



CRAWFORD UNIVERSITY, FAITH CITY, IGBESA

COLLEGE OF NATURAL AND APPLIED SCIENCES

DEPARTMENT OF COMPUTER AND MATHEMATICAL SCIENCES

HARMATTAN SEMESTER

SESSION: 2022/2023

COURSE CODE: CSC 307 COURSE TITLE: DATABASE DESIGN AND MANAGEMENT
UNITS: 3

TIME: 3HOURS

SECTION A (ANSWER ALL)

1. ABC is an automotive parts shop company which is planning to develop a database to store data regarding its customers, motor parts, and staff. The company has 12 branches in different towns/cities around Fiji. The company wants to get rid of the manual file system due to possible loss of data, company records not being properly organized etc. When a customer arrives at the shop, the friendly staff greets the customer and identifies whether the customer is a new customer or the customer has bought some parts previously. If the customer is new, the details of the customer is noted and stored in the database. The details about the customer that are kept by the company include the customer number (unique for each customer), the customer's name, residential and postal addresses, and home and work phone numbers. A customer can be classified as private or business. Business customers buy most parts from the company so they are eligible for some discount. Private customers can also get discount but it will be less than the business customer. The staff then serves the customer by showing the parts required and gives valuable suggestions to customers as well. The company stores the part number, part description, part price, quantity on hand, quantity on order, etc. When a customer buys part(s), an invoice is issued. For each invoice, the invoice number, invoice date, customer number, customer name, part number(s), part description(s), quantity, price, staff number and name who sold the parts are recorded. For each part, the supplier information, quantity on hand and branch location should also be stored in the database. According to company's policy, a supplier can supply a maximum of 5 different parts only.

- a. Write out the business rules for the scenario above. 7marks
- b. Draw the ERD for the business rules 10marks
- b. Explain the four (4) level of isolation in transaction 8marks
- c. List five (5) major reasons for database abstraction level 5marks

SECTION B ANSWER ANY TWO QUESTIONS

2a. What is the purpose of normalization 2marks

b. Normalize the student table below into 2NF and 3NF. 10marks

StdID	DeptCode	StdName	Department	College
001	CSC	Ayoade	Comp Sci	CONAS

c. Write a query to grant these users T1, T2, T3, and T4 the following operation; update, delete, and create. 3marks

3. Consider a schema with two relations, R(A, B) and S(B, C), where all values are integers. Make no assumptions about keys. Consider the following three relational algebra expressions:

a. $\pi_{A,C}(R \bowtie \sigma_{B=1}S)$

b. $\pi_A(\sigma_{B=1}R) \times \pi_C(\sigma_{B=1}S)$

c. $\pi_{A,C}(\pi_A R \times \sigma_{B=1}S)$

Two of the three expressions are equivalent (i.e., produce the same answer on all databases), while one of them can produce a different answer. Which query can produce a different answer? Give the simplest database instance you can think of where a different answer is produced. 6marks

d. List and explain the basic components of DBMS 5marks

e. Draw a conceptual diagram showing the data abstraction level 4marks

4. In a bid to award student an MTN scholarship. Write a query to:

Student	Level	Score
Promise	300	45
Inioluwa	400	56

- i. Display name of student whose score is below 50 1mark
- ii. Display the details of students whose name contains "so" 2marks
- iii. Count the number of student whose score is above 70 2marks
- iv. Count the number of whose score is above average of the total score 2marks
- v. Count the number of student in each level 2marks

b. Explain the following entity relationship type with an example: Unary relationship, Binary relationship, and Ternary relationship 6marks