



KNOWLEDGE FOR DEVELOPMENT

KIBABII UNIVERSITY

**UNIVERSITY EXAMINATIONS
2020/2021 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS
YEAR TWO SEMESTER TWO EXAMINATIONS**

**FOR THE DEGREE OF
(COMPUTER SCIENCE)**

**COURSE CODE : CSC 221
COURSE TITLE : DATABASE SYSTEM 1**

DATE: 04 /10/2021 TIME: 09.00 A.M – 11.00 A.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

a) Read the case below and answer questions that follow:

A company keeps records of the products it stores in a warehouse and the factories that make the products. Each product is identified by a unique product number and has a name and description. A product is made by a single factory but a factory can make more than one product. A factory is recognized by a factory code and has an address and telephone number. A product can be stored in one or more warehouses and a warehouse can stock a number of products. The quantity of a product stored at a warehouse needs to be recorded. A warehouse is identified by a warehouse code and the address is also held.

- i) Identify the entities in the case study. [4 Marks]
 - ii) Draw an ER diagram for the case study. [4 Marks]
 - iii) Show the cardinality and participation constraints in the E-R. [4 Marks]
- b) Identify two most recent and commonly used DBMSes and the areas are applied. [3 Marks]
- c) Briefly describe the following database models structures [6 Marks]
- i. Hierarchical Model
 - ii. Network Model
 - iii. Object-Oriented Model
- d) Explain using examples the two types of data independence in databases [4 Marks]
- e) Explain the objectives of the ANSI/SPARC three level architecture for the database management system software. [5 Marks]

QUESTION TWO [20 MARKS]

- a) Define the following terms [3 Marks]
- i. Database
 - ii. Database System
 - iii. Database Management System
- b) Explain five symbols used in development of an ER diagram [5 Marks]
- c) Study the following schema defined for Employee Management System:

| |
|--|
| Employee : EmpID, Name, Address, DeptID, Designation, Salary |
| Department: DeptID, DepartName, Depart Head |

- i) State the entities present in the system [2 Marks]
- ii) State the two primary keys that would be appropriate for the relations stated in (i) [2 Marks]
- iii) Explain how you would enforce entity integrity and referential integrity in the relations above [3 Marks]
- d) Outline five DBMS utilities [5 Marks]

QUESTION THREE [20 MARKS]

- a) Briefly explain the limitations of the file based system [5 Marks]
- b) Discuss three levels of data abstraction [6 Marks]
- c) The details below represent data stored in a retail shop about products and customer orders.

| Admission | Treatment details | Discharge details |
|------------------|-------------------|-------------------|
| Admission number | TreatmentNo | DischargeNo |
| Gender | AdmissionNo | AdmissionNo |
| FirstName | DoctorName | Medicine Bills |
| LastName | Diagnosis | Admission Bills |
| Date of Birth | Recommendation | Other Bills |
| | Medication | |

- i) Identify the most appropriate key to be the primary key for each table then show the relationships among the tables [4 Marks]
- ii) Describe any four field properties that can be used to enforce validity integrity in any for fields in the tables designed in question (a) above. [2 Marks]
- d) You are asked to design a database system for a health club. The database would contain data about customers, their training, contact numbers among others. Elaborate the main steps you would perform for designing and implement the database. [3 Marks]

QUESTION FOUR [20 MARKS]

- a) Explain five facilities/functions provided by database management system (DBMS) [5 Marks]
- b) Discuss the five components of the database system environment [5 Marks]
- c) To develop a database system, there are several components that must be incorporated [4 Marks]
- i. Data manipulation Language
 - ii. Data definition language
 - iii. Query language
- d) RnE company policy is to ensure up-to-date information on the processing and current location of each shipped item. To execute the RnE relies on the company-wide database. Shipped items are characterized by item number (unique), weight, dimensions, insurance amount, destination and final delivery date. Shipped items are received into the company system at a single retail center. Retail centers are characterized by their type, Unique Id and address. Shipped items make their way to their destination via one or more standard RnE transportation events (i.e. flights, truck) and a delivery route.
- e) Identify the entities that constitute this database the attributes in each [3 Marks]
- f) Draw an Entity Relationship Diagram that captures this information about the company [3 Marks]

QUESTION FIVE [20 MARKS]

a) Explain the function of a database catalogue.

[2 Marks]

b) The table below shows details of Students marks in a secondary school.

| Stdno | Fname | Lname | Maths | English | Kiswahili | Total |
|-------|-------|---------|-------|---------|-----------|-------|
| 4352 | Peter | Mwangi | 45 | 65 | 45 | |
| 4535 | Paul | Wafula | 44 | 76 | 65 | |
| 4536 | Mary | Nakhanu | 54 | 35 | 55 | |
| 4537 | Sam | Mutua | 33 | 67 | 25 | |
| 4538 | Sarah | Nafula | 66 | 66 | 33 | |
| 4539 | Amina | Abdi | 43 | 55 | 78 | |

Write an expression that will extract records that satisfy the following conditions.

i) Indicate the data types that would apply for each of the fields

[2 Marks]

ii) Explain what field would be suitable for primary key

[2 Marks]

iii) List all students with lname first letter "m".

[2 Marks]

iv) List all students who scored 60 and above in English.

[2 Marks]

v) List all students with the fname second letter "a".

[2 Marks]

vi) List all students who scored between 20 and 60 in Mathematics.

[2 Marks]

c) Write query expression to for the above table in question 3 to:

i) Calculate total marks for each student

[3 Marks]

ii) Calculate average marks for each student

[3 Marks]