UGANDA INSTITUTE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
END OF SEMESTER ONE EXAMINATIONS

ACADEMIC YEAR 2024/2025

DEPARTMENT: ICT

SEMESTER: ONE

PROGRAMME(S): DIPLOMA IN INFORMATION COMPUTER SCIENCE (DCS)

YEAR OF STUDY: TWO

COURSE: DATABASE DESIGN II

COURSE CODE : CSC212

DATE: MONDAY 16TH, DECEMBER 2024

TIME: 2:00 PM – 5:00 PM

DURATION: 3 HOURS

INSTRUCTIONS:

(i) This paper contains two Sections: A (40 marks) & B (60 marks).

(ii) Attempt ALL questions in Section A, and ONLY THREE questions in Section B.

(iii) All questions in Section B carry equal marks.

(iv) Credit will be given for use of relevant examples and illustrations.

(v) Begin each number in Section B on a new page of the answer sheet.

(vi) DO NOT write on this question paper.

SECTION A [40 MARKS]

Attempt ALL questions in this section

Question 1

a) What is database security? **(3 marks)**
b) Define a threat to database security. **(3 marks)**
c) Name five common threats to database security. How can each of them be prevented against? **(10 marks)**
d) In database access control there is a principle called "least privilege". What does this principle emphasize? **(4 marks)**
e) Why are backups essential, and what is one common backup type? **(4 marks)**
f) How does encryption protect a database, and when should it be used? **(4 marks)**
g) How can insider threats be mitigated in database administration? **(4 marks)**
h) What is database auditing, and why is it important? **(4 marks)**
i) Distinguish between GRANT and REVOKE **(4 marks)**

SECTION B [60 MARKS]

Attempt **ONLY THREE** Questions in this Section.

Question 2

a) Define Normalization **(2 marks)**
b) Explain purpose for Normalization in Database design **(6 marks)**
c) Normalize the table below from UNF to 3NF **(12 marks)**

Consider the table “Client Rental” below, created after gathering requirements from a certain organization

clientNo	cName	propertyNo	pAddress	rentStart	rentFinish	rent	ownerNo	oName
CR76	John Kay	PG4	6 Lawrence st, Glasgow	1-jul-00	31-Aug-01	350	C040	Tina Murphy
		PG16	5 Novar Dr, Glasgow	1-sep-01	1-sep-01	450	C093	Tony Shaw
CR56	Aline Stewart	PG4	6 Lawrence st, Glasgow	1-Sep-99	10-Jun-00	350	C040	Tina Murphy
		PG36	2 Manor Rd, Glasgow	10-Oct-00	1-Dec-01	375	C093	Tony Shaw
		PG16	5 Novar Dr, Glasgow	1-Nov-02	10-Aug-03	450	C093	Tony Shaw

Question 3

a) Describe what entity types represent in an ER model and provide examples of entities with a physical or conceptual existence. **(4 marks)**
b) Describe what relationship types represent in an ER model and provide examples of unary, binary, ternary, and quaternary relationships. **(4 marks)**
c) Describe what attributes represent in an ER model and provide examples of simple, composite, single-value, multi-value, and derived attributes. **(4 marks)**
d) Describe what the multiplicity constraint represents for a relationship type. **(4 marks)**
e) Illustrate a recursive relationship **(4 marks)**

Question 4

Create an ER diagram for each of the following descriptions:

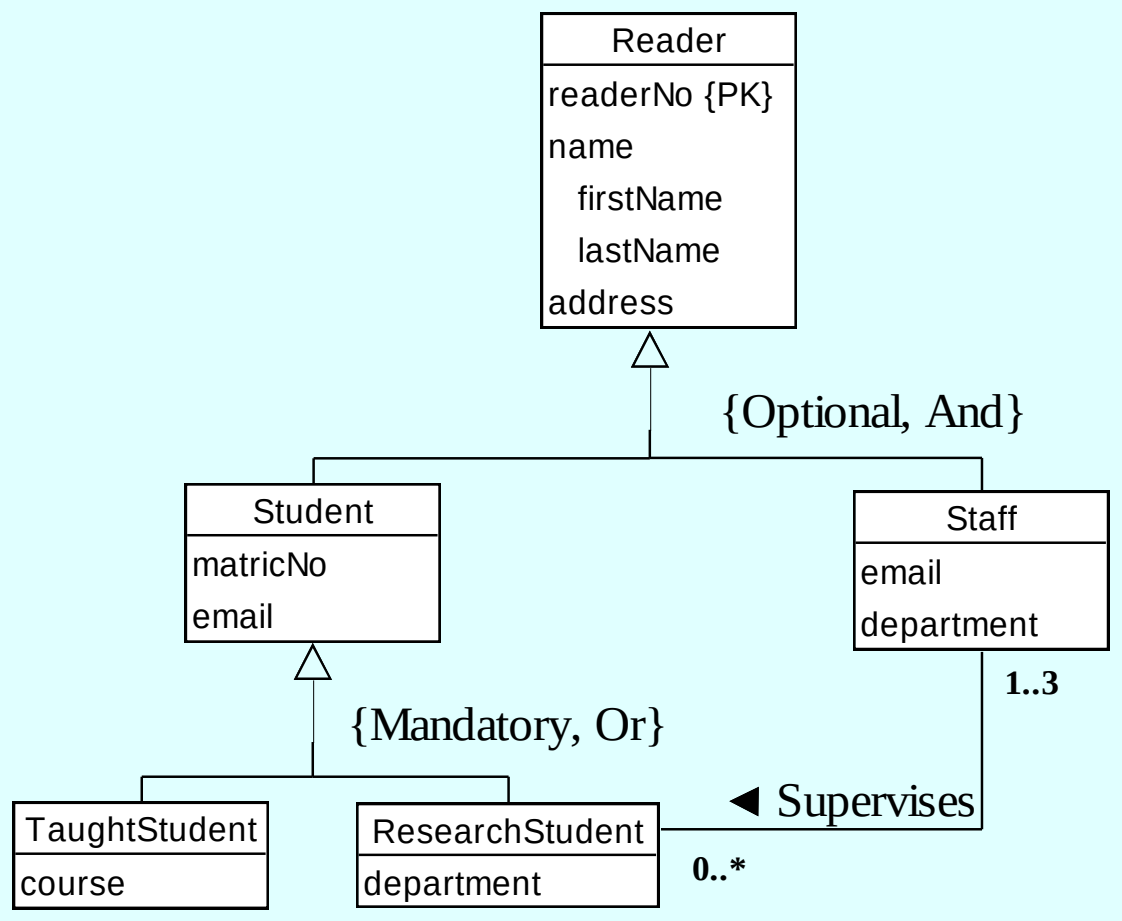
a) Each company operates four departments, and each department belongs to one company. (Note when the exact cardinality is known (in this example, 4) a value can replace the multiplicity range. **(4 marks)**
b) Each department in part (a) employs one or more employees, and each employee works for one department. **(4 marks)**
c) Each of the employees in part (b) may or may not have one or more dependants, and each dependant belongs to one employee. **(4 marks)**
d) Each employee in part (c) may or may not have an employment history. **(4 marks)**
e) Represent all the ER diagrams described in (a), (b), (c), and (d) as a single ER diagram. **(4 marks)**

Question 5

a) Define a transaction **(2 marks)**
b) Use an illustration to explain what a transaction is **(4 marks)**
c) Explain four properties of transaction **(4 marks)**
d) Explain what you understand by concurrency control in transaction management **(4 marks)**
e) Why is concurrency control needed in transaction management? **(6 marks)**

Question 6

Explain the business scenario represented by the EERD below **(20 marks)**



Question 7

The table below shows information about some employees of UICT. Use it to answer the questions that follow.

Table: Employees

EmployeeID	Name	Address	Email	ContactPhone	Department	Salary ($)
101	Alice Johnson	123 Main St, NY	alice.johnson@xyz.com	555-1234	HR	50000
102	Bob Smith	456 Oak St, NY	bob.smith@xyz.com	555-5678	IT	70000
103	Charlie Brown	789 Pine St, NY	charlie.brown@xyz.com	555-9101	Sales	60000
104	Diane Carter	321 Elm St, NY	diane.carter@xyz.com	555-1122	Marketing	55000
105	Edward Wilson	654 Maple St, NY	edward.wilson@xyz.com	555-3344	IT	80000

a) Write the SQL statement that will create a Database called: **UICT_EMPLOYEE_DB** (2 marks)

b) Write the SQL statements that will create the table **EMPLOYEE**, within the above database with **EmployeeID** as the primary key. **(3 marks)**

c) Write an SQL statement that will insert all values into the table as shown above. **(3 marks)**

d) The HR manager needs a list of email addresses for employees in the IT department to share updates about an upcoming technology workshop. Write an SQL query to retrieve the names and email addresses of all employees in the IT department. **(2 marks)**

e) The finance team is conducting a salary review and wants to identify all employees earning more than $60,000 for potential bonuses. Write an SQL query to fetch the names and salaries of employees earning above $60,000. **(2 marks)**

f) Management is planning performance-based incentives and wants to prioritize employees with the highest salaries. Write an SQL query to display all employee details sorted by salary in descending order to help them make decisions. **(2 marks)**

g) The company is assessing its staffing distribution across departments to determine where additional hires are needed. Write an SQL query to count the number of employees in each department. **(3 marks)**

h) Diane Carter recently changed her phone number. Write an SQL query to update her contact phone number in the system to 555-9999. **(3 marks)**

END