(Knowledge for Development)

KIBABII UNIVERSITY
(KIBU)

UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
SECOND YEAR FIRST SEMESTER

FOR THE DEGREE IN
(INFORMATION TECHNOLOGY)

COURSE CODE: BIT 212

COURSE TITLE: INTRODUCTION TO DATABASES

DATE: 22/12/2022 **TIME:** 9.00 A.M. – 11.00 A.M.

INSTRUCTIONS
ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

a) Define the following with reference to databases:
    i.   Tuple   **[2 marks]**
    ii.   Database system   **[2 marks]**
    iii. Application Program   **[2 marks]**

b) A model is a representation of 'real world' objects and events, and their associations. Explain the **Three** components of a data model   **[6 marks]**

c) Highlight the difference in the view/user level, conceptual level and physical level of data abstraction   **[3 marks]**

d) Normalize the table below to 1st Normal Form **[4 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

e) Highlight **Three** Causes of failure in database processes **[3 marks]**

f) Locking is a procedure used to control concurrent access to data. Differentiate between shared Lock and Exclusive Lock.   **[2 marks]**

g) Discuss the **Two** types of Integrity Constraints in relational databases. **[4 marks]**

h) Explain your understanding of Distributed database systems.   **[2 marks]**

QUESTION TWO [20 MARKS]

a) Create the table shown below in SQL and show the statements you used. **[4 marks]**

Table: Employee

ATTRIBUTE (FIELD) NAME	DATA DECLARATION
EMP_NUM	CHAR (3)
EMP_LNAME	VARCHAR (15)
EMP_FNAME	VARCHAR (15)
EMP_INITIAL	CHAR (1)
EMP_HIREDATE	DATE
JOB_CODE	CHAR (3)

b) Having created the table structure in question a) above,

i.   write the SQL code to enter data into the first row of the table as shown in the Figure below.   **[4 marks]**

EMP_NUM	EMP_LNAME	EMP_FNAME	EMP_INITIAL	EMP_HIREDATE	JOB_CODE
101	News	John	G	08-Nov-00	502
102	Senior	David	H	12-Jul-89	501
103	Arbough	June	E	01-Dec-96	500
104	Ramoras	Anne	K	15-Nov-87	501
105	Johnson	Alice	K	01-Feb-93	502
106	Smithfield	William		22-Jun-04	500
107	Alonzo	Maria	D	10-Oct-93	500
108	Washington	Ralph	B	22-Aug-91	501
109	Smith	Larry	W	18-Jul-97	501

Figure 1: Employee table

Note: Use the Figure 1 above (Employee table) to answer questions ii to v.

ii.   Write the SQL code to change the job code to 501 for the person whose personnel number is 107. After you have completed the task, examine the results, and then reset the job code to its original value.   **[3 marks]**

iii.   Assuming that the data shown in the Employee table have been entered, write the SQL code that lists all attributes for a job code of 502.   **[3 marks]**

iv.   Write the SQL code to delete the row for the person named William Smithfield, who was hired on June 22, 2004, and whose job code classification is 500.

[3 marks]

v.   Using a single command, write the SQL code that will enter the project number (PROJ_NUM) = 18 for all employees whose job classification (JOB_CODE) is 500   **[3 marks]**

QUESTION THREE [20 MARKS]

a)   Discuss **Five** Limitations of File based approach to data storage that led to the emergence of the database approach   **[10 Marks]**

b)   The database system environment consists of five major parts: hardware, software, procedures, data and people. Discuss any **Five** people that interact with the database within the database system environment.   **[10 Marks]**

QUESTION FOUR [20 MARKS]

a)   There are two main concurrency control techniques that allow transactions to execute safely in parallel subject to certain constraints: locking and timestamp methods. Describe each one of the **Two** concurrency control techniques   **[4 Marks]**

b)   Describe **Four** best DBMS selection criteria   **[8 Marks]**

c)   Discuss the database system development lifecycle.   **[8 Marks]**

QUESTION FIVE [20 MARKS]

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

A salesperson may manage many other salespeople. A salesperson is managed by only one salespeople. A salesperson can be an agent for many customers. A customer is managed by one salespeople. A customer can place many orders. An order can be placed by one customer. An order lists many inventory items. An inventory item may be listed on many orders. An inventory item is assembled from many parts. A part may be assembled into many inventory items. Many employees assemble an inventory item from many parts. A supplier supplies many parts. A part may be supplied by many suppliers

Required:

i.   Identify the entities in the above scenario   **[5 Marks]**
ii. Construct a clean and concise ER diagram for scenario above   **[5 Marks]**

b) Develop bi-directional complete business rules for each relationship between entities using below ERD.