FACULTY/COLLEGE	College of Business and Economics
SCHOOL	School of Consumer Intelligence and Information Systems
DEPARTMENT	Applied Information Systems
CAMPUS(ES)	APB
MODULE NAME	Information Systems 2A
MODULE CODE	IFS02A1
SEMESTER	First
ASSESSMENT OPPORTUNITY, MONTH AND YEAR	Final Summative Assessment Opportunity June 2022

ASSESSMENT DATE	10 June 2022	SESSION	08:00 – 11:00
ASSESSOR(S)	Prof Kennedy Njenga		
MODERATOR(S)	Dr Tope Samuel Adeyelure		
DURATION	3 hours (180 min)	TOTAL MARKS	100

NUMBER OF PAGES OF QUESTION PAPER (Including cover page)	3

INFORMATION/INSTRUCTIONS:
_____
- This is a closed-book assessment.
- Please answer all questions in Section A, Section B and Section C
- Read the questions carefully and answer only what is required.
- Number your answers clearly and correctly as per the question paper.
- Write neatly and legibly on both sides of the paper in the answer book, starting on the first page.
- The general University of Johannesburg policies, procedures and rules pertaining to written assessments apply to this assessment.
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## SECTION A [CASE STUDY QUESTIONS]   [30 MARKS]

As a graduate of the University of Johannesburg, you have been tasked to create a very simple database for a middle level college in your hometown to assist the college record information about professors, students and classes as follows;

- For each professor we need to store the College_ID, name and office number.
- For each student we need to store the student-id and name
- For each class the id (e.g., CSE 3311) and the name.
- Each class is taught by exactly one professor.
- Each student must take at least one class.
- For each class that a student took we need to store the grade

Simplifying assumptions: there is only one lecture for each class and only one semester in the database.

QUESTION 1

1.1   Using **crow foot notation**, model an Entity Relationship diagram (ERD) that captures the case study information about the college. Be certain to indicate primary keys, attributes, and relationships as per this notation.

(20)

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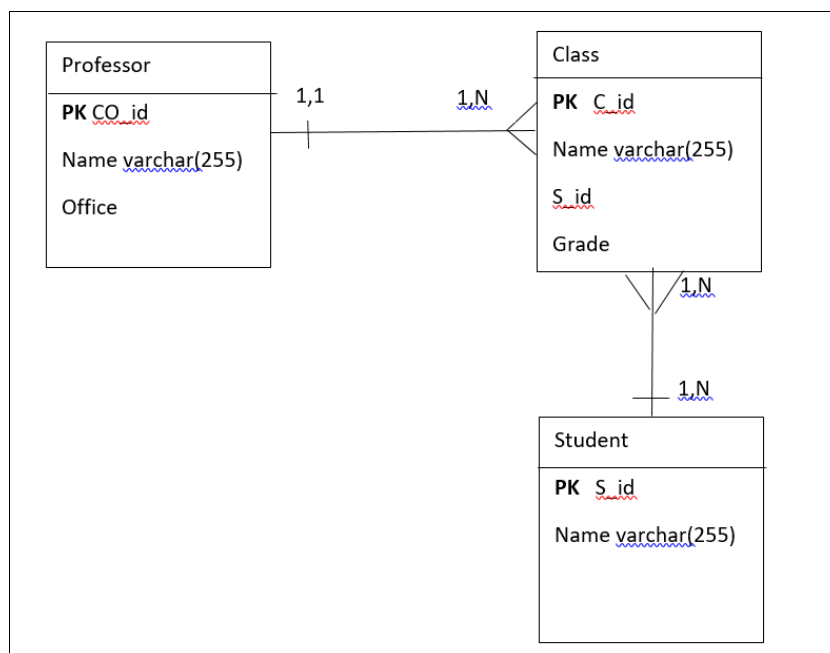
1.2   Do you think entity integrity is important for the database you would design for this college? Define entity integrity and state what would be the requirements to ensure that the design of your database has entity integrity.

> Yes. It is essential that all databases designed have entity integrity. [5 marks]
>
> Entity integrity is the condition in which each row (entity instance) in the table has its own unique identity.
> To ensure entity integrity, the primary key has two requirements:
> (1) all of the values in the primary key must be unique.
> (2) no key attribute in the primary key can contain a null.
>
> Primary keys are important because they are used to ensure that each row in a table is uniquely identifiable. They are also used to establish relationships among tables and to ensure the integrity of the data. A key consists of one or more attributes that determine other attributes. For example, an invoice number identifies all of the invoice attributes, such as the invoice date and the customer name.

(10)

SECTION B [GENERAL QUESTIONS]   [45 MARKS]

QUESTION 2

Explain the different basic types of join operations. What are they and how do they work?

Join operations can be classified as inner joins and outer joins. The inner join is the traditional join in which only rows that meet a given criterion are selected. The join criterion can be an equality condition (also called a natural join or an equijoin) or an inequality condition (also called a theta join.) An outer join returns not only the matching rows but the rows with unmatched attribute values for one table or both tables to be joined. The SQL standard also introduces a special type of join, called a cross join, that returns the same result as the Cartesian product of two sets or tables.

(15)

QUESTION 3

Explain the two SQL functions.

1. SQL is a data definition language (DDL). It includes commands to create database objects such as tables, indexes, and views, as well as commands to define access rights to those databases objects.

2. SQL is a data manipulation language (DML). It includes commands to insert, update, delete, and retrieve data within the database tables.

(15)

QUESTION 4

Explain your understanding of the term '**determination**' regarding the role of a key for attributes.

_____

_____

- Determination is the state in which knowing the value of one attribute makes it possible to determine the value of another.
    - Basis for establishing the role of a key
    - Based on the relationships among the attributes
    - The idea of determination is not unique to the database environment. You are familiar with the formula

revenue = profit. + cost

- This is a form of determination, because if you are given the *revenue* and the *cost*, you can determine the *profit*.

(10)

QUESTION 5

What does a complete information system compose of?

A complete information system is composed of
- People
- Hardware
- Software
- The database(s)
- Application programs, and procedures.

(5)

SECTION C [SQL QUESTIONS]   [25 MARKS]

QUESTION 6

What is a subquery? When is it used? Does the RDBMS deal with subqueries any differently from normal queries?

A subquery, also known as a nested query or an inner query, is a query that is embedded (or nested) inside another query. The inner query is always executed first by the RDBMS.
In the SQL statement, INSERT INTO tablename SELECT columnlist FROM tableneme;, the INSERT portion represents the outer query, and the SELECT portion represents the subquery. A user can nest queries (place queries inside queries) many levels deep; in every case, the output of the inner query is used as the input for the outer (higher-level) query.

(5)

Figure 1: Employee

_____

_____

Emp_Number	Emp_Name	Hire_Date	Salary
1234	Smith	1980-12-17	8000.00
1235	Allen	1982-12-09	1600.00
1236	Ward	1982-04-29	10000.00
1237	Jones	1981-04-02	2975.00
1238	King	1980-03-25	25000.00
1239	Blake	1981-05-02	3000.00

QUESTION 7

Write SQL code to modify column called "Emp_Name", by changing the datatype to varchar (25).

```
alter table Employee
alter column Emp_Name varchar(25);
```

(10)

QUESTION 8

Assuming we have our backup table called "Employee_BKP" available, write SQL code to update Salary by 0.25 times in Employee table for all Employees whose Salary is greater than or equal to R3000.

```
update Employee
set Salary = Salary * 0.25
where Emp_Number in (select Emp_Number from Employee_BKP where Salary >=3000);
```

(10)

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