BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

SYSTEMS ANALYSIS & DESIGN

Monday 23rd March 2015 – Morning

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

Answer any <u>Section A</u> questions you attempt in <u>Answer Book A</u>
Answer any <u>Section B</u> questions you attempt in <u>Answer Book B</u>

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

Compu-Fix Computer Repairs

Compu-Fix is a computer repair company operating out of a small workshop. The owner, Lee is the only person working in the company but he hopes to expand and employ more engineers in the near future. At present Lee holds much of the information about repair jobs in a filing cabinet but this is rather disorganised and he realises that a computer system would be a better method especially as any new members of staff would also need access to this information.

When a customer brings in a faulty computer Lee logs the fault and the customer's details giving him/her an estimated date for the repair to be completed. Every day he checks the list of repairs and selects the jobs to be done that day. If he finds he doesn't have the required parts in stock for a repair he places a purchase order with his supplier and reschedules the job to a later date. When a repair is complete and the customer comes to collect the computer, Lee gives him/her an invoice and the customer pays immediately.

Once a week Lee checks his stock of parts, and orders any that are getting low from his supplier.

Section A

Answer Section A questions in Answer Book A

A1

   a) Explain the differences between a physical and a logical data flow diagram (DFD).

(9 marks)

   b) List the processes and the external entities that you would include on a LOGICAL top level data flow diagram (DFD) of the Compu-Fix company. (You do not need to draw the DFD). **(7 marks)**

   c) Produce a Use Case diagram for the Compu-Fix system. (Hint – correct <<include>> or <extend>> relationships will attract additional marks). **(9 marks)**

A2

   a) List SEVEN techniques for eliciting requirements. **(7 marks)**

   b) Explain TWO of these techniques in detail including the advantages and disadvantages of each technique. **(18 marks)**

A3

   a) Describe a system development method of your choice. You should include a description of the stages/phases of your method as well as the interim products produced at each stage. A diagram of the method should be produced if appropriate. **(15 marks)**

   b) Discuss whether your chosen method would be suitable for developing a new computer system to support Compu-Fix as described in the case study. **(10 marks)**

Section B

Answer Section B questions in Answer Book B

B4 The table below shows an example of a list of repair jobs in the Compu-Fix Computer Repairs company described in the case study:

. Jobcode: C28	Start date: 15/10/2014	End date: 19/10/2014	Customer name: A Smith	Customer tel. no.: 6071213
	Part code: CPUInt	Part details: INTEL Dual Core E7600	Supplier name: CompParts	Supplier tel. no.: 6224546
	Part code: RAM	Part details: 2GB Samsung DDR3	Supplier name: Electronix	Supplier tel. no.: 5121314
Job code: M13	Start date: 20/10/2014	End date: 23/10/2014	Customer name: P Jones	Customer tel. no.: 5081214
	Part code: FuseM	Part details: Fuse FX3	Supplier name: Electronix	Supplier tel. no.: 5121314

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. **(18 marks)**

b) Draw an entity relationship diagram (ERD) based on the relations produced in part (a).

(7 marks)

B5 Consider the following extra information about the Compu-Fix system described in the case study:

"Compu-Fix plan to employ two types of engineers: full time engineers and part time engineers. The following data should be stored about each engineer: *Engineer number, Engineer name, Address, Tel number.* For full time engineers *Annual salary* is also stored, while for part time *Hourly rate* and *Hours worked* are stored. "

"An object of class Computer consists of a System unit, a Keyboard, and a Monitor."

Explain the following relationships between classes using examples from the Compu-Fix company system to illustrate your answers:

i) Association,

ii) Aggregation or Composition,

iii) Generalisation/Inheritance. **(15 marks)**

a) Discuss at least TWO similarities and TWO differences between class diagrams and entity relationship diagrams. **(10 marks)**

[Turn over]

B6

a) Explain how the following UML diagrams relate to each other:

    (i)   class diagrams,

    (ii) sequence diagrams,

    (iii) state machines/statecharts. **(7 marks)**

b)

    (i)   Give a brief explanation of the role state machines/statecharts play in systems modelling. **(4 marks)**

    (ii) Produce a state machine/statechart for the class Job in the Compu-Fix system described in the case study. You may assume that objects of this class are affected by the following 'events' (listed in alphabetical order):

         cancel job, completion of job, create job, delete job, reschedule job, schedule job.

         Please note that jobs are deleted automatically 6 months after their completion or cancellation. **(14 marks)**