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**JOMO KENYATTA UNIVERSITY**

**OF**

**AGRICULTURE AND TECHNOLOGY**

**UNIVERSITY EXAMINATIONS 2014/2015**

**THIRD YEAR FIRST SEMESTER/THIRD YEAR SECOND SEMSTER/FOURTH YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY/ BUSINESS INFORMATION TECHNOLOGY**

**ICS 2404: ADVANCED DATABASE SYSTEMS**

**DATE: AUGUST 2015 TIME: 2 HOURS**

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

**QUESTION ONE (30 MARKS - COMPULSORY)**

1. Explain the current interest in Data warehousing. [5 marks]
2. Outline techniques that can be used to reduce or eliminate

deadlock on a highly concurrent system. Discuss their

feasibility and effectiveness [5 marks]

1. A university is considering using spreadsheet to record details

of its students and courses. Discuss the disadvantages of this

solution and whether it would be best using a database. [5 marks]

1. Discuss the difference between pessimistic and optimistic

concurrency control. [5 marks]

1. Using examples, explain the following in the context of relations.
2. Cardinality [1 mark]
3. Participation [1 mark]
4. Recursive relationship [1 mark]
5. Ternary relationship [1 mark]
6. Link entity [1 mark
7. In the context of a database, explain the following terms:
8. Entity integrity [1 mark]
9. Referential integrity [1 mark]
10. Restricted delete [1 mark]
11. Cascade delete [1 mark]
12. Nullified delete [1 mark]

**QUESTION TWO (20 MARKS)**

1. In your own words;
2. Define “Database Transaction” [2 marks]
3. Explain what the “ACID” properties are and how they

affect the behavior of database transactions. You should

support your discussion with suitable examples and/or

diagrams. [4 marks]

1. Using your won examples and/or suitable diagrams, in the context

 of transaction processing discuss the function of:

1. COMMIT [1 mark]
2. ROLLBACK [1 mark]
3. SAVEPOINTS [1 mark]
4. Describe situations where such concepts in (b) above, alone

would be inadequate to ensure that data integrity was guaranteed. [2 marks]

1. Explain when the use of the “two-phase commit” protocol is

needed. Your response should give a detailed explanation of

this protocol. [3 marks]

1. Using your own examples, explain the following concurrency

problems in a multi-use database

1. Last update problem [2 marks]
2. Uncommitted dependency problem [2 marks]
3. Inconsistent Analysis problem [2 marks]

**QUESTION THREE (20 MARKS)**

1. Describe the defining characteristics of a “data warehouse” and

 how it differs in content and purpose from an OLTP database. [4 marks]

1. Explain, using examples, where appropriate, the term ‘ETL’

 with respect to date warehouses taking case to highlight the

 common problems or issues in each stage. [4 marks]

1. For each of the following terms, explain what the term means,

 the underlying concepts involved, any associated benefits or

 limitations, typical applications and features along with any

 additional technical or implementation points you think

 appropriate to mention.

 You should support your discussion with suitable diagrams

 and/or examples:

1. OLAP [3 marks]
2. Multi-Dimension Data [3 marks]
3. Data mining [3 marks]

**QUESTION FOUR (20 MARKS)**

1. The sample ERD (Figure 1below) describe a scenario in which

there are many bus companies that own a number of buses that

follows a prescribed route consisting of stages which consists

of a number of towns that are visited on the route starting from

and finishing at a bus home town. A bus journeys over one route

but a route may be used by many buses. A route is also covered

by many bus companies but a company only travels over one route.

1. Explain the problem known as “FAN TRAP”. Identify a

potential fan trap in the above ER model and show how

this is resolved. [4 marks]

1. With the aid of a diagram, explain the problems caused

by a “CHASM TRAP” and explain how this might be

resolved. [4 marks]

1. Security is a major concern in database systems:
2. Describe FOUR of the main threats to database security. [4 marks]
3. Using examples, describe how Triggers can contribute

to the security of the database, before and after a security

breach. [4 marks]

1. Describe TWO mechanisms for guarding against

SQL injection. [4 marks]