KOLEJ UNIVERSITI TUNKU ABDUL RAHMAN

FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

ACADEMIC YEAR 2019/2020

JANUARY/FEBRUARY EXAMINATION

COMPUTER SCIENCE BACS1053
DATABASE MANAGEMENT

FRIDAY, 31 JANUARY 2020 TIME: 9.00 AM – 11.00 AM (2 HOURS)

BACHELOR OF COMPUTER SCIENCE (HONOURS) IN DATA SCIENCE
BACHELOR OF COMPUTER SCIENCE (HONOURS) IN SOFTWARE ENGINEERING

BACHELOR OF INFORMATION TECHNOLOGY (HONOURS) IN INFORMATION SECURITY

BACHELOR OF SCIENCE (HONOURS) IN MANAGEMENT MATHEMATICS WITH COMPUTING

Instructions to Candidates:

Answer **ALL** questions. All questions carry equal marks.

BACS1053 DATABASE MANAGEMENT

Question 1

a) Describe *data* and *information*, and provide **ONE (1)** relevant example for each of them. (4 marks)

b) Database Management System (DBMS) performs several functions that ensure the integrity and consistency of the data in the database. Briefly explain any **FIVE (5)** functions of a DBMS. (15 marks)

c) Consider the following records in StaffA and StaffB tables:

StaffA

StaffID	Name	BranchNo
S001	Alvin	B01
S002	Esther	B01
S003	Eric	B02

StaffB

StaffID	Name	BranchNo
S001	Alvin	B01
S002	Esther	B01
S004	Alice	B02

Produce a resulting data in table after each of the following relational **set** operations statement has been performed:

(i) (SELECT * FROM StaffA) *UNION* (SELECT * FROM StaffB); (3 marks)

(ii) (SELECT * FROM StaffA) *INTERSECT* (SELECT * FROM StaffB); (3 marks)

[Total: 25 marks]

Question 2

a) Explain business rules and state any **TWO (2)** reasons why identifying and documenting business rules are important in database design. (6 marks)

b) Caring Pet Clinic provides treatment for various types of pets. Each pet owner's detail will be recorded during the first visit. The owner entity consists of attributes OwnerID, OwnerName, OwnerAddress and OwnerContact. Each owner can have one or more pets, but each pet belongs to one and only one owner. The pet entity consists of attributes PetID, PetName, PetCategory and OwnerID.

Each visitation to the clinic will be given a new visit number. The visit entity consists of attributes VisitNo, VisitDate and PetID. Each visitation may need one or many treatments for which the charge of each treatment is to be recorded. The treatment entity consists of attributes TreatID and TreatDesc. New treatment could be added even it is not applied to any pets.

(i) Draw an Entity-Relationship Diagram (ERD) for the above scenario using the *Crow's Foot notation* (exclude all attributes). Resolve many-to-many relationships, if any. (11 marks)

Question 2 b) (Continued)

(ii) For each of the entities in the ERD drawn in Question 2 b) (i), list all relevant attributes using Database Design Language (DBDL) format. In your listing, show all the primary keys and foreign keys (if any) clearly. Underline all the primary keys or composite keys and identify the foreign keys with an *. (8 marks)

[Total: 25 marks]

Question 3

a) Normalize the following table to a set of Third Normal Form (3NF) relations. Your answer should show all the three stages of normalization (1NF, 2NF and 3NF) by using the DBDL format (underline all primary keys and use an * to indicate the foreign keys). State the component(s) that is/are removed from each Normal Form. Besides that, 1NF must be divided into repeating and non-repeating group relations.

Account

AccountN	CustName	CustContact	TransactionCode	TransactionDesc	TransactionDate	Amount
A111223	Gary	012-3966889	DEP	Deposit	08/11/2019	1000
A111223	Gary	012-3966889	WDR	Withdraw	08/11/2019	500
A111223	Gary	012-3966889	WDR	Withdraw	10/11/2019	300
A111223	Gary	012-3966889	DEP	Deposit	30/11/2019	1200
A111224	Ellen	016-3344556	WDR	Withdraw	08/11/2019	500
A111225	Melvin	018-5505252	DEP	Deposit	08/11/2019	800

Table 1: Account

(13 marks)

b) Based on the sample data shown in the **Account** table above, explain each of the following data anomalies with a specific example.

(i) Insertion anomaly (2 marks)

(ii) Modification anomaly (2 marks)

(iii) Deletion anomaly (2 marks)

c) Briefly describe the following database recovery facilities:

(i) Backup facilities (2 marks)

(ii) Journalizing facilities (2 marks)

(iii) Checkpoint facilities (2 marks)

[Total: 25 marks]

Question 4

The Sunflower Hospital System allows doctors to book the surgery room for patient to perform the surgery operation.

Given the Database Design Language (DBDL) as follow:

Doctor (DoctorID, DoctorName, Salary, DeptID*)
Department (DeptID, DeptName)
SurgeryRoom (RoomID, RoomDesc)
SurgeryTreatment (DoctorID*, RoomID*, SurgeryDate, SurgeryCharge, PatientID*)
Patient (PatientID, PatientName, PatientContact)

Note: Date format *is* 'DD/MM/YYYY'

Write a SQL statement for each of the following questions:

a) Create the **SurgeryTreatment** table with the following constraints: (8 marks)
- Appropriate data types
- Enforce entity and referential integrities

b) Refer to the following details and insert a new patient record:
Patient ID – "P1355552"
Patient Name – "Alice Tan"
Patient Contact – "012-2557575" (2 marks)

c) Update patient ("P1322277") contact number to "016-7788222". (3 marks)

d) List out all doctor details from "ENT Department". (3 marks)

e) List out all patients (name and contact) with the surgery charge amount more than RM20000.00. (3 marks)

f) For each department (include department name), calculate the number of doctors and the total amount of their salaries. Arrange the total amount of their salaries in descending order. (6 marks)

[Total: 25 marks]