

# INSTITUTE OF TECHNOLOGY

## BLANCHARDSTOWN

<b>Year</b>	Year 1
<b>Semester</b>	Semester 2
<b>Date of Examination</b>	Wednesday 26 <sup>th</sup> May 2010
<b>Time of Examination</b>	12.30 – 2.30

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

<b>Module Title</b>	Databases
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**External Examiner(s):** *Dr Richard Studdert,*  
*Mr John Dunnion*

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### 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) Briefly explain each of the three layers of the ANSI-SPARC architecture for databases.
- b) Explain the terms **COMMIT** and **ROLLBACK** in the context of transaction management.
- c) Give an overview of what a transaction log is, and how it is used by a DBMS.
- d) What is the role of a Database Management System?
- e) Identify the entities in the following description: "A book shop needs to keep track of all books in stock, suppliers for each book, and needs to record each purchase order for new books for the shop."
- f) Explain, and give an example of, a **unary** relationship between two entities.
- g) Explain, and give an example of, a **derived attribute**.
- h) Why would you add a **primary key** to a database table? Illustrate your answer with an example.
- i) Explain the following excerpt from a SQL Create statement:  
  

```
CREATE TABLE dept (  
  deptno INT CHECK (deptno BETWEEN 10 and 49), . . . .)
```
- j) Explain the difference between a HAVING clause and a WHERE clause in a SQL SELECT statement.

## **SECTION B – Answer THREE questions**

### **Question 2.**

A garage maintains a stock of spare parts for Renault cars. Each part has a part number, a description, and a price. The garage also records the quantity in stock for each part. The garage keeps a record of all cars they have worked on. Cars are identified by their registration number. The garage also records the car model and the owner's name, address and phone number.

Cars can be booked in for a service or to mend a fault. The cost of the service will include a labour cost, and the cost of spare parts used.

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

**13 marks**

- b) Convert the ERD from part a) above to a relational model.

**7 marks**

### Question 3.

- a) Explain why you would bring all relations to 3<sup>rd</sup> normal form when designing a database. Give examples of three types of problems that may arise if relations are not in 3<sup>rd</sup> normal form. (You do not need to explain 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> normal form in your answer.)

**8 marks**

b)

OrderID(PK)	Order date	Customer name	Part name	Quantity ordered	Price
Ord001	10/05/2010	ITB	Box-A4 Paper	50	100
Ord001	10/05/2010	ITB	Box-A3 Paper	1	10
Ord002	11/05/2010	ITB	Box-A4 red paper	2	10

Convert the table above into a set of relations in 3<sup>rd</sup> 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**

### Question 4.

- a) Briefly explain each of the ACID properties.

**4 marks**

- b) Explain, with the aid of an example, how the **temporary update** problem can corrupt values in a database?

**10 marks**

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

**6 marks**

## Question 5.

- a) Give the SQL statement to create the following relation. Use appropriate data types and constraints. The attribute **animalType** should be limited to the following values: (cat, dog, hamster).

Pet (petID(PK), petName, dateOfBirth, animalType)

**8 marks**

- b) Give the SQL to insert ONE row of data into the Pet 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 Pet table defined above:

- i. List all details in the Pet table

**1 marks**

- ii. Show the name and date of birth of all dogs in the table

**2 marks**

- iii. List which types of animals are over 5 years of age (i.e. born before 01-05-2005)? Show each animal type ONCE.

**3 marks**

- iv. How many of each type of animal are listed in the table? (i.e. how many dogs, how many cats, and how many hamsters are in the table).

**4 marks**