REVISION NOTES: DATABASE SYSTEMS

These notes, as discussed in our first lesson, focus on understanding how databases are designed, managed, and used in real-world information systems rather than memorizing examination points. Examples are simplified to aid recall and application.

PART ONE

a) Data, Information, DBMS, and Database System

Data refers to raw, unprocessed facts such as numbers, names, or codes that on their own have little meaning. Information is data that has been processed and organized to become meaningful and useful. A DBMS is software used to store, retrieve, and manage data, while a database system includes the database, the DBMS, and the users or applications interacting with it.

b) Database Models and Their Advantages

Database models describe how data is structured and related. Early filing systems store data in simple files but are limited. Hierarchical and network models organize data through parent-child or linked relationships. The relational model stores data in tables and supports flexible querying, while object-based models store data as objects and integrate well with programming languages.

c) University Student Registration System Design

Designing a university registration system begins with conceptual design, which identifies entities such as students, courses, and lecturers and their relationships. Logical design converts these entities into tables with keys and attributes. Physical design focuses on how data is stored in the DBMS, including data types, indexing, and performance optimization.

PART TWO

a) Relational Database Terms

An entity represents a real-world object such as a student, while attributes describe its properties, such as name or identification number. A domain defines the acceptable values for an attribute. Atomicity ensures that each field contains indivisible data values, supporting accuracy, consistency, and efficient querying within a relational database.

b) Normalization up to Third Normal Form

Normalization is the process of organizing data to reduce redundancy and improve integrity. First Normal Form ensures all fields contain atomic values. Second Normal Form removes partial dependencies on a composite key. Third Normal Form eliminates transitive

dependencies so that non-key attributes depend only on the primary key, resulting in well-structured, efficient tables.

PART THREE

a) DDL and DML

Data Definition Language is used to create and modify database structures such as tables and indexes. It defines how data is stored within the database. Data Manipulation Language is used to work with the data itself, allowing users to insert, update, delete, and retrieve records stored in database tables.

b) Use of SQL Commands

SQL commands are used to manage both database structures and data. Tables are created to define storage structures, records are inserted to add data, updates are performed to modify existing records, and delete commands remove unwanted data. These operations enable effective management and maintenance of database information.

PART FOUR

a) Importance of Database Elements

Database elements such as field names, data types, and field sizes ensure data is stored clearly and correctly. Indexing improves the speed of data retrieval, while data entry rules promote accuracy and consistency. Together, these elements enhance database performance, reliability, and ease of use.

b) Common DBMS Operations

A DBMS supports operations such as sorting records, searching for specific data, adding new records, and deleting outdated information. It also allows the creation of views, which present selected data in a simplified or restricted format, improving usability and security without altering the original tables.

PART FIVE

a) Reports and Related Database Terms

Reports present data in a structured format suitable for analysis or printing. Merging combines data from different sources, while labels are used for printing identifiers such as addresses. Forms or screens allow data entry and viewing, and printed reports provide permanent or shareable records of organized information.

b) Creating a Ranked Database Report

Creating a ranked report involves selecting the relevant data source, summarizing information where necessary, and sorting records based on a chosen criterion such as total purchases. The

report is then formatted with appropriate headings and layout before being previewed and printed or exported for use.