



*(Knowledge for Development)*

**KIBABII UNIVERSITY**

**(KIBU)**

**UNIVERSITY EXAMINATIONS  
2019/2020 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS  
YEAR THREE SEMESTER TWO  
EXAMINATIONS**

**FOR THE DEGREE OF  
BACHELORS OF BUSINESS MANAGEMENT**

**COURSE CODE: BIT 321**

**COURSE TITLE: DATABASE MANAGEMENT SYSTEMS**

**DATE: 11/11/2020**

**TIME: 2.00PM – 4.00PM**

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**INSTRUCTIONS TO CANDIDATES**

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

**QUESTION ONE [COMPULSORY] [30 MARKS]**

1. A relational database consists of a collection of \_\_\_\_\_ [1 Mark]
  - a) Tables
  - b) Fields
  - c) Records
  - d) Keys
2. Database \_\_\_\_\_ is the logical design of the database, and the database \_\_\_\_\_ is a snapshot of the data in the database at a given instant in time. [2 Marks]
  - a) Instance, Schema
  - b) Relation, Schema
  - c) Relation, Domain
  - d) Schema, Instance
3. For each attribute of a relation, there is a set of permitted values, called the \_\_\_\_\_ of that attribute. [1 Mark]
  - a) Domain
  - b) Relation
  - c) Set
  - d) Schema
4. A data type that creates unique numbers for key columns in Microsoft Access is: [1 Mark]
  - a) Autonumber
  - b) Boolean
  - c) Sequential key
  - d) Sequential number
5. Which one of the following is a set of one or more attributes taken collectively to uniquely identify a record? [1 Mark]
  - a) Candidate key
  - b) Sub key
  - c) Super key
  - d) Foreign key
6. If every non-key attribute is functionally dependent primary key, then the relation will be in \_\_\_\_\_ [1 Mark]
  - a) First normal form
  - b) Second normal form
  - c) Third form
  - d) Fourth normal form
7. The \_\_\_\_\_ operation allows the combining of two relations by merging pairs of tuples, one from each relation, into a single tuple. [1 Mark]
  - a) Select
  - b) Join
  - c) Union
  - d) Intersection
8. \_\_\_\_\_ is used to define the structure of the relation, deleting relations and relating schemas. [1 Mark]
  - a) DML(Data Manipulation Language)
  - b) DDL(Data Definition Language)



- c) Query  
d) Relational Schema
9. The \_\_\_\_\_ clause allows us to select only those rows in the result relation of the \_\_\_\_\_ clause that satisfy a specified predicate. **[2 Marks]**  
 a) Where, from  
 b) From, select  
 c) Select, from  
 d) From, where
10. 

```
SELECT emp_name
FROM department
WHERE dept_name LIKE ' _____ Information Technology' ;
```

  
 \_\_\_\_\_ has to be added into the blank to select the dept\_name which has Information Technology as its ending string. **[1 Mark]**  
 a) %  
 b) \_  
 c) ||  
 d) \$
11. A \_\_\_\_\_ indicates an absent value that may exist but be unknown or that may not exist at all. **[1 Mark]**  
 a) Empty tuple  
 b) New value  
 c) Null value  
 d) Old value
12. \_\_\_\_\_ includes records from the right table that have no matching key in the left table in the result set **[1 Mark]**  
 a) Left outer join  
 b) Right outer join  
 c) Full outer join  
 d) Half outer join
13. Which of the following can be addressed by enforcing a referential integrity constraint? **[1 Mark]**  
 a) All phone numbers must include the area code  
 b) Certain fields are required (such as the email address, or phone number) before the record is accepted  
 c) Information on the customer must be known before anything can be sold to that customer  
 d) When entering an order quantity, the user must input a number and not some text (i.e., 12 rather than 'a dozen')
14. Data integrity constraints are used to: **[1 Mark]**  
 a) Control who is allowed access to the data  
 b) Ensure that duplicate records are not entered into the table  
 c) Improve the quality of data entered for a specific property  
 d) Prevent users from changing the values stored in the table
15. \_\_\_\_\_ makes the transaction permanent in the database **[1 Mark]**  
 a) View

- b) Commit
- c) Rollback
- d) Flashback

16. Study the following SQL statements and answer the question that follow: **[2 Marks]**

```
CREATE TABLE Employee(
  Emp_id NUMERIC NOT NULL,
  Name VARCHAR(20),
  dept_name VARCHAR(20),
  Salary NUMERIC,
  UNIQUE(Emp_id,Name));
```

```
INSERT INTO Employee VALUES(1002, Wanyonyi, CSC, 10000);
INSERT INTO Employee VALUES(1006, Onyango, Finance, );
INSERT INTO Employee VALUES(1002, Mwangi, Sales, 20000);
```

What will be the result if the statements are executed.

- a) All statements executed
  - b) Error in create statement
  - c) Error in insert into Employee values(1006, Onyango, Finance, );
  - d) Error in insert into Employee values(1002, Mwangi, Sales, 20000);
17. Drop Table cannot be used to drop a table referenced by a \_\_\_\_\_ constraint. **[1 Mark]**
- a) Super Key
  - b) Primary Key
  - c) Composite Key
  - d) Foreign Key
18. \_\_\_\_\_ express the number of entities to which another entity can be associated via a relationship set. **[1 Mark]**
- a) Mapping Cardinality
  - b) Relational Cardinality
  - c) Participation Constraints
  - d) None of the mentioned
19. If every non-key attribute is functionally dependent primary key, then the relation will be in \_\_\_\_\_. **[2 Marks]**
- a) First normal form
  - b) Second normal form
  - c) Third form
  - d) Fourth normal form
20. \_\_\_\_\_ is a state where the database no longer reflects a real state of the world that it is supposed to capture. **[1 Mark]**
- a) Consistent state
  - b) Parallel state
  - c) Durable state
  - d) Inconsistent state

21. In Kibabii University a lecturer must have a first degree and at least a *postgraduate degree* which can take single or several values. Treating *postgraduate degree* as \_\_\_\_\_ permits lecturers to have several post graduate degrees associated with them. [2 Marks]
- a) an entity
  - b) an attribute
  - c) a relation
  - d) a value
22. A process where the entity set *person* is classified as student and employee is called \_\_\_\_\_ [1 Mark]
- a) Generalization
  - b) Specialization
  - c) Inheritance
  - d) Constraint generalization
23. A \_\_\_\_\_ is a pictorial depiction of the schema of a database that shows the relations in the database, their attributes, and primary keys and foreign keys. [1 Mark]
- a) Schema diagram
  - b) Relational algebra
  - c) Database diagram
  - d) Schema flow
24. Which of the following schemas does define a view or views of the database for particular users? [1 Mark]
- a) Internal schema
  - b) Conceptual schema
  - c) Physical schema
  - d) External schema
25. Which of the following are the process of selecting the data storage and data access characteristics of the database? [1 Mark]
- a) Logical database design
  - b) Physical database design
  - c) Testing and performance tuning
  - d) Evaluation and selecting



### QUESTION TWO (20 MARKS)

- a. As a **database designer** you have been invited for an interview by the Bungoma County government. Part of the selection process is a technical interview. Answer the following questions from the interview panel.
- Explain, with examples, how a database table may be logically connected to another table, including the associated rules demanded by *referential integrity* to support such connectivity and any subsequent changes in either table. **[4 Marks]**
  - Explain, with examples, how the rows in a given database table may be uniquely identified, including the associated rules demanded by *entity integrity* and what guidelines exist for the selection of such a row-identification mechanism. **[4 Marks]**
- b. With respect to database transaction management explain the following terms. **[8 Marks]**
- Atomicity.
  - Consistency.
  - Isolation.
  - Durability.
- c. Show how appropriate relational algebra operations would be used to extract. **[4 Marks]**
- specific tuples.
  - specific attributes

### QUESTION THREE (20 MARKS)

- a. In MTN Kenya each member of staff is allocated a single computer. Information about computers belonging to staff members is stored in a database consisting of the following table:

**HasComputer** (StaffNo, ComputerNo, Manufacturer, Cost)

Company policy subsequently changes and some staff are allocated more than one computer however, each computer is still assigned to a single member of staff

- Explain why the above table design is no longer appropriate. **[2 Marks]**
  - Suggest a new database design to handle the new situation. **[2 Marks]**
- b. Each member of staff in a company works on a single project. Several staffs work on each project, and all staff working on the same project share the same office. The following table stores information about staffs, projects and offices.

**Works** (StaffNo, ProjectNo, ProjectDescription, OfficeNumber)

- Explain how an update anomaly could arise in the above table. **[2 Marks]**
- Identify the underlying fault in the above design, and show how the table can be transformed to remove this flaw. **[6 Marks]**
- Suppose the situation is as described above, except that now each project has just ONE member of staff working on it. Is the original table design still faulty? Explain your answer. **[3 Marks]**

- c. The following table keeps records of medical consultations conducted in Kibabii University Clinic. Each consultation takes place in a room and is conducted by a doctor on a patient. A patient cannot have two consultations on the same day.

PatientNo	ConsultationDate	ConsultationTime	DoctorNo	RoomNo
P01	13- Oct -18	08:30	D01	R01
P01	18- Oct -18	15:00	D02	R02
P02	13- Oct -18	10:00	D01	R01
P03	13- Oct -18	10:00	D02	R02
P04	26- Oct -18	08:	D01	R02

- i. Explain what is meant by a “functional dependency” between attributes in a table. [2 Marks]
- ii. Identify two functional dependencies from the above table. [2 Marks]
- iii. Suggest a suitable primary key for the above table. [1 Mark]

#### QUESTION FOUR (20 MARKS)

- a. A SQL **developer** is bidding for a new contract with Safaricom Kenya. Part of the selection process is a technical interview. Answer the following questions from the interview panel:
- i. For each of the following terms, explain what the term stands for, the essence of the functions it provides and a set of example SQL statements (at least TWO for each) that implement these functions: [8 Marks]
    - i. DDL
    - ii. DML
- b. Suppose you are using the database in the Figure below, composed of the two tables. Use the tables to answer the questions below.
- i. Identify the primary key in each table. [2 Marks]
  - ii. Identify the foreign key in the BookOrders table. [1 Mark]
  - iii. Draw the ER model for the database. [5 Marks]
  - iv. Does the BookOrders table exhibit referential integrity? Explain your answer. [4 Marks]

**Customer**

CustID	CustName	AcctNo.
100	Joe Smith	010839
101	Andy Blake	111248
102	Sue Brown	061544

**BookOrders**

OrderID	Title	CustID	Price
1001	The Dark Tower	102	12.00
1002	Incubus Dreams	101	19.99
1003	Song of Susannah	102	23.00
1004	The Time Traveler's Wife	100	21.00
1005	The Dark Tower	101	12.00
1006	Tanequil	102	15.00
1007	Song of Susannah	101	23.00



### QUESTION FIVE (20 MARKS)

- a. Relational databases are very effective in situations for which they are appropriate. In other situations, simpler file-based solutions may be sufficient. Suppose you are required to implement a system for storing information about a library's books, borrowers, and loans. Discuss FIVE reasons why a database system is superior to a file-based system for this task. Illustrate the answer with suitable examples. **[10 Marks]**

- b. Superlady agencies keeps invoices in the format shown below:

<b>customerID:</b> C12 <b>custName:</b> Mugure Odhiambo <b>custAddress:</b> 1699-50200 Bungoma			
<b>productCode</b>	<b>prodName</b>	<b>Price</b>	<b>Quantity</b>
P1	Laptop	40000	2
P2	iPad	25000	3
P3	HP LaserJet printer	14000	1

- i. Identify the repeating group of attributes and transform the above format into tables that are in 1st Normal Form. **[4 Marks]**
- ii. Identify any partial dependencies and transform into tables that are in 2<sup>nd</sup> Normal Form. **[4 Marks]**
- iii. Identify any transitive dependencies and transform into tables that are in 3<sup>rd</sup> Normal Form. **[2 Marks]**