INSTITUTE OF AERONAUTICAL ENGINEERING

Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY

TUTORIAL QUESTION BANK

Course Name	:	**DATABASE MANAGEMENT SYSTEMS**
Course Code	:	A40507
Class	:	II B. Tech II Semester
Branch	:	Information Technology
Year	:	2016 – 2017
Course Faculty	:	Mrs. K.Laxmi Narayanamma, Assistant Professor

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

PART – A (Short Answer Questions)

Q. No	Questions	Blooms Taxonomy Level	Course Outcome
	UNIT – I		
1	**List** the advantages of DBMS?	Knowledge	1
2	**List** the database Applications?	Knowledge	2
3	**Define** instances and schemas of database?	Knowledge	2
4	**Discuss** Data Independence?	Understand	2
5	**Explain** database Access for applications Programs	Understand	2
6	**Define** (i) Database (ii) DBMS	Knowledge	2
7	**Explain** about Database storage structure?	Understand	2
8	**Discuss** Transaction management?	Understand	2
9	**Explain** the Query Processor?	Understand	2
10	**Define** (i) Entity (ii) Attribute	Knowledge	3
11	**Define** Relationship and Relationship set?	Knowledge	3
12	**Discuss** about Data Definition language?	Understand	2
13	**Discuss** about Data Manipulation language?	Understand	2
14	**Explain** about querying relational data?	Understand	2
15	**Explain** the History of Data base Systems?	Understand	2
16	**Discuss** how can you change the data in the table?	Understand	2
17	**List** various types of attributes?	Knowledge	3
18	**Discuss** How can you alter and destroy tables?	Understand	2
	UNIT – II		
1	**Define** relational database query?	Knowledge	4
2	**State** about SELECT operation in Relational algebra?	Knowledge	4

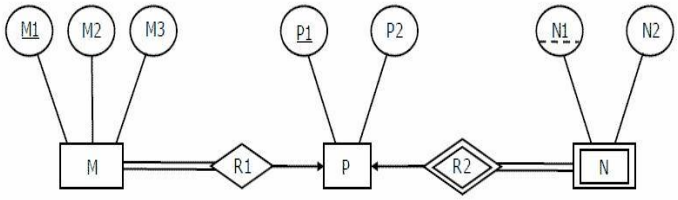
3	**State** about PROJECT operation in Relational algebra?	Knowledge	4
4	**Define** Aggregate Functions?	Knowledge	4
5	**Discuss** the use of rename operation?	Understand	4
6	**Illustrate** division operation?	Apply	4
7	**Discuss** the basic form of SQL query?	Understand	4
8	**Define** Null Values.	Knowledge	4
9	**Define** tuple variable with its syntax?	Knowledge	4
10	**Define** Dynamic SQL?	Knowledge	4
11	**Define** Assertions?	Knowledge	4
12	**Discuss** about trigger?	Understand	4
13	**Demonstrate** how to add a NOT NULL column to a table?	Apply	4
	UNIT – III		
1	**Define** redundancy?	Knowledge	5
2	**Define** functional dependency? Why are some functional dependencies trivial?	Knowledge	5
3	**Discuss** normalization?	Understand	5
4	**Illustrate** functional dependency with example?	Apply	5
5	**Illustrate** fully functional dependency with example?	Apply	5
6	**Demonstrate** transitive dependency? Give an example?	Apply	5
7	**Discuss** Domain-Key Normal Form?	Understand	5
8	**Define** Armstrong axioms for FD's?	Knowledge	5
9	**Define** First Normal Form?	Knowledge	5
10	**Define** Second Normal Form?	Knowledge	5
11	**Define** Third Normal Form?	Knowledge	5
12	**Define** Fourth Normal Form?	Knowledge	5
	UNIT – IV		
1	**Define** a Transaction? List the properties of transaction	Knowledge	6
2	**Discuss** different phases of transaction?	Understand	6
3	**Discuss** recoverable schedules?	Understand	6
4	**Discuss** cascade less schedules?	Understand	6
5	**Define** Two Phase Commit protocol?	Knowledge	6
6	**Demonstrate** the implementation of Isolation?	Apply	6
7	**Discuss** the Procedure to test Serializability?	Understand	6
8	**Explain** about different types of locks?	Understand	6
9	**Discuss** about Failure Classification?	Understand	6
10	**Define** a checkpoint?	Knowledge	6
11	**Discuss** the failures that can occur with loss of Non-volatile storage?	Understand	6
12	**Demonstrate** Conflict Serializability?	Apply	6
13	**Discuss** View Serializability?	Understand	6
	UNIT – V		
1	**Discuss** about data on External storage?	Understand	7
2	**Explain** Clustered Indexes?	Understand	7
3	**Discuss** the Primary and Secondary indexes?	Understand	7
4	**Define** Tree Indexing?	Knowledge	7
5	**Explain** Hash based Indexing?	Understand	7
6	**Discuss** the intuition for Tree Indexes?	Understand	7
7	**Define** Indexed Sequential Access Method?	Knowledge	7
8	**Discuss** about Overflow pages and Locking considerations of ISAM?	Understand	7
9	**Discuss** the Cost model of Heap files?	Understand	7
	Discuss the Cost model of Sorted files?	Understand	7
9	**Discuss** the Cost model of Clustered files?	Understand	7
10	**Discuss** the impact of Workload on Indexes?	Understand	7

PART – B (Long Answer Questions)

Q. No	Questions	Blooms Taxonomy Level	Course Outcome
	UNIT – I		
1	**Compare and Contrast** file Systems with database systems?	Apply	1
2	**Define** Data Abstraction and discuss levels of Abstraction?	Knowledge	2
3	**Discuss** about different types of Data models?	Understand	2
4	**Describe** the Structure of DBMS?	Understand	2
5	**Discuss** additional features of the ER-Models.	Understand	3
6	**Discuss** about the Concept Design with the ER Model?	Understand	3
7	**Write** about views and updates on views?	Knowledge	2
8	**Explain** different types of database users and write the functions of DBA?	Understand	2
9	**Explain** about different types of integrity constraints?	Understand	2
10	**Discuss** about the logical database Design?	Understand	2
11	**Distinguish** strong entity set with weak entity set? Draw an ER diagram to illustrate weak entity set?	Apply	3
12	**Differentiate** relation schema and relational instance? Define the terms arity and degree of s relation? What are domain constraints?	Understand	2
	UNIT – II		
1	**Illustrate** different set operations in Relational algebra with an example?	Apply	4
2	**Define** Join? Explain different types of joins?	Knowledge	4
3	**Discuss** about Domain Relational calculus in detail?	Understand	4
4	**Define** trigger and explain its three parts? Differentiate row level and statement level triggers?	Knowledge	4
5	**Illustrate** Group by and Having clauses with examples?	Apply	4
6	**Discuss** about Complex integrity constraints in SQL?	Understand	4
7	**Discuss** different types of aggregate operators with examples in SQL?	Understand	4
8	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?	Knowledge	4
9	a. **Discuss** correlated nested queries? b. **Write** a query to find the names of sailors who have reserved a red boat? c. **Write** a query to find the names of sailors who have not reserved a red boat?	Understand	4
10	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?	Understand	4
	UNIT – III		
1	**Illustrate** redundancy and the problems that it can cause?	Apply	5
2	**Define** decomposition and how does it address redundancy? Discuss the problem s that may be caused by the use of decompositions?	Knowledge	5
3	**Define** functional dependencies. How are primary keys related to FD's?	Knowledge	5
4	**Define** normalization? Explain 1NF, 2NF, 3NF Normal forms?	Knowledge	5
5	**Compare and contrast** BCNF with 3NF?	Apply	5
6	**Describe** properties of decompositions?	Understand	5
7	**Explain** about Schema refinement in Database design?	Understand	5
8	**Illustrate** Multivalued dependencies and Fourth normal form with example?	Apply	5
9	**Discuss** about Join dependencies and Fifth normal form?	Understand	5
10	**Illustrate** Inclusion dependencies with example?	Apply	5
	UNIT – IV		
1	**Explain** ACID properties and Illustrate them through examples?	Understand	6
2	**Discuss** How do you implement Atomicity and Durability?	Understand	6

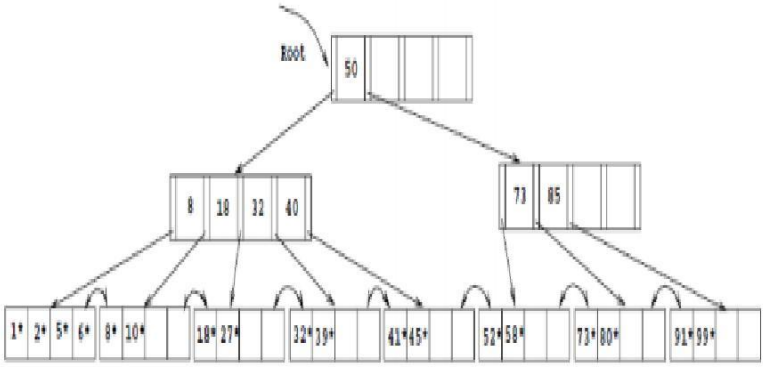
3	**Illustrate** Concurrent execution of transaction with examples?	Apply	6
4	**Discuss** Serializability in detail?	Understand	6
5	**Discuss** two phase locking protocol and strict two phase locking protocols?	Understand	6
6	**Describe** Timestamp based locking protocols?	Understand	6
7	**Describe** Validation-based locking protocols?	Understand	6
8	**Discuss** in detail Multiple Granularity?	Understand	6
9	**Explain** in detail Storage structure?	Understand	6
10	**Discuss** Deferred database modification and Immediate database modification?	Understand	6
11	**Discuss** how do you recover from Concurrent transactions?	Understand	6
12	**Explain** Buffer Management?	Understand	6
13	**Explain** different types of Advanced Recovery Techniques?	Understand	6
14	**Write** in detail about Remote Backup systems?	Apply	6
	UNIT – V		
1	**Write** in detail about Hash based Indexing and Tree based Indexing?	Apply	7
2	**Compare** I/O costs for all File Organizations?	Understand	7
3	**Explain** in detail about ISAM?	Understand	7
4	**Explain** B+ trees? Discuss about this Dynamic Index Structure?	Understand	7
5	**Demonstrate** searching a given element in B+ trees? Explain with example?	Understand	7
6	**Illustrate** insertion of an element in B+ trees with example?	Apply	7
7	**Illustrate** deletion of an element in B+ trees with example?	Apply	7
8	**Write** in detail about Static Hashing?	Apply	7
9	**Explain** in detail about Extendible Hashing?	Understand	7
10	**Explain** in detail about Linear Hashing?	Understand	7
11	**Compare and Contrast** Extendible Hashing with Linear Hashing?	Apply	7

PART – C (Problem Solving and Critical Thinking Questions)

Q. No	Questions	Blooms Taxonomy Level	Course Outcome
	UNIT – I		
1	Consider the following ER Diagram.  **Discuss** how many minimum numbers of tables are needed to represent M, N, P, R1, R2?	Apply	3
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?	Apply	3
3	**Analyze** and find whether View exists if the table is dropped from the database?	Analyze	2
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?	Analyze	3
	UNIT – II		
1	Consider the following relational schema Employee (empno,name,office,age) Books(isbn,title,authors,publisher) Loan(empno, isbn,date) **Write** the following queries in 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	Apply	4

<table>
<tr><td></td><td>McGraw-Hill?
c. Find the names of employees who have borrowed more than five different books published by McGraw-Hill?
d. For each publisher, find the names of employees who have borrowed?</td><td></td><td></td></tr>
<tr><td>2</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 value of X not be equal to?</td><td>Apply</td><td>4</td></tr>
<tr><td>3</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 (U, -, x, π, σ, p)?</td><td>Apply</td><td>4</td></tr>
<tr><td>4</td><td>Write SQL Query to find second highest salary of Employee from Employee table?</td><td>Apply</td><td>4</td></tr>
<tr><td colspan="4">UNIT – III</td></tr>
<tr><td>1</td><td>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?</td><td>Apply</td><td>5</td></tr>
<tr><td>2</td><td>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 and Cancellation?</td><td>Apply</td><td>5</td></tr>
<tr><td>3</td><td>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)?</td><td>Apply</td><td>5</td></tr>
<tr><td>4</td><td>Show that: if $\alpha \rightarrow \beta$ and $\alpha \rightarrow \gamma$ then $\alpha \rightarrow \beta\gamma$</td><td>Apply</td><td>5</td></tr>
<tr><td colspan="4">UNIT - IV</td></tr>
<tr><td>1</td><td>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?</td><td>Apply</td><td>6</td></tr>
<tr><td>2</td><td>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</td><td>Apply</td><td>6</td></tr>
<tr><td>3</td><td>Consider the transactions T1, T2, and T3 and the schedules S1 and S2 given below.
T1: r1(X);r1(Z);w1(X);w1(Z)
T2: r2(Y);r2(Z);w2(Z)
T3: r3(Y);r3(X);w3(Y)</td><td>Apply</td><td>6</td></tr>
</table>

	S1: r1(X);r3(Y);r3(X);r2(Y);r2(Z); w3(Y);w2(Z);r1(Z);w1(X);w1(Z) S2: r1(X); r3(Y); r2(Y); r3(X); r1(Z); r2(Z); w3(Y); w1(X); w2(Z); w1(Z) **Analyze** which one of the schedules is conflict-serializable?		
4	Suppose that there is a database system that never fails. **Analyze** whether a recovery manager required for this system?	Apply	6
	UNIT - V		
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?	Apply	7
2	In the index allocation scheme of blocks to a file, **Calculate** on what maximum possible size of the file depends?	Apply	7
3	A clustering index is defined on the fields of which type? **Analyze** them.	Apply	7
4	**Calculate** the minimum space utilization for a B+ tree index?	Apply	7
5	Consider the B+ tree index of order d = 2 shown in Figure  a. Show the tree that would result from inserting a data entry with key 9 into this tree. b. Show the B+ tree that would result from deleting the data entry with key 8 from the original tree, assuming that the left sibling is checked for possible redistribution	Apply	7

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