# Machakos University College

(A Constituent College of Kenyatta University)

University Examinations 2014/2015

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY**

**EXAMINATION FOR DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY**

**DATABASE DESIGN AND IMPLEMENTATION**

Date: 17TH December 2014 **Time:** 8:30 - 10:30 am

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Answer question 1 and any other two questions from section B.

**SECTION A**

**Question 1 (30 marks):**

**Question one:**

(a) Define the following terms as used in database design (6 marks)

i. Database

ii. Data

iii. Database management system

(b) A student takes one or more units from their program of study. Each unit is taught by a lecturer, who belongs to a department. A unit can be taken by more than one student and a lecturer can teach more than one unit. Represent this situation using an Entity Relationship diagram, giving at least one attribute per entity. (10 marks)

(c) Outline any four types of database models. (4 marks)

(d) Explain the role of the following in relations to database systems. (6 marks)

i. User

ii. Database designer

iii. Application programmers

(e) A local microfinance company keeps information about all customers and savings accounts in permanent system physical files at the bank. Highlight any four disadvantages of using this method. (4 marks)

**SECTION B (Answer any two)**

**Question Two (20 marks):**

(a) Discuss each of the following concepts in the context of the relational data model:

(8 marks)

i. Relation
ii. Attribute
iii. Domain
iv. tuple

(b) Proposed database for a book order processing system will have four relations: Customer, CustomerOrders, OrderDetails and Book. Suggest two fields for each of the tables.

(8 marks)

(c) Explain the following concepts in relation to the 3-Level ANSI database architecture.

(4 marks)

i. Data independence
ii. Abstraction

**Question Three (20 marks):**

a) Define the following terms as used in entity relationship models (10 marks)

i. Entity
ii. Key attribute
iii. Relationship
iv. Derived attribute
v. Weak entity

b) Distinguish between Multivalued and Composite attributes (2 marks)

c) State the three types of users of a database management systems (3 marks)

d) With the aid of a diagram, describe the three - level architecture of database management systems. (5 marks)

**Question Four (20 marks)**

*(a)* Discuss the properties of a relational table. (10 marks)

(b) The following is an outfit relation use it to answer the questions that following.

| **Outfit_name** | **Outfit_colour** | **Price (Kshs)** | **Origin** |
|---|---|---|---|
| Levis trouser | Blue | 1400 | Paris |
| Blazer shirt | Brown | 900 | UK |
| Savco trouser | Brown | 1200 | Nairobi |
| Jeans Shirt | Black | 800 | New York |

i) A customer would like to spend less than Kshs.1500 on an outfit. Using relational algebra write a statement that would display for her the outfit name that she can afford. (4 marks)

ii) Use a relational algebra, display the origin and colour of outfits that costs more than Kshs. 1000 (3 marks)

iii) Use a SQL statement to display the outfit names that are brown in colour and originate from UK

**(3 marks)**

**Question Five**

a) Distinguish the following terms giving an example for each. **(12 marks)**

   i. Total and partial participation of an entity

   ii. Cardinality and degree of a relation

   iii. Relation and relationship

   iv. Entity and entity set

b) Explain the term Object-Oriented data Model **(2 marks)**

c) List any three responsibilities of a database administrator **(3 marks)**

d) Using an example explain what is meant by a foreign key. **(3 marks)**