

INSTITUTE OF TECHNOLOGY

BLANCHARDSTOWN

Year	Year 1
Semester	Semester 2
Date of Examination	Friday 26 th August 2011
Time of Examination	10.00am – 12.00pm

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 In Information Technology	Module Code	COMP H1029
Prog Code	BN104	Prog Title	Bachelor of Science (Honours) in Computing	Module Code	COMP H1029

Module Title	Databases – Autumn paper
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External Examiner(s): *Dr Richard Studdert,*
Mr John Dunnion

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.

DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO

SECTION A – COMPULSARY

Question 1.

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

- a) List **three** functions of a DBMS.
- b) Explain, with the aid of an example, why you might use a **check constraint** in an SQL Create statement.
- c) 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.
- d) Explain the difference between an **inner join** and an **outer join**.
- e) Explain the difference between the **Order By** clause and the **Group By** clause in an SQL Select query.
- f) Explain, with the aid of an example, what is meant by a **ternary** relationship between two entity types.
- g) Explain, with the aid of an example, what is meant by a **multi-valued** attribute.
- h) Explain what is meant by a **transitive dependency** in a list of attributes, and explain why it causes a problem.
- i) What is meant by the **delete anomaly** as may arise when working with a badly designed database table.
- j) A DBMS must maintain four ACID properties. Explain the ACID properties of **atomicity** and **durability**.

(40 marks)

SECTION B – Answer ANY THREE questions

Question 2.

You have been asked to model the data requirements for a small theatre based on the following description of their venue:

The theater runs a number of events. For each event, the theatre records the name of the event, the date of the event, the time of the event, the ticket price, how many seats are available, and how many seats have been sold so far. All tickets for an event are the same price.

The theatre also maintains a list of all customers who have booked tickets with them. Details stored include the customer's name, address, contact phone number and credit card details.

Finally the theatre records the details of each booking made. A booking would be made by a customer for a particular event. Details recorded include the number of seats booked, and the cost of the booking.

- 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.

5 marks

- c) Why is an ERD a better way to document a data model than a paragraph of text?

2 marks

(20 marks)

Question 3.

Transaction ID(PK)	Transaction date	CustID	CustName	Item Purchased	Quantity purchased	Price
T436	1/08/2011	C33453	Helen	Tennis Racket	1	40
T436	1/08/2011	C33453	Helen	Tennis Ball	10	0.50
T437	2/08/2011	C85663	Jack	Goggles	1	10

- a) Not all attributes in the table above are functionally dependent on the primary key. Explain what this statement means.
In your answer, give examples of three ways in which an attribute is not functionally dependent on the primary key. Use the data above to illustrate your answer where relevant.

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 bringing the tables to 1st, 2nd or 3rd normal form.

12 marks

(20 marks)

Question 4.

One of the four ACID properties is isolation.

- a) Explain what is meant by transaction isolation. Give an overview of one problem that can arise if isolation is not guaranteed by a DBMS.

6 marks

- b) How is locking used by a DBMS to guarantee transaction isolation? In your answer, explain how locking is implemented using the two-phase locking protocol.

8 marks

- c) Describe how deadlock can arise, and how a DBMS handles deadlock.

6 marks

(20 marks)

Question 5.

- a) Give the SQL statement to create a holiday table as defined below. Use appropriate data types and constraints. DestinationID references a table called Destination which has a primary key called DestinationID.

Holiday (HolidayID(PK), description, destinationID(FK),
pricePerWeek, startDate, endDate)

8 marks

- b) Give the SQL statement to insert ONE row of data into the Holiday 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 Holiday table created in part a) above:

- i. Show the description and pricePerWeek for all holidays costing less than €700.00 per week

2 marks

- ii. List all details of holidays with a start date in June 2011.

2 marks

- iii. What is the average price per week for a holiday?

2 marks

- iv. What is the average price per week for each destinationID?

4 marks

(20 marks)