Sri Lanka Institute of Information Technology

B.Sc. Honours Degree in Information Technology

Specialized in Information Technology

Final Examination
Year 1, Semester 1 (2022)

IT1090 – Information Systems and Data Modelling

Duration: 02 Hours

June 2022

Instructions to Candidates:

- ◆ This paper has 05 questions.
- ◆ Answer all questions in the booklet given.
- ◆ This paper is marked out of 100 and contributes 60% of the Final Grade.
- ◆ This paper contains 06 pages, including the cover page.
- ◆ Electronic devices capable of storing and retrieving text, including calculators and mobile phones are not allowed.

Question 01 [Total 20 Marks]

a) Infer the correct answers for the given questions by referring to the following scenario.

HealthPharm is a pharmacy that purchases medicine and pharmaceutical items from CareDeals company, a wholesale pharmaceutical product dealer. The pharmaceutical inventory system at HealthPharm maintains the Medicine-ID, Generic-name, Brand-name, and the Quantity-In-Hand of medicines. At the end of each month the system generates reports on Stock-In-Hand of all medicines in the inventory (Stock report), the Quantity-Purchased during the month (Stock receives report) and the Quantity-Sold during the month (Monthly sales report). Once a sale or a purchase is made the medicine's Qty-In-Hand will be updated in the inventory system.

i) What are the inputs captured by the input function of the HealthPharm's inventory control system ? (03 Marks)

ii) What are the outputs presented by the output function of the inventory control system? (03 Marks)

iii) What are the stored data of the inventory control system ? (03 Marks)

iv) What are the subsystems (processes) of the HealthPharm inventory control system described above? (03 Marks)

b) "Information systems are the software and hardware and related components that support data-intensive applications."

Assume that you are been hired by ABC pharmacy to enhance the existing pharmacy management system using image processing technologies to scan and read the prescriptions issued by a medical doctor. Once the enhanced new pharmacy management system is operational at ABC pharmacy, they expect to gain more benefits.

i) Outline the end-users of the proposed pharmacy management system and mention what type of end-user each one is. (04 Marks)

ii) Predict TWO possible benefits gained by the proposed enhanced pharmacy management system. (04 Marks)

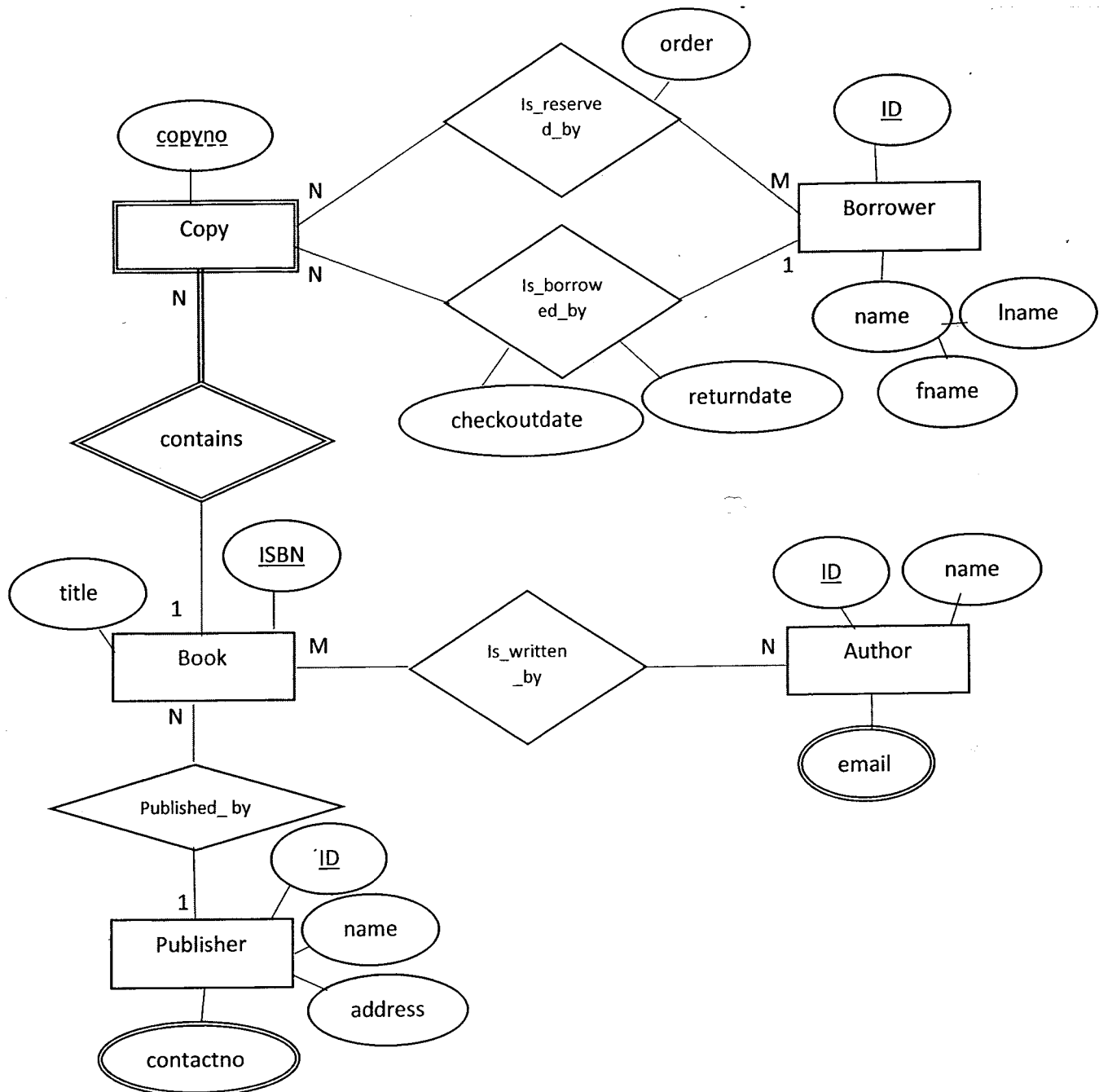## Question 02   [Total 20 Marks]

In XYZ manufacturing company they place orders for items needed for their manufacturing process from suppliers. Analyze the identified requirements given below and construct the Entity Relationship (ER) Diagram.

- There are several suppliers who supply items for the company.
- A supplier has a unique supplier number, name, phone, and an address.
- An item has a unique item code, name, quantity-in-hand, and re-order level.
- Each supplier supplies at least one or possibly several items.
- When purchasing an item, it can be made from any supplier who supplies that item, and the unit cost of an item may vary based on the supplier who supplies the item.
- The company places an order for items from suppliers when required, and a single order can contain one or more items in it possibly from same or different suppliers.
- For each order placed it is important for the company to keep track of a unique order number, the order date, delivery address, quantity ordered from each item, and the total bill amount of the order.
- The quantity ordered and the unit price are used to calculate the total bill amount for each order.
- When scheduling the deliveries, it is convenient for the company if they can extract the delivery location data (city, state, country) separately.
- For each order placed, one staff member from the Procurement department must be assigned and he/she is responsible for handling the order until it is received by the company.
- The company need to keep track of the Employee ID, name, designation and at least 2 contact numbers of the responsible staff member.

Question 03   [Total 24 marks]

a) Convert the following ER diagram to the Relational Schema.   (18 Marks)

b) Explain the term 'Relational database'.   (02 Marks)

c) List 4 advantages of the Database approach over the traditional data storage methods.
                                        (04 Marks)

Question 04   [Total 12 Marks]

Consider the following schema and the set of functional dependencies.

Student_Course (<u>StudentID, CourseID</u>, Student_Name, EnrolledDate, CourseFee, CourseName, CourseCredits, StudentTel_No)

(StudentID, CourseID) is the only primary key for the relation.

StudentID, CourseID $\longrightarrow$ EnrolledDate

StudentID $\longrightarrow$ Student_Name, StudentTel_No

CourseID $\longrightarrow$ CourseFee, CourseName, CourseCredits

a) In which Normal Form (NF) is the schema Student_Course in? Explain your answer.
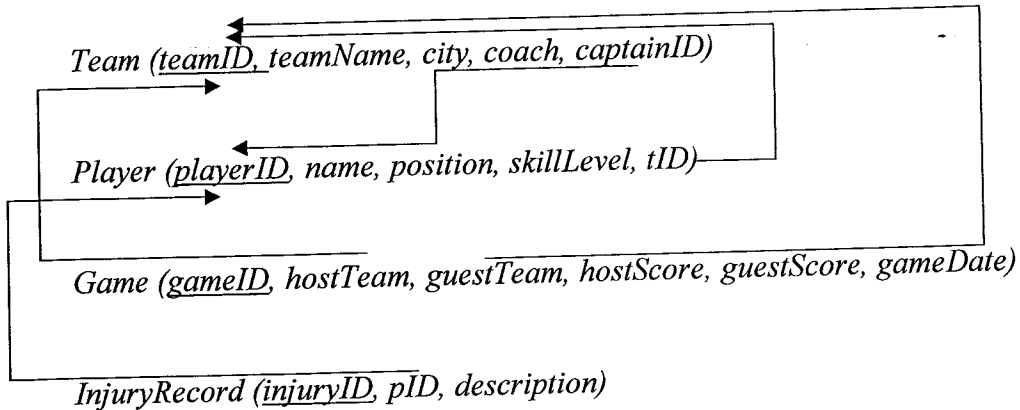
(03 Marks)

b) If the schema is not in 3NF convert it to a schema in 3NF. Explain each step of your answer.   (09 Marks)

Question 05   [Total 24 Marks]

Consider the following database schema for a Hockey League tournament database and construct the given queries in SQL.

Team (teamID, teamName, city, coach, captainID)

Player (playerID, name, position, skillLevel, tID)

Game (gameID, hostTeam, guestTeam, hostScore, guestScore, gameDate)

InjuryRecord (injuryID, pID, description)

a) Find the player names and positions of players who own a skill level of more than 10. Sort the result according to the descending order of the skill level.   (4 Marks)

b) Find the names of players who played as the guest team in the game hosted by Team ID '002' on the date '2/2/2021'.   (6 Marks)

c) Find the guest teams who scored a higher score than all the host teams. Display the team's name and coach.   (7 Marks)

d) For each player who had met with more than one injury; display the player's name and position of the player.   (7 Marks)