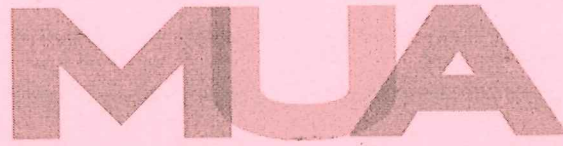


The
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DIPLOMA UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DIPLOMA IN INFORMATION COMMUNICATION
TECHNOLOGY/ DIPLOMA IN BUSINESS INFORMATION
TECHNOLOGY

DIT 100 : CONCEPTS OF DATABASE MANAGEMENT SYSTEMS

DATE: 3RD DECEMBER 2024

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **FOUR** questions.
6. Question **ONE** carries **30 MARKS** and the rest carry **10 MARKS** each.
7. Write all your answers in the Examination answer booklet provided.

QUESTION ONE

Read the Case Study below carefully and answer the questions that follow:

TechRetail, a large retail company, has been expanding rapidly over the past five years. As a result, their current system for managing business data—based on a traditional file processing system—is struggling to keep up with the demands of the growing business. The company stores various types of data, such as customer records, product inventories, sales transactions, and supplier details, across different files. These files are managed independently by different departments, leading to data duplication and inconsistencies. For example, customer names and addresses are stored in separate files by both the sales and support teams, which often leads to contradictory information between departments. Furthermore, each department has its own way of managing data, and there is no centralized system to ensure data accuracy and integrity.

The company has been facing serious challenges due to this system. The retrieval of customer or product data often takes longer than expected because the employees need to search through multiple files. This inefficiency has resulted in slow customer service, frequent errors in order processing, and a lack of proper tracking of inventory levels. The sales department has reported issues where they are unable to quickly determine which products are in stock, leading to lost sales opportunities. Additionally, management has expressed frustration that generating reports on overall company performance requires data to be manually compiled from different sources, which is time-consuming and prone to human errors.

To address these challenges, the company's IT team has suggested migrating from the current file processing system to a modern **Database Management System (DBMS)**. A DBMS will allow for the centralized storage of data, enabling all departments to access and update information efficiently from a single source. It will also help eliminate data redundancy, ensure data integrity, and provide advanced features such as data security, backup and recovery options, and report generation. The company's management is interested in learning how a DBMS will address their current problems and what the implementation process would look like, but they are

also concerned about the costs and possible disruptions that may arise during the transition.

Required:

- a) Define a **DBMS** and explain how it differs from the current **file processing system** the company is using. (5 Marks)
- b) Identify and describe the **key components** of the DBMS environment that would be necessary for the company to implement. (5 Marks)
- c) Discuss at least three **advantages** and two **disadvantages** of using a DBMS for this company. (7 Marks)
- d) Explain the **three-schema architecture** and how it can help in managing data for different users within the company. (6 Marks)
- e) Using **Entity-Relationship (E-R) modeling**, design a basic E-R diagram that represents the relationship between customers, products, and sales. Include key components such as entities, attributes, and relationships. (7 Marks)

QUESTION TWO

- a) Define the term **database** and explain what makes it different from a traditional file system. (4 Marks)
- b) List and briefly describe three functions of a DBMS. (3 Marks)
- c) State three characteristics of a database system. (3 Marks)

QUESTION THREE

- a) Differentiate between **instances** and **schemas** in a database system. (4 Marks)
- b) Discuss the importance of **data independence** in the context of a DBMS, and outline the two types of data independence. (6 Marks)

QUESTION FOUR

- a) Describe the basic components of an E-R model. (4 Marks)
- b) Draw an E-R diagram for a simple library system, where books are issued to members, keeping track of book titles, authors, issue date, and return date. (6 Marks)

QUESTION FIVE

- a) Define **normalization** and explain why it is important in database design. (4 Marks)
- b) Given the following , identify and explain any **modification anomalies** and suggest how normalization could solve them (6 Marks)

QUESTION SIX

- a) Define **relational algebra** and explain its importance in DBMS. (4 Marks)
- b) Given two relations:
Employee (EmpID, EmpName, DeptID)
Department (DeptID, DeptName)
Write the relational algebra expressions to:
- i. Retrieve the names of all employees working in the 'HR' department. (3 Marks)
- ii. Find the names of employees along with their department names. (3 Marks)