

UNIVERSITY OF FORT HARE

**DATABASE MANAGEMENT AND DESIGN
CSC 224**

SUPPLEMENTARY EXAMINATIONS

JANUARY 2019

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Time: 3 Hours

Subject: CSC 224

Marks: 100

This paper consists of four (4) pages including the cover page

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INSTRUCTIONS

- ❖ There are four (4) questions in this assessment, answer all questions.
- ❖ Write neatly and clearly.
- ❖ NO CALCULATORS and CELLPHONES allowed in this assessment.
- ❖ Number your answers correctly as indicated in each question.
- ❖ Read the question carefully before you attempt to answer.
- ❖ Full marks will be awarded to candidates who provide full answers, where necessary.
- ❖ Full credit will be given for 100 Marks.

QUESTION ONE [15 MARKS]

1.1 Define the following terms:

- a. User-Data [1]
- b. Database system [1]
- c. Desktop database [1]

1.2 State any four (4) disadvantages of file systems. [2]

1.3 State and explain the two (2) types of data stored in a database. [2]

1.4 State four characteristics of a *well-designed database*. [2]

1.5 Which *component* of the *DBMS* is responsible for the following:

- a. Accepting and converting logical requests. [1]
- b. Facilitates the development of transaction application. [1]

1.6 Briefly explain the four main roles of a database administrator. [4]

QUESTION TWO [20 MARKS]

2.1 State the outputs of a data model. [2]

2.2 Briefly explain how relationship types are defined between two entities. [2]

2.3 Why are business rules important to the designer? [5]

2.4 Briefly describe the hierarchical model. [5]

2.5 One of the disadvantages of the relational model is that "*it may promote "islands of information" problems as individuals and departments can easily develop their own applications*". Briefly explain what is meant by "*island of information*". [2]

2.6 State whether each of the following statements are *True* or *False*:

- a. All record types participate as child record types in exactly one parent-child relationship. [1]
- b. The entity relational model includes data definition language (DDL) and data manipulation language (DML) in the DBMS. [1]
- c. The network model represents complex data relationships more effectively than the hierarchical model. [1]

- d. A set of enforceable rules that guarantees the integrity of the data in one of the components produced by the data model. [1]
- e. A foreign key in one relation matches a super key in another relation. [1]

QUESTION THREE [30 MARKS]

3.1 Define the following terms:

- a. Domain [1]
- b. Mandatory relationship [1]
- c. Referential integrity [1]
- d. Functional dependence [1]

3.2 State any four (4) characteristics of relational tables. [4]

3.3 Explain in detail the INNER JOIN making use of an example. [4]

3.4 What is the purpose of indexes? [2]

3.5 What is the difference between a composite attribute and a multivalued attribute? [2]

3.6 Give an example of each of the following and justify your answer:

- a. Derived attribute [2]
- b. Optional attribute [2]

3.7 Under what condition must a foreign key be set to null? [1]

3.8 Draw an Entity-Relational (ER) Diagram for the following situation. Stillwater Antiques is a shop that buys and sells different kinds of antiques such a furniture, jewellery, china and clothing. Each item that the shop sells is uniquely identified by an item number and is also characterized by a description, asking price, condition and open-ended comments. Stillwater works with different individuals called clients who sells items to the store and buys items from the store. Some clients only sell items to the store, some only by items and some others both sell and buy. A client is identified by a client number and is also described by a client name and client address. When the shop sells an item in stock to a client, the shop wants to record the commission paid, the actual selling price, VAT and date sold. When the shop buys an item from the client, the shop wants to record the purchase cost, date purchased and condition of the item. [7]

3.9 State four (4) advantages of storing a derived attribute. [2]

QUESTION FOUR [35 MARKS]

4.1 State six (6) characteristics of a normalized database. [3]

4.2 Fill in the banks in each of the following statements:

- A relation that has no multivalued attributes is in _____ Normal Form. [1]
- A relation that has no partial functional dependencies is in _____ Normal Form. [1]
- A relation that has no transitive dependencies is in _____ Normal Form. [1]

4.3 Given the following project management report, normalize the relation to 3rd Normal Form (3NF), clearly showing each normalization stage and dependency diagrams for each normal form. [8]

Project Management Report				
Project Code	PRO 8736	Project Budget:	R380 000.00	
Project Title	SASSA System	Date	08/08/2018	
Project Manager No.	M38473			
Project Manger	C. Mvaba			
Employee No.	Employee Name	Department No.	Department Name	Hourly Rate
E9089	Anathi Magele	D093	IT	R188.00
E5487	Themba Mhanga	D870	Pensions	R65.00
E3485	Sisipho Nkosana	D093	IT	R120.00
E9451	Buhle Bambani	D092	Programming	R75.00

4.4 Explain the three (3) classes of SQL commands and when they would be used. [6]

4.5 In terms of referential integrity, explain how the following differs:

- ON UPDATE RESTRICT [1]
- ON UPDATE CASCADE [1]
- ON UPDATE SET NULL [1]

[Turn over for question 4.6 and 4.7]

4.6 Use the tables below to answer the following tables

Student Table	Results Table
mysql> select * from student;	mysql> select * from results;
+-----+-----+	+-----+-----+
s_number s_name	c_code s_num mark grade
+-----+-----+	+-----+-----+
1000 Asher Knose	ACC1 1005 95 Dist
1001 Peter Jones	CSC1 1005 70 Pass
1002 Mark Evert	CSC1 1007 35 Fail
1003 Mary James	CSC2 1002 90 Dist
1004 Jane Weeks	CSC2 1003 55 Pass
1005 John Doe	MAT1 1000 76 Dist
1006 Richard Gills	STA2 1003 15 Fail
1007 Jane Doe	
+-----+-----+	+-----+-----+

- Write a statement that will create a table called `s_tutors` with the following attributes: `tutor_name`, `tutor_number`, `s_number` (a foreign key from the *student table*) and `schedule_date`. The table has a composite primary key made up of `tutor_number` and `s_number`. Your statement should include both the `ON DELETE` and the `ON UPDATE` clauses. [4]
- Write an SQL statement that will perform a `LEFT JOIN` of the result table on to the student table. Your `JOIN` should include all the columns from both table. [3]
- Write a statement that will display the student numbers of all students that are doing `CSC2` from the `results` table. [3]

4.7 What is the difference between the `HAVING` clause and the `WHERE` clause? [2]