UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE *of* INFORMATICS *and* ELECTRONICS

Department of Computer Science
and Information Systems

Repeat Examination Paper

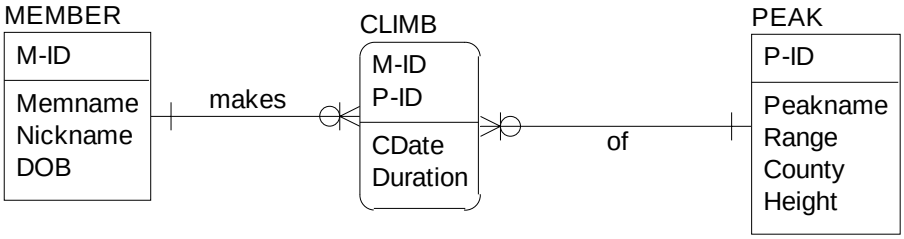
Academic Year:	**2005/06**	Semester:	**Semester 1**
Module Title:	**Introduction to Systems Analysis**	Module Code:	**CS4513**
Duration of Exam:	**2½ Hours**	Percent of Total Marks:	**82 (I grades) 100 (Repeats)**
Lecturer(s):	**Norah Power**	Paper marked out of:	**100**

Instructions to Candidates:

- **Please attempt all 10 questions.** They are all related and are best answered in the order in which they are presented.

Mountaineers Club

A mountaineers' club requires a little database that keeps track of its members and their conquests of the various mountain peaks that they climb. The E-R diagram below shows the structure of the database. Each member has an ID and a nickname as well as a name and Date of Birth (DOB). The duration of a climb is given in hours. All heights are in metres.



Q1

(a) What kind of entity is CLIMB? One of its identifying attributes has been blanked out. What is that attribute?

(b) In this model, Cdate refers to the date on which a member **first** climbed that peak. What would be the significance of modelling Cdate as <u>another</u> identifying attribute of CLIMB?

[7 Marks]

Q2

Write the record schemas for the Relations implied by the E-R diagram and the description above, consistent with your answer to Q1. All your Domains should be declared beforehand.

[10 marks]

Q3

(a) Write the State schema in Z for the database for this game. Include the existential and referential integrity constraints.

(b) Write the referential integrity constraints in SQL.

[16 marks]

Q4

Write **Relational Algebra** operations for the following queries. Use union or intersection operations where needed. Do not use 'and' or 'or' or any similar keywords.

i) List the names and heights of all peaks in the Mournes range

ii) List the names of all the players who were born before 01-Feb-1970

iii) Get the name, DOB and nickname of members who completed climbs taking more than 12 hours.

iv) The Ids of members who have climbed the peak identified by P101

v) The Ids of peaks that have been climbed by M100, M103 or M108

[15 marks]

Q5

Write **Relational Calculus** expressions for the (3) odd-numbered queries in Q4

[6 marks]

Q6
Write **Relational Calculus** expressions for the following queries:

i) How many members are there in the club?
ii) How many peaks has member M100 climbed?
iii) What is the name and range of each peak in Co Galway?
iv) Make a list of each mountain range along with its county.
v) List the height of each peak climbed by the member nicknamed 'Fidel'

[15 marks]

Q7
Re-write the (2) even-numbered queries in Q6 in **SQL**

[4 marks]

Q8
Express the following queries as **SQL** statements:
(Please write each clause on a separate line.)

i) Make a list of each mountain range along with its highest peak
ii) For each peak what age was the youngest climber to conquer it?
iii) Which peak has been conquered most often?

[9 marks]

Q9
Write an operation schema to delete a particular member identified by **m?** and all the climbs made by him.

[9 marks]

Q10
Write an operation schema to insert into the database a new conquest of a peak identified by **p?** by a member identified by **m?** Both **m?** and **p?** must already exist in the database. The climb took 5 hours on the 5th August 2006.

[9 marks]