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Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Examination July 2021 (2019 Scheme)

Course Code: ITT206

Course Name: DATABASE MANAGEMENT SYSTEMS

Max. Marks: 100

Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

Marks

- | | | |
|----|--|-----|
| 1 | Why do we need weak entity sets? How can we convert a weak entity set into a strong entity set? | (3) |
| 2 | List the important functions of a Database Administrator. | (3) |
| 3 | State a few reasons for the occurrence of NULL values in a relation. | (3) |
| 4 | Give three unary operations in relational algebra. | (3) |
| 5 | Write SQL queries for the following:
i. Add a column 'designation' to the table Employee and later drop the column.
ii. Find the sum of the salaries of all employees, the maximum salary, the minimum salary, and the average salary. | (3) |
| 6 | What are the different types of SQL Join? | (3) |
| 7 | State first normal form. | (3) |
| 8 | Why are some functional dependencies called trivial? | (3) |
| 9 | List the different types of transaction failures for which recovery is required. | (3) |
| 10 | Define NoSQL database. Give an example. | (3) |

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

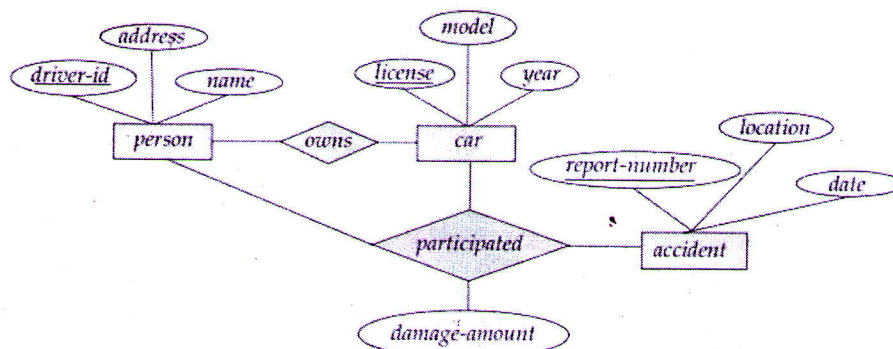
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|----|---|-----|
| 11 | a) Design an E-R diagram for keeping track of the scoring statistics of your favourite sports team. You should store the matches played, the scores in each match, the players in each match, and individual player scoring statistics for each match. Summary statistics should be modelled as derived attributes with an explanation as to how they are computed. | (6) |
| | b) Illustrate three schema architecture and explain how it helps to achieve data independence. | (8) |

- 12 a) Discuss the different types of user-friendly DBMS interfaces and the types of users who typically use each. (7)
- b) Consider a University database for the scheduling of classrooms for final exams. This database could be modelled with details as: (7)
- course has *name*, *department*, and *c-number*
 - section for each course has *s-number* and *enrollment*
 - room has *r-number*, *capacity*, and *building name*
 - exam has *exam-id* and *time*

Illustrate an E-R diagram for this database.

Module -2

- 13 a) Consider the following database schema with three relations: (10)
- Suppliers(sID, sName, address)
- Parts(pID, pName, colour)
- Catalog(sID, pID, price)
- Write the relational algebra expressions for the following queries:
- i) Find the names of all green parts
 - ii) Find all prices for parts that are red.
 - iii) Find the sIDs of all suppliers who supply a part that is black or white.
 - iv) Find the names of all suppliers who supply a part that is green.
- b) Differentiate entity integrity constraint and referential integrity constraint. (4)
- 14 a) Consider the following ER diagram for a car insurance company. Transform the diagram to appropriate relations and attributes in relational schema. (7)



- b) Consider the Employee database given below. (7)
- EMPLOYEE (ID, person_name, street, city)
- WORKS (ID, company_name, salary)

COMPANY (company_name, city)

Give an expression in the relational algebra for the following queries:

- i) Find the name of each employee who lives in city Miami.
- ii) Find the name of each employee whose salary is greater than \$100000.
- iii) Find the name of each employee who lives in Miami and whose salary is greater than \$100000.

Module -3

- 15 a) Consider the table Student (stud_code, stud_name, subject, marks). Write SQL procedure to display all records of Student table whose marks are greater than 70 and count all the table rows. (4)

- b) Define views in SQL. Write sample SQL queries to create a view, update view and drop view. (10)

- 16 a) Consider the following relations which are part of the University database. (8)

Instructor (id, name, dept_name, salary)

Course (course_id, title, dept_name, credits)

Section (course_id, sec_id, semester, year, building, room_number, time_slot_id).

Write SQL queries for the given questions:

- i) Find the titles of courses in the IT department that have 4 credits.
- ii) Find all instructors earning the highest salary.
- iii) Increase the salary of each instructor in the IT department by 10%.
- iv) Delete all courses that have never been offered.

- b) Consider the bank database. (6)

account (account_number, branch_name, balance)

depositor (customer_name, account number)

customer (customer_name, customer_street, customer_city)

Write an SQL trigger to carry out the following action: On delete of an account, for each customer-owner of the account, check if the owner has any remaining accounts, and if she does not, delete her from the depositor relation.

Module -4

- 17 a) Decompose the relation CLASS(course_id, title, dept_name, credits, sec_id, semester, year, building, room_number, capacity, time_slot_id) into multiple relations so that the resultant relations are in BCNF. (8)

- b) Give a set of functional dependencies (FDs) for the relation schema R(A,B,C,D) (6)
with primary key AB under which R is in 1NF but not in 2NF.
- 18 a) With examples, describe the insertion, updation and deletion anomalies in (9)
relational database design.
- b) With example , explain lossless decomposition. (5)

Module -5

- 19 a) Consider a database transaction to transfer 'x' dollars from Account A to (10)
Account B. Illustrate the need to ensure all the ACID properties in a transaction
with this example.
- b) What do you mean by two phase locking protocols in concurrency control? (4)
- 20 a) Illustrate deadlock and starvation in database transactions. (10)
- b) What are the features of shadow paging? (4)
