NATIONAL INSTITUTE OF TECHNOLOGY JAMSHEDPUR

Department of Computer Applications

MID SEMESTER EXAMINATION OCTOBER -2020

MCA (2nd Year): 3th Semester **Course Code:** CA3301

Computer Applications **Course Name:** Database Management Systems

Date of Exam: 16.10.2020

Time: 02 Hour **Max. Marks:** 30 **Name of Faculty:** Dr. Danish Ali Khan

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Note: The question paper consists of 03 questions. Attempt all questions . All questions are carrying 10 marks each. Assume any suitable missing data . If any.

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1. i) List five responsibilities of a database management system. For each responsibility, explain the problems that would arise if the responsibility were not discharged.

ii) What is union compatibility? Why do the UNION, INTERSECTION, and DIFFERENCE operations require that the relations on which they are applied be union compatible? Why DIVISON operator is used ?

iii) Consider a two-dimensional integer array of size n × m that is to be used in your favourite programming language. Using the array as an example, illustrate the difference (a) between the three levels of data abstraction, and (b) between a schema and instances. **3+4+3**

2. Employee (<u>person-name</u>, street, city)
Works (<u>person-name</u>, company-name, salary)
Company (<u>company-name</u>, city)
Manages (<u>person-name</u>, manager-name)

Consider the relational database, where the primary keys are underlined. Give an expression in the relational algebra to express each of the following queries:

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 located in several cities. Find all companies located in every city in which Small Bank Corporation is located. **5*2=10**

3. i) A weak entity set can always be made into a strong entity set by adding to its attributes the primary key attributes of its identifying entity set. Outline what sort of redundancy will result if we do so?

ii) Design a generalization–specialization hierarchy for a motor-vehicle sales company. The company sells motorcycles, passenger cars, vans, and buses. Justify your placement of attributes at each level of the hierarchy. Explain why they should not be placed at a higher or lower level.

iii) Consider an E-R diagram in which the same entity set appears several times. Why is allowing this redundancy a bad practice that one should avoid whenever possible?

2+5+3