

**MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**P.O. Box 972-60200 – Meru-Kenya.**

**Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411**

**Fax: 064-30321**

**Website:** [**www.must.ac.ke**](http://www.must.ac.ke) **Email:** **info@must.ac.ke**

**University Examinations 2015/2016**

FIRST YEAR, SECOND SEMESTER EXAMINATION FOR MASTER OF SCIENCE IN COMPUTER SCIENCE

**CCS 5102: DATABASE SYSTEMS**

**DATE: NOVEMBER, 2015 TIME:** $3$ **HOURS**

**INSTRUCTIONS: Answer question one and any other two**

**QUESTION ONE (30 MARKS)**

*Read the following case and answer the questions that follow:*

Baraka hospital limited wishes to implement a database to store the patient details. Each patient is uniquely identified by a patient number. Other personal details of the patient are also stored including the name and contacts for the next of kin. Every time a patient visits the hospital, the record of the visit is stored, including the symptoms, diagnosis, tests done, medication and next appointment. Patients fall under two categories; impatient and outpatient. The system will however focus on the outpatient details only.

1. Identify the entities that would be used to create the database and list of attributes for each, identifying the key attributes. ( 10 Marks)
2. Explain the level of normalization for each entity, with justification, where necessary normalize it to the third normal form.(3NF) (10 Marks)
3. Create the Entity Relationship model for the normalized entities. (10 Marks)

**QUESTION TWO (15 MARKS)**

1. Describe two similarities and two differences between the relational databases and object oriented databases. (6 Marks)
2. Explain the nature of real life problems that motivate the increased use of object oriented databases. (4 Marks)
3. Describe an environment where distributed databases would be applied and justify why they provide the best choice. In your answer identify the database element that is distributed. (5 Marks)

**QUESTION THREE (15 MARKS)**

1. Describe any three characteristics of object oriented databases. (6 Marks)
2. With the help of an example, describe the concepts of partitioning and replication as applied in the implementation of distributed databases. In your answer explain why partitioning and replication are key concepts and give the different options available in addressing these two concepts. (9 Marks)

**QUESTION FOUR (15 MARKS)**

1. Using appropriate examples describe the difference between relational algebra and relational calculus. In your answer illustrate at least two operators used in each case.

(5 Marks)

1. XmL databases may be implemented as either native XML databases or XML enabled databases. While describing their relationship with relational databases describe these two options. (6 Marks)
2. Describe the application of cost based query optimization in distributed databases.

(4 Marks)

 **QUESTION FIVE (15 MARKS)**

With the help of a diagram describe the three schema database architecture including the levels of abstraction and data independence that it represents. (15 Marks)