Question Paper

Exam Date & Time: 04-Jan-2023 (02:30 PM - 05:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

FIFTH SEMESTER B.TECH (IT) MAKEUP EXAMINATIONS, JANUARY 2023

DATABASE SYSTEMS [ICT 3157]

Marks: 50

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1) Consider the relational database given below, where the primary keys are underlined. Give an SQL (5) to express each of the following queries:

A) employee (person-name, street, city)

works (person-name, company-name, salary)

company (company-name, city)

manages (person-name, manager-name)

- i. Find the names of all employees in this database who live in the same city as the company for which they work.
- ii. Find the names of all employees who live in the same city and on the same street as do their managers.
- iii. Find the names of all employees in this database who do not work for First Bank Corporation.
- iv. Find the names of all employees who earn more than every employee of Small Bank Corporation.
- v. Assume the companies may be in several cities. Find all companies located in every city in which Small Bank Corporation is located.
- B) Write a PL / SQL block, which takes as input two integers m and n (m should be smaller than n) and (3) display the sum of numbers between m and n. Note: in PL/SQL to allow a user to enter a value during the execution of a program, you need to use the following notation: value = '&value'
- C) Consider the following relations of a University database. Student (S_ID, Name, dept_name, tot_credit) Course (Course_ID, Title, dept_name, credits) Takes (S_ID, Course_ID, Year, Grade) Department (dept_name, building, budget) Instructor (I_ID, name, dept_name, salary) Advisor (S_ID, I_ID)

Write a procedure to store course information in a new table, which has at least 10 number of students scored 'A' grade and maximum 5 students scored 'F' grade in a course offered by a particular department. Consider department name as an input parameter

Duration: 180 mins.

(2)

2)	A)	Consider that in an ER model, there is an entity set people with attributes id, name and destination, where id is the key attribute. There are two specializations of people: Employee and student. This generalization/specialization between people, employee and student is overlapping and partial. Employee has the attribute date_of_retirement and a multi-valued attribute phone_no. Student has the attribute date_of_joining. There are two specializations of student: UG and PG. This generalization/specialization between student, UG and PG is disjoint and total. UG has the multi-valued attribute hobby and PG has the attribute previous_degree. Develop a suitable database schema from the ER model avoiding redundancy. Clearly identify the primary keys and foreign keys of the tables.	(5)
	B)	Consider the following Database Schema. Course (course_no, description, cost, prerequisite) Section_Course (section_id, course_no, location, instructor_id, capacity) Enrollment(student_id, section_id, course_no, enroll_date, grade)	(3)
		Write a trigger to display section and course information when number of 'F' grade students in that section and course reaches count 10. Count the number of students who scored 'A' grade in all their enrolled courses.	
	C)	Consider the following schema related to hotel reservation: City (Pincode, CityName, State) Hotel (Hno, Name, Pin no., Address, max_capacity) Room (Roomno, Hno, Type, Price) Reservation (Rid, Gid, Roomno, Hno, Type, Arrival-Date, Departure-Date) Guest (Gid, Firstname, Lastname, Pin no., Address) Employee (Hno, Eno, Firstname, Lastname, Manager_eno.) Booking_Type (Type, Description)	(2)
		Create a view containing the hotel name starting with "S" and ends with "T" along with the names of the guest staying in that particular hotel. Also, write a separate query on the created view to obtain the total no. of Guest staying in each hotel.	
3)	A)	Explain simple 2-phase locking protocol with suitable example. Consider the following schedule S1 and S2. Which of the schedules, using shared and exclusive locks, satisfy the requirements for strict two phase locking? State the reason. (S:Shared lock, X: Exclusive lock, C: commit, U:Unlock) S1: S(A); R(A); X(B); R(B); W(B); U(A); C; U(B). S2: S(B); R(B); X(A); R(A); W(A); U(A); U(B); C.	(5)
	B)	Consider the following three schedules of transactions T1, T2 and T3. [Notation: In the following NYO represents the action Y (R for read, W for write) performed by transaction N on data O.] S1: 2RA 2WA 3RC 2WB 3WA 3WC 1RA 1RB 1WA 1WB S2: 3RC 2RA 2WA 2WB 3WA 1RA 1RB 1WA 1WB 3WC S3: 2RA 3RC 3WA 2WA 2WB 3WC 1RA 1RB 1WA 1WB Check whether the given schedule is conflict serializable or not.	(3)
	C)	When we say that schedule is recoverable. Illustrate with suitable example.	(2)
4)	A)	Let S1 and S2 be two schedules with the same set of transactions. When we say that, these two schedules are view equivalent? Consider the following schedule S1 and S2 comprising of transactions T1 and T2. Here R and W specifies read and write operations respectively. X and Y specifies data items. (Example: R2(X) specifies read operation performed on data item X by the transaction T2. Check whether the given schedules are view equivalent or not. S1: R1(X) W1(X) R2(X) W2(X) R1(Y) R2(Y) W2(Y) W1(Y) S2: R1(X) W1(X) R1(Y) W1(Y) R2(X) W2(X) R2(Y) R2(Y)	(5)
	B)	Consider a mongodb collection namely "Employee" with the following fields: empid, name, state and salary. Write a mongodb command for the following. Count the number of employees whose salary is more than 60000.	(3)

Page 2 of 3

List all employees from karnataka. To delete the employee collection

- C) Give an example for each of the NoSql database. Which type of NoSql type is more suitable for (2) shopping cart content?
- 5) Find the candidate key for the given below relations. Check whether the relation is in 3NF or not. (5) Relation R (A, B, C, D, E, P, G} with functional dependencies $F = \{AB \rightarrow CD, DE \rightarrow P, C \rightarrow E, P \rightarrow C, A\}$ A) $B \rightarrow G\}$.
 - Relation R (A, B, C, D, E, F} with functional dependencies $F = \{C \rightarrow F, E \rightarrow A, EC \rightarrow D, A \rightarrow B\}$
 - B) Illustrate with suitable example, wound-wait deadlock prevention scheme. Is it preemptive (3) technique? Give reason
 - C) How database sharding improves resilience. Illustrate with suitable scenario (2)

-----End-----