8.3 Normalisation

Name: _____ Class: _____ Date: _____ **Total: 24 marks**

KEY WORDS functional dependency • third normal form

Objective

Split tables along their functional dependencies and name the form.

1 Key knowledge and worked examples

The forms

2NF removes part-key dependencies; 3NF removes transitive ones; BCNF makes every determinant a key ✓. The anomalies – insert, update, delete – are the symptoms of a repeated fact ✓.

Worked example: the split

`Enroll(student, course, title, dept, building)`: `course → title` part-key, `title → dept → building` transitive – three tables, each fact once, each anomaly gone ✓.

2 Practice

2.1 In `Enroll(student, course, title)`, name the part-key dependency. [3]

2.2 Deleting the last enrollment for a course also deletes the course's title. Name the anomaly. [3]

2.3 A table in BCNF is automatically in which lower forms? [3]

3 Exam-style questions

3.1 `Project(proj_id, dept, dept_head, member, hours)` with key (proj_id, member) and facts: each project belongs to one department; each department has one head.

List every functional dependency. Identify the part-key and the transitive dependency. Split to 3NF (give the tables), and state which anomaly each split removes. Name the form of the original table. [8]

3.2 A report stores `order_id, line_no, product, unit_price, qty, order_total` with key (order_id, line_no); the total is the sum of qty x unit_price over the order's lines.

Name the derivable column and the anomaly it invites. State the 3NF treatment and the cost it adds per read of the report. Give the condition under which keeping the total is the better engineering choice, naming the mechanism that keeps it honest. [7]