National University

of Computer & Emerging Sciences FAST Peshawar Campus

Name: _____ Roll No: _____

Program: BS (CS)
Semester: Spring – 2022
Time Allowed: 1: 00 hour
Course: Database Systems

Examination: Sessional-I
Total Marks: 45 Weightage: 15
Date: 17 March 2022
Instructor: Shoaib M. Khan

NOTE: Attempt all questions.

1 Create the Entity Relationship Diagram for the library with following requirements: (15 marks)

- The library has many books, for each book we have its ISBN (unique), title, the number of copies, number of pages in this book, and the price.
- The library has two types of customers, either registered customers or un-registered customers. For all customers, we keep the ID (unique), name, DoB. For registered customers we keep additional information such as Registration ID, Tel. number, and the discount offer(s) available for that customer (can have several offers).
- Customers (either registered or not) can buy books; each customer can buy many books and can buy the same book on different dates. We want to capture the purchase date, the number of copies purchased, and the credit card (CC) info used in the transaction (CC number, expiry date, and 3-digit security number).
- Only registered customers can borrow books, where each borrow transaction has a borrow date and it can contain at most 3 books. Each borrowed book can be returned on a different date that we want to capture.
- The library maintains storage areas only for registered customers. Each area has an ID (unique), size, and rented price. Each area belongs to at most one customer and each customer can have at most one storage area.

2 Write the SQL Statements for the following: (15 marks)

Employee (SSN, name, salary, DNo)
Department (DNo, DeptName, MgrSSN)
Project (PNo, location, ProjName)
HourLog (SSN, PNo, hours)

a. Find the name and SSN of everyone who works more than 100 hours on a project.
b. Find the SSN of everyone who is not working on any project.
c. Find the name and SSN of everyone who works for department number 10 and also work on project number 345.
d. Find the name and the SSN of everyone who works on at least two projects.
e. For each project, find the SSN of everyone who works the longest hours for this project.

3 **Short Questions** (15 marks)

a) Write relational algebra expressions with output for any self join example.

b) Explain the minimality property of Candidate Key with the help of example.

c) Differentiate between Super Key and Candidate Key with the help of example.