INSTITUTE OF TECHNOLOGY BLANCHARDSTOWN

Year	Year 1
Semester	Semester 2
Date of Examination	Monday 14th May 2012
Time of Examination	9.30am - 11.30am

Prog Code	BN002	**Prog Title**	Higher Certificate in Science in Computing in Information Technology	**Module Code**	COMP H1029
Prog Code	BN013	**Prog Title**	Bachelor of Science in Computing	**Module Code**	COMP H1029
Prog Code	BN104	**Prog Title**	Bachelor of Science (Honours) in Computing	**Module Code**	COMP H1029

Module Title	Database Fundamentals

Internal Examiner(s): ***Geraldine Gray***
External Examiner(s): ***Dr Richard Studdert, Mr Michael Barrett***

Instructions to candidates:

1) **To ensure that you take the correct examination, please check that the module and programme which you are following is listed in the tables above.**
2) **Candidates should attempt ALL parts of Question 1, and any other THREE questions.**
3) **Question 1 is worth 40 marks. The remaining questions are worth 20 marks each.**

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SECTION A – COMPULSARY

Question 1.
Answer ALL parts to question 1. Each part is worth 4 marks.

a) Explain the term ***persistence*** in relation to data storage.

b) List ***three*** advantages of using a database.

c) Explain, with the aid of an example, why you might use a ***check constraint*** in an SQL Create statement.

d) Explain what is meant by the ***Domain*** of an attribute in a database table. In your answer include an example of defining the domain for an attribute.

e) Identify the entities in the following description: "A book club keeps track of it members, which books have been reviewed and the date and venue of each meeting."

f) Explain, with the aid of an example, what is meant by a **1:1** relationship between two entity types.

g) Explain the term ***Referential Integrity***. Give an example to illustrate your answer.

h) Give two ways in which a database **system failure** may occur. What data would be affected?

i) Explain the difference between a ***Having*** clause and a ***Group By*** clause in an SQL statement.

j) Explain the following SQL query:

```
SELECT employee_name, salary, department_number
FROM employee_table
WHERE salary < ANY  ( SELECT MIN(salary)
                      FROM employee_table
                      GROUP BY department_number);
```

(40 marks)

SECTION B – Answer THREE questions

Question 2.

You have been asked to model the data requirements for a secondary school based on the following description:

The database must record details on pupils, classes, subjects, grades and teachers. Details recorded for each pupil include their name, address, date of birth and contact details for their parent or guardian. Each class will have 30 pupils. A pupil belongs to one class only. Attributes for a class include the class name and year. A pupil will select a number of subjects, and a subject can be selected by a number of pupils. A pupils Christmas and summer grades are recorded for each subject. A teacher can teach one or more subjects. A subject can be taught by one or more teachers. The database records how many hours per week a teacher spends teaching each subject.

a) Represent the system description above as an Entity-Relationship Diagram. Ensure you have the correct cardinality and participation for each relationship. Include suitable attributes in your diagram.

16 marks

b) Pick TWO related entitles from your ERD in answer to part a) above, and convert them to a relational model.

4 marks

(Total: 20 marks)

Question 3.

Team ID	Team Name	Manager	Match ID	Time	Date
C7	Corduff	J. Ryan	454	11:30	19/05/12
V7	Verona	D. Murphy	454	11:30	19/05/12
C7	Corduff	J. Ryan	460	10:00	26/05/12
H7	Hartstown	H. Boyle	460	10:00	26/05/12

a) Using the table above to illustrate your answer, explain three problems that can arise when working with database tables that are not in 3rd normal form.

8 marks

b) Convert the table above into a set of relations in 3rd normal form. At each step of the process, identify if you are handling a repeating group, a partial dependency or a transitive dependency.

12 marks

(Total: 20 marks)

Question 4.

a) Briefly explain each of the ACID properties.

4 marks

b) Explain, with the aid of an example, how the 'lost update' problem can arise. Which ACID properties are violated when a lost update occurs?

10 marks

c) Explain one technique to solve the lost update problem. Show how it would work in your example from part b) above.

6 marks

(Total: 20 marks)

Question 5.

a) Give the SQL statement to create the *Product* table as defined below. Use appropriate data types and constraints. *supplierID* references the Supplier table which has *supplierID* as it's primary key.

Product (productID(PK), description, supplierID(FK), costPrice, sellingPrice)

8 marks

b) Give the SQL statement to insert ONE row of data into the Product table created in part a) above. Pick suitable values for each attribute.

2 marks

c) Write SQL statements to select the following data from the Product table defined in a) above:

i. List all unique supplierID's in the Product table.

2 marks

ii. Give the description of all products that have a sellingPrice more than 55.00 Euro.

2 marks

iii. Give the productID and description of all products whose ID starts with the string 'DC01'.

3 marks

iv. What is the minimum sellingPrice, the maximum sellingPrice and the average sellingPrice?

3 marks

(Total: 20 marks)