MAASAI MARA UNIVERSITY

REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
FORTH YEAR SECOND SEMESTER

SCHOOL OF SCIENCE AND INFORMATION SCIENCES
BACHELOR OF SCIENCE (INFORMATION SCIENCE)

COURSE CODE: INF 444

COURSE TITLE: DATA MINING AND ADVANCED DATABASE

DATE: 19TH APRIL 2018 **TIME: 1100 - 1300 HRS**

INSTRUCTIONS TO CANDIDATES

i. *Answer question ONE (compulsory) and any other TWO questions.*
ii. *Question one carries 30 marks*
iii. *All other questions carry 20marks*
iv. ***Mobile Phone is not allowed in the exam room***

SECTION A QUESTION ONE IS COMPUSARY

QUESTION ONE

a) Explain the difference between:

   i. Entity Integrity and Referential Integrity **[2Marks]**

   ii. Candidate key and composite key **[2Marks]**

   iii. Unary relationship and ternary relationship **[2Marks]**

b) To guarantee serializability, we must follow the Two-phase locking (2PL) protocol. Elaborate on the:

   i. Two phases of this protocol **[4 Marks]**

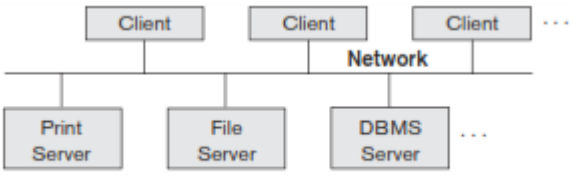
   ii. Term deadlock **[2 Marks]**

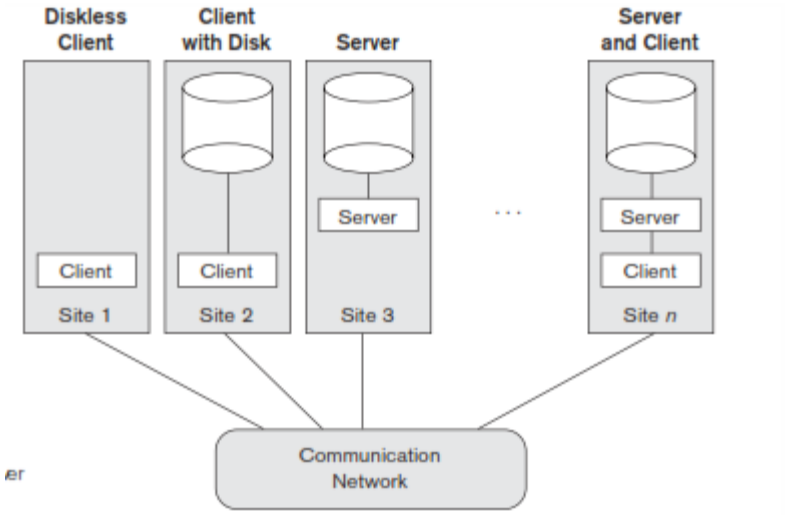
   iii. Two general techniques for handling deadlocks **[4 Marks]**

c) A major objective of the ANSI-SPARC architecture is to provide data independence. Draw a diagram illustrating this architecture **[4 Marks]**

d) Failures are generally classified as transaction, system, and media failures. Discuss the reasons why a transaction may fail in the middle of execution. **[6 Marks]**

e) With the aid of the diagrams below:





Using examples, distinguish between the TWO architectures. **[4 Marks]**

SECTION B 40 MARKS ANSWER ANY TWO QUESTION

QUESTION TWO

a) Distinguish between:

i. Physical data independence and Logical data independence **[2 marks]**

ii. Insertion anomaly and Update anomaly **[2 marks]**

iii. Functional dependency and Transitive dependency **[2 marks]**

b) A library uses the following table to store details of students, the books they have borrowed and when they borrowed them.

Borrowing

StudentID	StudentName	BookID	BookTitle	Date
S1	Smith	B1	Python	12-Apr-2016
S1	Smith	B2	Databases	17-Jan-2016
S2	Ford	B1	Python	25-Feb-2016

(i) Which Normal Form does the above table violate and why? **[3 Marks]**

(ii) Normalise the table to achieve 3rd normal form.

[5 Marks]

c) A football club uses the table below to record details of players and the positions in which they can play. Each player can play in up to a maximum of three positions:

playerID	playerName	Positions
P1	Lionel Messi	Forward, Centre Midfield
P2	Cristiano Ronaldo	Forward, Left Midfield, Right Midfield
P3	Philippa Lahm	Right Back, Defensive Midfield

(i) Explain why this table is not in "First Normal Form" (1NF).

[2 Marks]

(ii) Show how this table can be transformed into 1NF tables.

[4 Marks]

QUESTION THREE

a) Sensitivity of data is a measure of the importance assigned to the data by its owner, for the purpose of denoting its need for protection. Highlight the FIVE factors that cause data to be classified as sensitive.

[5 Marks]

b) Security considerations do not only apply to the data held in a database. Breaches of security may affect other parts of the system, which may in turn affect the database. Briefly explain what breaches databases security measures are taken to avoid such breaches. **[5 Marks]**

c) The database administrator (DBA) is the central authority for managing a database system. The DBA has a DBA account in the DBMS, sometimes called a system or superuser account, which provides powerful capabilities that are not made available to regular database accounts

and users. Explain the privileges the DBA commands.

[4 Marks]

d) Distinguish between the following terms:
   i. Authorization and Authentication **[2 Marks]**
   ii. Recovery and Journaling **[2 Marks]**
   iii. Discretionary security mechanism and Mandatory security mechanism **[2 Marks]**

QUESTION FOUR

a) Data is viewed as a resource to be shared by as many processes as possible. As a result, data must be organized in a way that is flexible and adaptable to unanticipated business requirements. Discuss the types data models below: **[8 marks]**
   i. Network Model
   ii. Relational Model

b) Queries select records from one or more tables in a database so they can be viewed, analyzed, and sorted on a common datasheet. Write the following commands: **[12 marks]**
   i. To eliminate a table Customer from the database
   ii. To remove rows from a table
   iii. To create a database Employee
   iv. To create a table Parking
   v. To retrieve data of employee Susan from table Employee
   vi. To retrieve data of the employees with parking allocations at office parking

End of Exam