Student Name: _____

Student ID: _____

**CSC3170 Introduction to Database Systems (2022-23 Term 1) Assignment 1**

**Submission deadline: before 21 Oct 2022 11:59pm**

## General Guidelines:

- Please submit your solutions via Blackboard.
- Do not close your browser of app before you have successfully uploaded your files. It is your own responsibility of keeping your file integrity.
- If you have any questions about this assignment, contact TA at nafees@link.cuhk.edu.hk.

**1.** Consider the ER diagram in Figure 1. Suppose a periodical can be uniquely identified by its name and publish date, and a press can be uniquely identified by its name or its address. **(10 marks)**

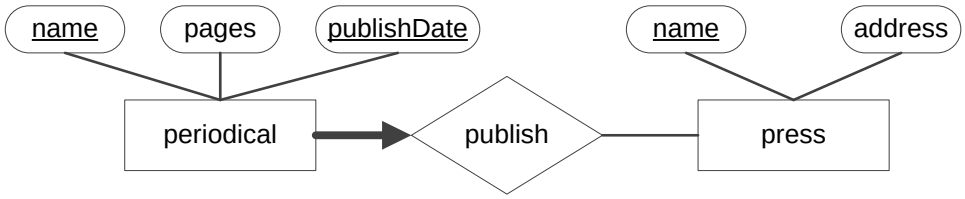



Figure 1: The ER diagram of libraries and periodicals

a. List all the superkeys of periodical. (1 marks)

b. List all the candidate keys of periodical. (1 marks)

c. List the primary key of periodical. (1 marks)

d. List all the superkeys of press. (1 marks)

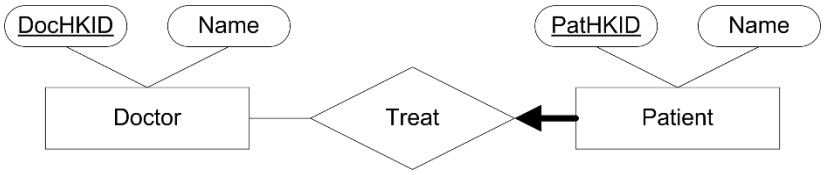
e. List all the candidate keys of press. (1 marks)

f. List the primary key of press. (1 marks)

g. What kind of relationship is “publish” (one to one, one to many, many to one, many to many)? (2 marks)

h. Explain the meaning of the thick arrow pointing from periodical to “publish”. (2 marks)

2. Consider the following ER-diagram and relational schemas. **(*10 marks)***

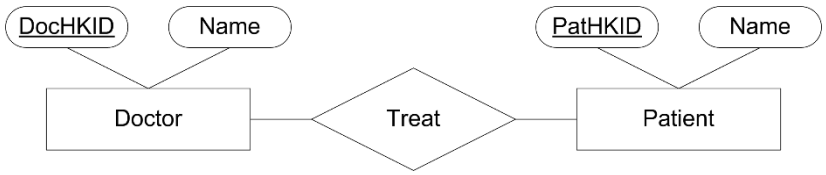



**Schema 1**
Doctor (DocHKID, Name)
Patients (PatHKID, Name)
Treat (DocHKID, PatHKID)

**Schema 2**
Doctor (DocHKID, Name)
Patients (PatHKID, Name, DocHKID)

a) Explain why schema 2 is more appropriate to represent the ER-diagram. *(5 marks)*

b) Which schema is more appropriate if the ER-diagram is modified as follows? Please explain your answer. *(5 marks)*




3. Consider the following requirements for an insurance company database. **(30 marks)**
   - An insurance company can be uniquely identified by *insuranceID*.
   - A branch has attributes *branchID* and *address.*
   - A branch can be uniquely identified by a pair of *{branchID, insuranceID}* and only belongs to one insurance company. Two branches can have the same *branchID* if they belong to different

insurance companies.

- Every insurance company must have at least one branch.
- An insurance agent has attributes *agentID*, *name*, *address,* and *phone.*
- An insurance agent can be uniquely identified by *agentID*.
- A branch can employ any number of insurance agents and an insurance agent must be employed by one branch.
- An insurance plan has attributes *planID, type* and *fee.*
- An insurance plan can be uniquely identified by *planID*.
- A client has attributes *clientID, name, age* and *healthStatus*.
- A client can be uniquely identified by *clientID*.
- An insurance plan must be owned by one client and must be managed by one insurance agent.
- A client owns at least one insurance plans and an insurance agent can manage any number of insurance plans.

i. Complete the following ER diagram according to the database requirements above (15 marks).

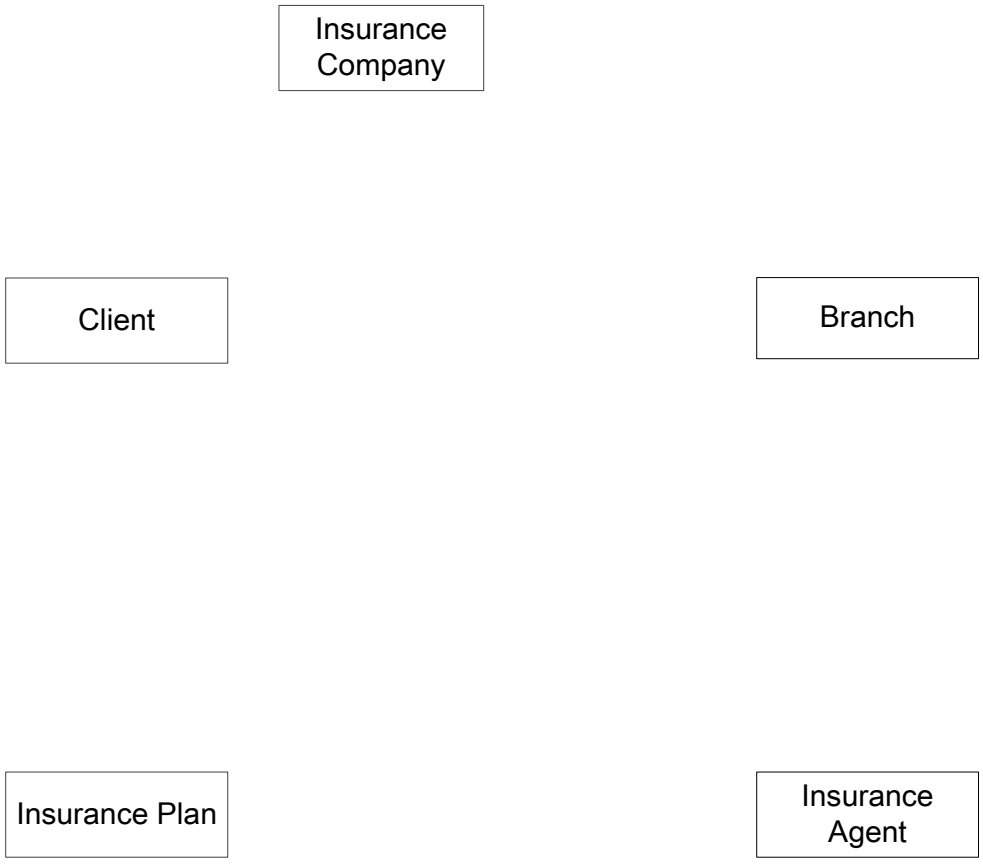



Figure 2: An incomplete ER diagram of insurance company

j. List all the strong entities, and their candidate keys. (*10 marks)*

k. List all the weak entities, and their partial keys and their identifying relationships. (*5 marks)*