UNIVERSITY OF RUHUNA

BACHELOR OF COMPUTER SCIENCE (GENERAL) DEGREE LEVEL I (SEMESTER II) EXAMINATION

SEPTEMBER/OCTOBER 2020

COURSE UNIT: CSC 1213(Database Management Systems) Duration: 2 Hours

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*Answer **All** Questions.*

1.

a) Explain how a DBMS would facilitate 'improved consistency' and 'improved security'?

b) By using suitable example, explain how you define the Referential Integrity Constraint when you design a database.

c) Briefly explain the three-schema architecture of the database systems.

d) Briefly describe the following database models particularly explaining how the data is modelled:
(i) Hierarchical Model
(ii) Network Model

2. The primary care hospital in Devinuwara provides healthcare facilities for people in that area. The hospital has more than 20 wards and 200+ beds for short and long stay patients. Further, it has different clinics for their patients.

Each ward is uniquely identified by a ward number and also has ward name, location (ex. Block A), total number of beds, and telephone extension number. Each clinic has unique clinic number and name.

Staff of the hospital has a Medical Director, a Personnel Officer, Doctors,Nurses and other staff members. The information stored on each member of staff includes a staff number (unique), name, address, telephone number, position held (ex. Medical Director, Doctor, Nurse), and the current salary. Further, it is important to record each staff member's qualifications, which includes date of qualification, type, and name of institution.

When a patient is first referred to the hospital he/she is allocated a unique patientnumber. Further, it records patient name, address, telephone number, date of birth, sex, marital status, date registered to the hospital, and the details of the patient's relative. The details of a patient's relative are also recorded, which includes the relatives' name, relationship to the patient, address and telephone number.

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A patient is assigned to one ward and a ward has many patients. Further, patient can register for one or more clinics and a clinic normally has many patients. A staff member must work for a clinic and a ward. Normally a clinic and a ward have many staff members.

a) Draw an ER diagram that captures the above requirements by indicating relevant attributesalong with the primary keys. Also specify cardinality and participation constraints. State any assumptions you have made.
b) Map the ER diagram you obtained in (a) into a set of relations.Specify the primary keys and foreign keys of each relation.

3.

a) Define Boyce-Codd Normal Form (BCNF). Do you think Boyce-Codd Normal Form (BCNF) is better than 3NF? Justify your answer.

b) Information aboutthe purchase orders received for a company are listed in the following Table. Primary key of the table is PurchaseOrderNo.

Purchase OrderNo	PODate	ItemNo	ItemName	UnitPrice	Qty	CustomerID	CustomerName
500	20-Nov-2019	P001 P002 P003	A B C	10 20 10	50 100 75	A101	Saman
600	21-Nov-2019	P001 P002 P004	A B D	10 20 40	65 70 80	A102	Amal

(i) Briefly describe the update anomalies which may exist with respect to the given table.
(ii) Is the data in the table in 1st Normal form? Justify your answer.
(iii)Normalize the data in the table into third normal form (3NF). Show your intermediate steps clearly. Use the functional dependency diagrams where necessary.

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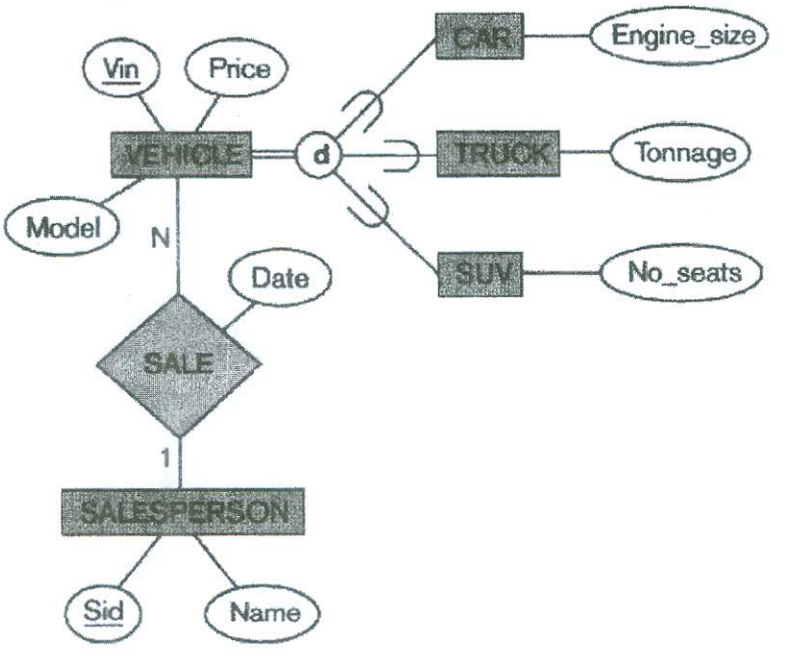
4.

a)

(i) Briefly explain the importance of Extended Entity Relationship (EER) Modelling.

(ii) Map the following EER into relations.



b) Consider the following relations:

Employee(eNumber: integer, eName: string, address: string, Designation: string)

Works(eNumber: integer, cName: string, salary: string)

Company(cName: string, city: string)

Manages(eNumber:integer, mNumber:integer)

Note: mNumber would represent same eNumber of a manager.

Express the following queries in ***Relational Algebra***, ***Tuple Calculus***, and ***Domain Relational Calculus***.

(i) Find the names of employees who work for the company 'Taxy Hub'.

(ii) List the names of managers who work for the companies in 'Colombo' city.

(iii)Find the names of employees who do not work for the companies in the city 'Matara'.

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