



HASSER ONLINE COLLEGE OF TECHNOLOGY

DBMS COURSE OUTLINE

KNEC DIPLOMA LEVEL IN ICT

1. Introduction to Databases

- Definition of a database
- Types of databases (flat-file, relational, hierarchical, network)
- Importance and applications of DBMS in organizations
- Differences between data and information
- Characteristics of a good database

2. Database Concepts and Terminologies

- Fields, records, tables
- Primary key, foreign key, candidate key, composite key
- Entities and attributes
- Relationships (1:1, 1:M, M:N)
- Referential integrity

3. Overview of Database Management Systems

- Functions of a DBMS
- Components of DBMS
- Types of DBMS software (MySQL, Oracle, SQL Server, PostgreSQL)
- Advantages and disadvantages of DBMS

4. Data Models

- Conceptual, Logical, and Physical models
- Hierarchical model
- Network model
- Relational model
- Object-oriented model

5. Entity–Relationship (ER) Modeling

- ER diagrams (entities, attributes, relationships)
- Cardinality and participation
- Converting ER diagrams into relational schemas

6. Relational Database Design

- Introduction to relational algebra
- Tables, rows, columns, domains
- Keys and constraints
- Normalization (1NF, 2NF, 3NF, BCNF)
- Denormalization (when and why)

7. Structured Query Language (SQL)

a. Data Definition Language (DDL)

- CREATE, ALTER, DROP tables
- Defining constraints

b. Data Manipulation Language (DML)

- INSERT, UPDATE, DELETE
- SELECT (basic and advanced queries)

c. Data Control Language (DCL)

- GRANT, REVOKE

d. Transaction Control Language (TCL)

- COMMIT, ROLLBACK, SAVEPOINT

e. Advanced SQL Concepts

- Joins (inner, left, right, full)
- Subqueries
- Aggregate functions (COUNT, SUM, AVG, MIN, MAX)
- Grouping (GROUP BY, HAVING)
- Views
- Indexes

8. Database Administration

- User roles and privileges

- Backup and recovery strategies
- Data security and access control
- Database performance tuning
- Storage management

9. Distributed Databases

- Definition and characteristics
- Advantages and challenges
- Homogeneous vs heterogeneous distributed databases
- Replication and fragmentation concepts

10. Database Application Development

- Connecting databases to applications
- Using SQL in programming (PHP, Java, C#, etc.)
- Form design and data validation
- CRUD operations in applications

11. Data Warehousing and Data Mining (*Introductory Level*)

- Concepts of data warehouses
- OLAP vs OLTP
- Basics of data mining (classification, clustering, association)

12. Emerging Trends in Databases

- NoSQL databases
- Cloud databases
- Big data concepts
- Database automation