REPUBLIC OF KENYA

COMPETENCY BASED MODULAR CURRICULUM

FOR

COMPUTER SCIENCE

KNQF LEVEL 6

(CYCLE 3)

PROGRAMME ISCED CODE: 0613 554 A.

TVET CDACC
P.O. BOX 15745-00100
NAIROBI

DATABASE MANAGEMENT

ISCED UNIT CODE: 0613 554 05A

UNIT CODE: ICT/CU/CS/CR/05/6/MA

Relationship to Occupational Standards

This unit addresses the unit of competency: Manage Databases

Duration of Unit: 210 hours

Unit Description:

This unit covers the competencies required to demonstrate database management skills. It involves understanding database fundamentals, designing a database, using Structured Query Language, understanding design of object-oriented databases, understanding indexing and hashing and understanding database applications.

Summary of Learning Outcomes:

By the end of the unit, the trainee should be able to:

Learning Outcomes	Durations (Hours)
1. Database fundamentals	40
2. Database design	30
3. Structured Query Language	60
4. Design of object-oriented databases	30
5. Indexing and hashing	25
6. Database applications	25
TOTAL	**210**

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Database fundamentals	1.1 Definition of database 1.2 Database terminologies 1.2.1 Table	• Oral tests • Written tests • Practical tests

	1.2.2 Database engine 1.2.3 Records 1.2.4 Field 1.3 Reasons of using databases 1.4 Definition of relational model 1.5 Relational Modelling Concepts 1.5.1 Relations/tables 1.5.2 Attributes/Columns 1.5.3 Domain 1.5.4 Tuples/Rows 1.5.5 Primary Key 1.5.6 Foreign Key 1.6 Properties of a relation/table 1.7 Comparison of RDBMS products 1.7.1 Oracle 1.7.2 MS SQL server 1.7.3 My SQL 1.7.4 Ms Access 1.8 Installation of MS SQL server 1.9 MS SQL server interface 1.10 Properties of MS SQL server Database 1.11 Prescribe RDBMS product for a simulated environment 1.12 Database security 1.12.1 Definition 1.12.2 Access control 1.12.3 Authentication 1.12.4 Integrity control 1.12.5 Backup	
2. Database design	2.1 Phases of database Design 2.1.1 Conceptual database design (ERM Modeling)	• Oral tests • Written tests • Practical tests

	2.1.2 Logical database design 2.1.3 Physical database design 2.2 Entity modelling 2.2.1 Components 2.2.2 Designing Entity Model using UML (Unified Modelling Language) 2.3 Normalisation 2.3.1 Definition 2.3.2 Demonstration of normalisation 2.4 Validating model according to the requirements / specified transactions (CRUD matrix)	
3. Structured Query Language (SQL)	3.1 SQL 3.1.1 Definition 3.1.2 Characteristics 3.1.3 Components 3.2 Data definition queries 3.2.1 CREATE 3.2.2 DROP 3.2.3 ALTER 3.3 Demonstration of CREATE TABLE statement 3.4 Demonstration of CREATE TABLE constraints: 3.4.1 PRIMARY KEY 3.4.2 FOREIGN KEY 3.4.3 NOT NULL 3.4.4 CHECK 3.4.5 UNIQUE 3.4.6 DEFAULT	• Practical tests • Oral tests • Written tests

	3.5 Editing table schema using SQL ALTER statement 3.5.1 Adding an attribute 3.5.2 Dropping an attribute 3.5.3 Modifying attribute domain 3.6 Dropping table using SQL DROP TABLE statement 3.7 Data manipulation query statements 3.7.1 INSERT 3.7.2 SELECT 3.7.3 UPDATE 3.7.4 DELETE 3.8 Data Manipulation Query Statements 3.8.1 Retrieving records using SELECT statement 3.8.2 Insertion of records using INSERT INTO statements 3.8.3 Deleting records using DELETE statement 3.8.4 Updating records using UPDATE. SET statement 3.9 SQL Joins 3.9.1 Definition of a join 3.9.2 Types of joins 3.10 Create and query a database from a validated ER model. 3.11 Creating a simple join	
4. Object oriented databases design	4.1 Object oriented database 4.1.1 Definition	• Practical tests • Oral • Written tests

	4.1.2 Comparison with other types of databases 4.2 Object oriented database concepts 4.2.1 Classes 4.2.2 Objects 4.2.3 Attributes 4.2.4 Inheritance 4.3 Implementation of Object Oriented Database Concepts from a set of requirements 4.4 Creation of views and triggers.	
5. Indexing and hashing	5.1 Indexing and hashing 5.1.1 Definition of indexing and hashing 5.1.2 Types of indexing 5.1.3 Types of hashing 5.2 Demonstration of indexing 5.2.1 Dense index 5.2.2 Sparse index 5.3 Demonstration of hashing 5.3.1 Static hashing 5.3.2 Dynamic hashing 5.4 Implementation of indexing and hashing in an existing database	• Practical tests • Oral • Written tests
6. Database applications	6.1 Decision support system 6.2 Data mining 6.3 Distributed Databases 6.4 Features of Data warehouses 6.5 Features of Spatial and geographical databases 6.6 Features of Multi-media databases 6.7 Mobility and personal databases	• Practical tests • Oral • Written tests

	6.8 Design and implementation of data warehouses	

Suggested Methods of Instruction

- Presentations and practical demonstrations by trainer;
- Guided learner activities and research to develop underpinning knowledge;
- Supervised practical database design and SQL projects
- Visiting expert from the ICT sector;
- Industrial visits

Recommended Resources for 25 trainees

S/No.	Category	Item Description / Specifications	Quantity	Recommended Ratio (Trainee: Item)
1	**Learning Materials**	Database Textbooks	25	1:1
2		Printed or digital lecture notes, case studies, ERD templates, normalization guides	25 Sets	1:1
3		SQL Cheat Sheets & Syntax Reference Guides	25	1:1
4		Access to online platforms	25 Logins	1:1
5	**Learning Facilities**	Training room with 25 workstations, whiteboard, projector, and proper lighting & ventilation	1 Room	-

6		Smart Board or Projector with HDMI/VGA for demonstrations	1	1:25
7	**Infrastructure**	High-speed Internet	1 Setup	-
8		Backup power (UPS and/or Generator)	1 Unit	-
9	**Tools & Equipment**	Laptops or Desktops.	25	1:1
10		RDBMS Software (MS SQL Server, MySQL, Oracle Express, PostgreSQL, MS Access)	25 Licenses	1:1
11		SQL Client Tools (e.g., SQL Server Management Studio, DBeaver, MySQL Workbench)	25	1:1
12		UML and ER Modeling Tools (e.g., Lucidchart, Draw.io, Visual Paradigm, StarUML)	25	1:1
13		Code Editor (e.g., Visual Studio Code, Sublime Text, Notepad++)	25	1:1
14		Virtual Machines / Docker for	10	1:2.5

		Simulated Environments (e.g., Oracle VM, VirtualBox, Docker Desktop)		
15	**Consumables**	Notebooks, pens, whiteboard markers, flipcharts	25 Sets	1:1
16		Printed ER diagrams, case study handouts	25 Sets	1:1
17		USB drives or external hard drives	10	1:2.5
18		SQL Script Samples and Practice Datasets	Shared	-
19	**Software Licenses**	Microsoft SQL Server Developer Edition / MySQL / Oracle XE (free editions or educational licenses)	25 Installations	1:1
20	**Safety & Support**	Anti-virus Software, Fire Extinguisher, First Aid Kit, Surge Protectors	5 Kits	1:5