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PES University, Bangalore

(Established under Karnataka Act 16 of 2013)

UE17CS252

END SEMESTER ASSESSMENT (ESA) B. TECH. 4TH SEMESTER – May 2019

UE17CS252 – Database Management Systems

Time: 3 Hours | Answer All Questions | Max Marks: 100

Make suitable assumptions when necessary and state them
Answer to the point.

1.	a	With a neat diagram, explain the three schema architecture and data independence.	6
	b	What are the advantages (list at least 4) of using a DBMS?	4
	c	Draw the ER diagram for an online store (like flipkart or Amazon). The online store has a number of warehouses which have a number of products supplied by many suppliers. Customers visit the web site and put products in their shopping cart. The warehouses are identified by an id and its location(latitude, longitude, street, city, pin code) and phone numbers are recorded. The stock(quantity) of various products is recorded. A warehouse has many products. The suppliers are identified by a supplier id and a name. Supplier's address is also stored. A supplier may supply one or more products. A product belongs to one product category and can be supplied by more than one supplier. The product can be stored in more than one warehouse. Product is identified by a product id and it name and description are recorded with its price. The products belong to a product category. The product category is organized as a hierarchy. For example, "All products" is a top level category. Computers, Electronics and other categories are children of "All products". Laptops, Desktops, Tablets, printers, mouse, monitor are children of "Computers" category. Similarly, Camera, TV, mp3 players are children of "Electronics" category. A customer visits the online store, puts products in his shopping cart (and then checks out). Customer is identified by customer id, and other information like email, phone, street address, city, pin code, is stored for the customer. **In the ER diagram, model the <u>shopping cart as a weak entity</u>.**	10
2.	a	Convert the following ER diagram to a relational schema. Indicate primary and foreign keys. • book_id is key for Book. • card_id is key for Member_Card • borrow_date is identifier for Borrowal.	8

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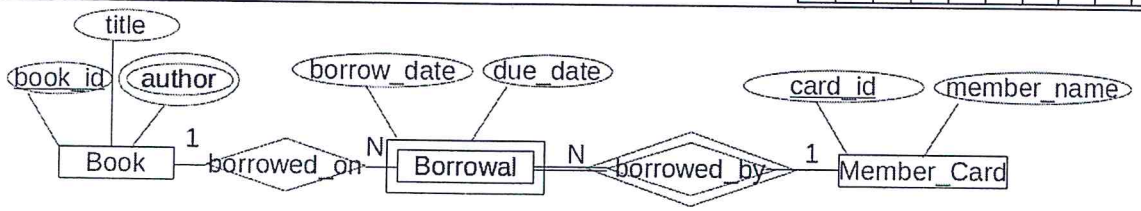

	b	i. Write the table creation SQL statements for the schema: Employee(emp_id, emp_name, designation, dept_id) Department(dept_id, dept_name, mgr_id) • dept_id refers to department table. • mgr_id refers to emp_id of employee table. ii. Give the SQL statement to add a record for the employee with id of 1, name as 'Ganesh Subramanya', designation of CEO, dept_id is not known yet (NULL). iii. Will the insert statement execute and insert a row? Explain. iv. Can you delete a row in department table if there are employee records referring to the department row. Explain. v. What change must you do to the tables to ensure that when a department row is deleted, the employees belonging to that department must be assigned to a dept_id of 1? (Give appropriate SQL statement).	8
	c	Define the following: i. Superkey ii. Key iv. Candidate keys iii. Primary Key	4
3.		For the schema, employee(emp_name, city) company(comp_name, city) works(emp_name, comp_name) manages(emp_name, manager_name) both emp_name and manager_name references emp_name	
	a	Write the SQL queries for the following requirements i. List the employees who live in the same city as the company they work for. Display employee name, company name and the city. ii. List the colleagues of 'Durga'. (Colleagues are people who work in the same company) iii. List the employee names and the city for employees who do not have a manager. **Use Correlated Nested Query.**	6
	b	Write the queries in SQL for: i. List all the employees (Display employee name, city and manager name). If the employee has a manager, display the manager name otherwise just display the employee name and city. ii. List the managers and the number (count) of employees under them. Ignore managers managing only one person. Order the output such that the manager with most people under him appears in the first row.	4

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		For the schema, book(book_id, title, publisher_name, no_of_copies) book_author(book_id, author_name) book_borrowals(book_id, card_id, borrowal_date, due_date, return_date) borrower(card_id, name, address, phone, email)	
	c	Give the relational algebra queries for: i. List all the books (book_id) borrowed by the member with name 'Dhatri' ii. List the borrowers (name) who have borrowed books and not returned them. (borrowals have a NULL value in return_date) iii. List the borrowers (name) who have not borrowed any books ever.	6
	d	Write the queries in relational algebra for: i. For each book, display the total number of times it has been borrowed. ii. List the borrowers (name) who have read all the books by 'R.K Narayan.'	4
4.	a	List the informal design guidelines for relational schema. What are the desired properties of relational decomposition?	6
	b	Consider a relation R with five attributes ABCDE. You are given the following dependencies: F = {A → B, BC → E, and ED → A} Find the candidate keys.	4
	c	Given R = {A, B, C, D} F = {A → B, BC → D, A → C} Which normal form is R in? Decompose the relation R to next higher normal form.	6
	d	Given a relation R (A, B, C, D) and a Functional Dependency F = {AB → CD} What additional functional dependency(ies) will make the relation R i. Not to be in 2NF ii. In 2NF but not to be in 3NF iii. In 3NF but not to be in BCNF In each of the above cases give at least one Functional Dependency that will violate the corresponding Normal Form Rule.	4
5.	a	For the schedule, $R_3(X), R_2(Y), W_2(Y), W_3(X), R_1(X), W_1(X), R_1(Y), W_1(Y), Commit_1, Commit_3, Commit_2$ Answer the following questions: i. Draw the precedence graph. ii. Give the equivalent serial schedules.	4
	b	Explain discretionary access control. Give the corresponding SQL statements in your explanation.	4
	c	Explain in brief i. Strict 2PL. ii. Deadlocks and deadlock detection.	6
	d	Answer in brief: i. The need for concurrency in DBMS. ii. List and explain (in one or two sentences) ACID properties. iii. How is the A and D property of ACID ensured by the DBMS?	6