

MACHAKOS UNIVERSITY COLLEGE
EXAMINATION FOR BACHELOR OF COMPUTER SCIENCE
SCO304 ADVANCED DATABASE SYSTEMS

DATE: APRIL 2015

TIME: 2HOURS

Instructions:

Attempt QUESTION ONE and ANY OTHER TWO questions

Question 1 (30marks) Compulsory

- a) i) Define the term *deadlock*. [2 marks]
ii) List and briefly explain the **three** general techniques for handling deadlock.[6marks]
- b) Differentiate between the following terms: [4 marks]
i.) Wait-die protocol and wound-wait protocol.
ii.) Share lock and exclusive lock.
- c) i) Define the term **SQL join**. [2 marks]
ii) With help of SQL statements, differentiate *two major categories of SQL joins*. [8 marks]
- d) i) Define the term database recovery. [2 marks]
ii) Explain any **six** causes of database failure. [6 marks]

Question 2 (20marks)

- a) i) Define the term *concurrency control*. [2 marks]
ii) Describe the types of problem that occur in a multi-user environment when concurrent access to the database is allowed. [6 marks]
iii) List and explain the **two** main concurrency control techniques that allow transactions to execute safely in parallel. [4 marks]
- b) Define the term **threat** as used in Database Systems. [2 marks]
- c) List and briefly explain any **three** computer-based security controls for a multi-user database environment. [6 marks]

Question 3(20marks)

- a) Define the following terms as used in databases: – [8 marks]
- b) Differentiate between the following: – [6 marks]
- i.) *Pessimistic and Optimistic concurrency control techniques.*
 - ii.) Shared and Exclusive locks.
 - iii.) Steal Policy and No-Steal Policy
- c) Discuss any three types of cost in running database in organization. [6marks]

Question 4(20marks)

- a) Once deadlock has been detected the DBMS needs to abort one or more of the transactions to recover from the deadlock. List and explain the **three main** issues that need to be considered in such a situation. [6 marks]
- b) Discuss the two-phase locking protocol as concurrency control. [4 marks]
- c) List and explain the **two** main reasons for allowing concurrent execution. [4 marks]
- d) Briefly explain how the following recovery techniques work. [6 marks]
- i.) Recovery using deferred update.
 - ii.) Recovery using immediate update.

Question 5(20marks)

- a) Define the term **Distributed Database**. [2 marks]
- b) List and explain any **five** advantages of a distributed database management system.[10marks]
- c) Explain the how the shadow paging recovery scheme works [6 marks]
- d) Explain **two** advantages of the shadow paging scheme. [2 marks]