UNIVERSITY OF COLOMBO SCHOOL OF COMPUTING
12 OCT 2023
EXAMINATION & REGISTRATION
ONLY

University of Colombo, Sri Lanka

University of Colombo School of Computing

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

First Year Examination - Semester I – UCSC AY20 [held in October 2023]

U. C. S. C. LIBRARY UNIVERSITY OF COLOMBO

SCS1203 — Database I

(Two (2) Hours)

Answer ALL questions

(Q1 – 40 marks, Q2- 30 marks, Q3- 15 marks and Q4 – 15 marks)

Number of Pages = 4 Number of Questions = 4

244

To be completed by the candidate

Index Number: | | | | | | | | |

Important Instructions to Candidates:

I. Students should answer in the medium of English language.

II. Note that questions appear on both sides of the paper. If a page or a part of this question paper is not printed, please inform the supervisor immediately.

III. Students should answer in **the separate answer books provided.**

IV. Write your index number CLEARLY on each and every page of your answer book and all other continuing answer sheets.

V. This paper consists of 4 questions in 4 pages (including the Cover Page).

VI. Answer ALL questions.

VII. Calculators and any electronic device capable of storing and retrieving text including electronic dictionaries, smart watches and mobile phones are **not allowed.**

VIII. Do not tear off any part of this question paper or the answer book. Under no circumstances may the answer book, used or unused, be removed from the Examination Hall by a candidate.

To be completed by the examiners

1	
2	
3	
4	
Total	

Question 01 (40 Marks)

Assume you are developing a comprehensive Cricket Management System for an international cricket association. This system will store and manage data for players, teams, matches, and tournaments.

Players are registered in the system with their personal details, including names, date of birth, nationality, and their preferred batting and bowling styles. Their career statistics such as total runs scored and total wickets taken are also recorded. Teams representing various countries are created and managed within the system. Each team has a captain and a coach. Players are associated with specific teams, and the captain of each team is a player from that team. Matches are scheduled in different venues with specific dates. The results of each match are recorded, along with the player who is declared the Man of the Match. Each match consists of one or more innings. Innings records include the team playing, the total runs scored, and the total wickets fallen during that inning. For each inning, detailed batting and bowling records are maintained. Batting records include runs scored, balls faced, fours hit, sixes hit, and how the player got out. Bowling records include the number of overs bowled, maidens bowled, runs conceded, wickets taken, and the economy rate. Umpires are assigned to officiate in matches. Each umpire is recorded in the system with their name. Tournaments, which can span several weeks or months, are created and managed. These tournaments consist of multiple matches involving various teams. Usually, three umpires and a match referee are appointed for each match. This system is expected to record all the details of each inning including dot balls, wide balls, no balls and retired hurt etc. It will help the players to play back each inning. Furthermore, the system should also facilitate the identification of partnerships. A team has eleven players selected to play in the match and a 12^{th} man and three reserve players who stay in the pavilion. An over consists of six legitimate deliveries, but the total number of deliveries may vary depending on wide balls, no balls etc.., delivered by the bowler.

(a) Design and draw an ER/EER diagram that captures the information about the above system indicating the necessary entities, attributes and relationships along with the primary keys and cardinality constraints/ratios. State any assumptions that you have made. [25 Marks]

(b) Map the above ER/EER diagram into set of relations clearly indicating the primary keys and foreign keys. [15 Marks]

Question 02 (30 Marks)

You are tasked with designing a relational database for a Library Management System. The system needs to store information about books, authors, and library members. Design an initial schema for this database, and then proceed to normalize it to at least Third Normal Form (3NF). Note that multiple copies of a book are maintained in a library and a book sometimes has multiple authors. List of attributes are given below for the initial schema. State all your assumptions (if any) clearly.

- *BookID (Primary Key), Title, ISBN, Publication Year, AuthorID (Foreign Key)*
- *AuthorID (Primary Key), AuthorName*
- *MemberID (Primary Key), MemberName, Email, Phone*
- *LoanID (Primary Key), BookID (Foreign Key), MemberID (Foreign Key), LoanDate, DueDate*

Consider the following relations regarding a gymnasium when answering **Questions 03 and 04.**

- *Member (MemberID, FName, LName, DOB, Gender, MobileNo, Address, RegBranchID)*
- *Branch (BranchID, Name, Address, ContactNo, Capacity, EmpID)*
- *Appointment (AppointmentNo, MemberID, BranchID, Date, StartSlot)*
- *Attendance (AppointmentNo, Status, CompleteTime)*
- *Slot (StartSlot, StartTime, EndTime)*
- *Instructor (EmpID, FName, LName, Qualification, MobileNo, Address)*

Question 03 (15 Marks)

Write Relational Algebra Queries to answer the following user queries. The labels to be displayed in the final output are given with respect to each query.

a) Retrieve the first name, last name and mobile number of gymnasium instructors whose qualification is "NVQ L3". (03 Marks)

<Instructor Qualification>

b) The output with the following table headings needs to be displayed. (03 Marks)

AppointmentNo	BranchID	Name	EmpID	StartSlot

<Branch Appointments>

c) List all gymnasium members who are registered with the "Piliyandala" branch and were born before the year 2000. (04 Marks)

<Piliyandala 2000>

d) Get a list of the First Names and Last Names of all the gymnasium members who were absent for the scheduled workout appointment on 30th September 2023. (05 Marks)

<Absent Sept 30>

Question 04 (15 Marks)

a) Describe in plain language what information is retrieved from the following SQL query. (02 Marks)

```
create view SearchView as select b.BranchID,b.Name,b.Capacity,i.EmpID,
i.FName, i.LName from Branch b inner join Instructor i on b.EmpID=i.EmpID
where b.Address like "%pitiya";
```

b) Write SQL Queries to answer the following user queries.

i. List all female gymnasium members who have appointments on International Women's Day (08th March 2023) at the same branch where they are registered. (03 Marks)

ii. Assume a text message needs to be sent to the gymnasium member at the end of each of their appointments as a summary of the workout details. The fields required to send the message are given in the sample text message below. (05 Marks)

Dear Member <MemberID>,

Congratulations! You have completed your workout session scheduled for <Date> from <StartTime> to <EndTime> at <CompleteTime>.

iii. Retrieve the number of members registered with any branch in any area in Colombo where the number of members is 30 or more displayed as the branch with the highest number of members first. (05 Marks)

********** **End of the Paper** **********