INSTITUTE OF AERONAUTICAL ENGINEERING
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COMPUTER SCIENCE AND ENGINEERING

DEFINITIONS AND TERMINOLOGY

Course Name	:	**DATABASE MANAGEMENT SYSTEM**
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OBJECTIVES

I	To help students to consider in depth the terminology and nomenclature used in the syllabus.
II	To focus on the meaning of new words / terminology/nomenclature

DEFINITIONS AND TERMINOLOGYQUESTION BANK

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
		UNIT - I			
1	What is Data?	Data are simply raw facts or figures, bits of information, but not information itself.	Remember	CLO1	ACS005.01
2	What is Information?	When data are processed, interpreted, organized, structured or presented so as to make them meaningful or useful, they are called information	Remember	CLO1	ACS005.01
3	Define Database?	A database is a collection of information that is organized so that it can be easily accessed, managed and updated.	Remember	CLO1	ACS005.01
4	Define Database Management System?	A database management system (DBMS) is system software for creating and managing databases. The DBMS provides users and programmers with a systematic way to create, retrieve, update and manage data.	Remember	CLO1	ACS005.01
4	Define Database System?	The database and DBMS software together is called as Database system.	Remember	CLO2	ACS005.02
5	What is File system?	File system controls how data is stored and retrieved data on storage disk.	Remember	CLO2	ACS005. 02
6	What is RDBMS?	A relational database management system (RDBMS) is a database management system (DBMS) based on the relational model of data.	Remember	CLO3	ACS005. 03
7	What is Relational database?	A relational database is a digital database based on the relational model of data,	Remember	CLO3	ACS005.03
8	Give example for commercial database software?	MySQL, Oracle RDBMS, IBM DB2	Remember	CLO3	ACS005.03
9	Define Data abstraction?	The process of hiding irrelevant details from user is called data abstraction	Remember	CLO4	ACS005.04
10	What is Instance?	The data stored in database at a particular moment of time is called instance of database.	Remember	CLO3	ACS005.03
12	What is Schema?	Design of a database is called the schema.	Remember	CLO3	ACS005.03
13	Define Data Independence?	Data independence means that "The application is independent of the storage structure and access strategy of data". In other words, the ability to modify the schema definition in one level should not affect the schema definition in the next higher level.	Remember	CLO4	ACS005.04
14	What is Conceptual design?	Conceptual design is the first stage in the database design process. The goal at this stage is to design a database that is independent of database software and physical details. The output of this process is a conceptual data model that describes the main	Remember	CLO4	ACS005.04

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		data entities, attributes, relationships, and constraints of a given problem domain. This design is descriptive and narrative in form.			
15	What is Relational Model?	Relational Model represents how data is stored in Relational Databases. A relational database stores data in the form of relations (tables).	Remember	CLO6	ACS005.06
16	What is ER Model?	ER model stands for an Entity-Relationship model. It is a high-level data model. This model is used to define the data elements and relationship for a specified system. It develops a conceptual design for the database.	Remember	CLO5	ACS005.05
17	What is Entity?	It is a 'thing' in the real world with an independent existence.	Remember	CLO5	ACS005.05
18	What is Attribute?	It is a particular property, which describes the entity.	Remember	CLO5	ACS005.05
19	What is Relation?	Relation refers to a table in a relational model.	Remember	CLO5	ACS005.05
20	What is Arity?	Number of columns in a relation.	Remember	CLO5	ACS005.05
21	What is Cardinality?	Number of rows in a relation.	Remember	CLO5	ACS005.05
22	What is tuple?	A single row of a table, which contains a single record for that relation is called a tuple	Remember	CLO5	ACS005.05
23	What is domain?	A domain is defined as the set of all values permitted for an attribute.	Remember	CLO5	ACS005.05
24	What is strong entity?	An entity set that has a primary key is called as Strong entity set.	Remember	CLO5	ACS005.05
25	What is weak entity?	A weak entity is an entity that cannot be uniquely identified by its attributes alone.	Remember	CLO5	ACS005.05
26	State DBA?	A database administrator (DBA) directs or performs all activities related to maintaining a successful database environment.	Remember	CLO3	ACS005.03
27	State Integrity Constraints?	Integrity constraints provide a way of ensuring that changes made to the database by authorized users do not result in a loss of data consistency.	Remember	CLO7	ACS005.07
28	Define Super key?	Super Key is the superset of primary key. The super key contains a set of attributes, including the primary key, which can uniquely identify any data row in the table.	Remember	CLO7	ACS005.07
29	Define Candidate key?	The candidate keys in a table are defined as the set of keys that is minimal and can uniquely identify any data row in the table.	Remember	CLO7	ACS005.07
30	Define Primary Key?	The primary key is selected from one of the candidate keys and becomes the identifying key of a table. It can uniquely identify any data row of the table.	Remember	CLO7	ACS005.07
31	Define Foreign Key?	A foreign key is an attribute value in a table that acts as the primary key in another another. Hence, the foreign key is useful in linking together two tables. Data should be	Remember	CLO7	ACS005.07

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		entered in the foreign key column with great care, as wrongly entered data can invalidate the relationship between the two tables.			
32	What is Transaction?	A transaction is a logical unit of database processing that includes one or more database access operations	Remember	CLO3	ACS005.03
33	Define entity set?	An entity set is a set of entities of the same type . Entity sets need not be disjoint. For example, the entity set employee (all employees of a bank) and the entity set customer (all customers of the bank) may have members in common.	Remember	CLO5	ACS005.05
34	Define entity model?	A conceptual model is a specific representation of the structure of data as entitiesand relationships, and is generally defined in a domain-specific language (DSL) that implements the concepts of the EDM.	Remember	CLO5	ACS005.05
35	Define attribute set?	An attribute set can be defined by a single attribute or by a set of attributes to apply to specific products.	Remember	CLO5	ACS005.05
36	Define key attribute?	Keys are very important part of Relational database model. They are used to establish and identify relationships between tables and also to uniquely identify any record or row of data inside a table. A Keycan be a single attribute or a group of attributes, where the combination may act as a key.	Remember	CLO5	ACS005.05
37	Define Derived attribute	A derived attribute is an attribute whose value is calculated (derived) from other attributes. Thederived attribute need not be physically stored within the database; instead, it can be derived by using an algorithm. ... As the name implies, multi-valued attributes may have many values.	Remember	CLO5	ACS005.05
38	Define Multivalued attribute	A multivalued attribute can have more than one value at a time for an attribute. For ex., skills of a surgeon is a multivalued attribute since a surgeon can have more than one skill.	Remember	CLO5	ACS005.05
39	Define Composite attribute	A simple attribute is one component that is atomic. Acomposite attribute has multiple components, each of which is atomic or composite. Figure 4. ER diagram notation for composite attribute domain, name. Another way to classify attributes is either as single-valued or multi-valued.	Remember	CLO5	ACS005.05
40	Define Simple attribute	Simple attribute − Simple attributes are atomic values, which cannot be divided further. For example, a student's phone number is an atomic value of 10 digits. Composite attribute − Composite attributesare made of more than one simple attribute. For example, a student's complete name may have first_name and last_name.	Remember	CLO5	ACS005.05
41	Define participation constraints	Participation constraint defines the least number of relationship instances in which an entity must participate.	Remember	CLO5	ACS005.05
42	Define Generalization?	Generalization is like a bottom-up approach in which two or more entities of lower level combine to form a higher level entity if they have some attributes in common. ... In generalization, entities are combined to form a more generalized entity, i.e., subclasses are combined to make a superclass.	Remember	CLO5	ACS005.05

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43	Define aggregation	Relationship with its corresponding entities is aggregated into a higher level entity. For example: Center entity offers the Course entity act as a single entity in the relationship which is in a relationship with another entity visitor.	Remember	CLO5	ACS005.05
44	Define specialization	Specialization is a top-down approach, and it is opposite to Generalization. In specialization, one higher level entity can be broken down into two lower level entities.Specialization is used to identify the subset of an entity set that shares some distinguishing characteristics.	Remember	CLO5	ACS005.05
45	Demonstrate Hierarchical model	In hierarchical model, data is organized into a tree like structure with each record is having one parent record and many children. The main drawback of this model is that, it can have only one to many relationships between nodes.	Remember	CLO7	ACS005.07
46	Demonstrate network model	The network model is a database model conceived as a flexible way of representing objects and their relationships. Its distinguishing feature is that the schema, viewed as a graph in which object types are nodes and relationship types are arcs, is not restricted to being a hierarchy or lattice.	Remember	CLO7	ACS005.07
		UNIT – II			
1	What is Relational algebra?	Relational Algebra is procedural query language, which takes relation as input and generates relation as output. Relational algebra mainly provides theoretical foundation for relational databases and SQL.	Remember	CLO9	ACS005.09
2	List Relational algebra operations	Relational algebra operations are selection, projection, set operations, renaming, joins and division.	Remember	CLO9	ACS005.09
3	What is a selection operation?	The select operation selects tuples that satisfy a given predicate. It is denoted by sigma (σ). Notation: $\sigma p(r)$	Remember	CLO9	ACS005.09
4	What is a Projection operation?	This operation shows the list of those attributes that we wish to appear in the result. Rest of the attributes is eliminated from the table. It is denoted by $\prod$. Notation: $\prod A1, A2, An (r)$	Remember	CLO9	ACS005.09
5	List set operations	set operations are union, intersection and set difference	Remember	CLO9	ACS005.09
6	What are Union operations?	Union is a binary relation. Suppose there are two tuples R and S. The union operation contains all the tuples that are either in R or S or both in R & S.It eliminates the duplicate tuples. It is denoted by $\cup$.	Remember	CLO9	ACS005.09

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		Notation: R ∪ S			
7	What are Intersection operations?	Intersection is a binary relation. Suppose there are two tuples R and S. The set intersection operation contains all tuples that are in both R & S. It is denoted by intersection ∩. Notation: R ∩ S	Remember	CLO9	ACS005.09
8	What is Set difference operations?	Set difference is a binary relation. Suppose there are two tuples R and S. The set intersection operation contains all tuples that are in R but not in S.It is denoted by intersection minus (-). Notation: R - S	Remember	CLO9	ACS005.09
9	What is renaming operations?	The rename operation is used to rename the output relation. It is denoted by rho (ρ). Example: We can use the rename operator to rename STUDENT relation to STUDENT1. ρ(STUDENT1, STUDENT)	Remember	CLO9	ACS005.09
10	What is Cartesian product	The Cartesian product is used to combine each row in one table with each row in the other table. It is also known as a cross product.It is denoted by X. Notation: E X D	Remember	CLO9	ACS005.09
11	What is joins operations?	A Join operation combines related tuples from different relations, if and only if a given join condition is satisfied. It is denoted by ⋈.	Remember	CLO9	ACS005.09
12	List join operations?	Natural join, Equi join, Inner join and outer join	Remember	CLO9	ACS005.09
13	What are natural join operations?	A natural join is the set of tuples of all combinations in R and S that are equal on their common attribute names. It is denoted by ⋈.	Remember	CLO9	ACS005.09
14	What are division operations?	Division operator A÷B can be applied if and only if: Attributes of B is proper subset of Attributes of A. The relation returned by division operator will have attributes = (All attributes of A – All Attributes of B)	Remember	CLO9	ACS005.09

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		The relation returned by division operator will return those tuples from relation A which are associated to every B's tuple.			
15	What is relational calculus?	Relational calculus is a non procedural query language, it uses mathematical predicate calculus.	Remember	CLO10	ACS005.10
16	What is domain relational calculus?	In domain relational calculus, filtering variable uses the domain of attributes. Domain relational calculus uses the same operators as tuple calculus. It uses logical connectives ∧ (and), ∨ (or) and ¬ (not).It uses Existential (∃) and Universal Quantifiers (∀) to bind the variable. Notation: { a1, a2, a3, ..., an | P (a1, a2, a3, ... ,an)} Where a1, a2 are attributes P stands for formula built by inner attributeS.	Remember	CLO10	ACS005.10
17	What is tuple relational calculus?	The tuple relational calculus is specified to select the tuples in a relation. The result of the relation can have one or more tuples. In TRC, filtering variable uses the tuples of a relation. Notation: {T | P (T)} or {T | Condition (T)} Where T is the resulting tuples P(T) is the condition used to fetch T.	Remember	CLO10	ACS005.10
19	Define Theta join?	The general case of JOIN operation is called a Theta join. It is denoted by symbol θ A ⋈$_\theta$ B Theta join can use any conditions in the selection criteria.	Remember	CLO9	ACS005.09
20	What is inner join?	In an inner join, only those tuples that satisfy the matching criteria are included, while the rest are excluded	Remember	CLO9	ACS005.09

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21	What is natural Join?	Natural join can only be performed if there is a common attribute (column) between the relations. The name and type of the attribute must be same.	Remember	CLO9	ACS005.09
22	What is equi-join?	When a theta join uses only equivalence condition, it becomes a equi join. $A \bowtie_{A.column\ 2\ =\ B.column\ 2} (B)$	Remember	CLO9	ACS005.09
23	What is Left Outer Join(⟕)?	In the left outer join, operation allows keeping all tuple in the left relation. However, if there is no matching tuple is found in right relation, then the attributes of right relation in the join result are filled with null values. $A ⟕ B$	Remember	CLO9	ACS005.09
24	What is Right Outer join(⟖)?	In the right outer join, operation allows keeping all tuple in the right relation. However, if there is no matching tuple is found in the left relation, then the attributes of the left relation in the join result are filled with null values. $A ⟖ B$	Remember	CLO9	ACS005.09
25	What is Full Outer Join(⟗)?	In a full outer join, all tuples from both relations are included in the result, irrespective of the matching condition. $A ⟗ B$	Remember	CLO9	ACS005.09
26	What is Outer Join?	In an outer join, along with tuples that satisfy the matching criteria.	Remember	CLO9	ACS005.09
27	What are the unary operations in Relational Algebra?	PROJECTION and SELECTION.	Remember	CLO9	ACS005.09
28	Justify the resulting relations of PRODUCT and JOIN operation the same?	No. PRODUCT: Concatenation of every row in one relation with every row in another. JOIN: Concatenation of rows from one relation and related rows from another.	Remember	CLO9	ACS005.09
29	List types of Inner joins?	Inner Joins:	Remember	CLO9	ACS005.09

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		• Theta join • EQUI join Natural join			
30	List types of outer joins?	Outer joins: • Left Outer Join • Right Outer Join Full Outer Join	Remember	CLO9	ACS005.09
31	How Does Tuple-oriented Relational Calculus Differ From Domain-oriented Relational Calculus?	The tuple-oriented calculus uses a tuple variables i.e., variable whose only permitted values are tuples of that relation. Example: QUEL The domain-oriented calculus has domain variables i.e., variables that range over the underlying domains instead of over relation. Example: ILL, DEDUCE.	Remember	CLO10	ACS005.10
32	What is the syntax for SELECT σ?	SELECT σ c (R) : c = condition; R = table	Remember	CLO9	ACS005.09
33	What does the RENAME operator do?	Renames relation and attributes of relation.	Remember	CLO9	ACS005.09
34	What is the syntax of RENAME?	P_newTableName_(list of new attribute names) (Table to affect)	Remember	CLO9	ACS005.09
35	What are the conditions for union?	Same number of attributes in both tables, and the tables has to be compatible.	Remember	CLO9	ACS005.09
		UNIT – III			
1	What is SQL?	SQL (Structured Query Language) is a standardized programming language that's used to manage relational databases and perform various operations on the data in them.	Remember	CLO14	ACS005.14
2	What is Query?	A query is a request for data or information from a database table or combination of tables.	Remember	CLO14	ACS005.10
3	What is Nested query?	A Nested query is a query within another SQL query and embedded within the WHERE clause.	Remember	CLO14	ACS005.14

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4	What is correlated subquery?	A correlated subquery is a subquery that uses values from the outerquery, requiring the inner query to execute once for each outer query.	Remember	CLO14	ACS005.14
5	What is DDL?	DDL stands for Data Definition Language which is used to define the database schema.	Remember	CLO14	ACS005.14
6	What is DML?	DML stands for Data Manipulation Language which is used to insert, delete, and update data within schema objects.	Remember	CLO14	ACS005.14
7	What is TCL?	TCL stands for Transaction Control Language. This command is used to manage the changes made by DML statements.	Remember	CLO15	ACS005.15
8	What is DCL?	DCL is stands for as Data control Language which is used to provide access permissions to users.	Remember	CLO15	ACS005.15
9	List DDL commands?	DDL statements create, alter, drop and truncate.	Remember	CLO14	ACS005.14
10	List DML commands?	DML statements are select, insert, update and delete.	Remember	CLO14	ACS005.14
12	List TCL commands?	TCL statements are commit, rollback and savepoint.	Remember	CLO15	ACS005.15
13	List DCL commands?	DCL statements are grant and revoke.	Remember	CLO15	ACS005.15
14	Define AND operator?	AND is used to filter records based on more than one condition and displays a record if all the conditions separated by AND are TRUE	Remember	CLO16	ACS005.16
15	Define OR operator?	OR is used to filter records based on more than one condition and displays a record if any of the conditions separated by OR are TRUE	Remember	CLO16	ACS005.16
16	Define BETWEEN operator?	The BETWEEN operator selects values within a given range. The values can be numbers, text, or dates.	Remember	CLO16	ACS005.16
17	Define COMPARISION operators?	Comparison operators are used in the WHERE clause to determine which records to select.	Remember	CLO16	ACS005.16
18	List few COMPARISON operators	=,< >, >, <, >=, <=, IN(), NOT IN,BETWEEN	Remember	CLO16	ACS005.16
19	Define Aggregate functions?	Aggregate functions compute a single result from a set of input values. Few functions are count, avg, max, min, sum	Remember	CLO16	ACS005.16
20	Define Group by and having clause?	An GROUP BY HAVING clause allows to group rows that have the same values and also with condition.	Remember	CLO16	ACS005.16
21	Define Order by clause?	An ORDER BY clause allows you to specify the order in which rows appear in the result set.	Remember	CLO16	ACS005.16
22	Define 'like' operator	Like operator is used for pattern matching in sql and denoted by wildcard symbol '%'.	Remember	CLO16	ACS005.16

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23	Define UNION operator?	UNION operator is used to combine the result sets of 2 or more SELECT statements. It removes duplicate rows between the various SELECT statements.	Remember	CLO16	ACS005.16
24	Define INTERSECT operator?	INTERSECT operator is used to return the results of 2 or more SELECT statements.	Remember	CLO16	ACS005.16
25	What is a sub query?	a subquery is a query within a query. These subqueries can reside in the WHERE clause, the FROM clause, or the SELECT clause.	Remember	CLO16	ACS005.16
26	What is Normalization?	Normalization is a process of organizing the data in database to avoid data redundancy, insertion anomaly, update anomaly & deletion anomaly.	Remember	CLO12	ACS005.12
27	Define Decomposition?	Decomposition is a process of dividing a complex relation into simple sub relations.	Understand	CLO12	ACS005.12
28	Define Functional Dependency?	A functional dependency is a constraint between two sets of attributes in a relation from a database. It is a relationship that exists when one attribute uniquely determines another attribute.	Understand	CLO11	ACS005.11
29	What is redundancy?	Redundancy is defined as repetition of data in database.	Understand	CLO12	ACS005.12
30	What is Trigger	A trigger is a stored procedure in database which automatically invokes whenever a special event in the database occurs.	Understand	CLO17	ACS005.17
31	What is an Assertion	An assertion ensures a certain condition will always exist in the database.	Understand	CLO17	ACS005.17
32	What is a key?	A KEY is a value used to identify a record in a table uniquely. A KEY could be a single column or combination of multiple columns	Understand	CLO11	ACS005.11
33	Define Normal forms	Normal form is used to reduce redundancy from the database table. Types of normal forms are: 1NF,2NF,3NF,4NF and 5NF	Understand	CLO13	ACS005.13
34	List out anomalies in dbms	Insertion, deletion and update anomalies	Understand	CLO13	ACS005.13
35	Define 1st normal form	A relation is in first normal form if and only if the domain of each attribute contains only atomic values, and the value of each attribute contains only a single value from that domain.	Understand	CLO13	ACS005.13
36	Define 2nd normal form	The Second Normal Form states that it should meet all the rules of 1NF and there must be no partial dependences of any of the columns on the primary key.	Understand	CLO13	ACS005.13
37	Define 3rd normal form	The Third Normal Form states that it should meet all the rules of second normal form and no primary fields are dependent on the other primary key.	Understand	CLO13	ACS005.13
38	Define 4th normal form	The Fourth Normal Form states that it should meet all the rules of 3NF and there are no non-trivial multivalued dependencies other than a candidate key.	Understand	CLO13	ACS005.13
39	Define BCNF normal form	It is a slightly stronger version of the third normal form. A table is in BCNF if every functional dependency $X \rightarrow Y$, X is the super key of the table.	Understand	CLO13	ACS005.13

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40	Define 5th normal form	The Fifth Normal Form states that it should meet all the rules of 4NF and not contains any join dependency and joining should be lossless.	Understand	CLO13	ACS005.13
41	Define prime attributes	Prime attributes are attributes of the relation which exist in at least one of the possible candidate keys.	Understand	CLO13	ACS005.13
42	Define non-prime attributes	A non-prime attribute of R is an attribute that does not belong to any candidate key.	Understand	CLO13	ACS005.13
43	Define a join dependency?	A join dependency is a constraint on the set of legal relations over a database scheme.	Understand	CLO13	ACS005.13
44	Define Multi valued dependency?	Multivalued dependency occurs when there are more than one independent multivalued attributes in a table.	Understand	CLO13	ACS005.13
45	Define Transitive dependency?	When an indirect relationship causes functional dependency it is called Transitive Dependency. If P -> Q and Q -> R is true, then P-> R is a transitive dependency.	Understand	CLO13	ACS005.13
		UNIT - IV			
1	Define transaction in DBMS.	A transaction is a unit of program execution that accesses and/or updates various data items.	Remember	CLO18	ACS005.18
2	State the property Atomicity of a Transaction.	Atomicity of a transaction is either all operations of the transaction are properly reflected in the database or none of them.	Understand	CLO18	ACS005.18
3	What is effect Durability of Transaction?	Durability ensures that after a transaction completes successfully, the changes it has made to the database persist, even if there are system failures	Remember	CLO18	ACS005.18
4	Indicate the importance of Isolation property of a Transaction.	Although multiple transactions may execute concurrently, each transaction must be unaware of other concurrently executing transactions and result as it is executing alone.	Understand	CLO18	ACS005.18
5	How Consistency of a transaction preserved?	Execution of a transaction in isolation preserves the consistency of the database.	Remember	CLO18	ACS005.18
6	Define the role of Recovery Management component?	The recovery-management component of a database system implements the support for atomicity and durability.	Remember	CLO20	ACS005.18
7	Define Schedule of transactions.	Schedule is a sequences of instructions that specify the chronological order in which all instructions of concurrent transactions are executed	Remember	CLO19	ACS005.19
8	Define a serializable Schedule.	A (possibly concurrent) schedule is serializable if it is equivalent to a serial schedule	Remember	CLO19	ACS005.19
9	When a schedule is View serializable?	A schedule S is view serializable if it is view equivalent to a serial schedule.	Remember	CLO19	ACS005.19
10	When two instructions are conflict to each other?	Instructions l_i and l_j of transactions T_i and T_j respectively, conflict if and only if there exists some item Q accessed by both l_i and l_j, and at least one of these instructions wrote Q.	Remember	CLO19	ACS005.19

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11	Define Recoverable schedule .	A schedule is recoverable if a transaction T_j reads a data item previously written by a transaction T_i , then the commit operation of T_i appears before the commit operation of T_j.	Remember	CLO20	ACS005.20
12	Define a Cascadeless schedules.	A Schedule is Cascadeless schedules in which cascading rollbacks cannot occur; for each pair of transactions T_i and T_j such that T_j reads a data item previously written by T_i, the commit operation of T_i appears before the read operation of T_j.	Remember	CLO20	ACS005.20
13	What are various possible failures may occur during concurrent transactions?	Two main issues to deal with: Failures of various kinds, such as hardware failures and system crashes Concurrent execution of multiple transactions.	Remember	CLO21	ACS005.21
14	List Various possible states of transaction	Active, Partially committed Failed , Aborted, Committed	Remember	CLO21	ACS005.21
15	How Concurrency control schemes ensure Isolation of transactions.	Concurrency control schemes are mechanisms to achieve isolation, that is, to control the interaction among the concurrent transactions in order to prevent them from destroying the consistency of the database	Remember	CLO21	ACS005.21
16	Define precedence graph with reference to graph based protocols.	Precedence graph is a direct graph where the vertices are the transactions (names) and arcs are drawn from T_i to T_j if the two transaction conflict, and T_i accessed the data item on which the conflict arose earlier.	Remember	CLO21	ACS005.21
17	What is purpose of Lock in Lock based protocols?	A lock is a mechanism to control concurrent access to a data item	Remember	CLO20	ACS005.20
18	Distinguish between Exclusive and Shared lock.	In requesting for Exclusive Lock on a Data item then it can be used for both read as well as to write whereas A shared lock can be requested on a Data item if it can used only to read.	Understand	CLO20	ACS005.20
19	Express What is a locking protocol.	A locking protocol is a set of rules followed by all transactions while requesting and releasing locks. Locking protocols restrict the set of possible schedules.	Understand	CLO20	ACS005.20
20	State the functions of Growing Phase in two phase locking protocol.	In Growing Phase of locking protocol, a transaction may obtain locks and transaction may not release locks	Remember	CLO20	ACS005.20
21	State the functions of Shrinking Phase in two phase locking protocol.	In Shrinking Phase of two phase locking protocol a transaction may release locks and transaction may not obtain locks.	Remember	CLO20	ACS005.20
22	Identify when a Transaction system is in dead lock state?	Transaction System is deadlocked if there is a set of transactions such that every transaction in the set is waiting for another transaction in the set.	Understand	CLO20	ACS005.20
23	Define lock point.	lock point is the point where a transaction acquired its final lock.	Remember	CLO20	ACS005.20
24	What is responsibility of Lock Manager.	A lock manager can be implemented as a separate process to process lock and unlock requests and it also maintains a data-structure called a lock table to record granted locks and pending requests.	Remember	CLO20	ACS005.20

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25	Identify the basic idea of Graph-based protocols.	Graph-based protocols Impose a partial ordering $\rightarrow$ on the set D = {d_1, d_2 ,..., d_h} of all data items. If $d_i \rightarrow d_j$ then any transaction accessing both d_i and d_j must access d_i before accessing d_j. Implies that the set D may now be viewed as a directed acyclic graph, called a *database graph*	Understand	CLO20	ACS005.20
26	What is the purpose of Dead lock Prevention protocols.	Dead lock Prevention protocols ensure that the system will *never* enter into a deadlock state.	Remember	CLO20	ACS005.20
27	How Wait-Die scheme prevent from Dead lock state.	In wait-die scheme(non-preemptive) older transaction may wait for younger one to release data item. Younger transactions never wait for older ones; they are rolled back instead, a transaction may die several times before acquiring needed data item	Remember	CLO21	ACS005.21
28	How Wound-wait scheme prevent from Dead lock state.	Wound-wait scheme preemptive older transaction *wounds* (forces rollback) of younger transaction instead of waiting for it. Younger transactions may wait for older ones.	Understand	CLO21	ACS005.21
29	What is transaction failure?	Transaction failure may be because of logical errors or systems errors. Logical errors: transaction cannot complete due to some internal error condition System errors: the database system must terminate an active transaction due to an error condition (e.g., deadlock)	Remember	CLO21	ACS005.21
30	Distinguish physical blocks from buffer blocks.	Physical blocks are those blocks residing on the disk. Buffer blocks are the blocks residing temporarily in main memory.	Understand	CLO21	ACS005.21
31	What is log and log record?	The log is a sequence of log records, and Log records maintains a record of update activities on the database on stable storage.	Remember	CLO21	ACS005.21
32	Describe deferred database modification.	The deferred database modification scheme records all modifications to the log, but defers all the writes to after partial commit.	Remember	CLO21	ACS005.21
33	Describe immediate database modification.	The immediate database modification scheme allows database updates of an uncommitted transaction to be made as the writes are issued since undoing may be needed, update logs must have both old value and new value	Remember	CLO21	ACS005.21
34	What is blind write?	If a transaction has write instruction on a attribute without having read instruction on the same data item is known as blind write.	Remember	CLO21	ACS005.21
35	What is dual paging problems?	When database decides to write buffer page to disk, buffer page may be in swap space, and may have to be read from swap space on disk and output to the database on disk. This results in extra I/O and is Known as dual paging problem.	Remember	CLO21	ACS005.21
36	What causes System Crash?	System crash: a power failure or other hardware or software failure causes the system to crash.	Remember	CLO21	ACS005.21

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37	Express the purpose of stable storage.	Stable storage: a mythical form of storage that survives all failures approximated by maintaining multiple copies on distinct nonvolatile media	Remember	CLO21	ACS005.21
38	Write the purpose of Checkpoints.	Checkpoints are used to streamline recovery procedure periodically by addressing problems in recovery procedure such as Time-consuming search process, unnecessarily redo transactions which have already output their updates to the database.	Remember	CLO21	ACS005.21
39	What idempotent of operations redo(), and undo().	Redo(), undo() operations must be Idempotent means, even if the operation is executed multiple times the effect is the same as if it is executed once	Remember	CLO21	ACS005.21
40	State the write-ahead logging or WAL rule.	Write-ahead-logging rule states that "Before a block of data in main memory is output to the database, all log records pertaining to data in that block must have been output to stable storage". Strictly speaking WAL only requires undo information to be output	Remember	CLO21	ACS005.21
	UNIT - V				
1	Distinguish volatile storage from non-volatile storage:	volatile storage: loses contents when power is switched off Non-volatile storage: Contents persist even when power is switched off and Includes secondary and tertiary storage, as well as battery-backed up main-memory.	Understand	CLO22	ACS005.22
2	What is main purpose of Tape storage?	Tape storage is non-volatile an used primarily for backup (to recover from disk failure), and for archival data	Remember	CLO22	ACS005.22
3	Describe how Access time computed ?.	Access time – the time it takes from when a read or write request is issued to when data transfer begins. Which is sum of Seek Time and Rotational latency?	Remember	CLO22	ACS005.22
4	State the purpose of Disk Block .	A database file is partitioned into fixed-length storage units called blocks. Blocks are units of both storage allocation and data transfer	Remember	CLO22	ACS005.22
5	What is Cache memory?	Cache Memory is fastest and most costly form of storage, volatile and managed by the computer system hardware.	Remember	CLO22	ACS005.22
6	Write about optical storage.	Optical storage is non-volatile, data is read optically from a spinning disk using a laser. CD-ROM, DVD , WORM, most popular forms.	Remember	CLO22	ACS005.22
7	Write the purpose of Juke-Box system.	Juke-box systems, with large numbers of removable disks, a few drives, and a mechanism for automatic loading/unloading of disks available for storing large volumes of data	Remember	CLO22	ACS005.22
8	*What is function of Read-Write Head?*	Read-write head Positioned very close to the platter surface (almost touching it) and	Remember	CLO22	ACS005.22

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
		Reads or writes magnetically encoded information.			
9	List various Memories in order of their preference.	Cache, Main Memory, Flash Memory, Magnetic Disk, Optical Disk and Tape disk.	Remember	CLO22	ACS005.22
10	What are responsibilities of Disk Controller?	Disk controller – interfaces between the computer system and the disk drive hardware. Its responsibilities are :accepts high-level commands to read or write a sector ,initiates actions such as moving the disk arm to right track, reading or writing the data ,Performs remapping of bad sectors		CLO22	ACS005.22
11	Define Mean time to failure (MTTF) .	Mean time to failure (MTTF) – the average time the disk is expected to run continuously without any failure.	Remember	CLO22	ACS005.22
12	What is RAID?	RAID: Redundant Arrays of Independent Disks is a disk organization techniques that manage a large numbers of disks, providing a view of a single disk of high capacity , high speed by using multiple disks in parallel, high reliability by storing data redundantly so that data can be recovered even if a disk fails .	Remember	CLO22	ACS005.22
13	What are main goals of parallelism in disk system?	Two main goals of parallelism in a disk system are: Load balance multiple small accesses to increase throughput and Parallelize large accesses to reduce response time.	Remember	CLO22	ACS005.22
14	List some buffer replacement techniques.	Least recently used (LRU strategy), Pinned block, Toss-immediate strategy, Most recently used (MRU) strategy	Remember	CLO22	ACS005.22
15	List various file organization Techniques	Sequential files, Random files, Heap file, Hash files, Index files	Remember	CLO22	ACS005.22
16	Distinguish ordered indices from hash indices .	Ordered indices: search keys are stored in sorted order where as Hash indices: search keys are distributed uniformly across "buckets" using a "hash function".	Understand	CLO24	ACS005.24
17	List various index evaluation metrics.	Access types, Access time, Insertion time, Deletion time, Space overhead	Remember	CLO23	ACS005.23
18	Differentiate Dense index from Sparse Index.	In Dense index index record appears for every search-key value in the file But Sparse Index contains index records for only some Applicable search-key values .	Understand	CLO23	ACS005.23
19	What are contents of a B$^+$-Tree node?	A typical B$^+$-Tree node contains n pointers and n-1 keys where P$_i$ pointers to children (for non-leaf nodes) or pointers to records or buckets of records (for leaf nodes) , and K$_i$ search-key values are ordered $K_1 < K_2 < K_3 < . . . < K_{n-1}$	Remember	CLO23	ACS005.23
20	How B-Tree and B+-tree are different?	B-Tree is Similar to B+-tree, but B-tree allows search-key values to appear only once; but in B+-tree some search keys appear repeatedly in various levels of nodes. In B-tree; an additional pointer field for each search key in a non leaf node must be included.	Understand	CLO23	ACS005.23

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21	Write characteristics of Extendable hashing function.	Extendable hashing – one form of dynamic hashing Hash function generates values over a large range — typically b-bit integers, with $b = 32$. At any time use only a prefix of the hash function to index into a table of bucket addresses.	Remember	CLO24	ACS005.24
22	Write Advantages and disadvantages of extendable hashing.	Benefits of extendable hashing are : Hash performance does not degrade with growth of file, Minimal space overhead Disadvantages of extendable hashing are: Extra level of indirection to find desired record, Bucket address table may itself become very big.	Remember	CLO24	ACS005.24
23	State purpose of Hash Function.	Hash function h is a function from the set of all search-key values K to the set of all bucket addresses B. Hash function is used to locate records for access, insertion as well as deletion.	Remember	CLO24	ACS005.24
24	Define Bucket in Hash File Organization.	A bucket is a unit of storage containing one or more records (a bucket is typically a disk block).	Remember	CLO24	ACS005.24
25	Describe an Ideal Hash Function.	An ideal hash function is uniform, i.e., each bucket is assigned the same number of search-key values from the set of all possible values. Ideal hash function is random, so each bucket will have the same number of records assigned to it irrespective of the actual distribution of search-key values in the file.	Remember	CLO24	ACS005.24
26	List reasons of Bucket Overflow in Hashing.	Bucket overflow can occur because of Insufficient buckets, Skew in distribution of records.	Remember	CLO24	ACS005.24
27	Distinguish open Hashing from Closed hashing.	In closed hashing overflow of buckets (over flow chaining) is used alternatively, in open hashing, no overflow buckets are used.	Understand	CLO24	ACS005.24
28	Distinguish static hashing from dynamic hashing.	In static hashing, function h maps search-key values to a fixed set of B of bucket addresses and dynamic hashing Allows the hash function to be modified dynamically and map to variable set of buckets.	Understand	CLO24	ACS005.24
29	List Basic steps in Query processing.	Steps in Query processing are : Parsing and translation, optimization and Evaluation	Remember	CLO22	ACS005.22
30	What is function of parsing and translation of query.	Parsing and translation: Translate the query into its internal form that is into relational algebra. Parser checks syntax, verifies relations	Remember	CLO22	ACS005.22
31	What is Query optimization?	Query Optimization is a process of choosing a plan with lowest cost from all equivalent evaluation plans. Cost is estimated using statistical information from the database catalog	Remember	CLO22	ACS005.22

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32	What is the purpose of Evaluation in Query processing?	In Evaluation step, The query-execution engine takes a query-evaluation plan, executes that plan, and returns the answers to the query.	Remember	CLO22	ACS005.22
33	What is Evaluation plan?	Annotated expression specifying detailed evaluation strategy is called an evaluation-plan.	Remember	CLO22	ACS005.22
34	List various measures of query cost.	Cost is generally measured as total elapsed time for answering query. Various factors contribute cost of query are I/O cost which include Disk accesses, CPU, or network communication costs.	Remember	CLO22	ACS005.22
35	What is Materialization?	Materialization generate results of an expression whose inputs are relations or are already computed, materialize (store) it on disk.	Remember	CLO22	ACS005.22
36	Write about pipelined evaluation.	Pipelined evaluation valuates several operations simultaneously, passing the results of one operation on to the next.	Remember	CLO22	ACS005.22
37	What is Double Buffering?	Double buffering use two output buffers for each operation, when one is full write it to disk while the other is getting filled	Remember	CLO22	ACS005.22
38	How pipelines are implemented?	Pipelines can be executed in two ways: demand driven and producer driven	Remember	CLO22	ACS005.22
39	List steps in Cost-Based Query Optimization.	Steps in cost-based query optimization are: Generate logically equivalent expressions using equivalence rules , Annotate resultant expressions to get alternative query plans, Choose the cheapest plan based on estimated cost	Remember	CLO22	ACS005.22
40	What is the purpose of Equivalence Rule?	An equivalence rule says that expressions of two forms are equivalent then one form Can replace other form and vice versa.	Remember	CLO22	ACS005.22

Signature of the Faculty   **Signature of the HOD**