KABARAK   UNIVERSITY

UNIVERSITY EXAMINATIONS

2010/2011 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE

COURSE CODE: COMP 314

COURSE TITLE: DATABASE MANAGEMENT SYSTEMS

STREAM: SESSION VI

DAY: FRIDAY

TIME: 9.00 – 11.00 A.M.

DATE: 15/04/2011

INSTRUCTIONS:
1. **This question paper has FIVE questions**
2. **Answer question one and any other two questions**

PLEASE TURN OVER

QUESTION ONE (30 MARKS) COMPULSORY

    (a) Explain the meaning of following terms
        i. Normalization
        ii. Relational calculus   (4mks)

    (b) Distinguish between Rollback and Roll forward database recovery   (2mks)

    (c) State the type of preferred recovery techniques in case of each of the following failures.
        i. system failure
        ii. incorrect data
        iii. storage medium destruction   (3mks)

    (d) Describe the five primary types of information flow in a data warehouse   (5mks)

    (e) With the aid of diagrams, discuss hierarchical, network and relational data models
                                                 (6mks)
    (f) The following relations contain data instances from the ROOM and GUEST relations in the relational schema in (2) above

ROOM

RoomNo	RoomName	Rate	HotelNo
103	Longonot	1200	17
104	Sinai	1000	17
103	Ruwenzori		17
206	Kilimanjaro	Not specified	18

GUEST

GuestNo	Name	IDNo	Contact
36	James Kiyai	11634567	0723000001
38	Pamela Karani	20345678	0733234567
40	Morris Maina	33214365	0713777234

The SQL statement used to create ROOM table is

```
CREATE TABLE Room (RoomNo int primary key, RoomName varchar(15),
Rate numeric (4) not null, HotelNo int references
hotel(HotelNo))
```

    i.   Does the above data satisfy the relational integrity values? If not, which rules are they and how are they violated   (4mks)
    ii.   Write an SQL statement that creates GUEST table   (6mks)

QUESTION TWO (20 MARKS) ELECTIVE
    (a) Describe any three components of a DBMS   (6mks)

    (b) To overcome the limitations of file based systems, databases were introduced. Explain four benefits of database systems that overcame the limitations of file based system   (8mks)

(c) With the aid of illustrations,
  i. Explain a many-to-many relationship.   (3mks)

  ii. Describe how a many-to-many relationship can be resolved.   (3mks)

QUESTION THREE (20 MARKS) ELECTIVE

Consider the four relations below from a book order database

Purchase

PNo	PDate	PubCode
34673	20 10 05	MCGi
34674	21 10 05	MAC
35332	30 11 05	MCGi

Publisher

PubCode	PubName
MCGi	McRaw-Hill
MAC	McMillan

Order

PNo	ISBN	Quantity
34673	007709073X	20
34673	007707253	15
34673	007707409	3
34674	0333197399	17
34674	0333371003	2
35332	007707253	5

Book

ISBN	BTitle	ACode
007709073X	SSADMA	GI01
007707253	SSADMA4	A234
007707409	SSADMA5	E753
0333197399	Databases	S593
0333371003	Database 2	S593

Use the above given relations to
  i.   List all primary keys, foreign keys and compound keys in the relations (4mks)
  ii.   Identify and write down the SQL data types applicable for PNo., PDate, ISBN and ACode fields   (2mks)
  iii. Draw an ER diagram relating the relations   (5mks)
  iv.   Write an SQL statement that creates the order relation. Constraint the quantity field such that it positive   (5mks)
  v.   Write SQL statements that displays PNo, ISBN, BTitle and ACode for more than 10 ordered books   (4mks)

QUESTION FOUR (20 MARKS) ELECTIVE

(a) What is the definition of an attribute?   (1mk)
(b) Explain the meaning of the following terms
  i.   candidate key
  ii.   ternary relations
  iii. Weak entity
  iv.   Multivalued attribute   (8mks)

(a)   Model the following scenario using Entity Relationship modeling showing cardinalities and relationships. Entities are capitalized.
```
There must be at least one BOOK COPY of each BOOK TITLE in a
library system.  Each BOOK TITLE must belong to one particular
CATEGORY, but a CATEGORY can exist in the system only if they
are current (i.e. if the book is returned, a record of the
loan is removed).  A BORROWER can have several LOANs (or none
at all) and each LOAN is for one BOOK COPY
```
  i. Identify all entities in the scenario   (3mks)

ii. Draw an overall ER diagram relating all the entities. Resolve many to many relationships if they exist. (8mks)

QUESTION FIVE (20 MARS)

    (a) Explain the meaning of the terms
             i. Compound key
           ii. Transient key
          iii. Un-normal form (6mks)
    (b) Describe the procedure of producing a 2NF (Second Normal Form) process in normalization (4mks)
    (c) Normalize the table below of room booking by customers to Third Normal Form (10mks)

Booking Number	Booking Date	Customer Number	Customer Name	Seminar Number	Seminar Title	Seminar Date	Venue	Number of Delegates
5487	13/5/10	58	James K	1254	Systems Analysis	18/6/10	Waterbuck	2
				1254	Systems Analysis	19/6/10	Merica	3
				1255	Systems Design	21/6/10	Merica	7
5488	14/5/10	87	Joan M	1254	Systems Analysis	18/6/10	Waterbuck	1
				1260	Data Analysis	19/6/10	Bontana	10
5489	15/510	87	Joan M	1255	Systems Design	23/6/10	Chambers	5
				1255	Systems Design	25/6/10	Chambers	2