit -4 Transaction Concept, Transaction State	<ul style="list-style-type: none"> <li>Transaction type</li> <li>States</li> </ul>	https://drive.google.com/drive/u/4/folders/1WgZtgHvDU BO2zD0 AhQPRB IP1HvSit ovw	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS	To understand the Transaction Concept, Transaction State	PPT	
40		Implementation of Atomicity and Durability	<ul style="list-style-type: none"> <li>Views type Description</li> </ul>	https://drive.google.com/drive/u/4/folders/1WgZtgHvDU BO2zD0 AhQPRB IP1HvSit ovw	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcPS	To understand the Implementation of Atomicity and Durability	PPT	
41	4	Concurrent Executions, Serializability, Recoverability, Implementation of Isolation	<ul style="list-style-type: none"> <li>Isolation process</li> <li>Method</li> </ul>	https://drive.google.com/drive/u/4/folders/1WgZtgHvDU BO2zD0 AhQPRB IP1HvSit ovw	https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI	To Analyze the Concurrent Executions, Serializability, Recoverability, Implementation of Isolation	PPT	

					<b>SLBfcP S</b>			
42		Testing for serializability	<ul style="list-style-type: none"> <li>• Testing method</li> <li>• Types</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1WgZtgHvDUBO2zD0AhQPRBIP1HvSitovw">https://drive.google.com/drive/u/4/folders/1WgZtgHvDUBO2zD0AhQPRBIP1HvSitovw</a>	<b>https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S</b>	To know the Testing for serializability	PPT	
43		loading constants Conditional execution	<ul style="list-style-type: none"> <li>• Loading types</li> <li>• Method</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1WgZtgHvDUBO2zD0AhQPRBIP1HvSitovw">https://drive.google.com/drive/u/4/folders/1WgZtgHvDUBO2zD0AhQPRBIP1HvSitovw</a>	<b>https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S</b>	Understand loading constants Conditional execution	PPT	
44		y, Lock Based Protocols, Timestamp Based Protocols		<a href="https://drive.google.com/drive/u/4/folders/1WgZtgHvDUBO2zD0AhQPRBIP1HvSitovw">https://drive.google.com/drive/u/4/folders/1WgZtgHvDUBO2zD0AhQPRBIP1HvSitovw</a>	<b>https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S</b>	To Understand the y, Lock Based Protocols, Timestamp Based Protocols	PPT	
45		Validation-Based Protocols, Multiple Granularity,	<ul style="list-style-type: none"> <li>• Protocol model</li> <li>• Types</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1WgZ">https://drive.google.com/drive/u/4/folders/1WgZ</a>	<b>https://drive.google.com/drive/u/4/f</b>	To Understand the Validation-Based	PPT	

		Recovery and Atomicity		tgHvDU BO2zD0 AhQPRB IP1HvSit ovw	<b>olders/ 1_3djV xB2r7 MMum xxZ7Pl JxOAI SLBfcP S</b>	Protocols, Multiple Granularity, Recovery and Atomicity		
46		Log-Based Recovery, Recovery with Concurrent Transactions.	<ul style="list-style-type: none"> <li>Recovery method</li> <li>Types</li> </ul>	https://drive.google.com/drive/u/4/folders/1WgZtgHvDUBO2zD0AhQPRBIP1HvSitovw	<b>https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S</b>	To Understand the Log-Based Recovery, Recovery with Concurrent Transactions	PPT	
47	5	UNIT 5 :Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexers	<ul style="list-style-type: none"> <li>Views type Description</li> </ul>	https://drive.google.com/drive/u/4/folders/1vXEnTPpLP8ykbIxYHx8F-R8fs27VaJjy	<b>https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S</b>	To Understand the Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexesr	Chalk and Talk	
48		Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organizations	<ul style="list-style-type: none"> <li>Hash method</li> <li>Types</li> </ul>	https://drive.google.com/drive/u/4/folders/1vXEnTPpLP8ykbIxYHx8F-R8fs27VaJjy	<b>https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PlJxOAI SLBfcP S</b>	To Understand the Index data Structures, Hash Based Indexing, Tree base Indexing, Comparison of File Organization	PPT	

					S	s		
49	Indexes and Performance Tuning, Intuitions for tree Indexes	<ul style="list-style-type: none"> <li>Views type</li> <li>Description</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1vXENTPpLP8ykbIxYHx8F-R8fs27VaJjy">https://drive.google.com/drive/u/4/folders/1vXENTPpLP8ykbIxYHx8F-R8fs27VaJjy</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	To Understand the Indexes and Performance Tuning, Intuitions for tree Indexes	PPT		
50	Indexed Sequential Access Methods (ISAM),	<ul style="list-style-type: none"> <li>Method of Sequential method</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1vXENTPpLP8ykbIxYHx8F-R8fs27VaJjy">https://drive.google.com/drive/u/4/folders/1vXENTPpLP8ykbIxYHx8F-R8fs27VaJjy</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	To Understand the Indexed Sequential Access Methods (ISAM),	PPT		
51	B+ Trees: A Dynamic Index Structure	<ul style="list-style-type: none"> <li>Dynamic method</li> <li>Types</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1vXENTPpLP8ykbIxYHx8F-R8fs27VaJjy">https://drive.google.com/drive/u/4/folders/1vXENTPpLP8ykbIxYHx8F-R8fs27VaJjy</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	To Understand the B+ Trees: A Dynamic Index Structure	PPT		
52	B+ Trees: A Dynamic Index Structure	<ul style="list-style-type: none"> <li>Dynamic index structure</li> <li>Types</li> </ul>	<a href="https://drive.google.com/drive/u/4/folders/1vXENTPpLP8ykbIxYHx8F-R8fs27VaJjy">https://drive.google.com/drive/u/4/folders/1vXENTPpLP8ykbIxYHx8F-R8fs27VaJjy</a>	<a href="https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS">https://drive.google.com/drive/u/4/folders/1_3djVxB2r7MMumxxZ7PIJxOAI SLBfcPS</a>	To Understand the B+ Trees: A Dynamic Index Structure	PPT		



				nTPpLP8 ykbIxYH x8F- R8fs27V aJjy	<b>olders/ 1_3djV xB2r7 MMum xxZ7Pl JxOAI SLBfcP S</b>	Structure		
--	--	--	--	---	--	-----------	--	--

4. Oracle for Professionals, The X Team, S.Shah and V. Shah, *SPD*.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, *PHI*.
6. Fundamentals of Database Management Systems, M. L. Gillenson, *Wiley Student Edition*.

**NPTEL Web Course:**

[https://onlinecourses.nptel.ac.in/noc18\\_cs15/preview](https://onlinecourses.nptel.ac.in/noc18_cs15/preview)

<http://nptel.ac.in/courses/106106093/>

<http://nptel.ac.in/courses/106106095/>

**NPTEL Video Course:**

<https://www.youtube.com/watch?v=EUzsy3W4I0g>

<https://www.youtube.com/playlist?list=PL52484DF04A264E59>

**Relevant syllabus for GATE:**

Databases: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

**Course Plan and Lesson Plan**

**Course outcomes**

Course Outcomes	Program Outcomes (PO)												Program Specific Outcomes (PSO)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	2	3	-	2	-	2	3	-	1	2	3	2
CO2	2	3	3	2	3	-	2	-	2	3	-	2	2	3	2
CO3	2	2	3	2	3	-	2	-	2	3	-	2	2	2	3
CO4	3	2	3	2	2	-	2	-	2	2	-	2	2	3	2
CO5	2	2	3	2	3	-	2	-	2	2	-	2	2	2	3

**1: Slight (Low)**

**2: Moderate (Medium)**

**3: Substantial (High)**

**- : None**

**Question Bank : Descriptive  
Questions: Short Answer Questions-  
Unit-1**

S.No	Question	Blooms Taxony level	Course outcome
1	Define the terms data and information?	REMEMBERING	1
2	Define (i) Database (ii)DBMS	REMEMBERING	1
3	List the advantages and applications of DBMS?	REMEMBERING	1
4	What are the disadvantages of file processing system?	REMEMBERING	1
5	Define instances and schemas of database?	REMEMBERING	1
6	What is data model? List the types of data models?	REMEMBERING	1
7	Discuss about Data Definition language?	CREATING	6
8	Discuss about Data Manipulation language?	CREATING	6
9	What is data Abstraction? Give the levels of data abstraction?	REMEMBERING	1
10	Who is DBA? What are the responsibilities of DBA?	REMEMBERING	1
11	Discuss Data Independence?	CREATING	6
12	What is an entity relationship model?	REMEMBERING	1
13	Define (i) Entity (ii) Attribute	REMEMBERING	1
14	Define Relationship and Relationship set?	REMEMBERING	1
15	What are key constraint and participating constraints?	REMEMBERING	1
16	Define weak entity and strong entity sets?	REMEMBERING	1
17	Define relation, relation instance and relation schema.	REMEMBERING	1
18	Define i) super key ii)candidate key iii) primary key	REMEMBERING	1
19	Explain the use of foreign key constraint?	UNDRE STANDIN G	2
20	Define the terms arity and cardinality of relation?	REMEMBERING	1

21	What are domain constraints	REMEMBERING	1
22	Explain about querying relational data?	UNDRESTDING G	2
23	Define views?	REMEMBERING	1
24	Discuss how can you change the data in the table?	CREATING	6
25	List various types of attributes?	REMEMBERING	1
26	Discuss how can you alter and destroy tables?	CREATING	6
27	Explain the use of null values?	UNDRESTDING G	2

### Long Answer Questions-

S. No	Question	Blooms Taxony level	Course outcome
1	Compare and Contrast file Systems with database system?	UNDRESTDING	2
2	Define Data Abstraction and discuss levels of Abstraction?	REMEMBERING	1
3	Discuss about different types of Data models?	CREATING	6
4	Describe the architecture of DBMS?	CREATING	6
5	Discuss additional features of the ER-Models?	CREATING	6
6	Discuss about the Conceptual Design with the ER-Model?	CREATING	6
7	Write about views and updates on views?	REMEMBERING	1
8	Explain different types of database users and write the functions of DBA?	UNDRESTDING	2
9	Explain about different types of integrity constraints?	UNDRESTDING	2
10	Discuss about the logical database Design?	CREATING	6
11	Distinguish strong entity set with weak entity set? Draw an ER diagram to illustrate Weak entity set?	UNDRESTDING	2
12	Explain how the integrity constraints are specified and enforces?	UNDRESTDING	2
13	Explain in detail about views?	UNDRESTDING	2

### Unit-2

### Short Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
------	----------	---------------------	----------------

1	Define relational database query?	REMEMBERING	1
2	Explain different types of query languages?	UNDRESTANDING	2
3	Explain about relational algebra?	UNDRESTANDING	2
	State about SELECT operation in Relational algebra?	ANALYZE	4
5	State about PROJECT operation in Relational algebra?	ANALYZE	4
6	Explain about set operations?	UNDRESTANDING	2
7	Discuss the use of rename operation?	CREATING	6
8	Define join ? Explain different join operations?	REMEMBERING	1
9	Illustrate division operation?	UNDRESTANDING	2
10	Explain about tuple relational calculus?	UNDRESTANDING	2
11	Explain about Domain relational calculus?	UNDRESTANDING	2
12	Discuss about the expressive power of relational algebra and calculus?	CREATING	6
13	. Discuss the basic form of SQL query?	CREATING	6
14	Explain the working of union, intersection and except operations?	UNDRESTANDING	2
15	Define nested queries?	REMEMBERING	1
16	Define correlated nested queries?	REMEMBERING	1
17	Explain Aggregate Functions?	UNDRESTANDING	2
18	What is the use of groupby and having clauses?	REMEMBERING	1
19	Define Null Values?	REMEMBERING	1
20	Define tuple variable with its syntax?	REMEMBERING	1
21	Define outer join? Explain its types?	REMEMBERING	1
22	Explain how to create new domain?	UNDRESTANDING	2
23	Define Assertions?	REMEMBERING	1
24	. Discuss about trigger?	CREATING	6

25	Demonstrate how to add a NOT NULL column to a table?	UNDREANDING	2
26	Write a TRC query to find the names of sailors who have reserved boat103?	REMEMBERING	1
27	Write a DRC query to find the names of sailors who have reserved red boat?	REMEMBERING	1

**Long Answer Questions-**

S. No	Question	Blooms Taxony level	Course outcome
1	Illustrate different operations in Relational algebra with an example?	UNDREANDING	2
2	Define Join? Explain different types of joins?	REMEMBERING	1
3	Discuss about Relational calculus in detail?	CREATING	6
4	Define trigger and explain its three parts? Differentiate row level and statement level triggers?	REMEMBERING	1
5	Illustrate Group by and having clauses with examples?	UNDREANDING	2
6	Discuss about Complex integrity constraints in SQL?	CREATING	6
7	Define null value? Describe the effect of null values in database?	REMEMBERING	1
8	Discuss different types of aggregate operators with examples in SQL?	CREATING	6
9	Define a nested query?	REMEMBERING	1
10	Write a nested query to find the names of sailors who have reserved both a red and green boat?	REMEMBERING	1
11	Write a nested query to find the names of sailors who have reserved all boats?	REMEMBERING	1

**Unit-3**

**Short Answer Questions-**

S.No	Question	Blooms Taxony level	Course outcome
1	Define redundancy?	REMEMBERING	1
2	Define functional dependency?	REMEMBERING	1
3	Explain the problems with Redundancy?	UNDREANDING	2
4	What is decomposition? Explain the properties of Decomposition?	REMEMBERING	1
5	Discuss normalization?	CREATING	6
6	Illustrate functional dependency with example?	UNDREANDING	2

7	Illustrate fully functional dependency with example?	UNDRESTDANDING	2
8	Demonstrate transitive dependency? Give an example?	UNDRESTDANDING	2
9	Define First Normal Form?	REMEMBERING	1
10	Define Second Normal Form?	REMEMBERING	1
11	Define Third Normal Form?	REMEMBERING	1
12	Explain about Loss Less Join Decomposition?	UNDRESTDANDING	2
13	Describe Dependency Preserving Decomposition?	CREATING	6
14	What is multi valued Dependency?	REMEMBERING	1
15	Define Fourth Normal Form?	REMEMBERING	1
16	Define Join Dependency?	REMEMBERING	1
17	Define BCNF?	REMEMBERING	1
18	Explain Fifth Normal Form?	UNDRESTDANDING	2
19	Explain about Inclusion Dependency?	UNDRESTDANDING	2

**Long Answer Questions-**

S. No	Question	Blooms Taxony level	Course outcom
1	Illustrate redundancy and the problems that it can cause	UNDRESTDANDING	2
2	Define decomposition and how does it address redundancy? Discuss the problems that may be caused by the use of decompositions?	REMEMBERING	1
3	Define functional dependencies. How are primary keys related to FD's?	REMEMBERING	1
4	Define normalization? Explain 1NF,2NF,3NF normal forms	REMEMBERING	1
5	Compare and contrast BCNF with 3NF?	UNDRESTDANDING	2
6	Describe properties of decompositions	CREATING	6

**Unit-4****Short Answer Questions-**

S. No	Question	Blooms Taxony level	Course outcome
1	Define a Transaction? List the properties of transaction	REMEMBERING	1
2	Discuss different phases(states) of transaction?	CREATING	6
3	What is shadow copy technique?	REMEMBERING	1
4	List the advantages of concurrent execution?	REMEMBERING	1
5	Define Schedule? What is a serial schedule?	REMEMBERING	1
6	Discuss the Procedure to test Serializability?	CREATING	6
7	Demonstrate Conflict Serializability?	UNDERSTANDING	2
8	Discuss View Serializability?	CREATING	6
9	Discuss recoverable schedules?	CREATING	6
10	Discuss cascade less schedules?	CREATING	6
11	Explain the procedure to test for serializability?	UNDERSTANDING	2
12	Explain about different types of locks?	UNDERSTANDING	2
13	Define Deadlock?	REMEMBERING	1
14	Explain about locking protocols?	UNDERSTANDING	2
15	Define Two Phase locking protocol?	REMEMBERING	1
16	Demonstrate the implementation of Isolation?	UNDERSTANDING	2
17	Explain how the locks are implemented?	UNDERSTANDING	2
18	Explain the rules of tree protocol?	UNDERSTANDING	2
19	What is timestamp? Explain different timestamps used by a transaction? [L1:REMEMBERING]	REMEMBERING	1
20	Explain Thomas write rule? [L2: UNDERSTANDING]	UNDERSTANDING	2

21	What are the phases of validation based protocol?	REMEMBERING	1
22	Explain different timestamps used by validation protocol?	UNDERSTANDING	2
23	Define granularity?	REMEMBERING	1
24	Explain about ARIES?	UNDERSTANDING	2

**Long Answer Questions-**

S. No	Question	Blooms Taxony level	Course outcome
1	Explain ACID properties and illustrate them through examples?	UNDERSTANDING	2
2	Discuss How do you implement Atomicity and Durability	CREATING	6
3	Illustrate Concurrent execution of transaction with examples	UNDERSTANDING	2
4	Discuss Serializability in detail?	CREATING	6
5	Discuss two phase locking protocol and strict two phase locking protocols? [L6: CREATING]	CREATING	6
6	Describe Times tamp based locking protocols?	CREATING	6
7	Describe Validation-based locking protocols?	CREATING	6
8	Discuss in detail Multiple Granularity?	CREATING	6
9	Explain in detail storage structure	UNDERSTANDING	2
10	Discuss how do you recover from failure?	CREATING	6
11	Explain Buffer Management?	UNDERSTANDING	2
12	Explain different types of advanced recovery techniques	UNDERSTANDING	2
13	Write in detail about Remote Backup systems?	REMEMBERING	1

**Unit-5**

**Short Answer Questions-**

S.No	Question	Blooms Taxony level	Course outcome
1	Discuss about data on External storage?	CREATING	6



2	What is indexing and what are the different kinds of indexing?	REMEMBERING	1
3	Explain Clustered Indexes?	UNDRESTANDING	2
4	Discuss the Primary and Secondary indexes?	REMEMBERING	1
5	Define Tree Indexing?	REMEMBERING	1
6	Explain Hash based Indexing?	UNDRESTANDING	2
7	Compare different file organizations?	UNDRESTANDING	2
8	Discuss the intuition for Tree Indexes?	CREATING	6
9	Define Indexed Sequential Access Method?	REMEMBERING	1
10	Discuss about Overflow pages and Locking considerations of ISAM?	CREATING	6
11	Discuss the Cost model of Heap files, Sorted files and Clustered files?	CREATING	6
12	Explain the structure of B+ tree?	UNDRESTANDING	2
13	Describe how the insert and delete operations are performed in B+ tree?	CREATING	6
14	Explain how search is performed in B+ tree?	UNDRESTANDING	2
15	Define static Hashing?	REMEMBERING	1
16	Explain extendible hashing?	UNDRESTANDING	2
17	Define linear hashing?	REMEMBERING	1
18	Differentiate between linear and extensible hashing?	UNDRESTANDING	2

### Long Answer Questions-

S.No	Question	Blooms Taxony level	Course outcome
1	Write in detail about hash based indexing and Tree based indexing [L1:REMEMBERING]	REMEMBERING	1
2	Compare I/O costs for all file organizations	UNDRESTANDING	2
3	Explain in detail about ISAM	UNDRESTANDING	2
4	Explain about B+ tree index file?	UNDRESTANDING	2

5	Demonstrate searching a given element in B+ trees? Explain with example?	UNDRESTAN DING	2
6	Illustrate insertion of an element in B+ Tree with example	UNDRESTAN DING	2
7	Illustrate deletion of an element in B+ Tree with example	UNDRESTAN DING	2
8	Write in detail about Static Hashing	UNDRESTAN DING	2
9	Explain in detail about Extendible hashing	UNDRESTAN DING	2
10	Explain in detail about Linear hashing	UNDRESTAN DING	2
11	Compare and contrast Extendible hashing With Linear hashing	UNDRESTAN DING	2

### Objective-Type Questions

#### JNTUH

1) In the relational modes, cardinality is termed as:

- (A) Number of tuples. (B) Number of attributes.  
(C) Number of tables. (D) Number of constraints.

**Ans: A**

2) Relational calculus is a

- (A) Procedural language. (B) Non- Procedural language.  
(C) Data definition language. (D) High level language.

**Ans: B**

3) The view of total database content is

- (A) Conceptual view. (B) Internal view.  
(C) External view. (D) Physical View.

**Ans: A**

4) Cartesian product in relational algebra is

- (A) a Unary operator. (B) a Binary operator.  
(C) a Ternary operator. (D) not Defined.

**Ans: B Cartesian product in relational algebra is a binary operator.(It requires two operands.**

**e.g., P X Q)**

5) DML is provided for

- (A) Description of logical structure of database.  
(B) Addition of new structures in the database system.  
(C) Manipulation & processing of database.  
(D) Definition of physical structure of database system.

**Ans: C DML is provided for manipulation & processing of database.Data stored in the database is processed or manipulated using data manipulation language commands as its name)**

6) 'AS' clause is used in SQL for

- (A) Selection operation. (B) Rename operation.  
(C) Join operation. (D) Projection operation.

**Ans: B 'AS' clause is used in SQL for rename operation. (e.g.,**

**SELECT ENO AS EMPLOYEE\_NO FROM EMP)**

7) ODBC stands for

- (A) Object Database Connectivity.(B) Oral Database Connectivity.
- (C) Oracle Database Connectivity.(D) Open Database Connectivity.

**Ans: D**

8) Architecture of the database can be viewed as

- (A) two levels. (B) four levels.(C) three levels. (D) one level.

**Ans: C**

In a relational model, relations are termed as

- a) Tuples. (B) Attributes(C) Tables. (D) Rows.

10) The database schema is written in

- (A) HLL (B) DML(C) DDL (D) DCL

**Ans: C**

11) In the architecture of a database system external level is the

- (A) physical level. (B) logical level.(C) conceptual level (D) view level.

**Ans: D**

12) An entity set that does not have sufficient attributes to form a primary key is a

- (A) strong entity set. (B) weak entity set.
- (C) simple entity set. (D) primary entity set.

**Ans: B**

13) In a Hierarchical model records are organized as

- (A) Graph. (B) List.(C) Links. (D) Tree.

**Ans: D**

14) In an E-R diagram attributes are represented by

- (A) rectangle. (B) square.(C) ellipse. (D) triangle.

**Ans: C**

15) In case of entity integrity, the primary key may be

- (A) not Null (B) Null(C) both Null & not Null. (D) any value.

**Ans: A**

16) In tuple relational calculus  $P1 \text{ @ } P2$  is equivalent to

- (A)  $\neg P1 \cup P2$  (B)  $P1 \cup P2$ (C)  $P1 \cap P2$  (D)  $P1 \cap \neg P2$

**Ans: A In tuple relational calculus  $P1 \_ P2$  is equivalent to  $\neg P1 \cup P2$ .**

**(The logical implication expression  $A \_ B$ , meaning if A then B,is equivalent to  $\neg A \cup B$ )**

17) The language used in application programs to request data from the DBMS is referred to as the

- (A) DML (B) DDL(C) VDL (D) SDL

**Ans: A**

18) A logical schema

- (A) is the entire database.
- (B) is a standard way of organizing information into accessible parts.
- (C) describes how data is actually stored on disk.
- (D) both (A) and (C)

**Ans: A**

19) In a relation

- (A) Ordering of rows is immaterial
- (B) No two rows are identical
- (C) (A) and (B) both are true

(D) None of these.

**Ans: C**

20) Which of the following is correct:

(A) a SQL query automatically eliminates duplicates.

(B) SQL permits attribute names to be repeated in the same relation.

(C) a SQL query will not work if there are no indexes on the relations

(D) None of these

**Ans: D**

21) It is better to use files than a DBMS when there are

(A) Stringent real-time requirements.

(B) Multiple users wish to access the data.

(C) Complex relationships among data.

(D) All of the above.

**Ans: B**

22) The conceptual model is

(A) dependent on hardware.

(B) dependent on software.

(C) dependent on both hardware and software .

(D) independent of both hardware and software.

**Ans: D**

23) What is a relationship called when it is maintained between two entities?

(A) Unary (B) Binary (C) Ternary (D) Quaternary

**Ans: B**

24) Which of the following operation is used if we are interested in only certain columns of a table?

(A) PROJECTION (B) SELECTION (C) UNION (D) JOIN

**Ans: A**

25) Which of the following is a legal expression in SQL?

(A) SELECT NULL FROM EMPLOYEE;

(B) SELECT NAME FROM EMPLOYEE;

(C) SELECT NAME FROM EMPLOYEE WHERE SALARY = NULL;

(D) None of the above

**Ans: B**

26) The users who use easy-to-use menu are called

(A) Sophisticated end users. (B) Naïve users.

(C) Stand-alone users. (D) Casual end users.

**Ans: B**

27) Which database level is closest to the users?

(A) External (B) Internal (C) Physical (D) Conceptual

**Ans: A**

28) Which are the two ways in which entities can participate in a relationship?

(A) Passive and active (B) Total and partial

(C) Simple and Complex (D) All of the above

**Ans: B**

29) The result of the UNION operation between R1 and R2 is a relation that includes

(A) all the tuples of R1

(B) all the tuples of R2

(C) all the tuples of R1 and R2

(D) all the tuples of R1 and R2 which have common columns

**Ans: D**

30) Which of the following is a comparison operator in SQL?

(A) = (B) LIKE (C) BETWEEN (D) All of the above

**Ans: D**

31) A set of possible data values is called

(A) attribute. (B) degree. (C) tuple. (D) domain.

**Ans: D**

32) Which of the operations constitute a basic set of operations for manipulating relational data?

(A) Predicate calculus (B) Relational calculus

(C) Relational algebra (D) None of the above

**Ans: C**

33) Which of the following is another name for weak entity?

(A) Child (B) Owner (C) Dominant (D) All of the above

**Ans: A**

34) Which of the following database object does not physically exist?

(A) base table (B) index (C) view (D) none of the above

**Ans: C**

### GATE

35) Consider a relational table with a single record for each registered student with the following attributes:

Registration\_number: Unique registration number for each registered student UID:

Unique identity number at the national level for each citizen BankAccount\_number:

Unique account number at the bank. A student can have multiple accounts or join

accounts. This attribute stores the primary account number. Name: Name of the student

Hostel\_room: room number of the hostel Which of the following option is incorrect ?

A. Bank account number is candidate key

B. Registration Number can be a Primary Key

C. UID is Primary Key if students are from the same country.

D. If S is a superkey such that S UID is Null then S UID is also a super key

36) Consider the following schedules involving two transactions. Which one of the following

statements is true ? [GATE 2007]

S1: r1(X); r1(Y); r2(X); r2(Y); w2(Y); w1(X)

S2: r1(X); r2(X); r2(Y); w2(Y); r1(Y); w1(X)

A) s1 is not conflict serializable and s2 is conflict serializable

B) both s1 and s2 are conflict serializable

C) s1 is conflict serializable and s2 is not conflict serializable

D) both s1 and s2 are not conflict serializable

37) Let E1 and E2 be two entities in an E/R diagram with simple single valued attributes. R1 and R2 are two relationships between E1 and E2, where R1 is one to many and R2 is many to many. R1 and R2 do not have any attributes of their own. What is the minimum number of

tables required to represent this situation in the relational model? [GATE 2005] A) 2 B) 4 C) 5 D) 3

38) The order of an internal node in a B+ tree index is the maximum number of children it can have. Suppose that a child pointer takes 6 bytes, the search filed value takes 14 bytes, and the block size is 512 bytes.

What is the order of the internal node ? [GATE 2004] A) 27 B) 24 C) 25 D) 26

**Websites Addresses:**

- 1) <http://nptel.iitm.ac.in/video.php?subjectId=106106093>
- 2) <http://www.sqlcourse.com/index.html>
- 3) <http://www.tutorialspoint.com/sql/>

**Expert details:**

- 1) Dr. S. Srinath working in IIIT Bangalore
- 2) Prof. D. Janaki Ram working in IIT Madras

**Journals (National & International):**

- 1) International Journal of Intelligent Information and Database Systems  
(<http://www.inderscience.com/jhome.php?jcode=ijjids>)
- 2) The Journal of Biological Databases and Curation  
(<http://database.oxfordjournals.org/content/current>)

**List of topics for student's seminar s:**

- 1) Database Management System purpose and applications
- 2) Database Users and Administrators
- 3) History of Database Systems
- 4) Data Models
- 5) File System vs DBMS
- 6) Form of basic SQL query with examples
- 7) Schema Refinement
- 8) Problems caused by Redundancy
- 9) Normalization and Normal Forms
- 10) Transaction Management
- 11) TransactionStates and properties
- 12) Concurrency control and execution

**Case Studies / Small Projects:**

1. Hospital Management System
2. Railway Reservation.