

3.3 Relational database design

Name: _____ Class: _____ Date: _____ **Total: 12 marks**

KEY WORDS relational database 关系数据库 • entity 实体 • primary key 主键
• foreign key 外键

Objective

Design relational tables using entities, primary keys, and foreign keys.

You must be able to:

- identify entities and their attributes
- choose a primary key
- use a foreign key to model a relationship

1 Worked examples

■ Model the relationship

A course system needs **students**, **courses**, and **enrolments** tables. Each table represents an **entity** 实体. **students.id** is a **primary key** 主键 because it uniquely identifies one student.

enrolments.student_id is a **foreign key** 外键 pointing to **students.id**. It records which student is enrolled without copying their name into every enrolment row.

2 Practice

2.1 Define a primary key. [1]

2.2 State which key points to a row in another table. [1]

2.3 Explain why storing one student's name in every enrolment row can cause problems.[2]

3 Exam-style questions

3.1 A library has books, members, and loans. Explain how a loans table can connect a member to a book. [4]

3.2 Explain why a unique primary key is important when updating or deleting a record.[4]

Solutions

2.1

- A value that uniquely identifies a row in a table.

2.2

- A foreign key.

2.3

- The same detail is duplicated in many rows.
- A name change may be updated inconsistently.

3.1

- The loans table is an entity recording each loan.
- It has its own primary key.
- It stores a member foreign key and a book foreign key.
- Each foreign key points to the matching primary key in its table.

3.2

- It identifies exactly one record.
- The system updates or deletes the intended row.
- It avoids confusing two records with similar names or values.
- This protects consistency in related tables.