



**THE CATHOLIC UNIVERSITY OF EASTERN AFRICA**

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

**MAIN EXAMINATION**

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**AUGUST - DECEMBER 2016 TRIMESTER**

**FACULTY OF SCIENCE**

**DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE**

**REGULAR PROGRAMME**

**DIT 003: DATABASE SYSTEMS**

**Date: DECEMBER 2016**

**Duration: 2 Hours**

**INSTRUCTIONS: Answer Question ONE and ANY other TWO Questions**

- Q1. a) Briefly explain what you understand by the term Database. **(2 Marks)**
- b) Give a description of the following terms in relation to the database approach?
- i. Data
  - ii. Database Management System
  - iii. Data independence
  - iv. Security
  - v. Integrity
  - vi. Table
- (10 Marks)**
- c) Briefly explain at least three limitations of the file based approach  
**(3 Marks)**
- d) Give a brief description of at least three advantages of using a database management system?  
**(6 Marks)**
- e) Briefly explain the five main components of the DBMS environment and how they relate to each other.  
**(5 Marks)**
- f) Write short notes on the following terms as used in databases
- i. Database schema
  - ii. Data model
- (4 Marks)**

Q2. a) Briefly explain the following terms as used in databases

- i. Relation
- ii. Attribute
- iii. Relationship
- iv. Primary Key
- v. Foreign Key

(10 Marks)

b) An agency called *InstantCover* supplies part-time/temporary staff to hotels within Nairobi. The table below lists the time spent by agency staff working at various hotels. The PIN number is unique for every member of staff.

**InstantCover Contracts**

PIN	ContractNo	Hours	EName	H_No	H_Loc
1135	C1024	16	Smith J	H25	Karen
1057	C1024	24	Hicine D	C58	Lang'ata
1068	C1025	28	White T	321	Buru Buru
1135	C1025	15	Smith J	213	Ngara

- i. The table above is susceptible to update anomalies. Provide examples of insertion, deletion and update anomalies.

(5 Marks)

- ii. Describe and illustrate the process of normalizing the table shown above to Boyce-Codd Normal Form (BCNF). State any assumptions you make about the data shown in this table.

(5 Marks)

Q3. a) **Relational algebra** defines theoretical way of manipulating table contents using relational operators. With the above background, perform the following operations on the table provided.

- i) SELECT only PRICE less than \$2 (5 Marks)
- ii) PROJECT P\_CODE and PRICE (5 Marks)
- iii) PROJECT PRICE (5 Marks)
- iv) SELECT only PRICE greater than \$ 10 (5 Marks)

P_CODE	P_DESCRIPT	PRICE
123456	Flashlight	5.26
123457	lamp	25.15
123458	Torch	10.99
213345	Box fan	1.92
254467	Power drill	34.99

311452	Pump	1.47
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- Q4. a) The ANSI-SPARC model comprises of three levels of abstraction for understanding some of the functionality of a DBMS. With the aid of a diagram briefly explain the three level ANSI – SPARC architecture  
(10 Marks)
- b) A **DBMS** is a software system that enables users to define, create, and maintain the database and provides controlled access to the database. It is the software that interacts with application programs and the database. Describe briefly at least five facilities that the **DBMS** offers. (10 Marks)
- Q5. a) Write short notes on the following as used in databases
- i. Relation
  - ii. Meta Data
  - iii. Database Designer
  - iv. Application programmers
  - v. Endusers
- (10 Marks)
- b) Fact-finding is the formal process of using research, meetings, interviews, questionnaires, sampling, and other techniques to collect information about system problems, requirements, and preferences. It is also called information gathering or data collection. In respect to the above explanations write short notes on the advantages and disadvantages of using questionnaires and observations as a fact finding process  
(10 Marks)

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