

UNIVERSITY OF FORT HARE

IFS215 & IFS215E

DATABASES –TEST 1

26 APRIL 2023

Time: 1,5 Hours

Marks: 60

This paper consists of three (3) pages including the cover page

Internal Examiners

Prof R Piderit

Mr V Funda

Dr E Chindenga

Internal Moderator

Mr D Boucher

GENERAL INSTRUCTIONS TO CANDIDATES

1. This paper consists of 2 Sections.
 - a. Answer THREE Questions in Section A.
 - b. Answer the COMPULSORY question in SECTION B.
 - c. Questions can be answered in any order but must be numbered correctly.
 - d. Only the first three questions in Section A will be marked.
 - e. Any answers you do not want marked must be clearly cancelled.
2. Time management is very important. The value of the mark for each question should be used as a rough guide to the amount of time allocated to answer the question.
(60 marks in 90 minutes)
3. It is in the candidate's interest to write clearly.

SECTION A - [45 marks] - ANSWER THREE QUESTIONS FROM THIS SECTION

Question 1 [15 marks]

Good decisions require good information, which is derived from raw facts known as data. Data are likely to be managed most efficiently when they are stored in a database.

- a. Identify and describe five characteristics of data quality. (5)
- b. Provide a definition and describe the role of database management systems. (5)
- c. What are three advantages and two disadvantages of database management systems. [Include a description of each to show you understand what they mean.] (5)

AND/OR

Question 2 [15 marks]

Data modelling is the first step in the database design journey, serving as a bridge between real-world objects and the database that resides in the computer.

- a. What makes data modelling important? (5)
- b. What is a business rule, and what is its purpose in data modelling? (5)
- c. Consider a company that sells products online. One important business rule for this company might be that *a customer can place multiple orders, but each order can only have one customer*. Describe and draw this relationship using **UML notation**. (5)

AND/OR

Question 3 [15 marks]

- a. Describe five characteristics of a relational table. (5)
- b. What does it mean to say that a database displays both *entity integrity* and *referential integrity* and why are *entity integrity* and *referential integrity* important in a database? (5)
- c. Consider the STUDENT and CLASS tables below and provide the relational schema. [Note you will need to identify a suitable primary key for each table.] (5)

Students

Student ID	StudFirst Name	StudLast Name	StudStreet Address	StudCity	StudState	StudZipcode
60001	Zachary	Erich	1204 Bryant Road	Seattle	WA	98125
60002	Susan	McLain	101 C Street, Apt. 32	Redmond	WA	98052
60003	Joe	Rosales	201 Cherry Lane SE	Redmond	WA	98073
60004	Diana	Bariet	4141 Lake City Way	Woodinville	WA	98072
60005	Tom	Wicksrath	2100 Mineola Avenue	Bellevue	WA	98006

Classes

Class ID	Class Name	Class Category	Credits	Instructor ID	Classroom
900001	Advanced Calculus	Math	5	220087	2201
900002	Advanced Music Theory	Music	3	220039	7012
900003	American History	History	5	220148	3305
900004	Computers in Business	Computer Science	2	220387	5115
900005	Computers in Society	Computer Science	2	220387	5117
900006	Introduction to Biology	Biology	5	220498	3112
900007	Introduction to Database Design	Computer Science	5	220516	5105
900008	Introduction to Physics	Physics	4	220087	2205
900009	Introduction to Political Science	Political Science	5	220337	3308

AND/OR

Question 4 [15 marks]

- a. Describe (with examples) the difference between a *set*, *complement* and *null set*. (5)
b. Describe (with examples) the difference between a *subset*, *union* and *intersection*. (5)

Use the following to answer (c) and (d):

$$I = \{1;2;3;4;5;6;7;8;9;10\}$$

$$II = \{3;4;5;6\}$$

$$III = \{1;2;3\}$$

$$IV = \{11;12;13\}$$

- c. Do I and IV have any common members? Write your answer in the proper notation. (3)
d. If I want to join II and III (make them a union), how would I show this with proper notation? (2)

SECTION B – [15 marks] - ANSWER THE COMPULSORY QUESTION

Question 5

[15 MARKS]

Scenario: A music streaming service (such as Spotify)

Andile has been asked by his boss to draw the Entity Relationship Diagram (ERD) to set up a new database for a music streaming service. He has managed to find some of the information he needs below from interviewing a few people in the company. But he knows he is missing information about Primary and Foreign Keys. He is worried as his boss said this is a big client and his job is “on the line”.

Andile has collected the following information -

The music streaming service has multiple users who can create playlists and listen to songs. Each song has a unique title, artist, and album, and belongs to a specific genre.

Andile has collected the following entity information:

- User (with attributes: username and email)
- Playlist (with attributes: name and description)
- Song (with attributes: title, artist, album, and genre)

He also thinks he knows what the relationships are between these entities:

- A user can create multiple playlists
- A playlist can contain multiple songs, and a song can belong to multiple playlists
- A song belongs to a single playlist, and a playlist can have multiple songs

Help Andile keep his job by assisting him with creating an ERD using UML notation and indicate all primary and foreign keys.

END OF PAPER