2022 JC 2 H2 Computing Mock Practice 2 (Paper 1)

Suggested Answers:

1 **(a)** Data redundancy
Data dependency.
Data privacy.
Data integrity.

(b) Normalisation is a technique of organising the tables in a database to reduce data redundancy and prevent inconsistent data. There are at least three normal forms associated with normalisation: first normal form (1NF), second normal form (2NF), and third normal form (3NF).

(c) For a table to be in 1NF, all columns must be atomic. This means there can be no multi-valued columns – i.e. the information in each column cannot be broken down further.
This table is not in 1NF because under the Subjects column of a student contains multiple values.

(d) (i) 1NF

STUDENT(StudentID, SubjectName, StudentName, ClassID,
ClassSize, LecturerID)

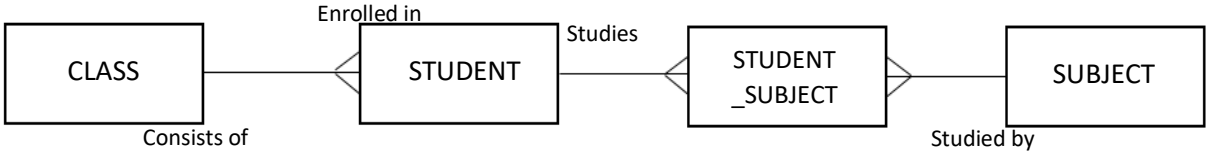
(ii) 2NF (Remove any non-key attribute that are dependent on the primary key partially)

STUDENT(StudentID, StudentName, ClassID, ClassSize)
STUDENT_SUBJECT(StudentID, SubjectName)
SUBJECT(SubjectName, LecturerID)

(iii) 3NF (Remove transitivity: Classize depends on ClassID, and ClassID depends on StudentID)

STUDENT(StudentID, StudentName, ClassID)
CLASS(ClassID, ClassSize)
STUDENT_SUBJECT(StudentID, SubjectName)
SUBJECT(SubjectName, LecturerID)

(e)



(description of the relationship is only good to have….)

(f) (i) A primary key uniquely identifies each record in a table and should not change over time. That is, a primary key tells a particular record apart from another record. Eg. `StudentID` of `STUDENT` is a primary key.

(ii) A composite key is a combination of two or more fields in a table that can be used to uniquely identify each record in a table. Uniqueness is only guaranteed when the fields are combined. When taken individually, the fields do not guarantee uniqueness. Eg. `StudentID` and `SubjectName` are composite keys.

(iii) A foreign key is an attribute (field) in one table that refers to the primary key in another table. Eg. `ClassID` in `STUDENT` is a foreign key that references to `ClassID` in `CLASS` or `SubjectName` from `STUDENT_SUBJECT` is a foreign key that references to `SubjectName` from `SUBJECT`.

(g) (i)
```
CREATE TABLE STUDENT (
StudentID TEXT PRIMARY KEY,
StudentName TEXT NOT NULL,
ClassID TEXT NOT NULL
);
```

(ii)
```
INSERT INTO STUDENT(StudentID, StudentName, ClassID)
VALUES('0201', 'Sara Lee', 'AR100')
```

2 (a) Personal data refers to data, whether true or not, about an individual who can be identified from that data; or from that data and other information to which the organisation has or is likely to have access. For eg. NRIC, password, etc.

(b) Implement compulsory login page to prevent unauthorised access.

Provide users with different levels of access to prevent unintentional view.

Designate a Data Protection Officer to ensure that your organisation complies with the PDPA.

Implement 2FA (eg security questions) to verify the authenticity of the requestor.

Update security patch of the system that contains personal data of clients regularly.