



MACHAKOS UNIVERSITY

University Examinations for 2017/2018

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

**THIRD YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY**

SIT 301: DATABASE ADMINISTRATION

DATE: 4/12/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS: Answer Question ONE and Any Other TWO Questions.

QUESTION ONE (30 MARKS)

- a) Distinguish between;
 - i) File –based system and database approach (2 marks)
 - ii) Centralized database and distributed database (2 marks)
- b) Database recovery is the restoration of a database in case of a failure. Discuss any three database basic recovery facilities (6 marks)
- c) Explain the meaning of transaction in database terms (2 marks)
- d) Describe the following data models:
 - i) Network model (2 marks)
 - ii) Relational model (2 marks)
- e) Describe various types of database security features provided by DBMS (4 marks)
- f) Describe the following database design processes;
 - i) Conceptual design (2 marks)
 - ii) Logical design (2 marks)
 - iii) Physical design (2 marks)

- g) Explain the difference between a data administration and database administration (4 marks)

QUESTION TWO (20 MARKS)

- a) Discuss any three components of DBMS. (3 marks)
- b) With an aid of an example explain the purpose of Concurrency Control in database administration. (5 marks)
- c) Explain the following broad categories of SQL functions;
- i) Data Definition Language (DDL) (3 marks)
 - ii) Data Manipulation Language (DML) (3 marks)
- d) Describe the following types of attributes in ER modeling and give an example for each.
- i. Primary key (2 marks)
 - ii. Composite key (2 marks)
 - iii. Candidate key (2 marks)

QUESTION THREE (20 MARKS)

- a) Enumerate the key roles of a database administrator (6 marks)
- b) With an aid of a state transition diagram, outline the states for transaction execution in a transaction processing. (6 marks)
- c) Distinguish between the following in relation to database architecture.
- i. Centralized vs Distributed (4 marks)
 - ii. Client-server vs Parallel (multi-processor) (4 marks)

QUESTION FOUR (20 MARKS)

- a) i) Explain the concept of transaction in relation to DBMS (2 marks)
- ii) Discuss Three cases that may causes a transaction to fail (6 marks)
- b) Explain four limitations of file based systems that gave rise to the database system. (4 marks)
- c) Describe the ACID transaction properties (6 marks)
- d) Explain the meaning of the term partial dependency (2 marks)

QUESTION FIVE (20 MARKS)

- a) Describe the roles of transaction processing in a modern DBMS (6 marks)
- b) Discuss Timestamp based concurrency control algorithm in DBMS (4 marks)
- c) Outline the techniques that a system administrator may use if a system crashes, to recover to a consistent database state. (4 marks)
- d) Giving example in each case, explain the following relational algebra operators as used in DBMS. (6 marks)
 - i. **select:** σ
 - ii. **project:** Π
 - iii. **union:** $\cup$