

**W1-2-6-1-6**

**JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY**

# **UNIVERSITY EXAMINATIONS 2012/2013**

**THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE IN INFORMATION TECHNOLOGY**

**ICS 2404 : ADVANCED DATABASE SYSTEMS**

**DATE: APRIL 2013 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS**

**QUESTION ONE [30 MARKS]**

1. Define each of the following terms as used in database systems [4 marks]
2. Transaction
3. Relation schema
4. Relation cardinality
5. Relation degree
6. (i) Explain what you understand by the term ‘integrity constraint’[2 marks]

(ii) Outline any two types of integrity constraints that may govern a database[4 marks]

1. Outline the four properties of a transaction [4 marks]
2. Highlight the two main motivation behind concurrent execution of database [4 marks]
3. Elaborate the role of each of the following DBMS components [4 marks]
4. Transaction manager
5. Recovery manager
6. After a system crash a DBMS executes the analysis, redo and undo phases. Explain what each recovery phase entails. [3 marks]
7. Using an appropriate example, define a view and outline how it is used as a security approach in database systems. [5 marks]

**QUESTION TWO [20 MARKS]**

1. Explain the three main principles behind the ARIES crash recovery algorithm[6 marks]
2. Explain the various actions for which a log record is written. [10 marks]
3. Describe each of the following terms as used in crash recovery. [4 marks]

**QUESTION THREE [20 MARKS]**

1. Explain the three main security issues that one must consider when designing a secure database systems [6marks]
2. (i) Define the term ‘access control’ as used in database security [2 marks]

(ii) Explain the two main database approaches towards enforcing security through

 access control. [6 marks]

1. Using an appropriate example the role of the GRANT and REVOKE sql commands

[6 marks]

**QUESTION FOUR [20 MARKS]**

1. Explain what you understand by the term ‘data definition language’ as used in SQL

[2 marks]

1. Apart from the CREATE statement, outline two other DDL statements [2 marks]
2. The human resource department in the office of president wishes to store data concerning its employees. This data entails the employee’s surname, middle name and first name. It also stores their KRA pin number, national ID number, diploma, master or doctoral), their job designation (e.g. chief, DO, PC, clerical, secretary, technician etc) and their job group. Using this information, answer the following questions:

(i) Write the SQL statement that will create the database called Human\_Resource

 [2 marks]

(ii) Identify the various tables that may be used in this database and write their relational schema. [6 marks]

1. Write the DDL statements to create at least four of the above identified relations, clearly implementing the integrity constraints. [8 marks].