



COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

NCIS301 – DATABASE SYSTEMS

END OF SECOND SEMESTER EXAMINATIONS

APRIL 2022

LECTURER: MR MUKHALELA

DURATION: 3 HOURS

INSTRUCTIONS TO CANDIDATES

1. This paper carries **5** questions.
 2. Answer **All** questions from **section A (Practical using a Lab allocated computer)** Upload your answer on **Moodle**.
 3. Answer any **4 (four)** from **section B** questions use **Exam provided Answer booklet in the section**.
 4. Each question carries 20 marks.
 5. The marks for each question are indicated in square [] brackets.
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SECTION A

ONE

- a) Consider the relational database shown in figure 1 below and use either MySQL Workbench or XAMP Server to implement it Enter the data into the tables as is:

The database should be named as your fullname+boats like *mukhalelabraitonboatsdb*

[5]

Sailors				Boats		
sid	sname	rating	age	bid	bname	color
1	Fred	7	22	101	Nina	red
2	Jim	2	39	102	Pinta	blue
3	Nancy	8	27	103	Santa Maria	red

Reserves		
sid	bid	day
1	102	9/12
2	102	9/13

Figure 2: A Sample Relational Database

- b) Design the corresponding Entity-Relationship diagram. NB: You may draw using pen and paper or MySQL Workbench. [5]
- c) Implement the following queries and show the results via a print screen or screenshot.:
- `SELECT s.sname FROM sailors S WHERE s.sname LIKE 'F_%F'.` [2]
 - `SELECT R.sid FROM Boats B, Reserves R
WHERE R.bid=B.bid AND B.color='red'
UNION
SELECT R.sid FROM Boats B, Reserves R
WHERE R.bid=B.bid AND B.color='green'` [2]
- d) Write SQL code for creating table Reserves and show how you are to enforce referential integrity through referencing foreign keys to the other schemas. [3]

- e) Soon after attending to an ICT Security Policies workshop with your Senior DBA, he requested that you implement a SQL GRANT COMMAND for securing the database via a user name and a password. Now write the SQL GRANT statement for securing the database to the user 'Zvavharwa' 'Tapedza' who will be the using the Database as an Administrator. [3]

SECTION B

TWO

- a) Using a diagram, illustrate and explain stages of the DBLC. [14]
- b) Identify and briefly exemplify the three types of anomalies which a Database support professional might want to avoid by normalizing database tables. [6]
- a) Using examples, define the following database terms:
- i. Data. [1]
 - ii. Weak Entity. [2]
 - iii. Primary Key. [2]
 - iv. Referential Integrity. [2]
 - v. Cardinality. [2]
 - vi. Composite attribute [2]
- b) Describe the three schema architecture. [9]

THREE

Consider the following database tables:

Articles			
ArticleNo	Author	Subject	Price
56-01	Shaanewako	Database	100
25-02	Ngeekwedu	Networks	100
96-23	Charakupa	Programing	120
78-98	Mambondiani	Database	90

Journals			
JournalNo	Author	Subject	Price
23334	Shoko	Database	20

97862	Shaanewako	Calculus	40
10023	Ndau	Networks	30

Show the resultant table (if any) and describe the output of the following:

- a) $\sigma_{\text{subject} = \text{"database"} \text{ and price} \leq 100}(\text{Articles})$. [4]

Article No	Author	Subject	Price
56-01	Shayanewako	Database	100

- b) $\Pi_{\text{author}}(\text{Articles}) \cup \Pi_{\text{author}}(\text{Journals})$. [4]

- c) $\sigma_{\text{author} = \text{"Shaanewako"}}(\text{Articles X Journals})$. [4]

- d) $\rho_{\text{References}}(\sigma_{\text{subject} = \text{"database"}}(\text{Articles}))$. [4]

- e) $\Pi_{\text{subject, author}}(\text{Articles})$. [4]

FOUR

- a) Briefly describe the concepts of logical and physical data independence as used in databases systems. [4]
- b) Your Database Administrator told you that you shouldn't forget to implement a locking protocol to safeguard execution of transactions. Define a lock and explain the two types of locks available in DBMSs. [4]
- c) Describe any three features of a nested transaction and link these to some of the ACID properties of concurrency control. [12]

FIVE

- a) Describe the following models of databases:
- ER model. [2]
 - Object oriented model. [3]
 - Network model. [3]
 - Hierarchical model. [3]
- b) Write SQL code snippets for accomplishing the following:
- Creating a new database to be called "*rabbitarydb*." [1]
 - Creating a table called "*buck*" and any two attributes and their data types. [3]

- iii. Suppose you had forgotten to include the primary key when you coded (bii) above, now write an appropriate SQL code for including a Primary Key. [2]
- iv. Write a statement for inserting any imaginary values into the table that you created in (bii) above. [3]

END OF EXAMINATION PAPER
