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The Open University of Sri Lanka
Faculty of Engineering Technology
Department of Electrical & Computer Engineering

Study Programme	: Bachelor of Software Engineering Honors
Name of the Examination	: Final Examination
Course Code and Title	**: EEI4366 Data Modeling and Database Systems**
Academic Year	: 2019/2020
Date	: 26th September 2020
Time	: 1330-1630hrs
Duration	: **3 hours**

General Instructions

1. Read all instructions carefully before answering the questions.
2. This question paper contains four (04) questions.
3. Answer all questions.
4. This is a Closed Book Test **(CBT).**
5. Answers should be in clear handwriting.
6. Do not use red colour pen.

Q1.

The following narrative describes a simplified version of the organization of Olympic facilities planned for the summer Olympics.

The Olympic facilities are divided into sports complexes. Sports complexes are divided into onesport and multisport types. Multisport complexes have areas of the complex designated for each sport with a location indicator (e.g., center, North East corner, South, etc.). A complex has a location, chief organizing individual, total occupied area, and so on. Each complex holds a series of events (e.g., the track stadium may hold many different races). For each event there is a planned date, duration, number of participants, number of officials, and so on. A roster of all officials will be maintained together with the list of events each official will be involved in. Different equipment is needed for the events (e.g., goal posts, poles, parallel bars) as well as, another set of equipment is needed for the maintenance of each sports complex (e.g. cleaning equipment, grass cutters, etc.). The two types of facilities (one-sport and multisport) will have different types of information. For each type of facility, there are number of amenities available (e.g. internet café, gym, pool, etc.) together with an approximate budget for each amenity.

a) Draw an EER diagram that shows the entity types, attributes, relationships, and specializations for this application. Clearly state any assumptions you make.

(25 Marks)

Q2.

a) Describe the purpose of Indexing. Define Clustered and Non-Clustered Index.

(6 Marks)

b) What are the three different types of schema corresponding to the three levels in the ANSI-SPARC architecture? **(3 Marks)**

c) Consider the following XML document, *autoloan.xml*

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<AutoLoans>
    <person>
        <name>
            <firstname> Thanuja </ firstname >
            <lastname> Samaranayake </ lastname >
        </name>
        <mobile> 0775584869 </mobile>
        <address> No345, Maharagama </address>
        <loan>
            <amount> 150000 </ amount >
            <payoutdate> 2018-04-20 </ payoutdate>
        </loan>
        <loan>
            <amount> 100000 </ amount >
            <payoutdate> 2017-06-29 </ payoutdate>
        </loan>
    </person>
```

```
<person>
    <name>
        <firstname> Kamal </ firstname >
        <lastname> Wickramasinghe </ lastname >
    </name>
    <mobile> 0771486923 </mobile>
    <address>No56,Kottawa rd,pannipitiya </address>
    <loan>
        <amount> 50000 </ amount >
        <payoutdate> 2018-01-05 </ payoutdate>
    </loan>
</person>
</AutoLoans>
```

i. Write a FLWOR expression that returns the ***'name'*** (name element) in autoloan.xml. Write the expected output of the FLWOR expression you wrote. **(6 Marks)**

ii. Write a FLWOR expression that returns all the ***'name'***, ***'payoutdate'*** and ***'amount'*** where the loan amount is higher than 75000/-. Write the expected output of the FLWOR expression you wrote. **(6 Marks)**

iii. Show how to add a new element called ***'LoanID'*** to the above xml document. **(4 Marks)**

Q3.

a) Define Boyce-Codd normal form. How does it differ from 3NF? Why is it considered a stronger form of 3NF? **(5 Marks)**

b) What is multivalued dependency? When does it arise? **(5 Marks)**

c) Does a relation with two or more columns always have a multivalued dependency? Show with an example. **(5 Marks)**

d) Define fourth normal form. When is it violated? When is it typically applicable? **(5 Marks)**

e) Define join dependency and fifth normal form. **(5 Marks)**

Q4.

Following table shows details of Employee of an organisations.

Table: Employee_Details

EmployeeID	EmployeeName	Zipcode	Street	City
101	Rose	06547	Obere Mw	Colombo
102	Ram	78852	Geethu Mw	Wattala
103	Rohan	96582	Suminda Mw	Gampaha
104	Morena	21356	Levan Mw	Galle

Write the necessary statements to satisfy each of the following requirements.

i. Create and Execute a stored procedure for selecting all the records from the "Employee_Details" table. **(5 Marks)**

ii. Create and Execute a stored procedure that selects Employees from a particular City from the "Employee_details" table **(10 Marks)**

iii. Create and Execute a stored procedure that selects Employees from a particular City with a particular Zipcode from the "Employee_Details" table **(10 Marks)**

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