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MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH. (COMPUTER SCIENCE & ENGINEERING)
MAKEUP EXAMINATIONS, JUNE 2018
SUBJECT: DATABASE MANAGEMENT SYSTEM [CSE 3281]
REVISED CREDIT SYSTEM
(25/06/2018)

Time: 3 Hours   MAX. MARKS: 50

> **Instructions to Candidates:**
> ❖ Answer **ALL** the questions.
> ❖ Missing data may be suitably assumed.

1A. Explain any three disadvantages of keeping data in a file-processing system considering a consignment of developing a video site similar to YouTube. Discuss the relevance of each of disadvantages to the storage of actual video data, and to metadata about the video, such as title, the user who uploaded it, tags, and which users viewed it. **3M**

1B. Consider the Schema 1 and explain the foreign key constraint from the *dept_name* attribute of *instructor* to the *department* relation. Give examples of inserts and deletes to these relations, which can cause a violation of the foreign key constraint. (Refer the Schema 1) **3M**

1C. Consider the banking database (Refer the Schema 2). Give an expression in the relational algebra for each of the following queries. **4M**
   i.   Identify the primary key for all relations.
   ii.   Find the names of all branches located in "Chicago".
   iii. Find the names of all borrowers who have a loan in branch "Downtown".
   iv.   Find the names of all customers whose balance is greater than $100,000.

2A. Consider the following expressions, which use the result of a relational algebra operation as the input to another operation. For each expression, explain in words what the expression does. (Refer the Schema 1) **3M**
   i. $\sigma_{year \geq 2009}(takes) \bowtie student$
   ii. $\sigma_{year \geq 2009}(takes \bowtie student)$
   iii. $\Pi_{ID,name,course\_id}(student \bowtie takes)$

2B. What are the attribute types used in E-R models? Explain with suitable example. **3M**

2C. Consider the bank database (Refer the Schema 2) and construct the following SQL queries for this relational database. **4M**
   i.   Find the names of all customers who live on the same street and in the same city as "Smith".
   ii.   Find the names of all branches with customers who have an account in the bank and who live in "Harrison".

3A. Construct an E-R diagram and reduce it to relational schema for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded **5M**

accidents. Each insurance policy covers one or more cars and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received.

3B. Write an appropriate SQL query using the university database (Refer the Schema 1). **5M**
    i.   Increase the salary of each instructor in the Comp. Sci. department by 10%.
    ii. Delete all courses that have never been offered (that is, do not occur in the *section* relation).
    iii. Insert every student whose *tot_cred* attribute is greater than 100 as an instructor in the same department, with a salary of $10,000.

4A. List and explain the SQL constructs by which the relations can be updated with an example. **4M**

4B. Normalise the following Table 1 and represent the database state after 1NF, 2NF and 3NF. (Consider minimum 3 tuples for each relation) **6M**

Project Code	Project Title	Project Manager	Project Budget	Emp No	Emp Name	Dept No	Dept Name	Hourly Rate
PC010	Pensions System	M Phillips	24500	S10001	A Smith	L004	IT	22.00
PC010	Pensions System	M Phillips	24500	S10030	L Jones	L023	Pensions	18.50
PC045	Salaries System	H Martin	17400	S10010	B Jones	L004	IT	21.75
				S10001	A Smith	L004	IT	18.00
				S31002	T Gilbert	L028	Database	25.50
PC064	HR System	K Lewis	12250	S31002	T Gilbert	L028	Database	23.50
				S21010	P Lewis	L009	IT	17.50
				S10034	B James	L009	HR	16.50

Table 1 : Project Details

5A. Compute the closure of the following set F of functional dependencies for relation schema $r(A, B, C, D, E)$. **4M**

$$A \rightarrow BC$$
$$CD \rightarrow E$$
$$B \rightarrow D$$
$$E \rightarrow A$$

List the candidate keys for R.

5B. Explain the transaction concept using a simple bank application consisting of several accounts and a set of transactions that access and update those accounts. **3M**

5C. What are the various modes in which data items can be locked, explain with example. **3M**

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classroom (<u>building</u>, <u>room_number</u>, capacity)
department (<u>dept_name</u>, building, budget)
course (<u>course_id</u>, title, dept_name, credits)
instructor (<u>ID</u>, name, dept_name, salary)
section (<u>course_id</u>, <u>sec_id</u>, <u>semester</u>, <u>year</u>, building, room_number, time_slot_id)
teaches (<u>ID</u>, <u>course_id</u>, <u>sec_id</u>, <u>semester</u>, year)
student (<u>ID</u>, name, dept_name, tot_cred)
takes (<u>ID</u>, <u>course_id</u>, <u>sec_id</u>, <u>semester</u>, <u>year</u>, grade)
advisor (<u>s_ID</u>, i_ID)
time_slot (<u>time_slot_id</u>, <u>day</u>, <u>start_time</u>, end_time)
prereq (<u>course_id</u>, <u>prereq_id</u>)

Schema 1 : UNIVERSITY DATABASE

branch (branch_name, branch_city, assets)
customer (cust_name, cust_street, cust_city)
loan (loan_number, branch_name, amount)
borrower (cust_name, loan_no)
account (account_no, branch_name, balance)
depositor (cust_name, account_no)

Schema 2 : BANKING DATABASE