

# 2024 CpSc Q11

Section: Database Design and Development

Topic: Functional and Aggregate Requirements —  
Entity-Occurrence Diagram

## Question Summary

- (a) (i) From the end-user requirements, identify one functional requirement.
- (a) (ii) State an aggregate function needed for implementing this requirement.
- (b) Using the sample data, complete an entity-occurrence diagram showing entities, instances, and their associations.

## Worked Solution

(a)(i) A functional requirement describes what the database must be able to do. From the end-user requirements, an example would be:

- ‘The system must be able to calculate the number of classes run by each instructor.’

(a)(ii) To implement this, an aggregate function is required — specifically, the COUNT() function, to count how many classes each instructor runs.

(b) The entity-occurrence diagram represents data instances and their relationships.

From the sample data:

Entities: Instructor, Class, and Member.

- Each Instructor can run one or more Classes.
- Each Member can attend one or more Classes.

This gives two one-to-many relationships:

1. Instructor → Class
2. Member → Class

Instances (examples):

- Instructor: Ins1, Ins2, Ins3
- Class: Class1, Class2, Class3, Class4
- Member: Mem1, Mem2, Mem3

So, the diagram would show each Instructor linked to the Classes they run, and each Member linked to the Classes they attend. For example:

Ins3 → Class2, Class3

Mem1 → Class2, Class3

Mem2 → Class2, Class4

Mem3 → Class1

This captures all entities, instances, and associations required by the question.

## **Final Answer**

Final Answer

(a)(i) Functional requirement: calculate the number of classes run by each instructor.

(a)(ii) Aggregate function: COUNT().

(b) Entities: Instructor, Class, Member — linked by one-to-many relationships as described above.

## **Revision Tips**

- Functional requirements describe what the system should do — e.g. 'calculate total', 'find highest value'.
- Aggregate functions (COUNT, SUM, AVG, MAX, MIN) are used to perform calculations across groups of data.
- An entity-occurrence diagram shows real examples (instances) of data and how they are related.
- Remember: one-to-many relationships are drawn with 'crow's foot' notation in formal diagrams.

## **Exam Alignment**

### Exam Alignment

Matches the 2024 SQA marking instructions — one mark for a correct functional requirement, one mark for identifying COUNT as the correct aggregate function, and two marks for correctly representing entities, instances, and associations in the entity-occurrence diagram.

Light



Photosystem II



Electron  
transport chain

Water



Photosystem I



$\text{NADP}^+ + \text{H}^+$

$\text{ADP} + \text{P}_i \longrightarrow \text{ATP}$

