

IMIS HIGHER DIPLOMA QUALIFICATIONS

**DATABASE DESIGN
(H4)**

Thursday 5th December 2013 10:00hrs – 13:00hrs

DURATION: 3 HOURS

Candidates should answer ALL the questions in Part A and THREE of the five questions in Part B. Part A carries 40% of the marks available and Part B carries 60%. Candidates should allocate their time accordingly.

No reference material of any kind may be taken into the examination.

[Turn over]

PART A.**Answer ALL questions in this section.****Question A1.**

In the context of the three-level ANSI-SPARC architecture, briefly describe the following

- The external level
- The conceptual level
- The internal level

Explain how this achieves the objective of logical and physical data independence.

(5 marks)

Question A2.

An Object-oriented Data Model (OODM) is the basis for an Object-oriented Database Management System. Define the following OODM terms

- Object
- Class
- Method
- Class Hierarchy
- Inheritance

(5 marks)

Question A3.

Explain the difference between the following SQL data definition commands

- CREATE TABLE
- CREATE TABLE AS
- CREATE VIEW

(5 marks)

Question A4.

Explain the concept of referential integrity using a suitable example to illustrate your answer.

(5 marks)

Question A5.

List FIVE advantages that a Distributed Database Management System might have over a traditional centralised database system.

(5 marks)

Question A6.

Briefly explain FIVE differences between an on-line transaction processing system (OLTP) and a data warehouse.

(5 marks)

Question A7.

Define the term cache as used in database performance tuning and explain the difference between the data cache (or buffer cache) and the SQL cache (or procedure cache).

(5 marks)

Question A8.

Explain the difference between a data administrator and a database administrator. Can an organisation make do with just one person for the two roles?

(5 marks)

(Total 40 marks)

[Turn over]

PART B.**Answer any THREE of the five questions in this section****Question B9.**

Dough-Boy is a small bakery company employing 20 people with branches in two locations within a small city. Currently it has separate systems for production control, personnel management, order handling and accounts.

- a) Describe some of the problems that Dough-Boy is likely to face having these separate systems. (10 marks)
- b) The management of Dough-Boy have asked you to prepare a report describing the advantages of using a Database Management System for handling the data requirements of the company. Describe FIVE of these advantages. (10 marks)

(Total 20 marks)**Question B10.**

Rob, Coronel and Crockett (2008) describe the six phases of the Database Lifecycle, starting with the initial study. Describe the four parts of this initial study, namely

- a) Analysis of the company situation (5 marks)
- b) Definition of problems and constraints (5 marks)
- c) Definition of objectives (5 marks)
- d) Definition of scope and boundaries (5 marks)

(Total 20 marks)

Question B11.

Dreamboats is an organisation that handles the hiring out of luxury yachts for their owners. Each yacht and its bookings is handled by an agent to ensure the smooth running of the hiring. One of the tables in the database holds details of the yachts that are in the system. This is the CREATE TABLE command used to define the table (N.B. the syntax used is indicative but not meant to represent a specific database management system. Line numbers have only been added to aid identification)

```

1   CREATE TABLE YachtforHire(
2       YachtNumber    VARCHAR(5)    NOT NULL
3       YachtMake      VARCHAR(15)   NOT NULL
4       CaptainIncluded CHAR(1)      DEFAULT "Y"
5       NumberofBerths SMALLINT
6       OwnerNumber    VARCHAR(5)    NOT NULL
7       AgentNumber    VARCHAR(5)
8   PRIMARY KEY (YachtNumber)
9   FOREIGN KEY (OwnerNumber) REFERENCES Owner ON DELETE NO
ACTION ON UPDATE CASCADE
10  FOREIGN KEY (AgentNumber) REFERENCES Agent ON DELETE SET
NULL ON UPDATE CASCADE);

```

- a) For line 1 explain the meaning of VARCHAR(5) (2 marks)
- b) For line 2 explain the meaning of NOT NULL (1 mark)
- c) For line 3 explain the meaning of CHAR(1) (1 mark)
- d) For line 3 explain the meaning of DEFAULT "Y" (2 marks)
- e) For line 4 explain the meaning of and justify the use of SMALLINT (2 marks)
- f) For line 8 explain the meaning of PRIMARY KEY (1 mark)
- g) For line 9 explain the meaning of FOREIGN KEY...REFERENCES (2 marks)
- h) For line 9 explain the meaning of ON DELETE NO ACTION (3 marks)
- i) For line 10 explain the meaning of ON DELETE SET NULL

- j) For line 10 explain the meaning of ON UPDATE CASCADE (3 marks)
(3 marks)

(Total 20 marks)

Question B12.

Transparency is an important aspect of a Distributed Database Management System environment

- a) In relation to Distribution Transparency explain the difference between
- i. Fragmentation transparency
 - ii. Location transparency
 - iii. Local mapping Transparency
- (12 marks)
- b) In relation to Transaction Transparency describe how a distributed transaction accesses data held at more than one location. (4 marks)
- c) Explain in outline how a Distributed Query processor (DQP) works (4 marks)

(Total 20marks)

Question B13.

- a) Describe the Extraction, Transformation and Loading (ETL) processes in a data warehouse project and some of the issues that need to be considered (12 marks)
- b) Briefly describe FOUR end-user access tools that could be used in a data warehousing environment (8 marks)

(Total 20 marks)

END OF EXAMINATION