INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

Computer Science and Engineering

TUTORIAL QUESTION BANK

Course Name	:	**DATABASE MANAGEMENT SYSTEMS**
Course Code	:	ACS005
Class	:	B. Tech IV Semester
Branch	:	Computer Science and Engineering
Academic Year	:	2018– 2019
Course Faculty	:	Dr. K Suvarchala , Professor, CSE Ms. K Mayuri,Assistant Professor,CSE

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 LEARNING OUTCOMES:

At the end of the course the students are able to:

CLOs	Description
ACS005.01	Define the terminology, features, and characteristics of database system
ACS005.02	Differentiate database systems from file systems by enumerating various features provided by database systems.
ACS005.03	Describe Data Models, Schemas, Instances, Three Schema Architecture and DBMS Component Modules
ACS005.04	Analyze an information storage problem and derive an information model expressed in the form of an entity relation diagram.
ACS005.05	Model the real world database systems using Entity Relationship Diagrams (ERD) from the requirements specification.
ACS005.06	Describe basics of the relational data model.
ACS005.07	Define and illustrate the Relational Data Model, Constraints and Schemas
ACS005.08	Transform an information model into a relational database schema and implement schema using data definition language and/or utilities.
ACS005.09	Formulate solutions to a broad range of query problems using relational algebra.
ACS005.10	Apply relational calculus to solve broad range of query problems.
ACS005.11	Illustrate the Functional Dependencies , Inference Rules, Minimal Sets of FDs
ACS005.12	Understand normalization theory and criticize a database design and improve the design by normalization.
ACS005.13	Explain various Normal Forms and Apply to normalize a database.
ACS005.14	Understand the SQL Data definition statements to formulate solutions to a broad range of query and data update problems
ACS005.15	Use an SQL interface of a multi-user relational DBMS package to create, secure, populate, maintain, and query a database.
ACS005.16	Use SQL queries for data aggregation, calculations, views, sub-queries, embedded queries, manipulation,

	and report generation.
ACS005.17	Demonstrate PL/SQL including stored procedures, stored functions, cursors, packages.
ACS005.18	Gain knowledge on transaction processing to maintain consistency and integrity of data in database systems.
ACS005.19	Describe concurrency control techniques to implement data integrity in database systems.
ACS005.20	Illustrate various backup and recovery techniques for database systems.
ACS005.21	Analyze transaction processing , concurrency control, Database recovery techniques
ACS005.22	Define disk storage devices, files of records, unordered files, ordered files and hashed files and organizations
ACS005.23	Familiar with basic database storage structures and access techniques- file and page organizations, indexing methods
ACS005.24	Illustrate various operations in implementing data indices using various hashing techniques.
ACS005.25	Possess the knowledge and skills for employability and to succeed in national and international level competitive examinations.

TUTORIAL QUESTION BANK

UNIT – I Conceptual Modeling			
PART – A (Short Answer Questions)			
Q.No	Questions	Blooms Taxonomy Level	Course Learning Outcomes (CLOs)
1.	List the advantages of DBMS.	Understand	CACS005.01
2.	List the database Applications.	Remember	CACS005.01
3.	Define instances and schemas of database.	Remember	CACS005.03
4.	Discuss Data Independence.	Understand	CACS005.02
5.	How application programs access data base?	Remember	CACS005.01
6.	Define (i) Database (ii) DBMS.	Remember	CACS005.03
7.	What are main components of Database storage structure?	Understand	CACS005.03
8.	What are the main responsibilities of Tnsaction management component?	Understand	CACS005.03
9.	Outline main functions of Query Processor.	Remember	CACS005.03
10.	Define (i) Entity (ii) Attribute	Remember	CACS005.04
11.	Define Relationship and Relationship set.	Remember	CACS005.04
12.	Discuss about Data Definition language.	Understand	CACS005.02
13.	Discuss about Data Manipulation language.	Remember	CACS005.02
14.	List responsibilities of a DBA.	Remember	CACS005.02
15.	Outline the History of Data base Systems.	Understand	CACS005.01
16.	Discuss how can you change the data in the table.	Understand	CACS005.02
17.	List various types of attributes.	Remember	CACS005.04
18.	Discuss How can you alter and destroy tables?.	Remember	CACS005.02
19.	Define a data model? List the types of data model used.	Understand	CACS005.03
20.	List the levels of data abstraction.	Understand	CACS005.02
PART – B (Long Answer Questions)			
1.	Compare and Contrast file Systems with database systems.	Understand	CACS005.02
2.	Define Data Abstraction and discuss levels of Abstraction.	Remember	CACS005.03
3.	Discuss about different types of Data models.	Remember	CACS005.03
4.	Describe the Structure of DBMS.	Understand	CACS005.02
5.	Discuss additional features of the ER-Models.	Remember	CACS005.04
6.	Discuss about the Concept Design with the ER Model.	Remember	CACS005.05
7.	Explain in detail Different types of Data Independence with examples.	Understand	CACS005.03
8.	Explain different types of database users and write the functions of DBA.	Understand	CACS005.02
9.	Explain about different types of integrity constraints.	Remember	CACS005.07
10.	Discuss about Different keys used in data base design with examples.	Remember	CACS005.06
11.	Distinguish strong entity set with weak entity set? Draw an ER diagram to illustrate weak entity set.	Understand	CACS005.03

12.	Differentiate relation schema and relational instance. Define the terms arity and degree of s relation? What are domain constraints.	Understand	CACS005.06
13.	List and explain the design issues of entity relationship.	Remember	CACS005.04
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	CACS005.05
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	CACS005.05
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 theirown. Calculate the minimum number of tables required to represent this situation in the relational model.	Understand	CACS005.05
3	Analyze and find whether modifications made at conceptual level makes application programs written by users at viewlevel to be modified in a database. Analyze your anser with illustration.	Remember	CACS005.05
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	CACS005.04
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	CACS005.02
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	CACS005.03
7	Why relational model became more popular comparing with other record based models?	Understand	CACS005.03
8	Describe the process to convert ER model into relation schema.	Remember	CACS005.05
9	Discuss the disadvantages of file processing system, and explain how these disadvantages are avoided in DBMS?	Understand	CACS005.02
10	Design a relational database for a university registrar's office the office maintain data about each class, including the instructor, the number of sudents enrolled,and time and place of the class meatings. For each student - class pair, a grade is recorded.	Remember	CACS005.05
UNIT – II **Relational Approach**			
PART – A (Short Answer Questions)			
1.	Define relational database query.	Remember	CACS005.08
2.	State the purpose of SELECT operation in Relational algebra.	Understand	CACS005.09
3.	State the purpose of PROJECT operation in Relational algebra.	Understand	CACS005.09
4.	Define a relational calculus.	Understand	CACS005.10
5.	Discuss the use of rename operation.	Remember	CACS005.09
6.	Illustrate division operation.	Remember	CACS005.09
7.	Discuss about expressive power of algebra and calculus.	Understand	CACS005.10
8.	Define a tuple relational calculus.	Remember	CACS005.10
9.	Illustrate union operation and intersection operation.	Understand	CACS005.09
10.	Illustrate cross-product operation.	Remember	CACS005.09
11.	List set operators in relational algebra.	Understand	CACS005.09
12.	List aggregate functions used in Relational Algebra.	Remember	CACS005.09
13.	List out types of joins.	Remember	CACS005.09
14.	Illustrate set difference operation.	Understand	CACS005.09
15.	Define a domain relational calculus.	Understand	CACS005.10
PART – B (Long Answer Questions)			
1	Illustrate different set operations in Relational algebra with an example.	Understand	CACS005.09
2	Define Join. Explain different types of joins in relational algebra.	Remember	CACS005.09
3	Discuss about Domain Relational calculus in detail.	Remember	CACS005.10
4	Discuss the difference between Relational Algebra and Relational Calculus.	Remember	CACS005.10

<table>
<tr><td>5</td><td>Illustrate Extended relational operations with examples.</td><td>Understand</td><td>CACS005.09</td></tr>
<tr><td>6</td><td>Discuss about Complex integrity constraints in SQL.</td><td>Remember</td><td>CACS005.06</td></tr>
<tr><td>7</td><td>Discuss structure of query in TRC and DRC with example.</td><td>Understand</td><td>CACS005.05</td></tr>
<tr><td>8</td><td>a.Define a query in Tuple relational Calculus.
b.Write a query in TRC to find the names of sailors who have reserved both a red and green boat?
c.Write a query in TRC to find the names of sailors who have reserved all boats?</td><td>Remember</td><td>CACS005.10</td></tr>
<tr><td>9</td><td>A Define query in Domain Relational Calculus.
b. Write a query in DRC to find the names of sailors who have reserved a red boat?
c. Write a query in DRC,to find the names of sailors who have not reserved a red boat?</td><td>Remember</td><td>CACS005.10</td></tr>
<tr><td>10</td><td>a. Explain Relational calculus.
b. Write a TRC query to find the names of sailors who have reserved boat 103?
c.Write a DRC query to find the names of sailors who have reserved boat 103?</td><td>Remember</td><td>CACS005.10</td></tr>
<tr><td>11</td><td>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.
i) $\sigma B=19(r)$
ii) $\prod A,F,(\ \sigma C=D(r\times s))$
iii) $r \cap s$</td><td>Remember</td><td>CACS005.10</td></tr>
<tr><td>12</td><td>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 query in RA,TRC and DRC
a) Find the names of the instructors not teaching any course.</td><td>Remember</td><td>CACS005.10</td></tr>
<tr><td colspan="4">PART – C (Problem Solving and Critical Thinking Questions)</td></tr>
<tr><td>1</td><td>Given the Students relation as shown below
<table>
<tr><th>StudentID</th><th>StudentName</th><th>StudentEmail</th><th>StudentAge</th><th>CPI</th></tr>
<tr><td>2345</td><td>Shankar</td><td>shankar@math</td><td>X</td><td>9.4</td></tr>
<tr><td>1287</td><td>Swati</td><td>swati@ee</td><td>19</td><td>9.5</td></tr>
<tr><td>7853</td><td>Shankar</td><td>shankar@cse</td><td>19</td><td>9.4</td></tr>
<tr><td>9876</td><td>Swati</td><td>swati@mech</td><td>18</td><td>9.3</td></tr>
<tr><td>8765</td><td>Ganesh</td><td>ganesh@civil</td><td>19</td><td>8.7</td></tr>
</table>
For (Student Name, Student Age) to be the key for this instance, analyze and find the value of X not be equal to student age.</td><td>Remember</td><td>CACS005.07</td></tr>
<tr><td>2</td><td>Given the relations
employee(name,salary,deptno)
department (deptno, deptname, address)
Solve which query cannot be expressed using the basic relational algebra operations.</td><td>Remember</td><td>CACS005.09</td></tr>
<tr><td>3</td><td>Write Query in relational algebra to find second highest salary of Employee from Employee relation.</td><td>Understand</td><td>CACS005.09</td></tr>
<tr><td>4</td><td>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.
i. Find the names of sailors who have reserved boat number 120
ii. Find the names of sailors who have reserved a green boat
iii. Find the names of sailors who have not reserved a green boat
iv. Find the names of sailors with the highest rating</td><td>Remember</td><td>CACS005.09</td></tr>
<tr><td>5</td><td>Consider the following database.
Employee (employee-name, street, city)
Works (employee-name, company-name, salary)</td><td>Understand</td><td>CACS005.10</td></tr>
</table>

	Company (company-name, city) Manager (employee-name, manager-name) Give an expression in the relational algebra, the tuple relational calculus, and the domain relational calculus, for the following query. Find the names of all employees who work for estate bank.		
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) i. Find the names of sailors who have reserved boat name 103; ii. Find the sailor id of sailors who have reserved a red boat; iii. Find the colors of boats reserved by the sailor rubber. iv. Find the names of sailors who have reserved a red boat.	Understand	CACS005.09
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) i. Find the names of all uniors (level = JR) Who are enrolled in a class taught by I.Teach. ii. Find the age of the oldest student who is either a history major or is enrolled in a course taught by I.Tech? iii. Find the names of all classes that either meet in room R128 or have five or more students enrolled? iv. Find the names of faculty members whom the combined enrollment of the course that they is less than 5? v. Print the level and the average age of students for that level, for each level?	Remember	CACS005.09
8	Write the RA 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) i. Find the age of the youngest sailor for each rating level? ii. Find the age of the youngest sailor who is eligible to vote for each rating level with at lead two such sailors? iii. Find the No.of reservations for each red boat? iv. Find the average age of sailor for each rating level that at least 2 sailors.	Understand	CACS005.09
	UNIT – III **Basic SQL Query**		
	PART – A (Short Answer Questions)		
1.	Illustrate Create statement with example.	Remember	CACS005.15
2.	Demonstrate DML statements in SQL Give an example.	Remember	CACS005.14
3.	Discuss various Aggregate functions used in SQL.	Understand	CACS005.16
4.	Define primary key.	Remember	CACS005.14
5.	State the syntax of foreign key constraint.	Remember	CACS005.16
6.	What are the data types in SQL?	Understand	CACS005.16
7.	Write a SQL statement to find employees whose commission is greater than their salaries.	Understand	CACS005.16
8.	Write a SQL statement to find the employees who are not clerks, analysts or salesmen.	Understand	CACS005.15
9.	Write a SQL statement to display the names of all the employees and position where the string ‘AR’ occurs in the name.	Understand	CACS005.16
10.	List out all classes in select statement.	Remember	CACS005.14
11.	Define redundancy.	Remember	CACS005.11
12.	Define functional dependency. Why are some functional dependencies trivial?	Remember	CACS005.11
13.	Discuss normalization.	Understand	CACS005.12
14.	Differentiate between trivial and nontrivial dependencies.	Remember	CACS005.12
15.	If relation R consists of only simple candidate keys then R should be in which normal form?	Understand	CACS005.12

16.	Define First Normal Form.	Understand	CACS005.13
17.	Define Second Normal Form.	Remember	CACS005.13
18.	Define Third Normal Form.	Remember	CACS005.13
19.	Define Fourth Normal Form.	Understand	CACS005.13
20.	Identify the Normal Forms of the relation R . R(ABCD) FD : {A → B, B → C}	Understand	CACS005.12

PART – B (Long Answer Questions)			
1	Define a View in SQL. Write about updates on views.	Remember	CACS005.16
2	Illustrate Group by and Having clauses with examples.	Understand	CACS005.15
3	Discuss about Complex integrity constraints in SQL.	Remember	CACS005.15
4	a.Define a nested query. b.Write a nested query to find the names of sailors who have reserved both a red and green boat. c.Write a nested query to find the names of sailors who have reserved all boats.	Remember	CACS005.16
5	Discuss various DML statement in SQL and explain with examples.	Remember	CACS005.15
6	Explain referential integrity constraint ,unique key. Is unique+not null is same as primary key	Remember	CACS005.15
7	What are nested queries? What is correlation in nested queries? Explain.	Remember	CACS005.16
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 a) Find the names of the students not registered in any section b) Find the total number of courses taught department wise c) Find the total number of courses registered department wise.	Remember	CACS005.14
7	Define decomposition and how does it address redundancy? Discuss the problems that may be caused by the use of decompositions.	Remember	CACS005.11
8	Define functional dependencies. How are primary keys related to FD’s?	Understand	CACS005.11
9.	Define normalization? Explain 1NF, 2NF, 3NF Normal forms.	Remember	CACS005.13
10	Describe properties of decompositions.	Remember	CACS005.13
11	Explain about Schema refinement in Database design.	Understand	CACS005.12
12	Illustrate Multivalued dependencies and Fourth normal form with example.	Remember	CACS005.13
13	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	CACS005.11
14	Compute the closer of the following set of functional dependencies for a relation scheme. R(A,B,C,D,E,F,G,H), F={ AB–>C, BD–>EF, AD–>G,A–>H} List the candidate keys of R.	Remember	CACS005.11
15	Convert the following schema into third normal form. Stdcourse (StdSSN , StdCity, StdClass , OfferNo , OffTerm, OffYear, CourseNo, CrsDesc , EnrGrade) With FDs are: StdSSN → StdCity, StdClass OfferNo → OffTerm, OffYear, CourseNo, CrsDesc CourseNo → CrsDesc StdSSN, OfferNo → EnrGrade	Remember	CACS005.13
PART – C (Problem Solving and Critical Thinking Questions)			
1	Write the SQL expression for the following Queries. Sailor Schema (sailor id, Sailorname, Rating.Age)	Understand	CACS005.16

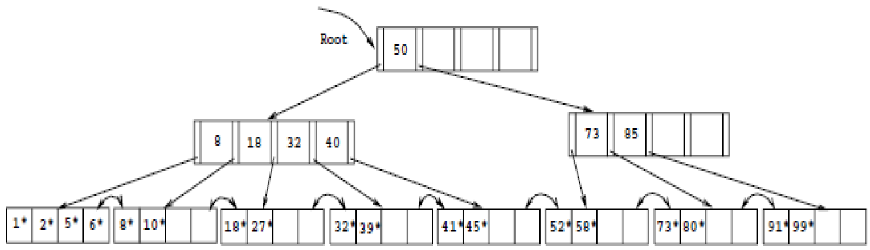
	Reserves (Sailor id, Boat id, Day) Boat Schema (Boat id, Boatname.color) i. Find the names of sailors who have reserved boat name 103; ii. Find the sailor id of sailors who have reserved a red boat; iii. Find the colors of boats reserved by the sailor rubber? iv. Find the names of sailors who have reserved 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) i. Find the names of all uniors (level = JR) Who are enrolled in a class taught by I.Teach? ii. Find the age of the oldest student who is either a history major or is enrolled in a course taught by I.Tech? iii. Find the names of all classes that either meet in room R128 or have five or more students enrolled? iv. Find the names of faculty members whom the combined enrollment of the course that they is less than 5? v. Print the level and the average age of students for that level, for each level?	Remember	CACS005.16
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) i. Find the age of the youngest sailor for each rating level? ii. Find the age of the youngest sailor who is eligible to vote for each rating level with at lead two such sailors? iii. Find the No.of reservations for each red boat? iv. Find the average age of sailor for each rating level that at least 2 sailors.	Understand	CACS005.16
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. Give an example of an updatable view involving two relations. Give an example of an insertable-into view that is updatable. Give an example of an insertable-into view that is not updatable.	Remember	CACS005.16
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. 5) GIVE DETAILS OF STUDENTS WHO STOOD FIRST IN EACH CLASS.	Remember	CACS005.16
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	CACS005.11
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: a. Title Author --> Catalog_no b. Catalog_no --> Title Author Publisher Year c. Publisher Title Year --> Price Assume {Author, Title} is the key for both schemes. Apply the appropriate normal form for Book Cancellation.	Remember	CACS005.13

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	CACS005.11
9	Show that: if $\alpha \rightarrow \beta$ and $\alpha \rightarrow \gamma$ then $\alpha \rightarrow \beta\gamma$.	Remember	CACS005.11
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	CACS005.12
11	Define BCNF. How does BCNF differ from 3NF? Explain with an example.	Remember	CACS005.13
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	CACS005.12
13	What is the need of Normalization in relational Database design? Explain "Dependency Preservation" in Database design?	Remember	CACS005.07
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	CACS005.11
UNIT – IV Transaction Management			
PART – A (Short Answer Questions)			
1	Define a Transaction. List the properties of transaction.	Remember	CACS005.18
2	Discuss different phases of transaction.	Remember	CACS005.18
3	Discuss recoverable schedules.	Remember	CACS005.19
4	Discuss cascade less schedules	Understand	CACS005.19
5	Define Two Phase Commit protocol.	Remember	CACS005.19
6	Demonstrate the implementation of Isolation.	Remember	CACS005.18
7	Discuss the Procedure to test Serializability.	Understand	CACS005.19
8	List different types of locks and write about compatability among them.	Remember	CACS005.19
9	Discuss about Failure Classification.	Remember	CACS005.19
10	Define a checkpoint.	Understand	CACS005.20
11	Discuss the failures that can occur with loss of Non-volatile storage.	Remember	CACS005.20
12	Demonstrate Conflict Serializability.	Understand	CACS005.19
13	Discuss View Serializability.	Remember	CACS005.19
PART – B (Long Answer Questions)			
1	Explain ACID properties and Illustrate them through examples.	Remember	CACS005.18
2	Discuss How do you implement Atomicity and Durability.	Understand	CACS005.18
3	Illustrate Concurrent execution of transaction with examples/	Remember	CACS005.19
4	Discuss Serializability in detail.	Remember	CACS005.19
5	Discuss two phase locking protocol and strict two phase locking protocols.	Understand	CACS005.19
6	Describe Timestamp based locking protocols.	Remember	CACS005.19
7	Describe Validation-based locking protocols.	Remember	CACS005.19
8	Discuss in detail Multiple Granularity.	Understand	CACS005.20
9	Explain in detail Storage structure.	Remember	CACS005.20
10	Discuss Deferred database modification and Immediate database modification.	Remember	CACS005.20
11	Discuss how do you recover from Concurrent transactions.	Remember	CACS005.20
12	Explain Buffer Management.	Understand	CACS005.20
13	Explain different types of Advanced Recovery Techniques.	Remember	CACS005.20
14	Write in detail about Remote Backup systems.	Understand	CACS005.20
15	Explain the Check point log based recovery scheme for recovering the database.	Remember	CACS005.20
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	CACS005.20
PART – C (Problem Solving and Critical Thinking Questions)			

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	CACS005.21

2	Analyze which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock? Explain the following: a. 2-phase locking b. Time-stamp ordering	Remember	CACS005.19
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	CACS005.19
4	Suppose that there is a database system that never fails.Analyze whether a recovery manager required for this system.	Remember	CACS005.21
5	Explain the ‘Immediate database Modification’ technique for using the Log to Ensure transaction atomicity despite failures.	Remember	CACS005.19
6	Consider the following actions taken by transaction T 1 on database objects X and Y : R(X), W(X), R(Y), W(Y) 1. 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. 2. Explain how the use of Strict 2PL would prevent interference between the two transactions. 3. Strict 2PL is used in many database systems. Give two reasons for its popularity.	Remember	CACS005.13
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. 3. A transaction that determines the total number of items for a given supplier. 4. A transaction that shows, for each part, the supplier that supplies the part at the lowest price	Understand	CACS005.19
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’ 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. 1.Explain what could go wrong, and how locking tuples would solve the problem.	Remember	CACS005.19

	2. 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. 3. Explain what index locking is and how it resolves the preceding conflict.		
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.	Remember	CACS005.21
10	What are the roles of the Analysis, Redo, and Undo phases in ARIES?	Understand	CACS005.20
	UNIT – V **Data Storage and Query Processing**		
	PART – A (Short Answer Questions)		
1	Discuss about data on External storage.	Understand	CACS005.22
2	Illustrate Clustered Indexes.	Remember	CACS005.23
3	Discuss the Primary and Secondary indexes.	Understand	CACS005.23
4	Define Tree Indexing.	Understand	CACS005.22
5	Describe Storage Hierarchy.	Remember	CACS005.23
6	Discuss the intuition for Tree Indexes.	Understand	CACS005.22
7	Define Indexed Sequential Access Method.	Understand	CACS005.23
8	Discuss about Overflow pages and Locking considerations of ISAM.	Understand	CACS005.23
9	Describe structure of B+ tree node.	Understand	CACS005.24
10	Compare dynamic and static hash techniques.	Understand	CACS005.24
11	List steps in Query processing.	Understand	CACS005.24
12	Discuss the advantages of Heap file organization.	Remember	CACS005.24
	PART – B (Long Answer Questions)		
1	Write in detail about Hash based Indexing and Tree based Indexing.	Understand	CACS005.23
2	Compare I/O costs for all File Organizations.	Understand	CACS005.22
3	Explain in detail about ISAM.	Remember	CACS005.22
4	Explain B+ trees? Discuss about this Dynamic Index Structure.	Understand	CACS005.23
5	Demonstrate searching a given element in B+ trees. Explain with example.	Understand	CACS005.23
6	Illustrate insertion of an element in B+ trees with example.	Remember	CACS005.23
7	Illustrate deletion of an element in B+ trees with example.	Understand	CACS005.23
8	Write in detail about Static Hashing.	Understand	CACS005.24
9	Explain in detail about Extendible Hashing.	Remember	CACS005.24
10	Explain in detail about Linear Hashing.	Understand	CACS005.24
11	Compare and Contrast Extendible Hashing with Linear Hashing.	Understand	CACS005.24
12	How does Extendable hashing use a directory of buckets? How does it handles insert and delete operations?	Understand	CACS005.24
13	Explain how insert and delete operations are handled in a static hash index.	Understand	CACS005.24
	PART – C (Problem Solving and Critical Thinking Questions)		
1	Consider a B+-tree in which the maximum number of keys in a node is 5 Calculate the minimum number of keys in any non-root node.	Understand	CACS005.23
2	In the index allocation scheme of blocks to a file, Calculate on what maximum possible size of the file depends.	Remember	CACS005.22
3	A clustering index is defined on the fields of which type? Analyze them.	Understand	CACS005.22
4	Calculate the minimum space utilization for a B+ tree index?	Understand	CACS005233
5	Explain about the B -tree and the structure of B +− tree in detail with an example.	Remember	CACS005.23
6	Consider the B+ tree index of order *d* = 2 shown in Figure 10.1. 1. Show the tree that would result from inserting a data entry with key 9 into this tree. 2. Show the B+ tree that would result from inserting a data entry with key 3 into the original tree. How many page reads and page writes does the insertion require? 3. Show the B+ tree that would result from deleting the data entry with key 8 from	Understand	CACS005.23

	the original tree, assuming that the left sibling is checked for possible edistribution. 4. Show the B+ tree that would result from deleting the data entry with key 8 from the original tree, assuming that the right sibling is checked for possible redistribution. 5. Show the B+ tree that would result from starting with the original tree, inserting a data entry with key 46 and then deleting the data entry with key 52. 6. Show the B+ tree that would result from deleting the data entry with key 91 from the original tree.  **Figure 10.1** Tree for Exercise 10.1		
7	Construct a B +– tree for the following set of key values. (2,3,5,7,11,17,19,23,29,31) Assume that the tree is initially empty and values are added in ascending order. Construct B+– tree for the cases where the number of pointers that will fit in one node is as follows. (a) four (b) six (c) eight	Understand	CACS005.23
8	Explain the distinction between closed and open hashing. Discuss the relative merits of each technique in database applications.	Remember	CACS005.24
9	Explain various steps in Query Processing and write any two techniques to optimize query.	Understand	CACS005.24
10	Suppose that we are using extendable hashing on a file that contains records with the following search-key values: 2,3,5,7,11,17,19,23,29,31 Show the extendable hash structure for this file if the hash function is h(x) = x mod 8 and buckets can hold three records.	Understand	CACS005.24

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