MONGU TRADES TRAINING INSTITUTE

IT SECTION

ADVANCED CERTIFICATE IN

COMPUTER STUDIES

TERM THREE

ASSIGNMENT

Date Given: 27th September, 2024

Due Date: 4th October, 2024

Database Technology

Assignment Instructions

1. Answer all the questions.
2. Your work should be neatly done.
3. Write your answers to the questions as clearly as possible.
4. Only Source Code must be submitted.
5. Assignments that will be submitted within 3 days after the due date will be marked out of 50% and those that will be submitted later than that will not be marked at all.

Make sure your name and programme are neatly indicated on your cover page.

Question 1

You are tasked with normalizing a database for an online bookstore system. The unnormalized table below stores information about books, authors, publishers, and orders.

Order_ID	Customer_Name	Book_Title	Author_Name	Publisher	Price	Quantity	Date
001	John Doe	The Future	Alice Baker	ABC Pub	50	2	2024-05-13
002	Jane Smith	Data Science	Bob Marks	XYZ Pub	30	1	2024-05-14
003	John Doe	Machine Learning	Alice Baker	ABC Pub	70	1	2024-05-13

a) Normalize the table up to the 3rd Normal Form (3NF). **(15 Marks)**
b) Draw an Entity-Relationship (ER) diagram for the normalized database. **(15 Marks)**

Question 2

Using SQL, create a database with the normalized structure from Practical Question 1. Write SQL queries to perform the following tasks:

a) Retrieve all orders made by John Doe, showing the book titles, authors, and total price. **(10 Marks)**
b) Create a view that shows the total amount spent by each customer on books. **(10 Marks)**
c) Write an SQL query to update the price of all books published by "XYZ Pub" by increasing the price by 10%. **(10 Marks)**

Question 3

Explain the importance of normalization in database design. In your answer, cover the following:

a) The role of functional dependencies in guiding the decomposition of relations. **(10 Marks)**
b) The trade-offs involved in database decomposition, such as preserving dependencies and ensuring data integrity. **(10 Marks)**
c) Why achieving Boyce-Codd Normal Form (BCNF) is critical for reducing anomalies in databases. **(10 Marks)**

Question 4

Discuss the concept of concurrency control in databases, addressing the following:

a) The Two-Phase Locking (2PL) protocol and how it ensures serializability in transactions. **(10 Marks)**

b) How deadlock prevention techniques, such as wait-die and wound-wait, mitigate the risk of deadlock in concurrent systems. **(10 Marks)**

c) Snapshot isolation and its role in providing high concurrency with minimal locking overhead. **(10 Marks)**