

KOLEJ UNIVERSITI TUNKU ABDUL RAHMAN
FACULTY OF COMPUTING AND INFORMATION TECHNOLOGY

ACADEMIC YEAR 2018/2019

JANUARY/FEBRUARY EXAMINATION

COMPUTER SCIENCE BACS1053
DATABASE MANAGEMENT

MONDAY, 11 FEBRUARY 2019

TIME: 9.00 AM – 11.00 AM (2 HOURS)

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) Explain **THREE (3)** differences between a file-based system and database management system (DBMS). (9 marks)
- b) Consider the following records in Publisher and Book tables:

Publisher		Book		
PublisherID	Name	BookCode	Title	PublisherID
1001	Wiley	O001	Database	1001
1002	Pearsoned	N002	Networking	1002
1003	CourseTech	A003	Accounting	1003
1004	Apress	P004	Programming	1003
		R005	Recipes	1010

Produce a resulting table after each of the following relational join operations has been performed:

- (i) Publisher *Left Outer Join* Book (4 marks)
- (ii) Publisher *Right Outer Join* Book (4 marks)
- c) Database recovery is a process of restoring the database to a correct state in the event of a failure. Recommend **TWO (2)** suitable recovery techniques for an Automatic Teller Machine (ATM) for the following conditions:
- (i) System failure (4 marks)
- (ii) Withdrawal transaction aborted (4 marks)
- [Total: 25 marks]

Question 2

ExpressPos Company provides a delivery service to the online shopping portal. A delivery Order Note includes the details (attributes) of customers, ordered items and delivery details.

Given a sample of Delivery Order Note as shown below:

<u>DELIVERY ORDER NOTE</u>		
Customer Details		
Customer ID : JE2828	Delivery Order No: DO1001	
Customer Name: Jane Wayne	Delivery Date: 29 Jun 2018	
HP Number: 60121234567	Deliveryman : James Lee	
Address: R14, Taman Megan, Jalan Desa, 53300 K.L.		
Delivery Details:		
Item No	Description	Quantity
Xm01	Xiaomi Note 4	1
Ca02	Phone casing	1
Rm03	memory card 16G	1
Total Delivered:		3

BACS1053 DATABASE MANAGEMENT**Question 2 (Continued)**

A customer may receive one or many delivery order notes, but a delivery order note can be issued to only one customer. The delivery order note has at least one delivered item. The items may be listed in the delivery order note or may not be listed because no customers order on the items.

- a) Draw an Entity-Relationship Diagram (ERD) for the above scenario using the *Crow's Foot notation*. Resolve many-to-many relationship, if any. (10 marks)
- b) For each of the entities in the ERD drawn in **Question 2 a)**, 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 *. (9 marks)
- c) Identify and explain **THREE (3)** composite attributes listed in the delivery order note. Justify your answer. (6 marks)

[Total: 25 marks]

Question 3

Telco Service Provider offers different internet broadband package to home customers.

Registration table shows the following records:

<u>Cust ID</u>	Cust Name	Area	contactNo	<u>Register Date</u>	<u>Package Code</u>	Price (RM)	Speed MB	Provider ID	Provider Name
C001	Eric	Setapak	0122850668	10/01/16	Ms30	89	30	Mx	Maxis
C001	Eric	Setapak	0122850668	12/01/17	Ms10	70	10	Mx	Maxis
C001	Eric	Setapak	0122850668	12/11/18	Ms30	89	30	Mx	Maxis
C002	Betty	USJ	0136684321	20/05/18	Tim50	159	50	Te	Time
C003	Anne	Gombak	0123850011	08/08/18	Unifi100	179	100	TM	Telekom
C003	Anne	Gombak	0123850011	05/06/17	Unifi30	129	30	TM	Telekom
C004	David	Sentul	0165431567	03/01/18	Streamyx	68	4	TM	Telekom
C005	Emily	Kepong	0177734567	07/02/18	Streamyx	68	4	TM	Telekom

- a) Based on the sample data shown in the table above, provide each of the following data anomalies with a specific example:
 - (i) Insertion anomaly (3 marks)
 - (ii) Modification anomaly (3 marks)
 - (iii) Deletion anomaly (3 marks)
- b) Normalize the table to a set of Third Normal Form (3NF) relations. Your answer should show all the 3 stages of normalization (1NF, 2NF and 3NF) by using the DBDL format (underline all primary keys and use an * to indicate the foreign keys). (12 marks)

BACS1053 DATABASE MANAGEMENT**Question 3 (Continued)**

- c) Explain the following functional dependencies in the normalization:
- (i) Partial dependency (2 marks)
 - (ii) Transitive dependency (2 marks)
- [Total: 25 marks]

Question 4

A software consulting company provides IT solutions to their clients. It manages several projects and assigns staff to handle the project.

Given the Database Design Language (DBDL) as follow:

Client (clientID, companyName, cAddress, contactNo)
 Project (projectNo, projectName, budget, startDate, completionDate, clientID*)
 WorkOn (staffID*, projectNo*, progressStatus, assignedDate)
 Staff (staffID, staffName, workExperience, salary)

Note: Date format is 'DD-MMM-YYYY'

You are required to use the *aliases* for the given tables as follow (where appropriate):

- C for Client, P for Project, W for WorkOn, S for Staff

Write Structured Query Language (SQL) statements to perform the following queries:

- a) Create the 'Project' table with the following constraints: (6 marks)
 - Appropriate data types
 - Enforce entity and referential integrity
 - Budget allocated at least 10000.
 - b) For each project, display the project number, project name, startDate and the number of staff who works on the assigned project. Label the column as 'NumOfStaff' and arrange the start date in descending order. (6 marks)
 - c) Display the project number, project name and staff name who worked on project number are 10, 30 and 50. (5 marks)
 - d) The budget of project name 'eWallet' is increased by 2%. (4 marks)
 - e) Remove a project that belongs to a client's company named 'maxtech'. (4 marks)
- [Total: 25 marks]