



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)  
Dundigal, Hyderabad-500043

## INFORMATION TECHNOLOGY

### TUTORIAL QUESTION BANK

<b>Course Title</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>				
<b>Course Code</b>	ACSB08				
<b>Programme</b>	B.Tech				
<b>Semester</b>	IV	CSE   IT			
<b>Course Type</b>	Core				
<b>Regulation</b>	<b>IARE - R18</b>				
<b>Course Structure</b>	<b>Theory</b>			<b>Practical</b>	
	<b>Lectures</b>	<b>Tutorials</b>	<b>Credits</b>	<b>Laboratory</b>	<b>Credits</b>
	3	-	3	3	1.5
<b>Chief Coordinator</b>	Mr.U Sivaji, Assistant Professor				
<b>Course Faculty</b>	Mr. N PoornaChandra Rao, Assistant Professor Mr. N Bhaswanth, Assistant Professor Ms. B Ramya sree, Assistant Professor Ms. K Mayuri, Assistant Professor Ms. B Vijaya Durga, Assistant Professor				

### COURSE OBJECTIVES:

<b>The course should enable the students to:</b>	
I	Understand the role of database management system in an organization and learn the Database concepts.
II	Design databases using data modeling and logical database design techniques
III	Construct database queries using relational algebra and calculus and SQL.
IV	Understand the concept of a database transaction and related concurrent, recovery facilities.
V	Learn how to evaluate a set of queries in query processing.

### COURSE OUTCOMES (COs):

CO 1	Understand the Database Systems, data Models, database Languages, DBS architecture, and Concepts of ER Model, Relational Model
CO 2	Ability to learn the concepts of relational algebra and relational calculus
CO 3	To understand SQL, relational database design, Normalization for relational databases.
CO 4	Ability to learn transaction processing, concurrency control and recovery mechanisms.
CO 5	Understand about the data Storage ,indexing ,hashing and query processing.

## COURSE LEARNING OUTCOMES (CLOs):

ACSB08.01	Describe the Purpose of Database Systems, Data Models, and View of Data.
ACSB08.02	Summarize the concept of Database Languages, Database Users.
ACSB08.03	Identify the Various Components of overall DBS architecture.
ACSB08.04	Use the concept of ER Model.
ACSB08.05	Describe Basics of Relational Model.
ACSB08.06	Determine Relational algebra
ACSB08.07	Understand selection and projection, set operations.
ACSB08.08	Determine renaming, joins, division.
ACSB08.09	Use examples of algebra queries.
ACSB08.10	Illustrate Tuple relational calculus, Domain relational calculus, and also expressive power of algebra and calculus.
ACSB08.11	Understand SQL – Data Definition commands, Queries with various options.
ACSB08.12	Analyze the concept of Data manipulation commands, Views, Joins, views.
ACSB08.13	Illustrate Calling a function, Returning multiple values from a function.
ACSB08.14	Contrast the Usage of Relational database design, Functional dependencies, Armstrong Axioms
ACSB08.15	Define Normalization, 2nd and 3rd Normalization, Basic definitions of MVDs and JDs, 4th and 5th normal forms.
ACSB08.16	Discuss the concept of Transaction, Transaction State.
ACSB08.17	Understand Atomicity and Durability, Concurrent Executions.
ACSB08.18	Summarize the concept of Serializability, Recoverability.
ACSB08.19	Discuss the Concurrency Control and various Protocols.
ACSB08.20	Understand the concept of Multi version Schemes, Deadlock Handling. Recovery and Concurrent Transactions.
ACSB08.21	Knowledge about the Physical Storage Media, Magnetic Disks, Storage Access
ACSB08.22	Apply Working with File Organization, Organization of Records in Files.
ACSB08.23	Understand Ordered Indices, B+-Tree Index Files, B-Tree Index Files, Static Hashing, Dynamic Hashing.
ACSB08.24	Comparison of Ordered Indexing and Hashing.
ACSB08.25	Illustrate Query Processing: Overview, Measures of Query Cost.

## TUTORIAL QUESTION BANK

MODULE- I				
Conceptual Modeling				
Part - A (Short Answer Questions)				
S No	QUESTIONS	Blooms Taxonomy Level	Course Outcomes	Course Learning Outcomes (CLOs)
1	State about Database Management System.	Remember	CO 1	ACSB08.01
2	Classify various views of data with an examples.	Understand	CO 1	ACSB08.01
3	List out various data models with their syntax.	Remember	CO 1	ACSB08.02
4	Illustrate various database languages.	Remember	CO 1	ACSB08.01
5	List out database users.	Understand	CO 1	ACSB08.03
6	Express various components of DBS architecture.	Remember	CO 1	ACSB08.01
7	List out different attributes used in ER model.	Understand	CO 1	ACSB08.01
8	Classify various operations performed in relational model.	Remember	CO 1	ACSB08.04
9	Illustrate various Relationships used in ER model.	Remember	CO 1	ACSB08.01
10	Design the relational data model with example.	Understand	CO 1	ACSB08.01
Part - B (Long Answer Questions)				
1	Explore the disadvantages of file processing system, and Justify how these Limitations are avoided in DBMS?	Understand	CO 1	ACSB08.01
2	Express different types of Data models used in database management system.	Remember	CO 1	ACSB08.02
3	Describe the overall database management system architecture with neat diagram?	Understand	CO 1	ACSB08.03
4	Demonstrate all the features supported by the entity relationship model with an example.	Understand	CO 1	ACSB08.02
5	Elucidate different users accessing data with database and narrate the functions of DBA.	Remember	CO 1	ACSB08.01
6	Enlist different types of integrity constraints used in data base management system.	Understand	CO 1	ACSB08.01
7	Classify different keys used in data base design with examples with respect to ER model and relational model.	Understand	CO 1	ACSB08.05
8	Compare and contrast strong entity set with weak entity set? Design an ER diagram to illustrate weak entity set.	Remember	CO 1	ACSB08.04
9	Compare the differences between relation schema and relational instance. Illustrate the terms arity and degree of s relation?	Understand	CO 1	ACSB08.02
10	Why relational data model became more popular comparing with other database models?	Remember	CO 1	ACSB08.01
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.	Understand	CO 1	ACSB08.01
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	ACSB08.01
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.	Understand	CO 1	ACSB08.02
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	ACSB08.02
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?	Understand	CO 1	ACSB08.01
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.	Understand	CO 1	ACSB08.02

7	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.	Understand	CO 1	ACSB08.01
8	Design a relational database for a university registrar's office. The office maintains 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.	Understand	CO 1	ACSB08.01

## MODULE-II

### Relational Approach

#### Part – A (Short Answer Questions)

1	Summarize about relational algebra.	Remember	CO 2	ACSB08.06
2	List out different operators used in relational algebra.	Remember	CO 2	ACSB08.06
3	Describe relational calculus with examples.	Understand	CO 2	ACSB08.06
4	Express the use of rename operation with their syntax.	Understand	CO 2	ACSB08.06
5	Illustrate division operation with their syntax.	Remember	CO 2	ACSB08.08
6	List out various points that are related to expressive power of algebra and calculus.	Understand	CO 2	ACSB08.08
7	Describe tuple relational calculus with neat examples.	Understand	CO 2	ACSB08.07
8	Describe the importance of union operation and intersection operation.	Understand	CO 2	ACSB08.07
9	State various types of joins with their syntax.	Understand	CO 2	ACSB08.10
10	Illustrate set difference operation with neat examples.	Remember	CO 2	ACSB08.08

#### Part - B (Long Answer Questions)

1	Illustrate different operations performed in relational algebra with an example.	Understand	CO 2	ACSB08.10
2	Categorize different types of joins used in relational algebra with an example.	Understand	CO 2	ACSB08.08
3	Describe about domain relational calculus and tuple relational calculus with example in detail.	Understand	CO 2	ACSB08.08
4	Distinguish the query performance between relational algebra and relational calculus.	Remember	CO 2	ACSB08.06
5	Illustrate the expressive power of relational algebra and relational calculus with respect to queries.	Understand	CO 2	ACSB08.06
6	List out various set operations used in relational algebra each with necessary example.	Understand	CO 2	ACSB08.08
7	Summarize selection and projection mechanisms in Relational algebra with an example.	Remember	CO 2	ACSB08.06
8	Describe with an example how renaming and division operations performed in relational algebra.	Understand	CO 2	ACSB08.08
9	Let the following relation schemas be given : R= (A, B, C) and S= (D, E, F) let relations r(R) and s(S) be given. Construct an expression in the Tuple relational calculus that is equivalent to each of the following. a) $\Pi_A(r)$ b) $\sigma_{B=17}(r)$ c) $r \times s$ d) $\Pi_{A,F}(\sigma_{C=D}(r \times s))$	Remember	CO 2	ACSB08.10
10	Consider the following schema branch (branch-name, branch-city, assets) customer (customer-name, customer-street, customer-city) account (account-number, branch-name, balance) loan (loan-number, branch-name, amount) depositor (customer-name, account-number) borrower (customer-name, loan-number) Express the following query in RA, TRC and DRC a) Find the names & cities of customers having a loan from the bank.	Understand	CO 2	ACSB08.06

#### Part - C (Problem Solving and Critical Thinking Questions)

1	Given the relations: employee(name,salary,deptno) department (deptno, deptname, address) Express which query cannot be expressed using the basic relational algebra operations (U, -, x, $\pi$ , $\sigma$ , p)? (a) department address of every employee (b) employees whose name is the same as their department name (c) the sum of all employees' salaries	Understand	CO 2	ACSB08.06
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	(d) all employees of a given department.			
2	Consider the following relational schema Employee (empno,name,office,age) Books(isbn,title,authors,publisher) Loan(empno, isbn,date) Describe the following queries in SQL and relational algebra. a) Find the names of employees who have borrowed a book Published by McGraw-Hill? b) Find the names of employees who have borrowed all books Published by McGraw-Hill? c) Find the names of employees who have borrowed more than five different books published by McGraw-Hill?	Understand	CO 2	ACSB08.08
3	Express the TRC expression for the following Queries? Sailor Schema (sailor id, Sailormame, Rating.Age) Reserves (Sailor id, Boat id, Day) Boat Schema (Boat id, Boatname.color) a) Find the names of sailors who have reserved boat 103; b) Find the sailor id of sailors who have reserved a green boat; c) Find the colors of boats reserved by the sailor Lubber? d) Find the names of sailors who have reserved both red and green boat?	Understand	CO 2	ACSB08.08
4	Express TRC expressions for the following relational database? sailor schema (sailor id, Boat id, sailormame, rating, age) Reserves (Sailor id, Boat id, Day) Boat Schema (boat id, Boatname, color) i. Find all sailors with a rating above 7. ii Find the names of sailors who have reserved a red boat. iii. Find the No.of reservations for each red boat? iv. Find the names of sailors who have reserved at least two boats.	Understand	CO 2	ACSB08.06

### MODULE -III

#### Basic SQL Query

##### Part - A (Short Answer Questions)

1	List out various DDL commands with neat examples.	Remember	CO 3	ACSB08.11
2	Describe about Multi Valued Dependencies.	Remember	CO 3	ACSB08.11
3	Express briefly about 3NF with examples.	Remember	CO 3	ACSB08.11
4	State about the functional dependency.	Remember	CO 3	ACSB08.11
5	Describe about normalization.	Remember	CO 3	ACSB08.11
6	List out all normal forms with neat examples.	Understand	CO 3	ACSB08.11
7	Enumerate various rules followed in Second Normal Form.	Understand	CO 3	ACSB08.11
8	List out various DML commands.	Remember	CO 3	ACSB08.12
9	With an example describe about the use of view in database systems.	Remember	CO 3	ACSB08.12
10	With an examples explain about Join Dependencies.	Understand	CO 3	ACSB08.12

##### Part – B (Long Answer Questions)

1	Deign a View in SQL. Enumerate about updates on views with various options and also examples.	Understand	CO 3	ACSB08.11
2	Illustrate group by and having clauses used in SQL with syntax and relevant examples.	Understand	CO 3	ACSB08.11
3	Analyze various armstrong axioms used in Relational database design with suitable examples.	Understand	CO 3	ACSB08.11
4	Describe various DDL, DML statements in SQL and explain with suitable examples.	Understand	CO 3	ACSB08.11
5	Elucidate referential integrity constraint and unique key. Justify unique+not null is same as primary key.	Remember	CO 3	ACSB08.11
6	Express nested queries? Describe correlation in nested queries with suitable example.	Remember	CO 3	ACSB08.11
7	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) describe 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	Understand	CO 3	ACSB08.11

	c) Find the total number of courses registered department wise.			
8	State decomposition and how does it address redundancy? Describe the problems that may be caused by the use of decompositions.	Understand	CO 3	ACSB08.13
9	Describe functional dependencies. How are primary keys related to functional dependencies?	Understand	CO 3	ACSB08.13
10	State normalization? Classify 1NF, 2NF, 3NF Normal forms with suitable examples.	Understand	CO 3	ACSB08.14
11	Describe about Schema refinement in relational database design with suitable example.	Understand	CO 3	ACSB08.13
12	Illustrate with an example if a relation schema R and a set of dependencies such that R is in BCNF, but is not in 4NF. Describe why 4NF is a normal form more desirable than BCNF	Remember	CO 3	ACSB08.15
13	Construct the closure of the following set F of functional dependencies for relation schema R=(A,B,C,D,E). A→BC CD→E B→D E→A List the candidate keys for R.	Remember	CO 3	ACSB08.15
<b>Part – C (Problem Solving and Critical Thinking)</b>				
1	Consider the Sailors-Boats-Reserves DB described in the text. s (sid, sname, rating, age) b (bid, bname, color) r (sid, bid, date) express each of the following queries in SQL. a) Find the names of sailors who have reserved boat name 103; b) Find the sailor id of sailors who have reserved a red boat; c) Find the colors of boats reserved by albert? d) Find the names of sailors who have reserved a all boats.	Remember	CO 3	ACSB08.11
2	Consider the following relations. Student(stuno, stuname, major, level, age) Class(Classname, meets at, Room, fid) Faculty(fid, fname, deptid) evaluate each of the following queries in SQL a) Find the names of all uniors (level = JR) Who are enrolled in a class taught by I.Teach? b) Find the age of the oldest student who is either a history major or is enrolled in a course taught by I.Tech? c) Find the names of all classes that either meet in room R128 or have five or more students enrolled? d) Find the names of faculty members whom the combined enrollment of the course that they is less than 5? e) Print the level and the average age of students for that level, for each level?	Understand	CO 3	ACSB08.11
3	Construct the SQL expressions for the following relational database. sailors(sailor id, Boat id, sailorname, rating, age) Reserves(Sailor id, Boat id, Day) Boat(boat id, Boatname, color) a) Find the age of the youngest sailor for each rating level? b) Find the age of the youngest sailor who is eligible to vote for each rating level with at lead two such sailors? c) Find the no.of reservations for each red boat? d) Find the average age of sailor for each rating level that at least 2 sailors.	Understand	CO 3	ACSB08.11
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. evaluate the following queries in relational algebra: a) Find the names of suppliers who supply some red part. b) Find the sids of suppliers who supply some red or green part. c) Find the sids of suppliers who supply every par. d) Find the sids of suppliers who supply every red or green part.	Understand	CO 3	ACSB08.12



**MODULE –IV****Transaction Management****Part – A (Short Answer Questions)**

1	State about Transaction. List out the properties of a transaction.	Remember	CO 4	ACSB08.17
2	Express different states of transaction.	Remember	CO 4	ACSB08.17
3	State the use of two phase commit protocol.	Remember	CO 4	ACSB08.18
4	Express the procedure to test serializability.	Understand	CO 4	ACSB08.19
5	List out different types of locks.	Remember	CO 4	ACSB08.19
6	Illustrate briefly the use of multiple granularities in transaction management.	Understand	CO 4	ACSB08.17
7	Express briefly about the usage of checkpoint.	Understand	CO 4	ACSB08.18
8	Describe about shadow paging.	Remember	CO 4	ACSB08.16
9	Illustrate the use of serializability in transaction management.	Understand	CO 4	ACSB08.18
10	Illustrate the use of recoverability in transaction management.	Remember	CO 4	ACSB08.19

**PART – B (LONG ANSWER QUESTIONS)**

1	Describe ACID properties for transaction processing and Explain them with an examples.	Understand	CO 4	ACSB08.18
2	Express how do you implement atomicity and durability for transaction processing.	Understand	CO 4	ACSB08.18
3	Illustrate concurrent execution of transactions and also enumerate with relevant examples.	Understand	CO 4	ACSB08.19
4	Contrast serializability, recoverability in case of transaction processing with relevant examples.	Understand	CO 4	ACSB08.19
5	Distinguish between two phase locking protocol and strict two phase locking protocols.	Remember	CO 4	ACSB08.17
6	Compare and contrast timestamp based locking protocols and validation-based locking protocols.	Remember	CO 4	ACSB08.18
7	Describe briefly about multiple granularity and multiversion schemes with relevant examples.	Remember	CO 4	ACSB08.19
8	Illustrate how recovery with concurrent transactions buffer management will be occurred. Explain with suitable examples.	Remember	CO 4	ACSB08.16
9	Describe in detail about log-based recovery techniques with relevant examples.	Understand	CO 4	ACSB08.18
10	Describe the failure classification scheme towards recovery with relevant example.	Remember	CO 4	ACSB08.18

**PART – C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)**

1	<p>Consider the following transactions with data items P and Q initialized to zero:</p> <pre> 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); </pre> <p>Justify any non-serial interleaving of T1 and T2 for concurrent execution leads to a schedule that is not conflict serializable.</p>	Understand	CO 4	ACSB08.17
2	<p>Analyze which of the following concurrency control protocols ensure both conflict serializability and freedom from deadlock.</p> <ol style="list-style-type: none"> <li>2-phase locking</li> <li>Time-stamp ordering</li> </ol>	Understand	CO 4	ACSB08.18
3	<p>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. Evaluate 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.</p>	Understand	CO 4	ACSB08.17
4	<p>Suppose that there is a database system that never fails. Analyze whether a recovery manager is required for this system.</p>	Understand	CO 4	ACSB08.17

5	<p>Consider the following actions taken by transaction T 1 on database objects X and Y: R(X), W(X), R(Y), W(Y)</p> <p>a) 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.</p> <p>b) Explain how the use of Strict 2PL would prevent interference between the two transactions.</p> <p>c) Strict 2PL is used in many database systems. Give two reasons for its popularity.</p>	Understand	CO 4	ACSB08.18
6	<p>Suppliers (sid: integer, sname: string, address: string)  Parts (pid: integer, pname: string, color: string)  Catalog (sid: integer, pid: integer, cost: real)  Consider 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.</p> <p>a) A transaction that adds a new part to a supplier's catalog.  b) A transaction that increases the price that a supplier charges for a part.  c) A transaction that determines the total number of items for a given supplier.  d) A transaction that shows, for each part, the supplier that supplies the part at the lowest price</p>	Understand	CO 4	ACSB08.16
7	<p>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'  evaluate an example of a query that would conflict with this command (in a concurrency control sense) if both were run at the same time.</p> <p>a) Express what could go wrong, and how locking tuples would solve the problem.  b) Evaluate 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.  c) Express what index locking is and how it resolves the preceding conflict.</p>	Understand	CO 4	ACSB08.17
8	<p>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. Design an example schedule of two transactions T1 and T2 that satisfies all these conditions, yet produces a database instance that is not the result of any serial execution of T1 and T2.</p>	Understand	CO 4	ACSB08.18
9	<p>When a transaction is rolled back under timestamp ordering, it is assigned a new timestamp. Explain why it cannot simply keep its old timestamp?</p>	Understand	CO 4	ACSB08.17

**MODULE -V**

**Data Storage and Query Processing**

**Part - A (Short Answer Questions)**

1	Describe briefly about data on External storage.	Remember	CO 5	ACSB08.21
2	Why Clustered Indexes are used in query processing.	Understand	CO 5	ACSB08.22
3	Compare and contrast the Primary and Secondary indexes.	Remember	CO 5	ACSB08.22
4	Describe the use of storage hierarchy.	Remember	CO 5	ACSB08.23
5	Express the intuition for Tree Indexes.	Remember	CO 5	ACSB08.23
6	Describe briefly about indexed sequential access method.	Remember	CO 5	ACSB08.24
7	Explain in detail about overflow pages and locking considerations in ISAM.	Remember	CO 5	ACSB08.24
8	Describe briefly the structure of B+ tree node.	Remember	CO 5	ACSB08.24
9	Compare and contrast dynamic and static hash techniques.	Remember	CO 5	ACSB08.25
10	List out various steps in Query processing.	Remember	CO 5	ACSB08.25

**Part - B (Long Answer Questions)**



1	Describe in detail about Hash based Indexing and Tree based Indexing with an example.	Understand	CO 5	ACSB08.23
2	Compare the differences between I/O costs for all File Organizations.	Remember	CO 5	ACSB08.22
3	Demonstrate in detail about indexed sequential access method with suitable example.	Understand	CO 5	ACSB08.22
4	Describe B+ trees? Discuss about this Dynamic Index Structure with suitable example.	Understand	CO 5	ACSB08.23
5	Demonstrate searching a given element in B+ trees. Explain with suitable example.	Remember	CO 5	ACSB08.23
6	Illustrate insertion of an element in B+ trees index files with suitable example.	Understand	CO 5	ACSB08.24
7	Illustrate deletion of an element in B trees index files with suitable with suitable example.	Understand	CO 5	ACSB08.24
8	Describe in detail about Static Hashing.	Remember	CO 5	ACSB08.24
9	Describe briefly about Extendible Hashing.	Remember	CO 5	ACSB08.25
10	Compare and contrast between static hashing, dynamic hashing with respect to indexing and hashing.	Remember	CO 5	ACSB08.25
<b>Part – C (Problem Solving and Critical Thinking)</b>				
1	Evaluate B+-tree in which the maximum number of keys in a node is 5 and calculate the minimum number of keys in any non-root node.	Understand	CO 5	ACSB08.22
2	In the index allocation scheme of blocks to a file, Justify on what maximum possible size of the file depends.	Understand	CO 5	ACSB08.23
3	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+-trees for the cases where the number of pointers that will fit in one node is as follows: a. Four b. Six c. Eight	Understand	CO 5	ACSB08.23
4	Interpret the minimum space utilization for a B+ tree index with suitable example?	Understand	CO 5	ACSB08.23
5	Suppose that extendable hashing is being used on a database file that contains records with the following search key values: (2, 3, 5, 7, 11, 17, 19, 23, 29, 31) a) Construct the extendable hash structure for this file if the hash function is $h(x) = x \text{ mod } 8$ and buckets can hold three records.	Remember	CO 5	ACSB08.23

**Prepared by:**

Mr.U Sivaji, Assistant Professor

**HOD, IT**