

Sample Questions

Computer Engineering / Artificial Intelligence and Data Science / Artificial Intelligence and Machine Learning / Computer Science and Engineering (Artificial Intelligence and Machine Learning) / Computer Science and Engineering (Data Science) / Computer Science and Engineering (Internet of Things and Cyber Security Including Block Chain Technology) / Cyber Security / Data Engineering / Internet of Things (IoT)

Subject Name: Database Management System

Semester: IV

Multiple Choice Questions

	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	Which of the following is true about Data Independence? It is the ability:
Option A:	To modify schema definition in one level without affecting schema definition in the next lower level.
Option B:	To modify schema definition in one level without affecting schema definition in the next higher level.
Option C:	To modify data in one level without affecting the data in the next lower level.
Option D:	To modify data in one level without affecting the data in the next higher level.
2.	Data redundancy leads to higher storage and access cost. It may lead to
Option A:	Data isolation
Option B:	Data inconsistency
Option C:	Integrity problem
Option D:	Atomicity
3.	The an attribute (say X) of entity set is calculated from other attribute value (say Y). The attribute X is called
Option A:	Single valued
Option B:	Multi valued

Option C:	Composite
Option D:	Derived
4.	A weak entity type always has a total participation constraint w.r.t. its identifying relationship, because
Option A:	Weak entity have a partial key
Option B:	Weak entity cannot be identified with an owner entity.
Option C:	Weak entity cannot be identified without an owner entity.
Option D:	Weak entity cannot identified without an identifying relationship
5.	In an Entity-Relationship (ER) model, suppose R is a one-to-many relationship from entity set E1 to entity set E2. Assume that E1 and E2 participate totally in R and that the cardinality of E2 is greater than the cardinality of E1. Which one of the following is true about R?
Option A:	Every entity in E1 is associated with exactly one entity in E2.
Option B:	Some entities in E1 are associated with more than one entity in E2.
Option C:	Every entity in E2 is associated with exactly one entity in E1.
Option D:	Every entity in E2 is associated with at most one entity in E1.
6.	The type of operation which extends the Projection operation by allowing functions of attributes to be included in the projection list.
Option A:	Join
Option B:	Generalized Projection
Option C:	Projection
Option D:	Aggregate functions
7.	i. What is union compatibility ?
Option A:	Two or more table share the same number of columns
Option B:	Two or more tables share the same number of columns and same domain
Option C:	Two or more tables have the same degree
Option D:	Two or more tables share the same domains

8.	$r \cap s =$
Option A:	$r - (r - s)$
Option B:	$s - (r - s)$
Option C:	$(r \cup s) - (r - s)$
Option D:	$(r \cup s) / (s \cup r)$
9.	Let E1 and E2 be two entities in an E-R diagram with one multi-valued attribute in E1, R1 and R2 are two relationships between E1 and E2, where R1 is one-to-many and R2 is many-to-many, R1 and R2 do not have any attributes of their own, What is the minimum number of tables required to represent this situation in the relational model.
Option A:	2
Option B:	4
Option C:	3
Option D:	5
10.	Write a query to set default value for salary to 25000 for table employee
Option A:	UPDATE employee MODIFY salary DEFAULT 25000
Option B:	UPDATE employee SET salary To DEFAULT 25000
Option C:	ALTER TABLE employee SET salary To DEFAULT 25000
Option D:	ALTER TABLE employee MODIFY salary DEFAULT 25000
11.	i. Consider the employee table: employee (employee id, name, dept name, salary) Create a new employee 'E-101', named 'Ashwin singh', with 50,000 salary for department 'developer'. Identify the appropriate SQL.
Option A:	INSERT INTO TABLE employee VALUES ('E-101', 'Ashwin Singh', 'Wireless', 100000)
Option B:	INSERT INTO employee ('E-101', 'Ashwin Singh', 'DEVELOPER', 50000)
Option C:	INSERT INTO employee VALUES('E-101', 'Ashwin Singh', 'DEVELOPER', 50000)
Option D:	INSERT INTO employee table(employee id, name, dept name, salary) VALUES

	(E-101, 'Ashwin Singh', 'DEVELOPER', 50000)										
12.	<p>Consider the following instance:</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Price</th> </tr> </thead> <tbody> <tr> <td>IPHONE</td> <td>5000</td> </tr> <tr> <td>PHONE</td> <td>1500</td> </tr> <tr> <td>LAPTOP</td> <td>1000</td> </tr> <tr> <td>IPAD</td> <td>5500</td> </tr> </tbody> </table> <p>The following Query is executed SELECT Price from Product order by Name DESC; Find out correct order of tuple numbers in the output ,if the tuple numbers in the above table are 1,2,3,4</p>	Name	Price	IPHONE	5000	PHONE	1500	LAPTOP	1000	IPAD	5500
Name	Price										
IPHONE	5000										
PHONE	1500										
LAPTOP	1000										
IPAD	5500										
Option A:	2,3,4,1										
Option B:	3,4,2,1										
Option C:	4,1,2,3										
Option D:	2,3,1,4										
13.	a. Which of the following statement is CORRECT ?										
Option A:	Every relation in 3NF is also in BCNF										
Option B:	A relation R is in 3NF if every non-prime attribute of R is fully functionally dependent on every key of R										
Option C:	Every relation in BCNF is also in 3NF										
Option D:	No relation can be in both BCNF and 3NF										
14.	Let R= (A,B,C,D,E,F) be a relation with the following dependencies. C->F, E->A, EC->D, A->B. Which of the following is a key for R										
Option A:	CD										
Option B:	EC										
Option C:	AE										
Option D:	AC										

15.	<p>Consider relational schema</p> <p>Member(phone,name,address,room,floor,stay)</p> <p>which satisfies following FDs:</p> <p>phone,name->address</p> <p>Phone->Room</p> <p>name->floor,stay. The given relation satisfies which highest normal form?</p>
Option A:	1NF
Option B:	2NF
Option C:	3NF
Option D:	BCNF
16.	What is true about timestamp based ordering protocol
Option A:	Ensure both conflict serializability and freedom from deadlock
Option B:	Ensure only conflict serializability
Option C:	Ensure only freedom from deadlock
Option D:	Ensure only view serializability
17.	Identify correct rules in growing phase (first phase) in two-phase locking protocol.
Option A:	Transaction can only acquire shared lock(lock-s) and exclusive (lock-X)
Option B:	transaction can only acquire shared lock(lock-s) ,exclusive (lock-X) and covert lock-s to lock-X
Option C:	transaction can release shared lock(lock-s) ,release exclusive (lock-X) and covert lock-s to lock-X
Option D:	transaction can acquire only shared lock(lock-s) and release exclusive (lock-X)
18.	Suppose in a database, there are three transactions T1, T2 and T3 with timestamp 10, 20 and 30 respectively. T2 is holding a data item which T1 and T3 are requesting to acquire. Which of the following statement is correct in respect of Wait-die Deadlock Prevention scheme?
Option A:	Transaction T1 will wait for T2 to release the data item.
Option B:	Transaction T1 will be aborted.

Option C:	Transaction T3 will wait for T2 to release the data item.
Option D:	Transaction T2 will wait for T1 to release the data item.
19.	Choose correct statement regarding immediate database modification method of log based recovery method
Option A:	Only Redo operation is performed
Option B:	Redo and undo operations are performed
Option C:	Only undo operation is performed
Option D:	No redo and undo operations are performed
20.	When transactions execute properly without interference from concurrently executing transactions then this property is referred to as.
Option A:	Atomicity
Option B:	Concurrency
Option C:	Consistency
Option D:	Isolation
21.	Which is not a level in three level schema architecture?
Option A:	conceptual schema
Option B:	Abstraction level
Option C:	external schema
Option D:	internal schema
22.	The operation produces a new relation with only some of the attributes of R, and removes duplicate tuples.
Option A:	Union
Option B:	Intersect
Option C:	Select
Option D:	Project
23.	In which operation the resultant relation contains all pairs of tuples from the two

	relations, regardless of whether their attribute values match.								
Option A:	Join								
Option B:	Set Difference								
Option C:	Cartesian product								
Option D:	Union								
24.	What is not true for a file based system to store data?								
Option A:	Provides data consistency								
Option B:	More redundancy								
Option C:	No security								
Option D:	Difficulty in accessing data.								
25.	In SQL which CLAUSE is used to apply conditions on a group?								
Option A:	ON								
Option B:	WHERE								
Option C:	HAVING								
Option D:	GROUP BY								
26.	An ER model of a database consists of entity types E1 and E2. These are connected by a relationship R which does not have its own attribute. Under which one of the following conditions, can the relational table for R be merged with that of E1?								
Option A:	Relationship R is one-to-many and the participation of E1 in R is total.								
Option B:	Relationships are one-to-many and the participation of E1 in R is partial.								
Option C:	Relationship R is many-to-one and the participation of E1 in R is total.								
Option D:	Relationship R is many-to-one and the participation of E1 in R is partial.								
27.	Consider the relation Sailors:								
	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Sid</th> <th>Sname</th> <th>Rating</th> <th>Age</th> </tr> </thead> <tbody> <tr> <td>22</td> <td>Dustin</td> <td>7</td> <td>45.0</td> </tr> </tbody> </table>	Sid	Sname	Rating	Age	22	Dustin	7	45.0
Sid	Sname	Rating	Age						
22	Dustin	7	45.0						

		29	Brutus	1	33.0	
		31	Lubber	8	55.5	
		58	Rusty	10	35.0	
		64	Horatio	7	35.0	
		71	Zorba	10	16.0	
	<p>What will be the output if following query?</p> <pre>SELECT AVG (S.age) FROM Sailors S WHERE S.rating = 10;</pre>					
Option A:	20					
Option B:	10.5					
Option C:	25.5					
Option D:	30					
28.	Which concurrency control protocols ensure freedom from deadlock?					
Option A:	2-phase locking					
Option B:	Timestamp Ordering					
Option C:	Validation Based					
Option D:	Strict 2-phase locking					
29.	The Join operation in which it keeps every tuple in first or left relation R if no matching tuple is found in S, then the attributes of S in join result filled with NULL values					
Option A:	Left outer join					
Option B:	Right outer join					
Option C:	Full join					
Option D:	Inner join					
30.	Consider the employee table:employee (employee id, name, dept name, salary) Create a new employee `E-101`, named `Ashwin singh`, with 50,000 salary for					

	department `developer'. Identify the appropriate SQL.
Option A:	INSERT INTO TABLE employee VALUES (`E-101',`Ashwin Singh',`Wireless', 10,00,000)
Option B:	INSERT INTO employee (`E-101',`Ashwin Singh',`DEVELOPER', 50,000)
Option C:	INSERT INTO employee VALUES(`E-101',`Ashwin Singh',`DEVELOPER', 50,000)
Option D:	INSERT INTO employee table(employee id, name, dept name, salary) VALUES (`E-101',`Ashwin Singh',`DEVELOPER', 50,000)
31.	An association between an entity and itself is called?
Option A:	Binary relationship
Option B:	Recursive relationship
Option C:	Aggregation
Option D:	Specialization
32.	If several concurrent transactions are executed over the same data set and the second transaction updates the database before the first transaction is finished, the ____ property is violated and the database is no longer consistent
Option A:	Atomicity
Option B:	Consistency
Option C:	Durability
Option D:	Isolation
33.	"Consider a relation R (A, B, C, D, E, F, G, H), where each attribute is atomic, and following functional dependencies exist. $CH \rightarrow G$, $A \rightarrow BC$, $B \rightarrow CFH$, $E \rightarrow A$, $F \rightarrow EG$ The relation R is _____."
Option A:	in 1NF but not in 2NF
Option B:	in 2NF but not in 3NF
Option C:	in 3NF but not in BCNF
Option D:	in BCNF
34.	In the process of normalization, the decomposition should satisfy the following

	properties
Option A:	lossy but dependency preserving
Option B:	lossless but not dependency preserving
Option C:	lossless and dependency preserving
Option D:	lossy and not dependency preserving
35.	Relation R=(A,B,C,D,E,G) having the functional dependencies F=(A->B, BG->E, C->D, D->G) What is the candidate key?
Option A:	BG
Option B:	AB
Option C:	ABG
Option D:	AC
36.	The scheme of database recovery is that all the updates of transactions are recorded in the database on disk before the transaction commits.
Option A:	Immediate update
Option B:	Deferred update
Option C:	Shadow paging
Option D:	Checkpoint
37.	Consider following 2 schedules S1:r1(X);r3(Y);r3(X);r2(Y);r2(Z);w3(Y);w2(Z);r1(Z);w1(X);w1(Z) S2: r1(X); r3(Y); r2(Y); r3(X); r1(Z);r2(Z); w3(Y); w1(X); w2(Z);w1(Z);W3(Z)
Option A:	S1 and S2 both are conflict serializable
Option B:	only S1 is conflict serializable
Option C:	only S2 is conflict serializable
Option D:	S1 and S2 both are not conflict serializable

38.	<p>a. Choose the option that correctly explains in words, the function of the following relational algebra expression</p> <p>b. $\sigma_{\text{year} \geq 2017 \wedge \text{salary} < 42000}(\text{Employee})$</p> <p>c.</p>
Option A:	Selects all tuples from the Employee
Option B:	Selects all the tuples from Employee wherever the year is lesser than 2017 and salary less than 42000
Option C:	Selects all the tuples from the Employee wherever the year is greater than or equal to 2017 and salary is less than 42000.
Option D:	Selects all tuples from the Employee wherever the year is greater than or equal to 2009
39.	When a person in the university is belonging to more than one lower level entity set such as student as well as faculty then the constraint is
Option A:	Disjoint
Option B:	Total
Option C:	Overlapping
Option D:	Partial
40.	<p>Consider the following two statements about database transaction schedules:</p> <p>I. Strict two-phase locking protocol generates conflict serializable schedules that are also recoverable.</p> <p>II. Timestamp-ordering concurrency control protocol with Thomas' Write Rule can generate view serializable schedules that are conflict serializable.</p> <p>Which of the above statements is/are TRUE?</p>
Option A:	I only
Option B:	II only
Option C:	I and II both
Option D:	Neither I nor II
41.	The capacity to alter the database schema at one level without affecting any other levels is termed as

Option A:	Data Independence
Option B:	Data Mapping
Option C:	Data Isolation
Option D:	Data Transformation
42.	Which of the following describes the database structure and constraints?
Option A:	View
Option B:	Schema
Option C:	Meta data
Option D:	Instance
43.	Overlapping with partial specialization constraint can be defined as
Option A:	When a higher level entity instance may be a member of multiple lower level Entities or it must be a member of at least one lower level entity set..
Option B:	When a higher level entity instance may be a member of multiple lower level Entities or it does not have to be a member of any lower level entity.
Option C:	When an entity instance may be a member of at most one lower level entity set.
Option D:	When an entity instance may be a member of at least one lower level entity set..
44.	If car is the entity type then Maruti 800, Swift dzire are the _____?
Option A:	Instance
Option B:	Schema
Option C:	Field
Option D:	Attribute
45.	a. How to form the primary key of a weak entity set?
Option A:	Using weak entity set discriminator attribute only
Option B:	By combining all the attributes of weak entity set
Option C:	Using primary key of identifying entity set and discriminator of weak entity set
Option D:	Not possible to have primary key for weak entity set
46.	If relation r contains Nr tuples, and relation s contains Ns tuples, then the result of which operation contains $Nr \times Ns$ tuples?
Option A:	Union

Option B:	Join
Option C:	Cartesian Product
Option D:	Set difference
47.	<p>Consider the following relations:</p> <p>Parts(pid,pname,color)</p> <p>PartCost(pid,cost)</p> <p>What does the following relational algebra expression represent?</p> <p>$\Pi_{pid} ((\sigma_{color='red'} (\mathbf{Parts})) \bowtie (\sigma_{cost \geq 1000} (\mathbf{PartCost})))$</p>
Option A:	Find the pid of all parts whose color is red.
Option B:	Find the pid of all parts whose color is red or cost ≥ 1000 .
Option C:	Find the pid of all parts whose color is red but not cost ≥ 1000 .
Option D:	Find the pid of all parts whose color is red and cost ≥ 1000 .
48.	i. What is the cardinality of column A, if a relation R(A,B,C,D,E) contains 40 rows and every column contains unique values.
Option A:	200
Option B:	40
Option C:	4
Option D:	20
49.	Consider Entity set A and B in ER diagram having many to many relationship between A and B. How to map this relationship into a relational model?
Option A:	By adding primary key of Entity set A as a foreign key component in Entity set B
Option B:	By adding primary key of Entity set B as a foreign key component in Entity set A
Option C:	By creating a separate relation(R) for mapping binary many to many relationships which includes the primary key of both A and B.
Option D:	By creating combine relation for entity set A and B

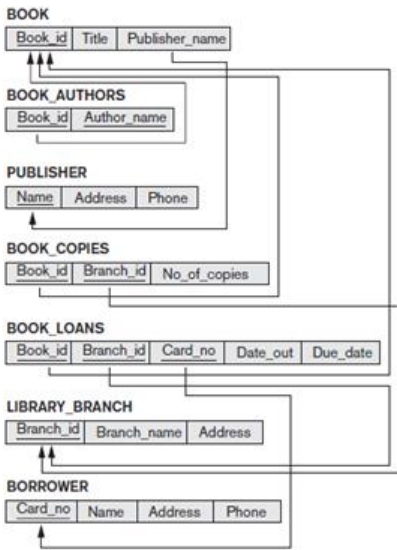
50.	<p>Consider Table Employees have 10 records and it has NOT NULL salary column which is also UNIQUE.</p> <p>SELECT COUNT(*) FROM Employee WHERE SALARY > ANY (SELECT SALARY FROM EMPLOYEE); How many rows will come in the OUTPUT of the given query?</p>
Option A:	10
Option B:	5
Option C:	9
Option D:	0
51.	<p>Consider Schema:</p> <p>Dept(dept_name, location, city);</p> <p>Which command can be used to delete column location from the given relation</p>
Option A:	MODIFY TABLE Dept DROP COLUMN location;
Option B:	ALTER TABLE Dept DROP COLUMN location;
Option C:	ALTER TABLE Dept DROP location;
Option D:	MODIFY TABLE Dept DROP location;
52.	<p>Consider the instructor table:</p> <p>INSTRUCTOR (instr_id, name, dept name, salary)</p> <p>Create a new instructor 'I-101', named 'Ashwin singh', with 50,000 salary for department 'Maths'. Identify the appropriate SQL statement.</p>
Option A:	INSERT INTO TABLE instructor VALUES ('I-101', 'Ashwin Singh', 'science', 10,00,000)
Option B:	INSERT INTO instructor ('I-101', 'Ashwin Singh', 'Maths', 50,000)
Option C:	INSERT INTO instructor VALUES('I-101', 'Ashwin Singh', 'Maths', 50,000)
Option D:	INSERT INTO instructor table(instr_id, name, dept name, salary) VALUES ('I-101', 'Ashwin Singh', 'maths', 50,000)

53.	Consider a relation R(A,B,C,D,) with the following functional dependency: AB->CD . The number of superkeys of R is:
Option A:	1
Option B:	2
Option C:	3
Option D:	4
54.	Identify the incorrect statement .
Option A:	3NF doesn't have transitive dependencies
Option B:	Composite attributes are not allowed in 1NF
Option C:	In 2NF ,there should not be any Full functional dependencies
Option D:	In BCNF, trivial FD are allowed
55.	consider the relation schema: Student_Performance (name, courseNo, rollNo, grade) has the following set of functional dependencies. F= { rollNo,courseNo->grade rollNo->name } and candidate key is (rollNo,courseNo) The highest normal form of this relation scheme is
Option A:	2NF
Option B:	3NF
Option C:	1NF
Option D:	BCNF
56.	If T1 , T2 are two transactions and I1 , I2 are two instructions of T1 and T2 respectively then I1 and I2 are conflicting instructions if
Option A:	They operate on the different data item
Option B:	They belong to different transactions
Option C:	At Least one of them is a write operation
Option D:	At Least one of them is a read operation
57.	What is true about the Wait-Die Algorithm for deadlock handling.

Option A:	Preemptive
Option B:	Non-preemptive
Option C:	Prefers Younger Transactions
Option D:	Both B And C
58.	i. Identify correct rules in growing phase (first phase) in two-phase locking protocol.
Option A:	Transaction can acquire only shared lock(LOCK-S) and exclusive (lock-X)
Option B:	Transaction can acquire only shared lock(LOCK-s) ,exclusive (lock-X) and covert Lock-S to Lock-X
Option C:	Transaction can release shared lock(LOCK-s) ,release exclusive (lock-X) and covert Lock-S to Lock-X
Option D:	Transaction can acquire only shared lock(LOCK-S) and release exclusive (lock-X)
59.	Choose the correct option
Option A:	Every Conflict serializable schedule is also View serializable
Option B:	Every View serializable schedule is also conflict serializable
Option C:	Both a and b
Option D:	Every serial schedule has same conflict and view equivalent schedule
60.	When a transaction is aborted due to ant kind of failure,which instruction should be executed to keep database in consistent state
Option A:	Commit
Option B:	Rollback
Option C:	Savepoint
Option D:	Checkpoint

Descriptive Questions

1	<p>Consider a dependency diagram of relation R and normalize it up to third normal form.</p> <pre> graph TD PK[Proj_no] --> Proj_name PK --> Emp_no PK --> Job_class PK --> Hrs_billed Emp_no --> Emp_name Emp_no --> Chg_hr Job_class --> Chg_hr PK -.-> Chg_hr </pre>
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2	Explain conflict and view serializability with suitable examples .
3	Explain deadlock handling in DBMS with suitable examples.
4	What are different database users? Give responsibilities of DBA
5	<p>Produce ER Diagram from the following relational database Schema.</p> 
6	<p>Book(<u>book_id</u>, title,author, cost) Store(<u>store_no</u>, city, state, inventory_val) Stock(store_no, book_id,quantity)</p> <p>Consider above relational schema and formulate SQL queries for the following:</p> <p>(i)Modify the cost of DBMS books by 10% (ii)Find the author of the books which are available in Mumbai store (iii)Find the title of the most expensive book (iv)Find the total quantity of books in each store (v) Add a new record in Book(Assume values as per requirement)</p>
7	Explain the transaction processing with the help of a state diagram?
8	<p>Consider the schema $R = \{A, B, C, D, E, F, G, H, I, J\}$ and set of functional dependencies</p> <p>$F = \{\{A, B\} \rightarrow \{C\}, \{A\} \rightarrow \{D, E\}, \{B\} \rightarrow \{F\}, \{F\} \rightarrow \{G, H\}, \{D\} \rightarrow \{I, J\}\}$.</p> <p>What is the key of R?</p> <p>Decompose R into 2NF and 3NF relations.</p>
9	Explain log based recovery techniques with examples?

10	Explain different types of Database users and the responsibilities of the DBA?
11	<p>Design an EER schema for a BANK database.</p> <p>Each bank can have multiple branches, and each branch can have multiple accounts and loans. Bank keeps the track of different types of Accounts (Saving_account, Checking_account) , Loans(Car_loans,Home_loans,...) , each account's Transaction (deposit, withdrawal,check,..) and each loan's Payments; both of these include the amount, date and time.</p> <p>State any assumptions you make about the additional requirement clearly.</p>
12	<p>Write SQL queries for the given database :</p> <p>Emp(Eid, Ename, Sal, City)</p> <p>Works(Eid, Cid)</p> <p>Company(Cid, Cname, City)</p> <ol style="list-style-type: none"> i. Find the lowest paid employee. ii. Find how many employees are working for the company 'ANZ Cooperation'. iii. Modify the database so that Joe now lives in "New York". iv. Find the total number of employees of each company. v. Give all employees of 'XYZ 'company a 10% raise in salary.
13	Explain the three levels of abstraction in DBMS including physical and logical data independence.
14	<p>Consider the given schema:</p> <ul style="list-style-type: none"> ● Employees (Empid, Fname, Lname, Email, Phoneno, Hiredate, Jobid, Salary, Mid, Did) ● Departments (Did, Dname,Managerid) ● Locations (Did, City,State) <p>Write the SQL queries for the following:</p> <ol style="list-style-type: none"> 1. List the employees who have a manager who works for a department based in Mumbai. 2. Give a 10% hike to all the Employees working in 'D01' department. 3. Display the information of the employees whose first name starts

	<p>with 'R' in descending order of their salary.</p> <p>4. Find name of the department which are having more than 20 employees</p> <p>5. Add a new record in departments(Assume values as per requirement)</p>
15	<p>Convert following E-R diagram to relational schema and equivalent schema diagram</p> <p>The E-R diagram consists of the following entities and relationships:</p> <ul style="list-style-type: none"> author (Entity): Attributes: name, address, URL. publisher (Entity): Attributes: name, address, phone, URL. book (Entity): Attributes: year, title, price, ISBN. customer (Entity): Attributes: name, address, email, phone. shopping-basket (Entity): Attributes: number, basketID. warehouse (Entity): Attributes: number, address, phone, code. <p>Relationships:</p> <ul style="list-style-type: none"> written-by (Relationship): Connects author and book. published-by (Relationship): Connects publisher and book. contains (Relationship): Connects book and shopping-basket. stocks (Relationship): Connects book and warehouse. basket-of (Relationship): Connects customer and shopping-basket.
16	<p>Explain 3NF .Consider relation r1 with the functional dependencies that hold on it.</p> <p>$r1(p, q, r, s, t)$ $p \rightarrow q,r,s,t$ $s \rightarrow t$</p> <p>check whether r1 is in 3NF or not .If it is not in 3NF decompose into 3NF.</p>
17	<p>Explain transaction ,properties and states with suitable example</p>
18	<p>Explain timestamp based protocol and how timestamp-ordering protocol guarantees serializability</p>