Reg. No.										

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MANIPAL INSTITUTE OF TECHNOLOGY, MANIPAL 576104

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MANIPAL INSTITUTE OF TECHNOLOGY

FOURTH SEMESTER B.Tech. (IT) DEGREE END SEMESTER EXAMINATION, MAY-2016
SUBJECT: DATABASE SYSTEMS (ICT-2203)
(REVISED CREDIT SYSTEM)

TIME: 3 HOURS **12/05/2016** **MAX. MARKS: 50**

Instructions to candidates

- Answer all questions
- Missing data, if any, may be suitably assumed

1A. Given a relation DB(Patno, PatName, appNo, time, doctor) with functional dependencies F = { Patno → PatName; {Patno, appNo } → {Time, doctor}; Time → appNo }. Find the candidate keys and normalize the relation upto the highest possible normal form.

1B. Discuss the problem of spurious tuples and how it can be prevented?

1C. What is a foreign key constraint? Why are such constraints important? What is referential integrity?

(5+3+2)

2A. What are the advantages and disadvantages of Timestamp Based protocol? Describe with suitable examples the solutions for the problem.

2B. Write a trigger to satisfy the condition in employee table that the new salary of the employee should always be greater than old salary. Consider the database schema given in Figure Q.3A.

2C. Discuss the following with suitable example:
i. Partial Commit State ii. Minimal Superkey.

(5+3+2)

3A. Consider the database schema given in Figure Q.3A:

EMPLOYEE(Name, Ssn, BDate, Address, Sex, Salary, Super_Ssn, Dno
DEPARTMENT (Dname, Dno, Mgr_Ssn, Mgr_Start_Date)
DEPT_LOCATIONS(Dno, Dlocation)
PROJECT(Pname, Pnumber, Plocation, Dno)
WORKS_ON(Essn, Pnumber, Hours)
DEPENDENT(Essn, Dependent_name, Sex, BDate, Relationship)

Figure Q.3A

Give an expression (query) in SQL for each of the following:

i. List the names of all employees who work in the department that has the employee with the highest salary among all employees.

ii. List the names of all employees whose supervisor's supervisor has '888333444' for Ssn.

iii. List the names of all employees with two or more dependents.

iv. List the names of the managers who have at least one dependent.

v. List out the employees who works on all the projects of their department.

3B. Define Trivial dependency. Consider the relation R(A, B, C, V, Z) and the functional dependencies F={A → BC; AC → Z; Z → BV; AB → Z}. Find the minimal cover of F.

3C. State the following rules:

i. Transitive Rule ii. Pseudo-transitive Rule

iii. Augmentation Rule iv. Decomposition Rule

(5+3+2)

4A. The Prescriptions chain of pharmacies has offered to give you a free lifetime supply of medicine if you design its database. Given the rising cost of health care, you agree. Below is the information that you gather:

- Patients are identified by an SSN, and their name, address, and age must be recorded.
- Doctors are identified by an SSN. For each doctor, the name, specialty, and years of experience must be recorded.
- Each pharmaceutical company is identified by its name and has a phone number.
- For each drug, the trade name and formula must be recorded. Each drug is sold by a given pharmaceutical company, and the trade name identifies a drug uniquely from the products of that company. If a pharmaceutical company is deleted, you need not keep track of its products any longer.
- Each pharmacy has a name, address, and phone number.
- Every patient has a primary physician. Every doctor has at least one patient.
- Each pharmacy sells several drugs and has a price for each. A drug could be sold at several pharmacies, and the price could vary from one pharmacy to another.
- Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and a quantity associated with it. You can assume that, if a doctor prescribes the same drug for the same patient more than once, only the last such prescription needs to be stored.
- Pharmaceutical companies have long-term contracts with pharmacies. A pharmaceutical company can contract with several pharmacies, and a pharmacy can contract with several pharmaceutical companies. For each contract, you have to store a start date, an end date, and the text of the contract.
- Pharmacies appoint a supervisor for each contract. There must always be a supervisor for each contract, but the contract supervisor can change over the lifetime of the contract.

Draw an ER-Diagram that captures the preceding information.

4B. Why schedule has to be Recoverable and Cascade-less? Explain with a suitable example.

4C. Explain the ACID properties of a transaction.

(5+3+2)

5A. Explain the characteristics of database approach.

5B. Write an algorithm for testing Non-additive join property of decomposition.

5C. Consider the following three log files at different instances of time as shown in Figure Q.5C. Briefly explain what happens with each instance when recovery system is executed.

(a)	(b)	(c)
$<T_0$, Start$>$	$<T_0$, Start$>$	$<T_0$, Start$>$
$< T_0$, A, 1000, 950$>$	$< T_0$, A, 1000, 950$>$	$< T_0$, A, 1000, 950$>$
$< T_0$, B, 2000, 2050$>$	$< T_0$, B, 2000, 2050$>$	$< T_0$, B, 2000, 2050$>$
	$< T_0$, Commit $>$	$< T_0$, Commit $>$
	$< T_1$, Start $>$	$< T_1$, Start $>$
	$< T_1$, C, 700, 600$>$	$< T_1$, C, 700, 600$>$
		$< T_1$, Commit $>$

Figure Q.5C

(5+3+2)