# KIBABII UNIVERSITY

(KIBU)

## UNIVERSITY EXAMINATIONS
## 2021/2022 ACADEMIC YEAR

## END OF SEMESTER EXAMINATIONS
## YEAR TWO SEMESTER ONE EXAMINATIONS

## FOR THE BACHELOR OF SCIENCE
## (INFORMATION TECHNOLOGY)

COURSE CODE  :  BIT 212

COURSE TITLE  :  INTRODUCTION TO DATABASES

DATE:  28/01/2022      TIME: 8.00 A.M.- 10.00 A.M.

INSTRUCTIONS TO CANDIDATE

ANSWER **QUESTION ONE** AND **ANY OTHER TWO**

## QUESTION ONE(COMPULSORY) [30 MARKS]

a) Give, using appropriate examples, the meaning of the following types of attributes as used in databases:

     i. Composite attribute                                         **[2 Marks]**

     ii. Derived attribute                                            **[2 Marks]**

     iii. Multi-valued attribute                                   **[2 Marks]**

b) Differentiate between physical and logical data independence     **[2 Marks]**

c) You have been appointed as the chief database administrator. You are required to advice the company Chief Executive Officer in regards to the key important components to consider when procuring a Database Management System. Discuss the components you would advise them on.     **[10 Marks]**

d) A schema defined for Employee Management System is:

> Employee: EmpID, Name, Address, Department, Designation, Salary
> Department: DepartID, DepartName, HeadID

    i. State the Entities present within the Employee Management System.     **[2 Marks]**

    ii. State two primary keys that would be appropriate for the relations stated in (i) above.     **[2 Marks]**

    iii.   Write SQL statement for the following:

        I.     Retrieve the details of employee who gets the maximum salary. **[4marks]**

        II.    List names of all employee who earn more than KSH. 200,000 **[4 Marks]**

## QUESTION TWO [20 MARKS]

a) As the Database Administrator in Kibabii University, you are required to explain to the University Management the following:

    **i.** Why they should shift from the traditional File-based system and adopt the Database approach.     **[4 Marks]**

    **ii. FIVE** functions of a Database Management System.     **[10 Marks]**

b) In an organization, data can be represented with the use of various data models. Discuss **TWO** types of object-based data model. **[6 Marks]**

## QUESTION THREE [20 MARKS]

a) Normalize the table below:     **[10 Marks]**

| Attribute Name | Sample Value | Sample Value | Sample Value |
|---|---|---|---|
| StudentID | 1 | 2 | 3 |
| StudentName | John Smith | Sandy Law | Sue Rogers |
| CourseID | 2 | 2 | 3 |
| CourseName | Programming Level 1 | Programming Level 1 | Business |
| Grade | 75% | 61% | 81% |
| CourseDate | Jan 5th, 2014 | Jan 5th, 2014 | Jan 7th, 2014 |

b)
   i) Discuss the various data anomalies that are likely to occur when designing and implementing a database. **[5 Marks]**
   ii) How can such anomalies in b i) be eliminated? **[5 Marks]**


## QUESTION FOUR [20 MARKS]

a) What do you understand by the term concurrency control as used in transaction management? **[2 Marks]**

b) What is the difference between a shared lock and exclusive lock? **[2 Marks]**

c) Discuss two main concurrency control techniques that allow transactions to execute safely in parallel subject to certain constraints. **[6 Marks]**

d)
   I) What is a deadlock as applied to database transactions? **[2 Marks]**
   II) Explain **THREE** deadlock control techniques? **[6 Marks]**
   III) Which of the above deadlock control techniques would you recommend in the event:
   i. The probability of a deadlock occurring is high? **[1 Mark]**
   ii. The probability of a deadlock occurring is low? **[1 Mark]**


## QUESTION FIVE [20 MARKS]

a) Suppose you are given the following requirements for a simple database for the National

   Hockey League (NHL):

   - The NHL has many teams,

   - Each team has a name, a city, a coach, a captain, and a set of players,

   - Each player belongs to only one team,

   - Each player has a name, a position (such as left wing or goalkeeper), a skill level, and a set of injury records,

   - A team captain is also a player,

   - A game is played between two teams (referred to as host team and guest team)

   and has a date (such as May 11th, 2021) and a score (such as 4 to 2).

   **Required:**

   Construct a clean and concise ER diagram for the NHL database **[20 Marks]**