# MACHAKOS UNIVERSITY

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT: CIT**

**UNIT NAME:** DATABASE ADMINISTRATION

**UNIT CODE:** SIT 301

**SEMESTER: AUGUST 2018**

**DATE:** **TIME: 2 HOURS**

**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 defiendency (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:** $\sigma$
ii. **project:** $\prod$
iii. **union:** $\cup$