UNIVERSITY *of* LIMERICK

OLLSCOIL LUIMNIGH

COLLEGE *of* INFORMATICS *and* ELECTRONICS

Department of Computer Science
and Information Systems

Repeat Examination Paper

Academic Year:	**20006/07**	Semester:	**Semester 1**
Module Title:	**Introduction to Systems Analysis**	Module Code:	**CS4513**
Duration of Exam:	**2½ Hours**	Percent of Total Marks:	**80 (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.

Visiting Students

A university requires a little database to keep track of its visiting students and the modules that they take. The ER diagram below shows the structure of the database. Each student has a student ID, a name, a group (such as Erasmus or Study Abroad), a country of origin and Date of Birth (DOB). Each module that is available to students has a specific number of credits. The database keeps track of the modules that each visiting student studies, the grades they receive and the rating that each student gives to each module taken.

Q1

What kind of relationship is shown in the diagram above? What are its attributes? Indicate the identifying attributes of the relationship.

[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 used in this system. Include the existential and referential integrity constraints.
(b) Indicate how the referential integrity constraints would be written in the Create table statement 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 lecturers of all the 5 credit modules
ii) Name all the students who were born after 01-May-1989
iii) Get the name and DOB of students who got A1s or A2s in any of the modules they studied.
iv) List the module codes of modules that have been taken by U.S. students
v) Get the names of lecturers who received ratings of 1 or 2 from visiting students.

[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 visiting students have taken module CS4513?
ii) How many different ratings are there?
iii) What is the name and country of each student who got an A1 in a 5 credit module?
iv) For each student/module in which the student rated the module 3 or higher, give the student Id, module code and module credits.
v) For each student/module, list the name of the student along with the module name and the lecturer name.

[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) List each module code along with its average rating by visiting students
ii) List each lecturer along with his/her average rating by visiting students.
iii) Give full details of the module(s) that have been taken most often by visiting students.

[9 marks]

Q9
Write an operation schema to delete from the database a particular student identified by **s?** along with all the modules she has taken.

[9 marks]

Q10
Write a schema for an operation that tries to insert into the database the fact that a student identified by **s?** is taking a module identified by **m?** The student exists but not the module, so the operation to insert the fact is rejected, giving the message: 'No such module'.

[9 marks]