BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

SYSTEMS ANALYSIS & DESIGN

Monday 21st March 2016 - Morning

Answer **any** FOUR questions out of SIX. All questions carry equal marks
Time: TWO hours

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

The marks given in brackets are **indicative** of the weight given to each part of the question.

Calculators are NOT allowed in this examination

Case Study for both sections A and B

The 'Exotic Treat' company

The 'Exotic Treat' company is a small, independent business that sells exotic sweets and cakes to the public. The proprietor is very keen on baking and specialises in making homemade sweets and cakes for sale in the shop. As well as making much of the confectionery sold in the shop, the proprietor also buys sweets and some cakes from suppliers to increase the range of products for sale.

At the end of each day the proprietor reviews the sales of the homemade items. He then decides how many sweets and cakes to make for the next day. This is also partly to replenish any stock that needs to be bought from suppliers, and also to keep track of the sales. Once a week the proprietor checks the stock to dispose of anything that is past its 'use by' date. He also checks to see if any raw ingredients for the homemade products, or any pre-made sweets and cakes need to be ordered from the suppliers.

The proprietor orders supplies on a Cash On Delivery basis, so all deliveries are paid for immediately.

Section A
Answer Section A questions in Answer Book A

A1

    a)   Produce a top level data flow diagram of the 'Exotic Treat' company.

(20 marks)

    b)   Compare a data flow model with an Entity Relationship model. There is no need to produce a complete ERD but you may wish to illustrate your answer with examples.

(5 marks)

A2

    a)   Describe the role and responsibilities of the following:

        i)   Business analysts,

        ii)   Stakeholders.

(10 marks)

    b)   Describe the phases of the System Development Life Cycle explaining the involvement of the two roles in part (a) in the relevant phases.

(15 marks)

A3

    a)   Explain what is meant by prototyping and why this is used in systems development.

(6 marks)

    b)   Explain the differences between throwaway prototyping and system (or evolutionary) prototyping and how each approach is used in systems development.

(10 marks)

    c)   Describe the basic process of User Interface Design and the role that prototyping plays in this process.

(9 marks)

Section B
Answer Section B questions in Answer Book B

B4

The table below shows an example of a list of products ordered by the 'Exotic Treat' company described above.

Product code	Product name:	Supplier no.:	Supplier name:		
C7	Madeira cake	S23	A Jones		
	Order no: 27/2011	Order date: 3/8/2011	Order total: £210	Delivery code: 8/8/2011/1	Delivery firm: ABC
	Order no: 34/2011	Order date: 1/9/2011	Order total: £112	Delivery code: 6/9/2011/3	Delivery firm: XYZ
	.....	.....	.....	....	....
Product code: C9	Product name: Carrot cake	Supplier no.: S11	Supplier name: B Young		
	Order no: 29/2011	Order date: 14/8/2011	Order total: £112	Delivery code: 20/8/2011/11	Delivery firm: XYZ
	....	.....	....	....	
Product code: C6	Product name: Pavlova	Supplier no.: S23	Supplier name: A Jones		
	Order no: 25/2011	Order date: 24/7/2011	Order total: £150	Delivery code: 30/7/2011/10	Delivery firm: Z cars
	....	.....	.....	.....	.....

a) Normalise the table to produce a set of relations in the Third Normal Form. You must show all of your working explaining each step. You may assume that each product is provided by one supplier. State any further assumptions you make.

(18 marks)

b) Draw an Entity Relationship Diagram (ERD) based on the relations identified in part a).

(7 marks)

B5

a) Consider the following extra information about the 'Exotic Treat' system described above:

"There are two types of suppliers: local suppliers and foreign suppliers. The following data should be stored about each local supplier: Supplier no.,Supplier name, Email address, Town. The following data should be kept about foreign suppliers: Supplier no., Supplier name, Email address, Country, Currency.

An object of class Order consists of an order heading followed by order lines."

Explain the following relationships between classes using examples from the 'Exotic Treat' system to illustrate your answers:

i) Association,

ii) Aggregation or Composition, and

iii) Generalisation/Inheritance.

The examples should show relevant fragments of a class diagram.

(15 marks)

b) Provide a brief explanation of the following characteristics/attributes of a good software design: Reliable, General, Flexible, Reusable.

Which characteristic is particularly important for a design of a patient monitoring system in a hospital? Explain why.

(10 marks)

B6

a) Activity diagrams can be used to model different aspects of a system. Give examples of THREE different applications of activity diagrams in systems modelling.

(6 marks)

b) UML statecharts/state machines and activity diagrams are based on a similar notation. They have however completely different meanings. Discuss the main differences between these diagrams.

(6 marks)

c) Produce a state machine/statechart for the class Delivery in the 'Exotic Treat' system described above. You may assume that objects of this class are affected by the following 'events' specified in alphabetical order: amend a delivery, arrange a new delivery, cancel, complete, confirm. Note that existing delivery records can be amended only once.

(13 marks)