**THE CATHOLIC UNIVERSITY OF EASTERN AFRICA**

**A. M. E. C. E. A**

**MAIN EXAMINATION**

**MAY – JULY 2016 TRIMESTER**

**FACULTY OF SCIENCE**

**DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE**

**REGULAR PROGRAMME**

**DIT 013: DATABASE SYSTEMS**

| Date:  JULY  2016 | Duration: 2 Hours |
|---|---|
| **INSTRUCTIONS:  Answer Question ONE and ANY OTHER TWO Questions** | |

Q1.  a)  Explain any THREE rationale behind the three schema architecture (ANSI – SPARC)  **(6 marks)**

b)  Explain the role of the following database sub languages
   i  Data Definition language (DDL)  **(1 mark)**
   ii  Data Manipulation language (DML)  **(1 mark)**

c)  Differentiate between a weak entity and strong entity use an example to support your answer.  **(4 marks)**

d)  Discuss any THREE SQL constraints that can be defined while creating or altering tables. For each use an example to demonstrate how its implemented.  **(9 marks)**

e)  Consider the following table containing details of students of CUEA university.

| Reg no | Name | Gender | DOB | Department name |
|---|---|---|---|---|
| 1026737 | James | M | 01/23/1994 | Computer science |
| 1025858 | Joe | M | 09/15/1990 | Law |
| 1028661 | Peter | M | 11/22/1987 | Commerce |
| 1029789 | Stacy | F | 06/06/1996 | SS |

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Write SQL statement to
i    Create the table                                                    **(3 marks)**
ii   Display all students from department of law             **(2 marks)**
iii  Set all students gender to 'M'                                   **(2 marks)**
iv   Delete all records of students whose gender is 'M'     **(2 marks)**

Q2.   a)    Explain any THREE benefits associated with database approach.
                                                                              **(6 marks)**

      b)    The following scenario relates to a upcoming matatu organization. A group
            of system analysts did analysis and come up with the following user
            requirements.

            i     A person (owner) can have 1 or many vehicles. Information kept
                  about person include Id No, Name, gender, Email and address. The
                  Id No uniquely identities each person. A given vehicle can be
                  owned by only one person. Information stored about a vehicle
                  include vehicle registration number, Vehicle type, color, date
                  registered. The vehicle registration number uniquely identifies each
                  vehicle.

            ii    A given vehicle operates in only one route but we can have many
                  vehicles operating in a given route. Information captured about a
                  route include route id startpoint and endpoint. The route Id uniquely
                  identifies each route.

            iii   A vehicle belongs to a specific sacco and a given sacco has 3 or
                  more vehicles. The information captured about a sacco includes the
                  sacco name, location  sacco Id and a description. The sacco Id
                  uniquely identifies each sacco.

            Required
            Represent the above scenario using ER model              **(14 marks)**

Q3.   a)    Write appropriate SQL statement to
            i     Drop a column named "Address" for a table known as "staff"
                                                                              **(2 marks)**

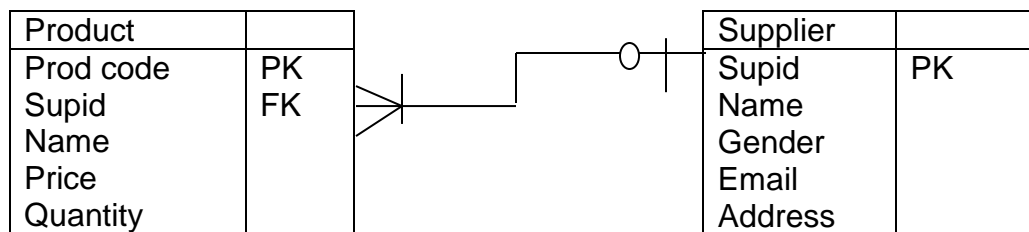            ii    Insert a new record into a table known as "branch" having the
                  following data                                              **(2 marks)**

            | Branch No | Location | Address | Branch Name |
            |-----------|----------|---------|-------------|
            | BOO 1     | Kisumu   | 62      | Starehe     |

            iii   Return the records for all staffs earning salary between 10,000 and
                  20,000 from a table known as "staff"                    **(3 marks)**

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b) Critically discuss any THREE ways of classifying database management systems (DBMS) **(6 marks)**

c) Discuss the TWO types of data independence that can exist in a database environment. **(4 marks)**

d) Explain any THREE services exposed by DBMS to its end users. **(3 marks)**

Q4. a) Discuss any THREE major limitations associated with file based approach. **(6 marks)**

b) A data model consists of THREE major components. Discuss the role played by TWO of the components. **(4 marks)**

c) Explain the THREE major basic components of ER model giving an example for each. **(6 marks)**

d) Provided with the following relational scheme, write the appropriate SQL statement to implement the schemes.

| Product | | | Supplier | |
|---|---|---|---|---|
| Prod code | PK | | Supid | PK |
| Supid | FK | | Name | |
| Name | | | Gender | |
| Price | | | Email | |
| Quantity | | | Address | |

**(4 marks)**

Q5. a) With reference to DBMS discuss how the following multi-user architecture
   i    Transaction processing monitor    (TPM)    **(2 marks)**
   ii   File based architecture    **(2 marks)**
   iii  Three tier architecture    **(3 marks)**

b) Critically discuss how the three schema architecture (ANSI-SPARC) architecture works, use a diagram to support your explanation. **(8 marks)**

c) Let
   Warden (warden, name, address, section)
   Section (SectioNO, SectionDescription, Address)
   Be part of the database
   Write appropriate SQL statement to implement the two tables. **(5 marks)**

**\*END\***

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