



MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
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(ISO/IEC - 27001 - 2005 Certified)

WINTER – 2018 EXAMINATION
MODEL ANSWER

Subject: Relational Database Management System

Subject Code: 17332

Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q. No	Sub Q.N.	Answer	Marking Scheme
1.	(A) (a) Ans.	Attempt any SIX of the following: List the application of database management system. 1. Banking 2. Airlines 3. Universities 4. Credit Card transactions 5. Telecommunication: 6. Finance 7. Sales. 8. Manufacturing 9. On-line Retailers	12 2M <i>Any two applicati on 1M each</i>
	(b) Ans	Write advantages of network model. 1) Conceptual simplicity- network model is also conceptually simple and easy to design. 2) Capability to handle more relationship types- The network model can handle the one to many and many to many relationships which is real help in modeling the real life situations.	2M <i>Any 2 advanta ges list only 1M each</i>



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		<p>3) Ease of data access-The data access is easier and flexible than the hierarchical model.</p> <p>4) Data integrity- The network model does not allow a member to exist without an owner.</p> <p>5) Data independence- The network model is better than the hierarchical model in isolating the programs from the complex physical storage details.</p>	
	(c) Ans	<p>Explain foreign key constraint. It is used to establish the parent child relation between two tables. Value of foreign key is derived from primary key. Primary key is defined into parent table and foreign key is defined into child table.</p>	<p>2M <i>Correct explanation</i> 2M</p>
	(d) Ans	<p>What are the different data types of SQL. 1.Char 2.Number 3.varchar /varchar2 4.Long 5. Date</p>	<p>2M <i>Any four data types 1/2 M each</i></p>
	(e) Ans	<p>What is serializability? When multiple transactions run concurrently, then it may give rise to inconsistency of the database. Serializability is a concept that helps to identify which non-serial schedules are correct and will maintain the consistency of the database.</p>	<p>2M <i>Correct definition 2M</i></p>
	(f) Ans	<p>What is view? A VIEW in SQL is a logical subset of data from one or more tables.</p>	<p>2M <i>Correct definition 2M</i></p>
	(g) Ans	<p>Define following with respect to PL/SQL. (i) Function (ii) Procedure (i)Function: A function is a logically grouped set of SQL and PL/SQL statements that perform a specific task. (ii) Procedure: It is named PL/SQL block which performs one or more specific task</p>	<p>2M <i>Correct definition 1M each</i></p>



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	<p>(h)</p> <p>Define the terms : (i) Candidate Key (ii) Primary Key</p> <p>Ans</p>	<p>(i) Candidate Key Sometimes in relation, there are more than one attributes are having the unique identification property. Those attributes are known as candidate key.</p> <p>(ii) Primary Key Within a relation there is always one attribute which has values that are unique in a relation also not null, thus can be used to identify tuple of that relation. Such a unique identifier is called the primary key.</p>	<p>2M</p> <p><i>Correct definition 1M each</i></p>
	<p>(B)</p> <p>(a)</p> <p>Ans</p>	<p>Attempt any TWO of the following : Explain 3 levels of data abstraction with suitable diagram. Three levels of abstraction are as follows: 1) Physical level 2) Logical level 3) View level Diagram:</p> <div data-bbox="548 1276 1084 1780" data-label="Diagram"><pre>graph TD; subgraph View_Level [View Level]; direction LR; View1[View1]; View2[View2]; Viewn[View n]; end; View_Level --- Logical_level[Logical level]; Logical_level --- Physical_level[Physical level];</pre></div>	<p>8 4M</p> <p><i>Diagram 2M</i></p> <p><i>Description 2M</i></p>



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		<p>Explanation:</p> <p>1. Physical Level:</p> <ul style="list-style-type: none">• It is lowest level of abstraction.• This level defines lowest complicated data structure of database system.• This level hidden from user.• It defines how the data are stored. <p>2. Logical Level:</p> <ul style="list-style-type: none">• The level next to physical level is called logical level.• This level defines what data stored in the database and what the relationships among these data are.• Fully decides the structure of the entire database. <p>3. View Level:</p> <ul style="list-style-type: none">• This level is used to show the part of database to user.• There is more complexity in physical as well as logical level so user should not interact with complicated database.• So different view of database can be created for user to interact with database easily	
	<p>(b)</p> <p>Ans</p>	<p>Describe the command to change the data in the table with example.</p> <p>Update statement is used to modify the data in a table. To update selective rows from the table where the specified condition gets satisfied.</p> <p>Syntax : Update <tablename> set <attribute_name1=expression1> where <search_condition>;</p> <p>Example: update student set age=18 where s_id=102;</p>	<p>4M</p> <p><i>Syntax / description 2M</i></p> <p><i>Example 2M</i></p>



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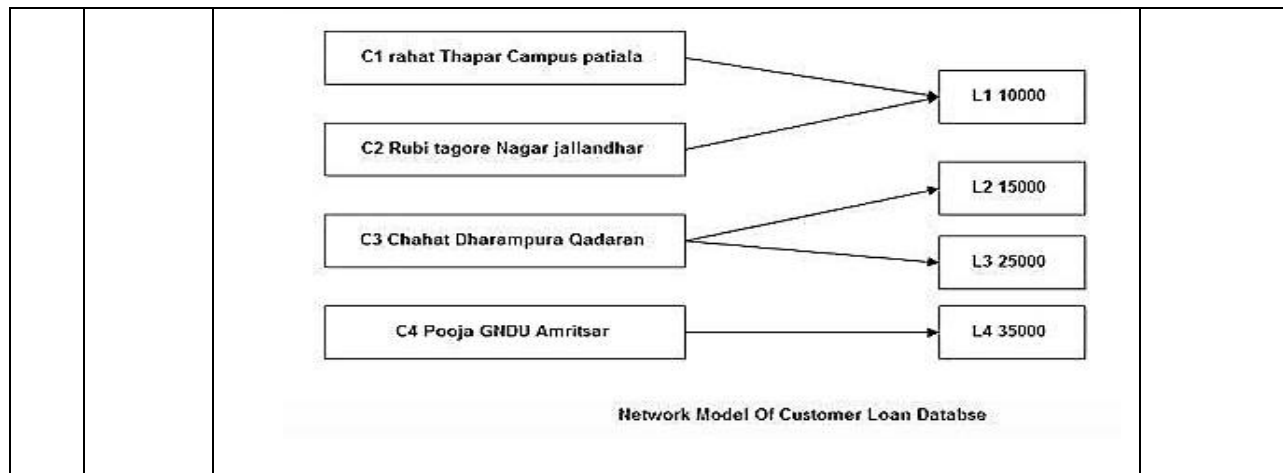
(c)	Ans	<p>Compare database triggers and procedures. <i>Note: Any other relevant comparison shall be considered.</i></p> <table border="1" style="width: 100%; border-collapse: collapse; margin: 10px 0;"> <thead> <tr> <th style="width: 50%;">Database Trigger</th> <th style="width: 50%;">Procedures</th> </tr> </thead> <tbody> <tr> <td>1. Triggers are fired when particular SQL commands (DML) are executed</td> <td>1. Procedures are executed when they are called</td> </tr> <tr> <td>2. Triggers have events and related actions</td> <td>2. Procedure do not have events and related actions</td> </tr> <tr> <td>3. Triggers are called implicitly</td> <td>3. Procedure are called explicitly</td> </tr> <tr> <td>4. Triggers cannot accept parameters</td> <td>4. Procedures can accept parameters.</td> </tr> </tbody> </table>	Database Trigger	Procedures	1. Triggers are fired when particular SQL commands (DML) are executed	1. Procedures are executed when they are called	2. Triggers have events and related actions	2. Procedure do not have events and related actions	3. Triggers are called implicitly	3. Procedure are called explicitly	4. Triggers cannot accept parameters	4. Procedures can accept parameters.	<p>4M</p> <p><i>Any 4 relevant differences</i> 1M each</p>
Database Trigger	Procedures												
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4. Triggers cannot accept parameters	4. Procedures can accept parameters.												
2	Ans	<p>Attempt any FOUR of the following Explain network model with a suitable diagram. <i>Note: Any other relevant diagram or example shall be considered.</i></p> <p><u>Network model:</u></p> <ol style="list-style-type: none"> 1. This model is introduced by Charles Bachman. 2. The network model is a database model. 3. We can represent objects and relationships. Nodes are objects and relationships are links. 4. Network Model is based on tree like structure with many roots. 5. One to many (1:N) or many to many(M:M) relationship is maintained. 6. Network Model is more popular as compare to the Hierarchical model. 7. In Network Model, data is represented as a collection of records of fixed format. Records are physically linked through linked list. 8. In database, data is organized as a graph. 9. It uses client server architecture. It is mainly used in network 	<p>16 4M</p> <p><i>Explanation</i> 3M</p> <p><i>Diagram</i> 1M</p>										



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(b) Ans	<p>Compare BCNF and 3NF with suitable example.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">BCNF</th> <th style="width: 50%;">3NF</th> </tr> </thead> <tbody> <tr> <td>Redundancy is low compared to 3NF</td> <td>Redundancy is high compared to BCNF</td> </tr> <tr> <td>It concentrates on candidate keys</td> <td>It concentrate on primary key.</td> </tr> <tr> <td>It may not preserve all functional dependencies</td> <td>It may preserve all dependencies</td> </tr> <tr> <td>For any trivial dependency in a relation R say X->Y, X should be a super key of relation R.</td> <td>No non-prime attribute must be transitively dependent on the Candidate key</td> </tr> <tr> <td>Lossless decomposition is hard to achieve in BCNF.</td> <td>Lossless decomposition can be achieved in 3NF.</td> </tr> </tbody> </table> <p>Example OF 3NF A bank uses the following relation: Vendor(ID, Name, Account_No, Bank_Code_No, Bank) The attribute ID is the identification key. All attributes are single valued (1NF). The table is also in 2NF. The following dependencies exist:</p> <p>1. Name, Account_No, Bank_Code_No are functionally dependent on ID (ID --> Name, Account_No, Bank_Code_No)</p>	BCNF	3NF	Redundancy is low compared to 3NF	Redundancy is high compared to BCNF	It concentrates on candidate keys	It concentrate on primary key.	It may not preserve all functional dependencies	It may preserve all dependencies	For any trivial dependency in a relation R say X->Y, X should be a super key of relation R.	No non-prime attribute must be transitively dependent on the Candidate key	Lossless decomposition is hard to achieve in BCNF.	Lossless decomposition can be achieved in 3NF.	<p>4M</p> <p><i>Any 2 points 1M each</i></p> <p><i>Example of each 1M</i></p>
BCNF	3NF													
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	<p>2. Bank is functionally dependent on Bank_Code_No (Bank_Code_No --> Bank)</p> <p>There is a transitive dependency between Bank_Code_No and Bank, because Bank_Code_No is not the primary key of this relation. To get to the third normal form (3NF), we have to put the bank name in a separate table together with the clearing number to identify it.</p> <p>Vendor(ID, Name, Account_No, Bank_Code_No) Bank(Bank_Code_No, Bank)</p> <p>Example of BCNF:</p> <p>Let's assume there is a company where employees work in more than one department. EMPLOYEE table ⊕ EMP_ID, EMP_COUNTRY, EMP_DEPT, DEPT_TYPE, EMP_DEPT_NO)</p> <p>In the above table Functional dependencies are as follows: EMP_ID → EMP_COUNTRY EMP_DEPT → {DEPT_TYPE, EMP_DEPT_NO} Candidate key: {EMP-ID, EMP-DEPT}</p> <p>The table is not in BCNF because neither EMP_DEPT nor EMP_ID alone are keys.</p> <p>To convert the given table into BCNF, we decompose it into three tables: 1.EMP_COUNTRY table: EMP_ID → EMP_COUNTRY 2.EMP_DEPT table: EMP_DEPT → {DEPT_TYPE, EMP_DEPT_NO} 3.EMP_DEPT_MAPPING table: EMP_ID, EMP_DEPT</p> <p>Functional dependencies 1. EMP_ID → EMP_COUNTRY 2. EMP_DEPT → {DEPT_TYPE, EMP_DEPT_NO}</p> <p>Candidate keys: For the first table: EMP_ID For the second table: EMP_DEPT</p>	
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		<p>For the third table: {EMP_ID, EMP_DEPT} Now, this is in BCNF because left side part of both the functional dependencies is a key.</p>	
	(c)	<p>Consider the structure of stud record (Name, Mark, Age, Place, Phone, Birth_date) Write SQL queries for following: (i) To list the name of student who do not have phone no. (ii) To list the students from Nashik and Pune (iii) To change mark of Monika to 88 instead of 80 (iv) To list the student's from Amit's age group</p> <p><i>Note: Here table name is considered as <u>studrecord</u></i> (i) To list the name of student who do not have phone no. Select Name from studrecord Where Phone IS NULL;</p> <p>(ii) To list the students from Nashik and Pune Select Name from studrecord Where Place='Nashik' or Place='Pune'; (or) Select Name from studrecord Where Place in('Nashik' , 'Pune')</p> <p>(iii) To change mark of Monika to 88 instead of 80 Update studrecord Set Mark=88 Where Name='Monika';</p> <p>(iv) To list the student's from Amit's age group Select Name from studrecord Where Age=(Select Age from Student Where Name='Amit');</p>	4M
	Ans		<p><i>For each query 1M</i></p>
	(d)	<p>Write command & its syntax for (i) creating snapshot (ii) to view the record from snapshot (iii) altering snapshot (iv) dropping snapshot</p>	4M
	Ans	<p>i) Creating Snapshot: Create snapshot command is used to create the snapshot. Syntax:- CREATE SNAPSHOT [schema.] <snapshot name>AS subquery;</p>	<p><i>Each command with syntax 1M</i></p>



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		<p>ii)to view a record from snapshot select command is used to view record from snapshot. Syntax : Select */<column list> from <view name>;</p> <p>iii) Altering snapshot: Snapshot can be altered by using ALTER SNAPSHOT command. The only parts of a snapshot that can be altered are its storage parameters, refresh type and refresh start, and next interval. The select for the snapshot, base tables, and other data related items cannot be changed without dropping and recreating the snapshot.</p> <p>Syntax:- ALTER SNAPSHOT <snapshotname> [[PCTFREE <integer>] [PCTUSED <integer>] [REFRESH [FAST/COMPLETE/FORCE]]];</p> <p>iv) Dropping a snapshot To remove the snapshot DROP SNAPSHOT Command .When snapshot is dropped which a snapshot log had associated with it, only the rows required for maintaining that snapshot are dropped.</p> <p>Syntax:- Drop snapshot <snapshot name>;</p>	
	<p>(e) Ans</p>	<p>Describe Grant and Revoke Commands. Grant: This command is used to give permission to user to do operations on the other user’s object.</p> <p>Syntax: Grant<object privileges>on<object name>to<username>[with grant option] ;</p> <p>Example: Grant select,update on emp to user1;</p> <p>Revoke: This command is used to withdraw the privileges that has been granted to a user.</p>	<p>4M</p> <p><i>Descript ion of each command 2M</i></p>



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		<p>Syntax: Revoke <object privileges>on<object name>from <username> ;</p> <p>Example: Revoke select, update on emp from user1;</p>	
(f) Ans	<p>Explain overall structure of DBMS Components of DBMS are classified in three categories. <u>Query processor</u></p> <ol style="list-style-type: none">DDL Interpreter: It interprets DDL statements and records them in a set of tables containing metadata or data dictionary.DML Compiler: It translates DML statements of high level query language into low level instructions that query evaluation engine understands.Compiler and linker or Embedded DML PreCompiler: It converts DML statements embedded in application program to normal procedural calls in host language. The precompiler must interact with the DML compiler to generate the appropriate code.Query Evaluation Engine: It executes low level instructions generated by DML compiler and DDL interpreter. <p><u>Storage Manager</u></p> <ol style="list-style-type: none">Authorization and integrity manager Which tests for the satisfaction of integrity constraints and checks the authority of users to access data.Transaction manager Which ensures that the database remains in a consistent correct) state despite system failures, and that concurrent transaction executions proceed without conflicting.File Manager It manages the allocation of space on disk storage and the data structures used to represent information stored on disk.Buffer manager Which is responsible for fetching data from disk storage into main memory, and deciding what data to cache in main memory.	<p>4M</p> <p><i>Relevant Explanation 4M</i></p>	



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		<p><u>Disk Storage</u></p> <ol style="list-style-type: none"> i. Data files, which store the database itself. ii. Data dictionary, which stores metadata about the structure of the database, in particular the schema of the database. iii. Indices, which provide fast access to data items that hold particular values. iv. Statistical Data: It stores statistical information about the data in the database. 	
3	<p>(a) Ans</p>	<p>Attempt any FOUR of the following:</p> <p>What are different alter commands in SQL? Explain with example.</p> <p>Alter command is a DDL command. It is used to change the structure of an existing table. The different types of alter queries are: Alter-add: Alter-add is used to add a new column to an existing table. It can be also used to add primary key, foreign key, unique, check constraints. General syntax for adding column: alter table <tablename> add <columnname><datatype><(size)> for adding constraints: alter table <tablename> add constraint <constraintname><constraint type>(column name)</p> <p>Example alter table student add emailid varchar2(50); alter table student add constraint pk_student primary key(student_id); Alter-modify: alter-modify is used to change the structure of an existing column in a table or to add a not null constraint General syntax: alter table<tablename> modify <columnname><datatype>(size); alter table <tablename> modify columnname not null</p>	<p>16 4M</p> <p><i>Explanation of alter add with example</i> 2M</p> <p><i>Explanation of alter-modify with example</i> 2M</p>
	<p>(b) Ans</p>	<p>Explain looping in PL/SQL.</p> <p>A loop is used to execute a set of statements repeatedly. the different loops in PL/SQL are:</p>	<p>4M</p>



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		<p>1. simple loop General syntax: initialization; loop body of the loop incr/decr; exit when condition; end loop; The looping variable is initialized first. The body of the loop gets executed and the increment or decrement of the looping variable is done. This step executes repeatedly till the exit condition turns true. The condition is checked at the end.</p> <p>2. while loop General syntax: initialization while condition loop body incr/decr end loop The initialization of the loop variable is done first. The condition is checked as the next step. If the condition is true, the statements in the body of the loop get executed. Further, increment and decrement of the looping variable is done. The steps are executed till the condition in the while loop turns false.</p> <p>3. for loop General syntax: forloop_variable in initial_value .. final_value loop body end loop The looping variable is initialized to the initial_value. It is then compared to the final value. If true, then the body of the loop gets executed. The value of the looping variable is incremented by 1. The looping variable is compared to the final value and the steps repeat till the condition turns false. To print in reverse, the general syntax: forloop_variable in reverse initial_value .. final_value loop body end loop</p>	<p><i>For listing loops 1M</i></p> <p><i>explanation of each 3M</i></p>
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	<p>(c) Ans</p>	<p>Describe ACID properties of transaction A transaction is a single unit of execution. It can have different steps. Every transaction in the DBMS must follow the ACID properties. The ACID properties are: A-Atomicity C-Consistency I-Isolation D-Durability Atomicity- This property states that every transaction should be treated as an atomic unit that is, either the entire transaction should be completed totally or it should not be done at all. It also states that under no condition should a transaction be partially completed. Consistency- The database must remain in consistent state after any transaction. The execution of a transaction should not result in inconsistency of the database. Isolation-in systems where more than one transaction execute simultaneously and in parallel, all transaction will be carried out and each transaction should feel that it is the only transaction happening. If T_i, T_j are two transactions, then T_i should feel that it is the only transaction happening while it is executing, either T_j should have completed execution or will execute once T_i completes. Durability- The database should be durable enough to hold all its latest updates even if the system fails or restarts. If a transaction updates data in a database and commits, then the database will hold the modified data. If a transaction commits but the system fails before the data could be written on to the disk, then that data will be updated once the system starts.</p>	<p>4M</p> <p><i>Explanation of each property</i> 1M</p>
	<p>(d) Ans</p>	<p>How to create views? Explain any two options of views. <i>Note: Any relevant example shall be considered however general syntax is expected.</i> A view is a virtual table based on the result set of the SQL statement. To create a view, the create view query is used. General syntax: create view viewname as select query. Example: create view vw_student as select stud_id, stud_name, ssc_per from student;</p>	<p>4M</p> <p><i>Create views</i> 2M</p> <p><i>Any two options</i> 2M</p>



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		<p>The different options in view are: OR REPLACE option: it recreates the view, if a view by the name already exists.</p> <p>FORCE option: it creates the view regardless of whether the tables to which the view refers exist or whether the user has privilege on them. The user cannot still execute the view but the user can create it.</p> <p>NO FORCE option: it creates the view only if the base tables exist and the user has privileges on them</p> <p>WITH CHECK option: it restricts inserts and updates performed through the view to prevent them from creating rows that the cannot itself select based on the where clause of the CREATE VIEW statement. It may be used in a view that is based on another view.</p> <p>WITH READ ONLY: if the view is created with WITH READ ONLY, then only select is allowed against the view. No data manipulation is allowed</p>	
	<p>(e) Ans</p>	<p>Draw & explain the block structure of PL/SQL.</p> <div style="text-align: center; border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 5px;">Declaration</div> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-bottom: 5px; margin-top: 10px;">Execution Block</div> <div style="border: 1px solid black; padding: 5px; display: inline-block; margin-top: 10px;">Exception Block</div> </div> <p>The declaration section is used to define data types, structures, and variables. Variables can be declared in the declaration section by giving them names, data types, and initial values. It starts with the keyword 'Declare'.</p> <p>The execution section is required in a block structure and it must have at least one statement. The execution section is the place where the execution code or business logic code is placed in PL/SQL. Procedural code and SQL statements can be written inside the execution section. It starts with the keyword 'Begin'.</p>	<p>4M</p> <p><i>Diagram</i> 1M</p> <p><i>Explanation of Each block</i> 3M</p>



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		<p>The exception handling section is starting with the Exception keyword. The exception section is the place where the code to handle exceptions are put.</p>	
<p>(f) Ans</p>	<p>Explain two tier and three tier client server architecture.</p> <p>Two tier architecture: The following is true for two tier architecture The application is partitioned into a component that resides at the client machine which invokes database system functionality at the server machine through query language statements. Application program standards like ODBC and JDBC are used for interaction between the client and the server.</p> <div style="text-align: center;"> </div> <p>(a) Two-tier architecture (b) Three-tier architecture</p> <p>Three tier architecture: The three tier architecture includes the following: Clients contain GUI interfaces and some additional application-specific business rules. The intermediate server also known as application server accepts requests the clients, processes the requests and sends database commands to the database server. It acts as a conduit for passing (partially processed data from the database server to the clients, when it may be processed further and filtered to be presented to users in GUI format. Thus the user interfaces, application rules and the database comprises of the three tier architecture</p>		<p style="text-align: center;">4M</p> <p style="text-align: center;"><i>Two tier architecture 2M</i></p> <p style="text-align: center;"><i>Three tier architecture 2M</i></p>



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4	<p>(a)</p> <p>Ans</p>	<p>Attempt any FOUR of the following:</p> <p>Explain the term Specialization and Generalization with suitable example</p> <p>Generalization: Generalization is super class in DBMS which holds common properties/ attributes for more than one entities (Specialized class). In generalization, the higher level entity can also combine with other lower level entity to make further higher level entity.</p> <div style="text-align: center;"> </div> <p>Specialization: Specialization holds special attributes of entities which are distinguished from other entities of same type. Specialization is opposite to Generalization. In specialization, some higher level entities may not have lower-level entity sets at all.</p> <div style="text-align: center;"> </div>	<p>16 4M</p> <p style="font-style: italic;">Explana tion of each term with suitable example 2M</p>
	<p>(b)</p> <p>Ans</p>	<p>Write a PL/SQL program to print numbers 1 to 7 using for loop.</p> <pre> begin for i in 1 ..7 loop dbms_output.put_line(i); end loop; end; </pre>	<p>4M</p> <p style="font-style: italic;">Syntax 2M Correct Logic 2M</p>



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	<p>(c) Ans</p>	<p>Explain the use of truncate statement and rename statement. Give example Truncate- It is a DDL query. It is used to delete all the rows of a table. Conditional delete is not possible with truncate. This query is to be used with caution as the rows so deleted may not be brought back using roll back. General syntax Truncate table <tablename> Example: Truncate table student; This query will delete all the rows of the table student. Rename- It is a DDL query and is used to rename a table. General syntax: Rename <old_table_name> to <new_table_name> Example: rename student to stud_details</p>	<p>4M <i>Explanation with example</i> 2M each</p>
	<p>(d) Ans</p>	<p>List & explain set operators in SQL. <i>Note: Example is optional.</i> Set operators combine the results of two component queries into a single result. Queries containing set operators are called as compound queries. Set operators in SQL are represented with following special keywords as: Union, Union all, intersection & minus. 1) Union : The Union of two or more sets contains all elements, which are present in either or both. Union works as or. The duplicates of both the tables will appear only once. Example: select ename from emp1 union select ename from emp2; 2) Union all : The Union of 2 or more sets contains all elements, which are present in both, including duplicates. Example: select ename from emp1 union all select ename from emp2; 3) Intersection: The intersection of two sets includes elements which are present in both.</p>	<p>4M <i>List</i> 2M <i>Explanation of each operator</i> 1/2 M</p>



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Example:

select ename from emp1 intersect select ename from emp2;

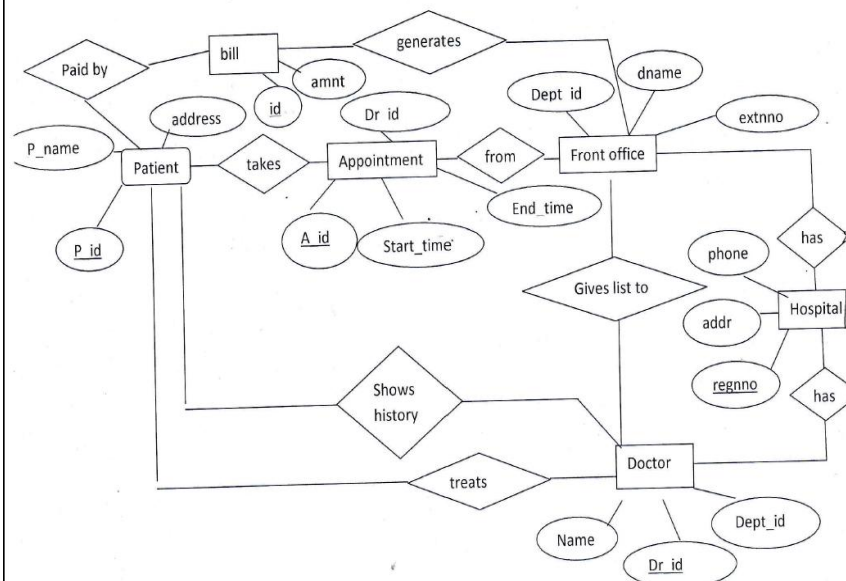
4) Minus: The minus of two sets includes elements from set1 minus elements of set2.

Example:

select ename from emp1 minus select ename from emp2;

(e)
Ans

Draw an E-R diagram for Hospital Management System.



4M

Use of correct entities 1M

Correct symbols 2M

Correct relations hips 1M



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	<p>(f) Ans</p>	<p>Explain types of database users. List of DBMS user: a) Naive users Naïve users are unsophisticated users. They interact with the system through the application program. They give data as input through application program or get output data which is generated by application programs. b) Application programmers: Application programmers are the users who write the application programs. These programmers use programming tools to develop the program. RAD technology is used to write the program. c) Sophisticated users: Sophisticated users interact with the system by making the requests in the form of query language. These queries are then submitted to the query processor. Query processor converts the DML statements into lower level interactions which are understandable by storage manager. d) Specialized users: These users are not traditional. They write some special application programs which are not regular applications like CAD, knowledge based and expert system. e) Database administrator: Responsible for managing whole database system, create and maintains database. Manages users who can access the database and manages integrity issue. Manages performance of system as and when required.</p>	<p>4M <i>Any 4 types 1M each</i></p>
5	<p>(a) Ans</p>	<p>Attempt any FOUR of the following: List and Explain the function of DBA. <i>Note : Any 4 functions shall be considered.</i> Functions of DBA : 1. Schema Definition 2. Storage Structure and Access Method Definition 3. Assisting Application Programmers 4. Physical Organization Modification 5. Approving Data Access</p>	<p>16 4M <i>List 2M Explanation 2M</i></p>



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		<p>6. Monitoring Performance 7. Backup and Recovery</p> <p>1. Schema Definition:</p> <ul style="list-style-type: none"> • The DBA definition the logical Schema of the database. A Schema refers to the overall logical structure of the database. • According to this schema, database will be developed to store required data for an organization. <p>2. Storage Structure and Access Method Definition:</p> <ul style="list-style-type: none"> • The DBA decides how the data is to be represented in the stored database. <p>3. Assisting Application Programmers:</p> <ul style="list-style-type: none"> • The DBA provides assistance to application programmers to develop application programs. <p>4. Physical Organization Modification:</p> <ul style="list-style-type: none"> • The DBA modifies the physical organization of the database to reflex the changing needs of the organization or to improve performance. <p>5. Approving Data Access:</p> <ul style="list-style-type: none"> • The DBA determines which user needs access to which part of the database. • According to this, various types of authorizations are granted to different users. <p>6. Monitoring Performance:</p> <ul style="list-style-type: none"> • The DBA monitors performance of the system. The DBA ensures that better performance is maintained by making changes in physical or logical schema if required. <p>7. Backup and Recovery:</p> <ul style="list-style-type: none"> • Database should not be lost or damaged. • The DBA ensures this periodically backing up the database on magnetic tapes or remote servers. • In case of failure, such as virus attack database is recovered from this backup. 	
	<p>(b) Ans</p>	<p>What is sequence? Explain with syntax and example. Sequence is a set of integers 1, 2, 3, ... that are generated and supported by some database systems to produce unique values on demand.</p> <ul style="list-style-type: none"> • A sequence is a user defined schema bound object that generates a sequence of numeric values. • Sequences are frequently used in many databases because many 	<p>4M <i>Definitio n 2M</i></p> <p><i>Syntax 1M</i></p>



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		<p>applications require each row in a table to contain a unique value and sequences provides an easy way to generate them.</p> <ul style="list-style-type: none">The sequence of numeric values is generated in an ascending or descending order at defined intervals . <p>Syntax: CREATE SEQUENCE sequence_name START WITH initial_value INCREMENT BY increment_value MINVALUE minimum value MAXVALUE maximum value CYCLE NOCYCLE ;</p> <p>sequence_name: Name of the sequence.</p> <p>initial_value: starting value from where the sequence starts.</p> <p>increment_value: Value by which sequence will increment itself. Increment_value can be positive or negative.</p> <p>minimum_value: Minimum value of the sequence. maximum_value: Maximum value of the sequence.</p> <p>cycle: When sequence reaches its set_limit it starts from beginning.</p> <p>nocycle: An exception will be thrown if sequence exceeds its max_value.</p> <p>Example Following is the sequence query creating sequence in ascending order.</p> <p>Example : CREATE SEQUENCE sequence_1 start with 1 increment by 1</p>	<p><i>Example IM</i></p>
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		minvalue 0 maxvalue 100 cycle;	
<p>(c) Ans</p>	<p>Explain with suitable example various types of triggers. Triggers can be classified based on the following parameters. Classification based on the timing</p> <ul style="list-style-type: none"> • BEFORE Trigger: It fires before the specified event has occurred. • AFTER Trigger: It fires after the specified event has occurred. • INSTEAD OF Trigger: A special type. You will learn more about the further topics. (only for DML) <p>Classification based on the level</p> <ul style="list-style-type: none"> • STATEMENT level Trigger: It fires one time for the specified event statement. • ROW level Trigger: It fires for each record that got affected in the specified event. (only for DML) <p>Classification based on the Event</p> <ul style="list-style-type: none"> • DML Trigger: It fires when the DML event is specified (INSERT/UPDATE/DELETE) • DDL Trigger: It fires when the DDL event is specified (CREATE/ALTER) <div style="background-color: #e0f2f1; padding: 10px; border: 1px solid #ccc;"> <p>Syntax:</p> <pre> CREATE [OR REPLACE] TRIGGER <trigger_name> [BEFORE AFTER INSTEAD OF] [INSERT UPDATE DELETE.....] ON <name of underlying object> [FOR EACH ROW] [WHEN <condition for trigger to get execute>] DECLARE <Declaration part> BEGIN <Execution part> EXCEPTION <Exception handling part> END; </pre> <p style="text-align: right;"> Trigger Timing Event ROW Level Conditional Clause </p> </div>		<p style="text-align: center;">4M</p> <p style="text-align: center;"><i>Explanation of any two types with suitable example 2M each</i></p>



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Syntax Explanation:

- The above syntax shows the different optional statements that are present in trigger creation.
- BEFORE/ AFTER will specify the event timings.
- INSERT/UPDATE/LOGON/CREATE/etc. will specify the event for which the trigger needs to be fired.
- ON clause will specify on which object the above-mentioned event is valid. For example, this will be the table name on which the DML event may occur in the case of DML Trigger.
- Command "FOR EACH ROW" will specify the ROW level trigger.
- WHEN clause will specify the additional condition in which the trigger needs to fire.
- The declaration part, execution part, exception handling part is same as that of the other PL/SQL blocks. Declaration part and exception handling part are optional.

Example of DDL Trigger

1. create trigger saftey
2. on database
3. for
4. create_table,alter_table,drop_table
5. as
6. print'you can not create ,drop and alter table in this database'
7. rollback;

Example of DML trigger

1. create trigger deep
2. on emp
3. for
4. insert,update,delete
5. as
6. print'you can not insert,update and delete this table i'
7. rollback;



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		<p>DML triggers are two type</p> <p>AFTER Triggers</p> <p>AFTER triggers are executed after the action of an INSERT, UPDATE, or DELETE statement.</p> <ol style="list-style-type: none"> 1. create trigger insert 2. on emp 3. after insert 4. as 5. begin 6. insert into empstatus values('active') 7. end 	
	<p>(d) Ans.</p>	<p>What is cursor? Explain any two types of cursor.</p> <p>A cursor is a temporary work area created in the system memory when a SQL statement is executed. A cursor contains information on a select statement and the rows of data accessed by it. This temporary work area is used to store the data retrieved from the database, and manipulate this data. A cursor can hold more than one row, but can process only one row at a time. The set of rows the cursor holds is called the active set.</p> <p>There are two types of cursors in PL/SQL</p> <p>Implicit Cursors:</p> <p>When DML statements like Delete, Insert, Update and Select statements are executed, implicit statements are created to process these statements. Oracle provides few attributes called as implicit cursor attributes to check the status of DML operations. The cursor attributes available are %FOUND, %NOTFOUND, %ROWCOUNT, and %ISOPEN. The values of the cursor attributes always refer to the most recently executed SQL statement.</p> <p>Explicit Cursors:</p> <p>When precise control is needed over query processing, cursor can be explicitly declared in the declarative part of any PL/SQL block, subprogram, or package. An explicit cursor is defined in the declaration section of the PL/SQL Block. It is created on a SELECT</p>	<p style="text-align: center;">4M</p> <p style="text-align: center;"><i>Definitio n 2M</i></p> <p style="text-align: center;"><i>Explana tion of types 2M</i></p>



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		Statement which returns more than one row. A suitable name is provided for the cursor.	
(e) Ans.		<p>What is relational algebra? Explain select & project operations.</p> <p>Relational Algebra Operators are mathematical functions used to retrieve queries by describing sequence operations on tables or even databases (schema) involved. With relational algebra operators, a query is always composed of a number of operators, which each in turn are composed of relations as variables and return an individual abstraction as the end product.</p> <p>The following are the main relational algebra operators as applied to SQL</p> <p>The SELECT Operator</p> <p>The SELECT operator is used to choose a subset of the tuples(rows) from a relation that satisfies a selection condition, acting as a filter to retain only tuples that fulfills a qualifying requirement.</p> <ul style="list-style-type: none"> • The SELECT operator in relational algebra is denoted by the symbol σ (sigma). • The syntax for the SELECT statement is then as follows: $\sigma_{\langle \text{Selection condition} \rangle}(\mathbf{R})$ • The σ would represent the SELECT command • The $\langle \text{selection condition} \rangle$ would represent the condition for selection. • The (\mathbf{R}) would represent the Relation or the Table from which we are making a selection of the tuples. <p>To implement the SELECT statement in SQL, we consider an example in which we would like to select the EMPLOYEE tuples whose employee number is 7, or those whose date of birth is before 1980...</p> <p style="text-align: center;">$\sigma_{\text{empno}=7}(\mathbf{EMPLOYEE})$</p> <p style="text-align: center;">$\sigma_{\text{dob} < '01-Jan-1980'}(\mathbf{EMPLOYEE})$</p> <p>The SQL implementation would translate into:</p> <p>I. SELECT empno FROM EMPLOYEE WHERE empno=7 II. SELECT dob FROM EMPLOYEE WHERE DOB < '01-Jan-1980'</p>	<p>4M</p> <p><i>Definition 1M</i></p> <p><i>Two operations 1½M each</i></p>



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		<p>The PROJECT Operator</p> <p>This operator is used to reorder, select and get rid of attributes from a table. At some point we might want only certain attributes in a relation and eliminate others from our query result. Therefore the PROJECT operator would be used in such operations.</p> <p>The symbol used for the PROJECT operation is π (pi).</p> <ul style="list-style-type: none">• The general syntax for the PROJECT operator is: $\pi_{\langle \text{attribute list} \rangle}(\mathbf{R})$• π would represent the PROJECT.• $\langle \text{attribute list} \rangle$ would represent the attributes(columns) we want from a relational.• (\mathbf{R}) would represent the relation or table we want to choose the attributes from. <p>To implement the PROJECT statement in SQL, we consider an example in which we would like to choose the Date of Birth (dob) and Employee Number (empno) from the relation EMPLOYEE.</p> <ul style="list-style-type: none">• $\pi_{\text{dob, empno}}(\mathbf{EMPLOYEE})$ <p>In SQL this would translate to:</p> <p>SELECT dob, empno FROM EMPLOYEE</p>	
	<p>(f) Ans.</p>	<p>What is use of group by clause? Explain with an example.</p> <p>The SQL GROUP BY clause is used in collaboration with the SELECT statement to arrange identical data into groups.</p> <p>The GROUP BY statement is often used with aggregate functions (COUNT, MAX, MIN, SUM, AVG) to group the result-set by one or more columns.</p> <p>This GROUP BY clause follows the WHERE clause in a SELECT statement and precedes the ORDER BY clause.</p>	<p>4M</p> <p><i>Definitio n 2M Explana tion with example 2M</i></p>



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		<p>Syntax:</p> <pre>SELECT <i>column_name(s)</i> FROM <i>table_name</i> WHERE <i>condition</i> GROUP BY <i>column_name(s)</i> ORDER BY <i>column_name(s);</i></pre> <p>Example</p> <pre>SELECT COUNT(CustomerID), Country FROM Customers GROUP BY Country ORDER BY COUNT(CustomerID) DESC;</pre>	
6	(a) Ans	<p>Attempt any FOUR of the following:</p> <p>What is data independence? What are its types?</p> <p>Data Independence: Capacity to change the schema at one level of a database system without having to change the schema at the next higher level.</p> <p>A major objective for three-level architecture is to provide data independence, which means that upper levels are unaffected by changes in lower levels.</p> <p>There are two types of data independence:</p> <ul style="list-style-type: none"> • Logical data independence • Physical data independence <p>Logical Data Independence</p> <p>Logical data independence indicates that the conceptual schema can be changed without affecting the existing external schemas. The change would be absorbed by the mapping between the external and conceptual levels.</p> <p>Physical Data Independence</p> <p>Physical data independence indicates that the physical storage structures or devices could be changed without affecting conceptual schema. The change would be absorbed by the mapping between the conceptual and internal levels.</p>	<p style="text-align: center;">16 4M</p> <p style="text-align: center;"><i>Definitio</i> <i>n</i> 2M</p> <p style="text-align: center;"><i>Any</i> <i>Two</i> <i>types</i> 1M <i>each</i></p>



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	<p>(b) Ans</p>	<p>Explain the need of normalization by example. The need of normalization are the following:</p> <ul style="list-style-type: none">• To Minimize data redundancy i.e. no unnecessarily duplication of data should be present.• To make database structure flexible i.e. it should be possible to add new data values and rows without reorganizing the database structure.• Data should be consistent throughout the database i.e. it should not suffer from following anomalies. <p>Insert Anomaly - Due to lack of data i.e., all the data available for insertion such that null values in keys should be avoided. This kind of anomaly can seriously damage a database</p> <p>Update Anomaly - It is due to data redundancy i.e. multiple occurrences of same values in a column. This can lead to inefficiency.</p> <p>Deletion Anomaly - It leads to loss of data for rows that are not stored elsewhere. It could result in loss of vital data.</p> <ul style="list-style-type: none">• Complex queries required by the user should be easy to handle.• To ensure data dependencies are logical (all related data items are stored together).	<p>4M</p> <p><i>Explanation of any 4 needs 1M each</i></p>
	<p>(c) Ans</p>	<p>Draw and explain State diagram of transaction. States of Transaction A transaction must be in one of the following states:</p> <p>Active: the initial state, the transaction stays in this state while it is executing.</p> <p>Partially committed: after the final statement has been executed.</p> <p>Failed: when the normal execution can no longer proceed.</p> <p>Aborted: after the transaction has been rolled back and the database has been restored to its state prior to the start of the transaction.</p> <p>Committed: after successful completion.</p>	<p>4M</p> <p><i>Diagram 2M</i></p> <p><i>Explanation 2M</i></p>



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	<p>The state diagram corresponding to a transaction is shown in Figure.</p> <div style="text-align: center;"> <pre> graph LR active((active)) --> partially_committed((partially committed)) active --> failed((failed)) partially_committed --> committed((committed)) partially_committed --> failed failed --> aborted((aborted)) </pre> <p style="text-align: center;">States of transaction</p> </div> <p>A transaction has committed only if it has entered the committed state. Similarly, a transaction has aborted only if it has entered the aborted state. A transaction is said to have terminated if has either committed or aborted.</p> <p>A transaction starts in the active state. When it finishes its final statement, it enters the partially committed state. At this point, the transaction has completed its execution, but it is still possible that it may have to be aborted, since the actual output may still be temporarily hiding in main memory and thus a hardware failure may preclude its successful completion.</p>	
<p>(d) Ans</p>	<p>Explain tuple relational calculus with example. The Tuple Relational Calculus: The tuple relational calculus is a nonprocedural language. We must provide a formal description of the information desired. A query in the tuple relational calculus is expressed as</p> $\{t \mid P(t)\}$	<p>4M <i>Explanation</i> 2M</p> <p><i>Example</i> 2M</p>



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		<p>i.e. the set of tuples t for which predicate P is true.</p> <p>We also use the notation</p> <p>$t[a]$ to indicate the value of tuple t on attribute a.</p> <p>$t \in r$ to show that tuple t is in relation r.</p> <p>For example, to find the branch-name, loan number, customer name and amount for loans over \$1200:</p> $\{t \mid t \in borrow \wedge t[amount] > 1200\}$											
	<p>(e) Ans</p>	<p>Compare functional dependency & multivalued dependency.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Functional Dependencies</th> <th style="text-align: center;">Multivalued dependencies</th> </tr> </thead> <tbody> <tr> <td>This occurs when one attribute in a relation is unique</td> <td>This occurs when more than one attributes are dependent on another.</td> </tr> <tr> <td>It is represented as $X \twoheadrightarrow Y$</td> <td>It is represented as $X \rightrightarrows Y$</td> </tr> <tr> <td>It plays a role in the 1NF database normalization.</td> <td>It plays a role in the 4NF database normalization.</td> </tr> <tr> <td> <p>Example:</p> <p>EmpID \rightarrow EmpName,</p> <p>EmpName is functionally dependent on EmpID because EmpName can take only one value for the given value of EmpID</p> </td> <td style="background-color: #e0e0e0;"> <p>Example:</p> <p>Person \rightrightarrows mobile,</p> <p>Person \rightrightarrows food_likes</p> <p>This is described as:</p> <p>“person multi determines mobile” and “person multi determines food_likes.”</p> </td> </tr> </tbody> </table>	Functional Dependencies	Multivalued dependencies	This occurs when one attribute in a relation is unique	This occurs when more than one attributes are dependent on another.	It is represented as $X \twoheadrightarrow Y$	It is represented as $X \rightrightarrows Y$	It plays a role in the 1NF database normalization.	It plays a role in the 4NF database normalization.	<p>Example:</p> <p>EmpID \rightarrow EmpName,</p> <p>EmpName is functionally dependent on EmpID because EmpName can take only one value for the given value of EmpID</p>	<p>Example:</p> <p>Person \rightrightarrows mobile,</p> <p>Person \rightrightarrows food_likes</p> <p>This is described as:</p> <p>“person multi determines mobile” and “person multi determines food_likes.”</p>	<p>4M</p> <p><i>Any 4 Points</i> <i>1M each</i></p>
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	<p>(f) Ans</p>	<p>Explain any four aggregate functions with example. The following are the most commonly used SQL aggregate functions:</p> <ul style="list-style-type: none">• AVG – calculates the average of a set of values.• COUNT – counts rows in a specified table or view.• MIN – gets the minimum value in a set of values.• MAX – gets the maximum value in a set of values.• SUM – calculates the sum of values. <p>COUNT function example</p> <p>To get the number of products in the <code>products</code> table, the <code>COUNT</code> function is used as follows:</p> <pre>SELECT COUNT(*) FROM products;</pre> <p>AVG function example</p> <p>To calculate the average units in stock of the products, the <code>AVG</code> function is used as follows:</p> <pre>SELECT AVG(unitsinstock) FROM products;</pre> <p>Or</p> <pre>SELECT categoryid, AVG(unitsinstock) FROM products GROUP BY categoryid;</pre> <p>SUM function example</p> <p>To calculate the sum of units in stock by product category, the <code>SUM</code> function is used with the <code>GROUP BY</code> clause as the following query:</p> <pre>SELECT categoryid, SUM(unitsinstock)FROM products GROUP BY categoryid;</pre>	<p>4M</p> <p><i>Any four functions with example 1M each</i></p>



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	<p>MIN function example</p> <p>To get the minimum units in stock of products in the products table, the <code>MIN</code> function is used as follows:</p> <pre>SELECT MIN(unitsinstock) FROM products;</pre> <p>MAX function example</p> <p>To get the maximum units in stock of products in the products table, the <code>MAX</code> function is used as shown in the following query:</p> <pre>SELECT MAX(unitsinstock)FROM products;</pre>	
--	---	--