Q1) Let us take the example of the sample database consisting of supplier, parts and shipments. The record structure and some sample records for supplier, parts and shipments elements are as given in following tables.

The Supplier records

Sno	Name	Status	City
S1	Suneet	20	Qadian
S2	Ankit	10	Amritsar
S3	Amit	10	Amritsar

The Part records

Pno	Name	Color	Weight	City
PI	Nut	Red	12	Qadian
P2	Bolt	Green	17	Amritsar
P3	Screw	Bule	17	Jalandhar
P4	Screw	Red	14	Qadian

The Shipment records

Sno	Pno	Qty
S1	P1	250
S1	P2	300
S1	P3	500
S2	P1	250
S2	P2	500
S3	P2	300

Draw the Hierarchical

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Q2) Consider the following database schema

 Employee (person-name, age, street, city, company-name, salary)

Q1) Find the names and cities of residence of all employees who work for bank company.
Q2) Find the names, streets, and cities of residence of all employees who work for bank company and acquire more than $10,000.
Q3) Find all employees who live in the same city and on the same street.

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Q3) What is NULL? Give an example to illustrate testing for NULL in SQL.

……..…

Q4) Describe substring comparison in SQL. For the relation Person(name, address), write a SQL query which retrieves the names of people whose name begins with 'A' and address contains 'Sulaymaniyah'.

………..

Q5) Consider the following relations with keys underlined
Street (name, location, city)
House (number, street_name)
Lives (name, house_number)

Define the above relations as tables in SQL making real world assumptions about the type of the fields. Define the primary keys and the foreign keys.
And answer the following queries in SQL
  (i)   Get the names of persons who live in the street named 'main town'.
  (ii)   Get the house numbers street wise.
  (iii)   Get the numbers of houses which are not occupied.

....

Q6) Consider the relations
 EMP(ENO, ENAME, AGE, BASIC_SALARY)
WORK_IN(ENO, DNO)
DEPT(DNO, DNAME, CITY)
Express the following queries in SQL
  (i)   Find names of employees who work in a dept. in Delhi.
  (ii)   Get the dept. number in which more than one employee is working.

....

Q7) Express the following queries in SQL assumes that the data is stored in EMPLOYEE table with relevant fields.
  (i)   Display name, job, salary, and hire date of employee who are hired between May 10, 1975 and December 20, 1980. Order the query in ascending order of hire date.
  (ii)   Display name and hire date of employee who are employed after employee 'Sara'.

....

Q8) Explain entity integrity and referential integrity rules in relational model. Show how these are realized in MYSQL.

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Q9) Consider the following relations:

S (S#, SNAME, STATUS, CITY)
SP (S#, P#, QTY)
P (P#, PNAME, COLOR, WEIGHT, CITY)

Give an expression in MYSQL for each of queries below:

(i) Get supplier names for supplier who supply at least one red part
(ii) Get supplier names for supplier who do not supply part P2.

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Q10) Explain the integrity constraints: Not Null, Unique, Primary Key with an example each.

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Q11) Consider the following relational schemas:

EMPLOYEE (EMPLOYEE_NAME, STREET, CITY)
WORKS (EMPLOYEE_NAME, COMPANYNAME, SALARY)
COMPANY (COMPANY_NAME, CITY)

Specify the table definitions in SQL.

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Q12) Give an expression in MYSQL for each of queries below:

1. Find the names of all employees who work for first Bank Corporation.
2. Find the names and company names of all employees sorted in ascending order of company name and descending order of employee names of that company.
3. Change the city of First Bank Corporation to ' Sulaymaniyah,'

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Q13) Normalization is a three stage process – After the first stage, the data is said to be in first normal form, after the second, it is in second normal form, after the third, it is in third normal form.

Let's begin by creating a sample set of data. Imagine we are working on a system to keep track of employees working on certain projects.

Use normalization process to design a database in which it is easy to organize and manage data while ensuring the accuracy of data throughout the database.

Project number	Project name	Employee number	Employee name	Rate category	Hourly rate
1023	Madagascar travel site	11	Vincent Radebe	A	$60
		12	Pauline James	B	$50
		16	Charles Ramoraz	C	$40
1056	Online estate agency	11	Vincent Radebe	A	$60
		17	Monique Williams	B	$50

....

Q14) Supposes you have the following tables, explain what is the different in the concept of PRIMARY KEY.

```
CREATE TABLE users(
  user_id INT AUTO_INCREMENT PRIMARY KEY,
  username VARCHAR(40),
  password VARCHAR(255),
  email VARCHAR(255));
```

```
CREATE TABLE roles(
  role_id INT AUTO_INCREMENT,
  role_name VARCHAR(50),
  PRIMARY KEY(role_id));
```

```
CREATE TABLE userroles(
  user_id INT NOT NULL,
  role_id INT NOT NULL,
```

```
PRIMARY KEY(user_id,role_id),
FOREIGN KEY(user_id) REFERENCES users(user_id),
FOREIGN KEY(role_id) REFERENCES roles(role_id));
```

……………………………………………………………………………………….

Q15) A hierarchical schema consists of record types and PCR types. Consider the relations given below for a human resources system consist of:
Root :- **Employee**
First Child :- **Compensation** ; **Job Assignments** ; **Benefits**
Second Child :- **Compensation** (Performance Ratings; Salary History) ;
　　　　　　Benefits (Pension; Life Insurance; Health)
For the above relations draw a hierarchical model with boxes, lines.

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Q16) The network model is a database model conceived as a flexible way of representing objects and their relationships. Consider the relations given below for an airlines system:

Departure :- **Los Angeles**
Arrival :- **Chicago** ; **Cleveland** ; **New York ; Boston**
Flight Number :- **Chicago** (110) ; **New York** (110; 139; 209)
Passenger : - 110 (Adam, S. ; Howell, R. ; McGillen, T.)

For the above relations draw a network model with boxes, lines.

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Q17) Define the following terms

1. **SQL Schema** (The structure that contains descriptions of objects created by a user i.e. is the table name and its attributes: Product(PName, Price, Category, Manfacturer)
2. **Data Definition Language** (Commands that define a database, including creating, altering, and dropping tables and establishing constraints).
3. **MySQL** (is an open source relational database management system. It is based on the **structure query language (SQL)**, which is used for adding, removing, and modifying information in the database. Standard SQL commands, such as CREATE , DROP, INSERT, and UPDATE can be used with MySQL).
4. **Database Model** (is a type of data model that determines the logical structure of a database and fundamentally determines in which manner data can be stored, organized, and manipulated).
5. **Hierarchical Database** (consists of a collection of records which are connected to one another through links).

6. **Network Database (**The network model is a database model conceived as a flexible way of representing objects and their relationships).
7. **Database Normalization** (is a process that "improves" a database design by generating relations that are of higher normal forms. It reduces data redundancies and helps eliminate the data anomalies).
8. **Dependency Diagram** (The arrows below the dependency diagram indicate less desirable dependencies -- partial dependencies and transitive dependencies**).**
9. **Transitive Dependency** (that is, one or more attributes may be functionally dependent on nonkey attributes).

....

Q18) Suppose that you have the following table with name **customers**, try to use SQL statement SELECT to describe the difference between using SQL **AND** & **OR** Operators.

customers

Customer ID	City	Country
1	London	UK
2	München	Germany
3	Madrid	Spain
4	Berlin	Germany

....

Q19) Supposes we have the following figure explain in details the concept of partial dependencies and transitive dependencies.

....
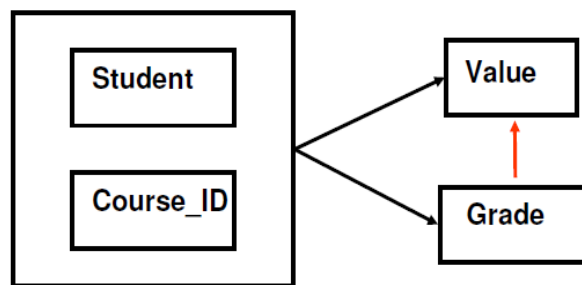
Q20) Define the following with respect to SQL

(i) ORDER BY clause: The **ORDER BY clause** allows you to sort the records in your result set. The **ORDER BY clause** can only be used in select statements.

....

Q21) Consider the following relational database:
STUDENT (name, student#, class, major)
COURSE (course name, course#, credit hours, department)
SECTION (section identifier, course#, semester, year, instructor)
GRADE_REPORT (student#, section identifier, grade)
PREREQUISITE (course#, presequisite#)

Specify the following queries in SQL on the above database schema.

(i) Retrieve the names of all students majoring in 'CS' (Computer Science).
(ii) Retrieve the names of all courses taught by Professor King in 1998
(iii) Delete the record for the student whose name is 'Smith' and whose student number is 17.
(iv) Insert a new course <'Knowledge Engineering', 'CS4390', 3, 'CS'>

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Q22) show the Advantages and Disadvantages of **Hierarchical and Network data models**

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Q24) SQL scalar functions return a single value, based on the input value. Explain the meaning of each one:

1) UCASE() - Converts a field to upper case

2) LCASE() - Converts a field to lower case

3) MID() - Extract characters from a text field

4) LEN() - Returns the length of a text field

5) ROUND() - Rounds a numeric field to the number of decimals specified

6) NOW() - Returns the current system date and time

7) FORMAT() - Formats how a field is to be displayed

8) AVG() - Returns the average value

9) COUNT() - Returns the number of rows

10) FIRST() - Returns the first value

11) LAST() - Returns the last value

12) MAX() - Returns the largest value

13) MIN() - Returns the smallest value

14) SUM() - Returns the sum

....

Q25) Convert the following table to Normalized table.

Un-normalized Students table:

Student#	AdvID	AdvName	AdvRoom	Class1	Class2
123	123A	James	555	102-8	104-9
124	123B	Smith	467	209-0	102-8

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Q26) Convert the following table to Normalized table.

Un-normalized Contacts table:

Contacts

Name	Company	Address	Phone1	Phone2	Phone3	ZipCode
Joe	ABC	123	5532	2234	3211	12345
Jane	XYZ	456	3421			14454
Chris	PDQ	789	2341	6655		14423

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Q27) Multiple Choice Questions

1. Software that defines a database, stores the data, supports a query language, produces reports and creates data entry screens is a:

A) data dictionary   B) database management system (DBMS)   C) decision support system   D) relational database

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Q28) Draw a diagram to show a simplified schematic of a typical SQL environment, as described by the SQL.

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Q29) Explain the followings:

1) What is the difference between database system and information system?
2) Redundant Array of Independent Disks

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Q30) Discuss the distinction between top-down and bottom-up approaches to database design.

…………………………………………………………………………………………………..

Q31) Explain the terms primary key, candidate key and foreign key. Give an example for each.

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Q32) Consider the two relations given below

R

A	B	C
A1	b1	c1
Null	b2	null
a1	b1	c1

S

D	A	F
d1	a1	f1
d1	a2	null

Given that A is the primary key of R, D is the primary key of S and there is a referential integrity between S.A and R.A, discuss all integrity constraints that are violated.

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Q33) Explain the difference between the three storage types- Primary Storage, Secondary Storage and Tertiary Storage.

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Q34) Convert the following ER – diagram into a relational database (the primary keys are underlined):

…………………………………………………………………………………………………..
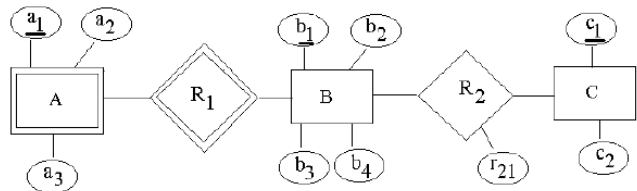
Q35) What are the various states through which a database transaction passes through in its lifetime? Briefly discuss all the events that causes transition from one state to another.

……

Q36) Explain the following transitive dependency in SALES relation

……….
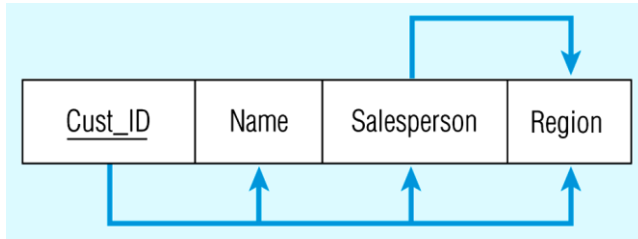
Q37) Explian Database Lifecycle (DBLC) in details.

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Q38) What is a Distributed Database System (**DDBS**)?

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Q39) What is not a DDBS?

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Q40) What is the difference between Centralized DBMS on a Network and Distributed DBMS Environment.

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Q41) The following relation is in First Normal Form, but not Second Normal Form, convert it to 2NF.

Order #	Customer	Contact Person	Total
1	Acme Widgets	John Doe	$134.23
2	ABC Corporation	Fred Flintstone	$521.24
3	Acme Widgets	John Doe	$1042.42
4	Acme Widgets	John Doe	$928.53

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Q42) Normalization is the process of making a database fit "good database design" rules. We talk about normalization in terms of "normal forms" (NF). The normal forms are cumulative, i.e. for a database to be in 2NF (second normal form), it must also meet the requirements of 1NF convert it to normal forms.

IDNum	FirstName	LastName	SchoolName	SchAddress	SchCity	SchState	SchZip
1	Joe	Smith	Carver	123 Easy Street	Little Rock	AR	72201
2	Freda	Joseph	Carver	123 Easy Street	Little Rock	AR	72201
3	Busy	Body	Cloverdale	456 Anywhere	Little Rock	AR	72209
4	Pikup	Andropov	Lakewood	789 High	North Little Rock	AR	72222

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Q43) Choose the correct or the best alternative in the following:

1. The rule that a value of a foreign key must appear as a value of some specific table is called a

(A) Referential constraint.   (B) Index.
(C) Integrity constraint.   (D) Functional dependency.

2. A relation is in _____ if an attribute of a composite key is dependent on an attribute of other composite key.

(A) 2NF   (B) 3NF
(C) BCNF   (D) 1NF

3. What is data integrity?
(A) It is the data contained in database that is non redundant.
(B) It is the data contained in database that is accurate and consistent.
(C) It is the data contained in database that is secured.
(D) It is the data contained in database that is shared.

4. Block-interleaved distributed parity is RAID level
(A) 2.   (B) 3
(C) 4.   (D) 5.

5. If a transaction T has obtained an exclusive lock on item Q, then T can
(A) read Q   (B) write Q
(C) both read and write Q   (D) write Q but not read Q

6. In 2NF
(A) No functional dependencies (FDs) exist.
(B) No multivalued dependencies (MVDs) exist.

(C) No partial FDs exist.
(D) No partial MVDs exist.

7. Which of the following is a reason to model data?
(A) Understand each user's perspective of data
(B) Understand the data itself irrespective of the physical representation
(C) Understand the use of data across application areas
(D) All of the above

8. The normal form that is not necessarily dependency preserving is
(A) 2NF   (B) 3NF
(C) BCNF   (D) 4NF

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Q44) Consider the following relations with primary keys underlined.
Salesperson (SNo, Sname, Designation)
Area (ANo, Aname, ManagerNo)
Product (PNo, Pname, Cost)
SAP (SNo, ANo, PNo)
(a) Define the schema in SQL specify the attributes, and keys assuming that
ManagerNo is a foreign key. Specify the constraint that the cost of a product cannot be
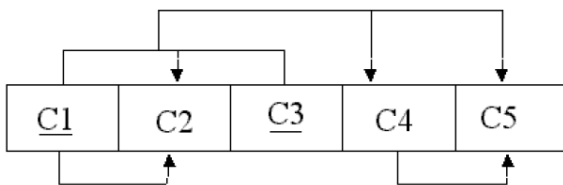greater than $10.
(b) Answer using SQL
(i) Select the names of all the products that are sold.
(ii) Select the product numbers which are marketed by at least two salespersons.
(iii) Select the names of all salespersons who are not Managers.

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Q45) Given the dependency diagram shown in the following figure, (the primary key
attributes are underlined)

(i) Identify and discuss each of the indicated dependencies.
(ii) Create a database whose tables are atleast in 3NF, showing dependency diagram for
each table

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Q46) Consider the following relations with underlined primary keys
Product(P_code, Description, Stocking_date, QtyOnHand, MinQty, Price, Discount,

V_code)
Vendor(V_code, Name, Address, Phone)
Here a vendor can supply more than one product but a product is supplied by only one vendor. Write SQL queries for the following :

(i) List the names of all the vendors who supply more than one product.
(ii) List the details of the products whose prices exceed the average product price.
(iii) List the Name, Address and Phone of the vendors who are currently not supplying any product.

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Q47) Suppose we have the following table

pub_id	pub_name	pub_city	country	country_office	no_of_branch	estd
P001	Jex Max Publication	New York	USA	New York	15	1969-12-25
P002	BPP Publication	Mumbai	India	New Delhi	10	1985-10-01
P003	New Harrold Publication	Adelaide	Australia	Sydney	6	
P004	Ultra Press Inc.	London	UK	London	8	1948-07-10
P005	Mountain Publication	Houstan	USA	Sun Diego	25	
P006	Summer Night Publication	New York	USA	Atlanta	10	1990-12-10
P007	Pieterson Grp. of Publishers	Cambridge	UK	London	6	
P008	Novel Publisher Ltd.	New Delhi	India	Bangalore	10	2000-01-01

What is the output of the following syntax.

```
SELECT pub_NAME,COALESCE(estd,country,pub_city)
FROM newpublisher;
```


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