University of Strathclyde Glasgow

Department of Computer & Information Sciences

CS990 Database and Web Systems Development

Monday 17th April 2023 **9.30am - 10.30am**

Duration: 1 hour

Attempt all the Questions

Calculators may be used.

Calculators must not be used to store text and/or formulae nor be capable of communication. Invigilators may require calculators to be reset.

Question 1.

A university library has a database containing information about borrowers, books, and bookloans.

```
Borrower(brID, bName, yearBorn, Phone)

Book(bkID, bTitle, publisherName)

Loan(loanID, brID, bkID, outDate, dueDate)
```

The data is stored in the following three tables with some example data shown:

Borrower

brID	bName	yearBorn	Phone
301	John	1991	023232521
302	Angela	2001	023541587
303	Smith	1999	023465874
304	Stuart	2004	023645832

PLEASE TURN OVER

Book

bkID	bTitle	publisherName
1024	Good Bye!	NormanBell
1090	The Story of Twin City	NormanBell
1092	History 1990	xSprinter
1908	Sydney Bird	xSprinter

Loan

loanID	brID	bkID	outDate	dueDate
101	301	1024	2020-7-11	2020-8-12
111	301	1024	2020-8-14	2020-9-14
122	302	1092	2021-9-29	2021-10-26
133	303	1024	2021-10-30	2021-11-26

a) The library intends to promote its services, but it needs to know how many subscribing members it currently has. Write an SQL query to return the total number of borrowers in the library's database.

(*2 marks)*

b) Write an SQL query that returns the books that were borrowed and the loan date for each book, starting with latest loan date on record.

(*5 marks)*

c) The library has a new book entitled "Tourism Photo" published by xSprinter available for loan. Write an SQL statement to add this new book as the next record to the library's database.

(*2 marks*)

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d) The library intends to update its database as some of the borrowers are old and have ceased to be subscribing members of the library. Write an SQL statement to delete all records of borrowers who were born before 1950.

(2 marks)

e) The library intends to promote its services to its members, but it needs to know the telephone numbers and the names of its members. Write an SQL query to output the phone numbers followed by the names of its subscribing members in alphabetical order.

(*4 marks)*

f) Write an SQL query to find the name of the book which has been borrowed more than two times by someone.

(*5 marks)*

Question 2.

Examine the Patient Medication data from the derived table as shown below, for the Wellmeadows Hospital which specializes in the provision of health care for elderly people. When a patient is prescribed medication, the details are recorded. This includes the patient's name and number, drug number and name, units per day, method of administration (for example, oral, intravenous (IV)). The medication (pharmaceutical supplies) given to each patient is monitored.

patient No	dname	drugNo	fullName	wardno	wname	bed No	description	dosage	Method OfAdmin	Units perday
P10034	Morphine Teracyclene Morphine	10223 10334 10223	Ian Neil	Ward11	Orthopadic	84	Pain Killer Antibiotic Pain Killer	10mg/ml 0.5mg/ml 10mg/ml	Oral IV Oral	50 10 10
P10036	Morphine Montelukast	10223 10335	John Smith	Ward12	ENT	90	Pain Killer Antiallergic	10mg/ml 10mg tablet	Oral Oral	10 2

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(a) Identify the functional dependencies represented by the attributes shown in the table given.

(4 marks)

(b) Describe and illustrate the process of normalizing the attributes shown in the above table to produce a set of well-designed 3NF relations.

(6 marks)

(c) Identify the primary and foreign keys in your 3NF relations.

(4 marks)

(d) Draw a simple ERD diagram to show the relationships between the structures identified above.

(6 Marks)

End of Paper

(Muhammad Ifran)