INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad-500043

ELECTRICAL AND ELECTRONIC ENGINEERING

TUTORIAL QUESTION BANK

Course Title	**FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEMS**				
Course Code	ACS553				
Programme	B.Tech				
Semester	VII	EEE | MECH			
Course Type	Core				
Regulation	**IARE - R16**				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	-	3	-	-
Chief Coordinator	Ms. K. Radhika, Assistant Professor,				
Course Faculty	Ms. P Navya, Assistant Professor				

COURSE OBJECTIVES:

The course should enable the students to:	
I.	Discuss the basic database concepts, applications, data models, schemas and instances.
II.	Design Entity Relationship model for a database.
III.	Demonstrate the use of constraints and relational algebra operations.
IV.	Describe the basics of SQL and construct queries using SQL.
V.	Understand the importance of normalization in databases.

COURSE OUTCOMES (COs):

CO 1	Apply relational calculus to solve broad range of query problems.
CO 2	Gain knowledge on transaction processing to maintain consistency and integrity of data in database systems.
CO 3	Describe concurrency control techniques to implement data integrity in database systems.
CO 4	Illustrate various backup and recovery techniques for database systems.
CO 5	Analyze transaction processing , concurrency control, Database recovery techniques

COURSE LEARNING OUTCOMES (CLOs):

ACS553.01	Define the terminology, features, and characteristics of database system.
ACS553.02	Differentiate database systems from file systems.
ACS553.03	Describe Data Models, Schemas, Instances, Three Schema Architecture and DBMS Component Modules.
ACS553.04	Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram.
ACS553.05	Model the real world database systems using Entity Relationship Diagrams (ERD) from the requirements specification.
ACS553.06	Describe basics of the relational data model.
ACS553.07	Transform an information model into a relational database schema and implement schema using data definition language and/or utilities.
ACS553.08	Formulate solutions to a broad range of query problems using relational algebra.
ACS553.09	Apply relational calculus to solve broad range of query problems.
ACS553.10	Illustrate the Functional Dependencies , Inference Rules, Minimal Sets of FDs.
ACS553.11	Understand normalization theory and improve the design by normalization.
ACS553.12	Understand the properties of transaction (ACID).
ACS553.13	Demonstrate serializability by taking various schedules.
ACS553.14	Gain knowledge on transaction processing to maintain consistency and integrity of data in database systems.
ACS553.15	Describe concurrency control techniques to implement data integrity in database systems.
ACS553.16	Illustrate various backup and recovery techniques for database systems.
ACS553.17	Analyze transaction processing, concurrency control, Database recovery techniques.
ACS553.18	Illustrate various lock based protocols.
ACS553.19	Analyze various time stamp based protocols.
ACS553.20	Understand the concepts of update and shadow paging.

	UNIT- I			
	CONCEPTUAL MODELING			
	Part - A (Short Answer Questions)			
S No	QUESTIONS	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcomes (CLOs)
1	List the advantages of DBMS.	Understand	CO 1	ACS553.01
2	List the database Applications.	Remember	CO 1	ACS553.01
3	Define instances and schemas of database.	Remember	CO 1	ACS553.03
4	Discuss Data Independence.	Understand	CO 1	ACS553.02
5	How application programs access data base?	Remember	CO 1	ACS553.01
6	Define (i) Database (ii) DBMS.	Remember	CO 1	ACS553.03
7	What are main components of Database storage structure?	Understand	CO 1	ACS553.03
8	What are the main responsibilities of Transaction management component?	Understand	CO 1	ACS553.03
9	Outline main functions of Query Processor.	Remember	CO 1	ACS553.03
10	Define (i) Entity (ii) Attribute	Remember	CO 1	ACS553.04
11	Define Relationship and Relationship set.	Remember	CO 1	ACS553.04
12	Discuss about Data Definition language.	Understand	CO 1	ACS553.02
13	Discuss about Data Manipulation language.	Remember	CO 1	ACS553.02
14	List responsibilities of a DBA.	Remember	CO 1	ACS553.02
15	Outline the History of Data base Systems.	Understand	CO 1	ACS553.01
16	Discuss how can you change the data in the table.	Understand	CO 1	ACS553.02
17	List various types of attributes.	Remember	CO 1	ACS553.04
18	Discuss How can you alter and destroy tables?	Remember	CO 1	ACS553.02
19	Define a data model? List the types of data model used.	Understand	CO 1	ACS553.03
20	List the levels of data abstraction.	Understand	CO 1	ACS553.02
	Part - B (Long Answer Questions)			
1	Compare and Contrast file Systems with database systems.	Understand	CO 1	ACS553.02
2	Define Data Abstraction and discuss levels of Abstraction.	Remember	CO 1	ACS553.03
3	Discuss about different types of Data models.	Remember	CO 1	ACS553.03
4	Describe the Structure of DBMS.	Understand	CO 1	ACS553.02
5	Discuss additional features of the ER-Models.	Remember	CO 1	ACS553.04
6	Discuss about the Concept Design with the ER Model.	Remember	CO 1	ACS553.05
7	Explain in detail Different types of Data Independence with examples.	Understand	CO 1	ACS553.03
8	Explain different types of database users and write the functions of DBA.	Understand	CO 1	ACS553.02
9	Explain about different types of integrity constraints.	Remember	CO 1	ACS553.07
10	Discuss about Different keys used in data base design with examples.	Remember	CO 1	ACS553.06
11	Distinguish strong entity set with weak entity set? Draw an ER diagram to illustrate weak entity set.	Understand	CO 1	ACS553.03
12	Differentiate relation schema and relational instance. Define the terms arity and degree of relation? What are domain constraints?	Understand	CO 1	ACS553.06
13	List and explain the design issues of entity relationship.	Remember	CO 1	ACS553.04
14	Develop ER-Diagram for a hospital with a set of patients and a set of medical doctors. Associated with each patient a log of the various tests and examinations conducted.	Remember	CO 1	ACS553.05
15	Discuss about Basic Concepts of ER Model in DBMS	Remember	CO 1	ACS553.04
16	Explain ER Model? With its Entity and Entity Set?	Remember	CO 1	ACS553.04
17	Discuss about ER Model and its Relationships?	Remember	CO 1	ACS553.04

18	Discuss about generalization with a neat diagram?	Remember	CO 1	ACS553.04
19	Explain specialization with a neat diagram?	Remember	CO 1	ACS553.04
20	Discuss about aggregation with a neat diagram?	Remember	CO 1	ACS553.04
Part - C (Problem Solving and Critical Thinking Questions)
1	Design an E-R diagram for keeping track of the exploits of your favorite sports team. You should store the matches played, the scores in each match, the players in each match and individual player statistics for each match. Summary statistics should be modeled as derived attributes.	Remember	CO 1	ACS553.05
2	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. Calculate the minimum number of tables required to represent this situation in the relational model.	Understand	CO 1	ACS553.05
3	Analyze and find whether modifications made at conceptual level makes application programs written by users at view level to be modified in a database. Analyze your answer with illustration.	Remember	CO 1	ACS553.05
4	We can convert any weak entity set to strong entity set by simply adding appropriate attributes. Analyze why, then, do we have weak entity sets?	Understand	CO 1	ACS553.04
5	What are the responsibilities of a DBA? If we assume that the DBA is never interested in running his or her own queries, does the DBA still need to understand query optimization? Why?	Remember	CO 1	ACS553.02
6	Describe the structure of a DBMS. If your operating system is upgraded to support some new functions on OS files (e.g., the ability to force some sequence of bytes to disk), which layer(s) of the DBMS would you have to rewrite to take advantage of these new functions.	Remember	CO 1	ACS553.03
7	Why relational model became more popular comparing with other record based models?	Understand	CO 1	ACS553.03
8	Describe the process to convert ER model into relation schema.	Remember	CO 1	ACS553.05
9	Discuss the disadvantages of file processing system, and explain how these disadvantages are avoided in DBMS?	Understand	CO 1	ACS553.02
10	Design a relational database for a university registrar's office the office maintain data about each class, including the instructor, the number of students enrolled, and time and place of the class meetings. For each student - class pair, a grade is recorded.	Remember	CO 1	ACS553.05
UNIT - II
RELATIONAL APPROACH
Part – A (Short Answer Questions)
1	Define relational database query.	Remember	CO 2	ACS553.08
2	State the purpose of SELECT operation in Relational algebra.	Understand	CO 2	ACS553.09
3	State the purpose of PROJECT operation in Relational algebra.	Understand	CO 2	ACS553.09
4	Define a relational calculus.	Understand	CO 2	ACS553.10
5	Discuss the use of rename operation.	Remember	CO 2	ACS553.09
6	Illustrate division operation.	Remember	CO 2	ACS553.09
7	Discuss about expressive power of algebra and calculus.	Understand	CO 2	ACS553.10
8	Define a tuple relational calculus.	Remember	CO 2	ACS553.10
9	Illustrate union operation and intersection operation.	Understand	CO 2	ACS553.09
10	Illustrate cross-product operation.	Remember	CO 2	ACS553.09
11	List set operators in relational algebra.	Understand	CO 2	ACS553.09
12	List aggregate functions used in Relational Algebra.	Remember	CO 2	ACS553.09
13	List out types of joins.	Remember	CO 2	ACS553.09
14	Illustrate set difference operation.	Understand	CO 2	ACS553.09
15	Define a domain relational calculus.	Understand	CO 2	ACS553.10

16	What is Cartesian product	Understand	CO 2	ACS553.10
17	What is joins operations?	Understand	CO 2	ACS553.10
18	What is renaming operations?	Understand	CO 2	ACS553.10
19	What are natural join operations?	Understand	CO 2	ACS553.10
20	What are division operations?	Understand	CO 2	ACS553.10
	Part - B (Long Answer Questions)			
1	Illustrate different set operations in Relational algebra with an example.	Understand	CO 2	ACS553.09
2	Define Join. Explain different types of joins in relational algebra.	Remember	CO 2	ACS553.09
3	Discuss about Tuple Relational calculus in detail.	Remember	CO 2	ACS553.10
4	Discuss the difference between Relational Algebra and Relational Calculus.	Remember	CO 2	ACS553.10
5	Illustrate Extended relational operations with examples.	Understand	CO 2	ACS553.09
6	Discuss about procedural langauge in SQL.	Remember	CO 2	ACS553.06
7	Discuss structure of query in TRC with example.	Understand	CO 2	ACS553.05
8	Write a query in TRC to find the names of sailors who have reserved both a red and green boat? Write a query in TRC to find the names of sailors who have reserved all boats?	Remember	CO 2	ACS553.10
9	Write a query in TRC to find the names of sailors who have reserved a red boat? Write a query in TRC to find the names of sailors who have not reserved a red boat?	Remember	CO 2	ACS553.10
10	Write a TRC query to find the names of sailors who have reserved boat 103?	Remember	CO 2	ACS553.10
11	Let R=(ABC) and S=(DEF) let r(R) and s(S) both relations on schema R and S. Give an expression in the Tuple relational calculus that is equivalent to each of the following. $\sigma B=19(r)$ $\prod A,F,(\sigma C=D(r \times s))$ $r \cap s$	Remember	CO 2	ACS553.10
12	Consider the following schema instructor (ID, name, dept_name), teaches (ID, course_id, sec_id, semester, year), section (course_id, sec_id, semester, year), student (ID, name, dept_name), takes (ID, course_id, sec_id, semester, year, grade) 1. Write the following query in RA,TRC and DRC 2. Find the names of the instructors not teaching any course.	Remember	CO 2	ACS553.10
13	Find the names of sailors who have reserved a green boat	Remember	CO 2	ACS553.10
14	Find sid's of sailors who've reserved a red and a green boat Find sid's of all sailors who've reserved red boat but not green boat.	Remember	CO 2	ACS553.10
15	Find sid's of all sailors who have a rating of 10 or reserved boat 104 Find sailors whose rating is better than every sailor called Horatio.	Remember	CO 2	ACS553.10
16	Find the sailors with the highest rating Find the names of all branches in the loan relation.	Remember	CO 2	ACS553.10
17	Write about set operations with syntax and examples	Remember	CO 2	ACS553.10
18	Write about Division operation in relational algebra with example	Remember	CO 2	ACS553.10
19	Write about join operations with syntax and examples	Remember	CO 2	ACS553.10
20	Differentiate natural join and inner join operations with examples	Remember	CO 2	ACS553.10

	Part - C (Problem Solving and Critical Thinking Questions)			
1	For the following relational database, give the expressions in RA. student(stuno, stuname, major,level,age) Class(Classname, meets at, Room, fid) Faculty(fid,fname,deptid) 1. Find the names of all uniors (level = JR) Who are enrolled in a class taught by I.Teach. 2. Find the age of the oldest student who is either a history major or is enrolled in a course taught by I.Tech? 3. Find the names of all classes that either meet in room R128 or have five or more students enrolled?	Understand	CO 2	ACS553.07
2	Given the relations employee(name,salary,deptno) department (deptno, deptname, address) Solve which query cannot be expressed using the basic relational algebra operations.	Remember	CO 2	ACS553.09
3	Write Query in relational algebra to find second highest salary of Employee from Employee relation.	Understand	CO 2	ACS553.09
4	Consider the following schema given. The primary keys are underlined. Sailors(sailor-id, sailor-name, sailor-rating, sailor-age) Boats(boat-id, boat-name, boat-color) Reserves(sailor-id, boat-id, day) Write queries in Relational Algebra. 1. Find the names of sailors who have reserved boat number 120 2. Find the names of sailors who have reserved a green boat 3. Find the names of sailors who have not reserved a green boat 4. Find the names of sailors with the highest rating	Remember	CO 2	ACS553.09
5	Consider the following database. Employee (employee-name, street, city) Works (employee-name, company-name, salary) Company (company-name, city) Manager (employee-name, manager-name) 1. Give an expression in the relational algebra, the tuple relational calculus, for the following query. 2. Find the names of all employees who work for estate bank.	Understand	CO 2	ACS553.10
6	Write the RA expression for the following Queries. Sailor Schema (sailor id, Sailorname, Rating.Age) Reserves (Sailor id, Boat id, Day) Boat Schema (Boat id, Boatname.color) 1. Find the names of sailors who have reserved boat name 103; 2. Find the sailor id of sailors who have reserved a red boat; 3. Find the colors of boats reserved by the sailor rubber. 4. Find the names of sailors who have reserved a red boat.	Understand	CO 2	ACS553.09
7	For the following relational database, give the expressions in RA. student(stuno, stuname, major,level,age) Class(Classname, meets at, Room, fid) Faculty(fid,fname,deptid) 1. Find the names of all uniors (level = JR) Who are enrolled in a class taught by I.Teach. 2. Find the age of the oldest student who is either a history major or is enrolled in a course taught by I.Tech?	Remember	CO 2	ACS553.09

8	Sailor Schema (sailor id, Sailorname, Rating.Age) Reserves (Sailor id, Boat id, Day)Boat Schema (boat id, Boatname, color)
	   1. Find the age of the youngest sailor for each rating level?
	   2. Find the age of the youngest sailor who is eligible to vote for each rating level with at lead two such sailors?
	   3. Find the No.of reservations for each red boat?
	   4. Find the average age of sailor for each rating level that at least 2 sailors.
		Remember	CO 2	ACS553.09

9	How the statement "the sids of suppliers who supply some red or green part" can be represented in the form of relational algebra and tuple relational calculus from the above relations. Suppliers scheme: Suppliers(sid: INTEGER, sname: STRING, address: STRING) Parts(pid: INTEGER, pname: STRING, color: STRING) Catalog(sid: INTEGER, pid: INTEGER, cost: REAL)	Remember	CO 2	ACS553.09
10	Given the relations employee(name,salary,deptno) department (deptno, deptname, address) Solve which query cannot be expressed using the basic sql operations.	Remember	CO 2	ACS553.09

<table>
<tr><td colspan="5" align="center">UNIT - III</td></tr>
<tr><td colspan="5" align="center">BASIC SQL QUERY AND NORMALIZATION</td></tr>
<tr><td colspan="5" align="center">Part - A (Short Answer Questions)</td></tr>
<tr><td>1</td><td>Illustrate Create statement with example.</td><td>Remember</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>2</td><td>Demonstrate DML statements in SQL Give an example.</td><td>Remember</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>3</td><td>Discuss various Aggregate functions used in SQL.</td><td>Understand</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>4</td><td>Define primary key.</td><td>Remember</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>5</td><td>State the syntax of foreign key constraint.</td><td>Remember</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>6</td><td>What are the data types in SQL?</td><td>Understand</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>7</td><td>Write a SQL statement to find employees whose commission is greater than their salaries.</td><td>Understand</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>8</td><td>Write a SQL statement to find the employees who are not clerks, analysts or salesmen.</td><td>Understand</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>9</td><td>Write a SQL statement to display the names of all the employees and position where the string 'AR' occurs in the name.</td><td>Understand</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>10</td><td>List out all classes in select statement.</td><td>Remember</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>11</td><td>Define redundancy and its problems</td><td>Remember</td><td>CO 3</td><td>ACS553.10</td></tr>
<tr><td>12</td><td>Define functional dependency. Why are some functional dependencies trivial?</td><td>Remember</td><td>CO 3</td><td>ACS553.10</td></tr>
<tr><td>13</td><td>Discuss normalization.</td><td>Understand</td><td>CO 3</td><td>ACS553.10</td></tr>
<tr><td>14</td><td>Differentiate between trivial and nontrivial dependencies.</td><td>Remember</td><td>CO 3</td><td>ACS553.10</td></tr>
<tr><td>15</td><td>If relation R consists of only simple candidate keys then R should be in which normal form?</td><td>Understand</td><td>CO 3</td><td>ACS553.10</td></tr>
<tr><td>16</td><td>Define First Normal Form.</td><td>Understand</td><td>CO 3</td><td>ACS553.11</td></tr>
<tr><td>17</td><td>Define Second Normal Form.</td><td>Remember</td><td>CO 3</td><td>ACS553.11</td></tr>
<tr><td>18</td><td>Define Third Normal Form.</td><td>Remember</td><td>CO 3</td><td>ACS553.11</td></tr>
<tr><td>19</td><td>Define Fourth Normal Form.</td><td>Understand</td><td>CO 3</td><td>ACS553.11</td></tr>
<tr><td>20</td><td>Identify the Normal Forms of the relation R .
R(ABCD) FD : {A → B, B → C}</td><td>Understand</td><td>CO 3</td><td>ACS553.11</td></tr>
<tr><td colspan="5" align="center">Part – B (Long Answer Questions)</td></tr>
<tr><td>1</td><td>Define a View in SQL. Write about updates on views.</td><td>Remember</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>2</td><td>Illustrate Group by and Having clauses with examples.</td><td>Understand</td><td>CO 3</td><td>ACS553.07</td></tr>
<tr><td>3</td><td>Discuss about Complex integrity constraints in SQL.</td><td>Remember</td><td>CO 3</td><td>ACS553.07</td></tr>
</table>

4	Write a nested query to find the names of sailors who have reserved both a red and green boat. Write a nested query to find the names of sailors who have reserved all boats.	Remember	CO 3	ACS553.07
5	Discuss various DML statements in SQL and explain with examples.	Remember	CO 3	ACS553.07
6	Explain referential integrity constraint , unique key. Is unique +not null is same as primary key	Remember	CO 3	ACS553.07
7	What are nested queries? What is correlation in nested queries? Explain.	Remember	CO 3	ACS553.07

8	Consider the following schema instructor (ID, name, dept_name), teaches (ID, course_id, sec_id, semester, year), section (course_id, sec_id, semester, year), student (ID, name, dept_name),
	takes (ID, course_id, sec_id, semester, year, grade)
	Write the following queries in SQL
	    1. Find the names of the students not registered in any section
	    2. Find the total number of courses taught department wise
	    3. Find the total number of courses registered department wise.
		Remember	CO 3	ACS553.07

9	Define decomposition and how does it address redundancy? Discuss the problems that may be caused by the use of decompositions.	Remember	CO 3	ACS553.11
10	Define functional dependencies. How are primary keys related to FD's?	Understand	CO 3	ACS553.11
11	Define normalization? Explain 1NF, 2NF, 3NF Normal forms.	Remember	CO 3	ACS553.11
12	Describe properties of decompositions.	Remember	CO 3	ACS553.11
13	Explain about Schema refinement in Database design.	Understand	CO 3	ACS553.11
14	Illustrate multivalued dependencies and Fourth normal form with example.	Remember	CO 3	ACS553.11
15	Compute the closer of the following set of functional dependencies for a relation scheme. R(A,B,C,D,E) F={ A–>BC,CD–>E,B–>D,E–> A} List out the candidate keys of R.	Remember	CO 3	ACS553.11
16	Write a note on INSERT, DELETE, UPDATE commands in SQL	Remember	CO 3	ACS553.07

17	R(ABCD) is relation with FD set {C→D, C→A, B→C}. Find
	    i. Candidate Key
	    ii. Normal form that can be existed
	    iii. Decompose in BCNF relations
		Remember	CO 3	ACS553.11

18	Explain the key constraints Primary key and Foreign key with examples	Remember	CO 3	ACS553.07
19	Find pairs of sids such that the supplier with the first sid charges more for some part than the supplier with the second sid.	Remember	CO 3	ACS553.07
20	Find the sids of suppliers who supply some red part and some green part	Remember	CO 3	ACS553.07
	Part – C (Problem Solving and Critical Thinking)			

1	Write the SQL expression for the following Queries. Sailor Schema (sailor id, Sailorname, Rating.Age)
	Reserves (Sailor id, Boat id, Day)
	Boat Schema (Boat id, Boatname.color)
	    1. Find the names of sailors who have reserved boat name 103;
	    2. Find the sailor id of sailors who have reserved a red boat;
		Understand	CO 3	ACS553.07

	3. Find the colors of boats reserved by the sailor rubber? 4. Find the names of sailors who have reserved a red boat?			
2	For the following relational database, give the expressions in SQL. student(stuno, stuname, major,level,age) Class(Classname, meets at, Room, fid) Faculty(fid,fname,deptid) 1. Find the names of all uniors (level = JR) Who are enrolled in a class taught by I.Teach? 2. Find the age of the oldest student who is either a history major or is enrolled in a course taught by I.Tech? 3. Find the names of all classes that either meet in room R128 or have five or more students enrolled?	Remember	CO 3	ACS553.07
3	Write the SQL expressions for the following relational database. sailor schema (sailor id, Boat id, sailorname, rating, age) Recerves (Sailor id, Boat id, Day) Boat Schema (boat id, Boatname, color) 1. Find the age of the youngest sailor for each rating level? 2. Find the age of the youngest sailor who is eligible to vote for each rating level with at lead two such sailors? 3. Find the No.of reservations for each red boat?	Understand	CO 3	ACS553.07
4	Consider the following schema: Suppliers(sid: integer, sname: string, address: string) Parts(pid: integer, pname: string, color: string) Catalog(sid: integer, pid: integer, cost: real) The Catalog relation lists the prices charged for parts by Suppliers. Answer the following questions: Give an example of an updatable view involving one relation. 1. Give an example of an updatable view involving two relations. 2. Give an example of an insertable-into view that is updatable. 3. Give an example of an insertable-into view that is not updatable.	Remember	CO 3	ACS553.07
5	Consider following relations in DB and solve the queries: Student (GR_NO, name, gender, address, city, class) Marks (GR_NO, sub1, sub2, sub3, total, per) 1. Display the student of 'FYBCA' and 'TYBCA'. (2 mark each) 2. Display the marks of student whose gr_no>100. 3. Count the no of girls in FYBCA. 4. count the no: of first class students in TYBCA.	Remember	CO 3	ACS553.07
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6	Consider a relation scheme R = (A, B, C, D, E, H) on which the following functional dependencies hold: {A–>B, BC–> D, E–>C, D–>A}. Write the candidate keys of R.	Remember	CO 3	ACS553.07
7	Consider the following relational schemes for a library database: Book (Title, Author, Catalog_no, Publisher, Year, Price) Collection (Title, Author, Catalog_no) the following are functional dependencies: Title Author --> Catalog_no Catalog_no --> Title Author Publisher Year Publisher Title Year --> Price Assume {Author, Title} is the key for both schemes. Apply the appropriate normal form for Book Cancellation.	Remember	CO 3	ACS553.07
8	Consider a schema R (A, B, C, D) and functional dependencies A -> B and C ->D.Solve and find whether the decomposition of R into R1 (A, B) and R2(C, D) belongs to which one or both (dependency preserving and loss less join)?	Understand	CO 3	ACS553.11

9	Show that: if α → β and α → γ then α → βγ.	Remember	CO 3	ACS553.11
10	Consider the relation R(A,B,C,D,E,F) and FDs A → BC, F → A, C → AD → E, E → D AD is the decomposition of R into R1(A,C,D) R2 (B,C,D) and R3 (E,F,D) loss less? Explain the requirement of Lossless decomposition.	Understand	CO 3	ACS553.11
11	Define BCNF. How does BCNF differ from 3NF? Explain with an example.	Remember	CO 3	ACS553.11
12	Suppose the schema R(A,B,C,D,E) is decomposed into (A,B,C) and (A,D,E)show that the decomposition is not a dependency preserving decomposition if the following set of FD hold A→ BC, CD→ E, B→ D, E→ A.	Understand	CO 3	ACS553.11
13	What is the need of Normalization in relational Database design? Explain "Dependency Preservation" in Database design?	Remember	CO 3	ACS553.11
14	Suppose that we have the following three tuples in a legal instance of a relation schema S with three attributes ABC (listed in order): (1,2,3), (4,2,3), and (5,3,3). Which of the following dependencies can you infer does not hold over schema S? (a) A → B, (b) BC → A, (c) B → C	Understand	CO 3	ACS553.11
UNIT - IV				
TRANSACTION MANAGEMENT				
Part – A (Short Answer Questions)				
1	Define a Transaction. List the properties of transaction?	Remember	CO 4	ACS553.12
2	Discuss different phases of transaction?	Remember	CO 4	ACS553.13
3	Discuss recoverable schedules?	Remember	CO 4	ACS553.12
4	Discuss cascade less schedules?	Understand	CO 4	ACS553.12
5	Define Two Phase Commit protocol?	Remember	CO 4	ACS553.12
6	Demonstrate the implementation of Isolation?	Remember	CO 4	ACS553.12
7	Discuss the Procedure to test Serializability?	Understand	CO 4	ACS553.13
8	List different types of locks and write about compatibility among them?	Remember	CO 4	ACS553.12
9	Discuss about Failure Classification?	Remember	CO 4	ACS553.13
10	Define a checkpoint?	Understand	CO 4	ACS553.12
11	Discuss the failures that can occur with loss of Non-volatile storage?	Remember	CO 4	ACS553.12
12	Demonstrate Conflict Serializability?	Understand	CO 4	ACS553.13
13	Discuss View Serializability?	Remember	CO 4	ACS553.14
14	Explain the distinction between serial schedule and serializable schedule with examples?	Understand	CO 4	ACS553.12
15	How Consistency of a transaction preserved?	Understand	CO 4	ACS553.13
16	When two instructions are conflict to each other?	Understand	CO 4	ACS553.14
17	Indicate the importance of Isolation property of a Transaction?	Understand	CO 4	ACS553.12
18	State the property atomicity of a Transaction?	Understand	CO 4	ACS553.13
19	Explain about transaction states with a neat diagram?	Understand	CO 4	ACS553.12
20	Discuss about Schedule and Recoverability?	Understand	CO 4	ACS553.13
Part – B (Long Answer Questions)				
1	Explain ACID properties and Illustrate them through examples?	Remember	CO 4	ACS553.12
2	Discuss How do you implement Atomicity and Durability?	Understand	CO 4	ACS553.13
3	Illustrate Concurrent execution of transaction with examples?	Remember	CO 4	ACS553.12
4	Discuss Serializability in detail with an example?	Remember	CO 4	ACS553.13
5	Discuss two phase locking protocol and strict two phase locking protocols?	Understand	CO 4	ACS553.14
6	Describe Timestamp based locking protocols?	Remember	CO 4	ACS553.12
7	Describe Validation-based locking protocols?	Remember	CO 4	ACS553.13

8	Discuss in detail Multiple Granularity?	Understand	CO 4	ACS553.14
9	Explain in detail Storage structure?	Remember	CO 4	ACS553.12
10	Discuss Deferred database modification and Immediate database modification?	Remember	CO 4	ACS553.13
11	Discuss how you recover from Concurrent transactions?	Remember	CO 4	ACS553.13
12	Explain Buffer Management with a neat diagram?	Understand	CO 4	ACS553.12
13	Explain different types of Advanced Recovery Techniques.	Remember	CO 4	ACS553.13
14	Write in detail about Remote Backup systems?	Understand	CO 4	ACS553.12
15	Explain the Check point log based recovery scheme for recovering the database.	Remember	CO 4	ACS553.12
16	When a transaction is rolled back under timestamp ordering, it is assigned a new timestamp. Why can it not simply keep its old timestamp?	Remember	CO 4	ACS553.13
17	Consider the following schedule S1. S1=r3(y), r3(z), r1(x), w1(x), w3(y), w3(z), r2(z), r1(y), w1(y), r2(y), w2(y), r2(x), w2(x) Check whether S1 is serializable or not. If it is serializable, write its equivalent serial schedule.	Remember	CO 4	ACS553.13
18	With a neat diagram explain NO-UNDO/NO-REDO recovery mechanism in transaction processing?	Remember	CO 4	ACS553.13
19	Explain the serializable and non serializable schedule?	Remember	CO 4	ACS553.13
20	Suppose that there is a database system that never fails. Analyze whether a recovery manager required for this system.	Remember	CO 4	ACS553.12
Part – C (Problem Solving and Critical Thinking)				
1	Consider the following transactions with data items P and Q initialized to zero: T1: read(P); read(Q); If P=0 then Q:=Q+1; write(Q); T2: read(Q); read(P); If Q=0 then P:=P+1; write(P); Solve and find any non-serial interleaving of T1 and T2 for concurrent execution leads to a serializable schedule or non serializable schedule. Explain.	Understand	CO 4	ACS553.14
2	Analyze which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock?	Remember	CO 4	ACS553.14
3	Suppose that we have only two types of transactions, T1 and T2. Transactions preserve database consistency when run individually. We have defined several integrity constraints such that the DBMS never executes any SQL statement that brings the database into an inconsistent state. Assume that the DBMS does not perform any concurrency control. Give an example schedule of two transactions T 1 and T 2 that satisfies all these conditions, yet produces a database instance that is not the result of any serial execution of T 1 and T 2.	Understand	CO 4	ACS553.14
4	Suppose that there is a database system that never fails. Analyze whether a recovery manager required for this system.	Remember	CO 4	ACS553.14
5	Explain the 'Immediate database Modification' technique for using the Log to Ensure transaction atomicity despite failures.	Remember	CO 4	ACS553.12

6	Consider the following actions taken by transaction T1 on database objects X and Y
	: R(X), W(X), R(Y), W(Y)
	Give an example of another transaction T 2 that, if run concurrently to transaction T without some form of concurrency control, could interfere with T 1.
	    1. Explain how the use of Strict 2PL would prevent interference between the two transactions.
	    2. Strict 2PL is used in many database systems. Give two reasons for its popularity.
		Remember	CO 4	ACS553.12

7	Suppliers(sid: integer, sname: string, address: string) Parts(pid: integer, pname: string, color: string) Catalog(sid: integer, pid: integer, cost: real)
	The Catalog relation lists the prices charged for parts by Suppliers.
	For each of the following transactions, state the SQL isolation level that you would use and explain why you chose it.
	    1. A transaction that adds a new part to a supplier's catalog.
	    2. A transaction that increases the price that a supplier charges for a part.
		Understand	CO 4	ACS553.13

8	Answer each of the following questions briefly.
	The questions are based on the following relational schema:
	Emp(eid: integer, ename: string, age: integer, salary: real, did: integer) Dept(did: integer, dname: string, floor: integer)
	and on the following update command: replace (salary = 1.1 * EMP.salary) where EMP.ename = 'Santa'
	    1. Give an example of a query that would conflict with this command (in a concurrency control sense) if both were run at the same time.
	    2. Explain what could go wrong, and how locking tuples would solve the problem.
	    3. Give an example of a query or a command that would conflict with this command, such that the conflict could not be resolved by just locking individual tuples or pages but requires index locking.
		Remember	CO 4	ACS553.14

9	Suppose that we have only two types of transactions, T 1 and T 2. Transactions preserve database consistency when run individually. We have defined several integrity constraints such that the DBMS never executes any SQL statement that brings the database into an inconsistent state. Assume that the DBMS does not perform any concurrency control. Give an example schedule of two transactions T 1 and T 2 that satisfies all these conditions, yet produces a database instance that is not the result of any serial execution of T 1 and T 2.	Understand	CO 4	ACS553.12
10	What are the roles of the Analysis, Redo, and Undo phases in ARIES?	Understand	CO 4	ACS553.13
UNIT - V			
CONCURRENCY CONTROL			
Part - A (Short Answer Questions)			
1	State the functions of Growing Phase in two phase locking protocol.	Understand	CO 4	ACS553.18
2	State the functions of Shrinking Phase in two phase locking protocol.	Understand	CO 4	ACS553.18
3	Identify when a Transaction system is in dead lock state?	Understand	CO 4	ACS553.18
4	What is Immediate modification?	Understand	CO 4	ACS553.18
5	What is growing phase?	Understand	CO 4	ACS553.16

6	What is shrinking phase?	Understand	CO 4	ACS553.18
7	What is granularity?	Understand	CO 4	ACS553.18
8	What is intention-shared (IS)?	Understand	CO 4	ACS553.18
9	What is intention-exclusive (IX)?	Understand	CO 4	ACS553.18
10	What is shared & intention-exclusive (SIX)?	Understand	CO 4	ACS553.18
11	What is timestamp?	Understand	CO 4	ACS553.18
12	Define Timestamp Ordering Protocol?	Understand	CO 4	ACS553.19
13	What is log?	Understand	CO 4	ACS553.19
14	What is deferred modification?	Understand	CO 4	ACS553.16
15	What is blind write?	Understand	CO 4	ACS553.16
16	Describe immediate database modification	Understand	CO 4	ACS553.16
17	Describe deferred database modification.	Understand	CO 4	ACS553.16
18	What is transaction failure?	Understand	CO 4	ACS553.15
19	Identify when a Transaction system is in dead lock state?	Understand	CO 4	ACS553.15
20	What is locking protocol?	Understand	CO 4	ACS553.18
Part - B (Long Answer Questions)				
1	Why do you need concurrency in Transactions?	Understand	CO 4	ACS553.15
2	Discuss States of Transactions With a neat diagram?	Understand	CO 4	ACS553.15
3	What is Concurrency Control? Potential problems of Concurrency	Understand	CO 4	ACS553.15
4	Why use Concurrency method with an example?	Understand	CO 4	ACS553.17
5	Discuss Concurrency Control Protocols with an example?	Understand	CO 4	ACS553.17
6	Discuss Lock-based Protocols with an example?	Understand	CO 4	ACS553.18
7	Discuss Two Phase Locking (2PL) Protocol with an example?	Understand	CO 4	ACS553.18
8	Write about Strict Two-Phase Locking Method?	Understand	CO 4	ACS553.18
9	Discuss Timestamp-based Protocols with an example?	Understand	CO 4	ACS553.19
10	Write about Characteristics of Good Concurrency Protocol?	Understand	CO 4	ACS553.19
11	Discuss Timestamp Ordering Protocol?	Understand	CO 4	ACS553.19
12	Discuss Crash Recovery with an example?	Understand	CO 4	ACS553.16
13	Discuss Log-based Recovery with an example?	Understand	CO 4	ACS553.16
14	Discuss Recovery with Concurrent Transactions with an example	Understand	CO 4	ACS553.17
15	Write about the Need for Concurrency Control	Understand	CO 4	ACS553.17
16	What is the Need for Recovery of data?	Understand	CO 4	ACS553.16
17	Write about Recovery Facilities with an example	Understand	CO 4	ACS553.16
18	Write about Complete Schedules with an example	Understand	CO 4	ACS553.15
19	Discuss the relation between various types of schedules?	Understand	CO 4	ACS553.16
20	Write about shadow paging with a neat diagram?	Understand	CO 4	ACS553.20
Part – C (Problem Solving and Critical Thinking)				
1	Write about conflict operations with an example?	Understand	CO 5	ACS553.15
2	Discuss Conflict serializable schedule with an example?	Understand	CO 5	ACS553.14
3	Discuss View serializable schedule with an example?	Understand	CO 5	ACS553.15
4	Write about Recoverable schedule with an example?	Understand	CO 5	ACS553.16
5	Discuss Cascadless schedule with an example?	Understand	CO 5	ACS553.16
6	How Should Lock be Used?	Understand	CO 5	ACS553.17
7	How should timestamps be used?	Understand	CO 5	ACS553.18
8	How to test if two schedules are View Equal or not?	Understand	CO 5	ACS553.17
9	Explain the time stamp ordering concurrency control technique with an example.	Understand	CO 5	ACS553.17
10	Consider the following schedule: S:R1(A), W2(A), Commit2, W1(A), W3(A), Commit3, Commit1 The find Schedule is serializable schedule and is not strict recoverable schedule.	Understand	CO 5	ACS553.17

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