MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

UNIVERSITY ORDINARY EXAMINATION

2018/2019 ACADEMIC YEAR

THIRD YEAR **FIRST** SEMESTER EXAMINATION FOR, MASTER OF SCIENCE IN INFORMATION TECHNOLOGY

SIT 603 – DATABASE DESIGN AND MANAGEMENT

DURATION: 2 HOURS

DATE:
TIME:

Instructions to candidates:

1. Answer question One and Any Other Two questions
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

ANSWER ANY FOUR QUESTIONS

QUESTION ONE (35 MARKS)

a) An important concept in the theory of relational database is that of a functional dependency.
Explain what is meant by a functional dependency and give an example (3marks)

b) A company uses the table below to record details of its projects. Each project is attached to a department and runs for a certain duration (in Months). The primary key for this table is (projnbr,deptnbr)

PROJNBR	DEPTNBR	PROJ NAME	DEPT NAME	DURATION
P01	D03	Web Portal	Hr Dept	10
P01	D07	Web Portal	Sales Dept	10
P02	D07	Data Warehouse	Sales Dept	7
P02	D03	Data Warehouse	Hr Dept	7

i. Give an example of an "update Anomaly" that may occur in this table (2marks)
ii. Explain what is meant by "partial dependency" in a table (2marks)
iii. Identify any partial dependencies from the above table (3marks)
iv. Remove any partial dependencies from the above table by performing s normalization process and show skeletal designs of the resultant tables (6marks)

c) Describe the role and content of the data dictionary (metadata) in a DBMS (5marks)
d) Describe **Four** possible benefits of "Views" in databases (4marks)

QUESTION TWO (25 MARKS)

a) Explain briefly what is meant by a weak Entity Type. Provide an example of a Weak Entity either from the scenario or using an example of your own (5marks)

b) One of the main responsibilities of a database developer is to enforce the following integrity constraints on database tables;

- Domain integrity
- Entity integrity
- Referential integrity

i. Briefly explain why it's essential to enforce the three integrity constraints (3marks)

ii. Write SQL code to show how you would implement EACH of these constraints on tables provided in Figures A1.1 TO A1.3 below (10marks)

iii. Write **Two** SQL statements one on INSERT and the other one DELETE statement that will test whether your referential integrity constraints are auctioned (7marks)

FIGURE A 1.1 HOTEL TABLE

HOTELCODE	HOTEL	RESORT
FLB	Flamingo	Benidorm
BHB	Bali Hai	Benidorm
HAZ	Hawaii	Santa posa
SPZ	SunPark	Playa Blanca
AHB	AL Hambra	Beni dorm
JDM	Jardin del sol	Palma Nova
SPM	Sun Park	Playa Blanca

FIGURE 1.2 HOTEL PACKAGE TABLE

HOTELCODE	PACKAGE ID	PRICE
FLB	1	265
JDM	1	295
BHB	3	199
HAZ	4	308
SPZ	6	310
AHB	2	199
JDM	3	199
JDM	6	165
SPB	6	159

Figure 1.3 PACKAGE TABLE

PACKAGE ID	CATERING	NIGHTS	MONTH
1	SC	7	June
3	FB	14	November
4	HB	10	July
6	FB	10	November
2	HB	14	May

QUESTION THREE (25 MARKS)

a) Study the following scenario;

A travel company provides a selection of **Hotels** that prospective customers can reserve prior to booking a room. A customer can select from a range of **Accommodation Types** that each hotel offers to suit their requirements. Details of the accommodation type include the catering facilities self catering (SC), Half Board (HB), Full Board (FB). The bad type Twin bed (T); Doubled bed (D); Suite(S).The price the hotel is determined by the hotel and the type of accommodation offered. In addition, a customer can do accommodation **Reservation** at a hotel possibly on different dates

Assume that;

- Each hotel is identified by a hotel code
- The accommodation type is identified by a unique accommodation type code
- Accommodation is only available during the Month of June in 2016

Required ;

Derive an Entity relationship diagram for the above scenario to the following Requirements.

i. Entity types that you model are listed on Bold
ii. Show Relationships and Participation constraints
iii. Resolve many to many relationships (12marks)

b) Describe **Five** features (functions) you would expect to find in a DBMS (10marks)

c) The ANSI-SPARC Architecture provides data independence. Describe the meaning and objective of data independence (3marks)

QUESTION FOUR (25 MARKS)

a) Describe using examples, the meaning and objectives of the following data modeling stages
   i. Logical
   ii. Physical (10marks)

b) With reference to a sample relation of your own choosing explain and discuss the following relational model terminologies, including its function and any related concepts
   i. Tuple
   ii. Attribute
   iii. Domain
   iv. Degree
   v. Cardinality (10marks)

c) (i) Explain the term candidate key (2marks)
   (ii) List **Three** candidate keys for the following table (A,B,C and D are the attributes of the table) (3marks)

A	B	C	D
a1	b1	c1	d1
a2	b3	c3	d1
a1	b2	c1	d2

QUESTION FIVE (25 MARKS)

a) Explain the concepts of transaction scheduling and serialisability. Describe **Two** types of problems (giving an example) that might appear when a transaction schedule is not serialisable (10marks)

b) Backups of the database should be taken in order to protect data. Enlist Four measures that can be taken in order to ensure the security and effectiveness of database backups (6marks)

c) A database can be defined as a self-describing collection of integrated records. Explain the meaning and importance of the term “self describing (4marks)

d) A company wants to move its current filebased system to a database system. In many ways, this can be seen as a good decision. Identify and describe Five disadvantages of adopting database approach (5marks)