BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

SYSTEMS ANALYSIS & DESIGN

Monday 16th September 2019 - 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.

[Turn Over]

Case Study for both sections A and B

Case Study: Techno-repairs

Techno-repairs is a computer repair company operating out of a small workshop. The owner is the only person working in the company but they hope to expand and employ more engineers in the near future. At present the owner holds much of the information about repair jobs in a filing cabinet but this is rather disorganised and they realise 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, the fault and customer's details are logged, giving the customer an estimated date for the repair to be completed. Every day the owner checks the list of repairs and selects the jobs to be done that day. If the required parts are not in stock for a repair, a purchase order is raised with the relevant supplier and the job is rescheduled to a later date. When a repair is complete and the customer comes to collect the computer, they are given an invoice and pay immediately.

Once a week the owner checks the stock of parts and orders any that are getting low from the relevant supplier.

[Turn Over]

Section A
Answer Section A questions in Answer Book A

A1.

a) Produce a top level Data Flow Diagram (DFD) for Techno-repairs.

(15 marks)

b) Explain how DFDs and Entity Relationship Models (ERM) are related in information systems development. There is no need to produce a complete ERM, but you should illustrate your answer with examples related to Techno-repairs.

(10 marks)

A2.

a) Explain what is meant by “throwaway prototyping” and how it might be used in the early stages of developing a system for Techno-repairs.

(10 marks)

b) Briefly describe how prototypes can be used in other stages of the system development life cycle.

(10 marks)

c) Briefly explain any potential disadvantages of prototyping in information systems development.

(5 marks)

A3.

a) Describe the phases of an iterative/incremental approach to systems development such as the Unified Process. You should identify the interim products created at the end of each phase.

(15 marks)

b) Discuss how the method you have described might be applied to the development of a system for Techno-repairs.

(10 marks)

[Turn Over]

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 Techno-repairs company described in the case study.

Job code: C28	**Start date: 15/10/2018**	**End date: 19/10/2018**	**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: 20/10/2018**	**End date: 23/10/2018**	**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)

[Turn Over]

B5. Consider the following extra information about the Techno-repairs system described in the case study:

"Techno-repairs 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 engineers' *Hourly rate* and *Hours worked* are stored. The computers that Techno-repairs work with typically consist of a System unit, a Keyboard, and a Monitor."

a) Explain the following relationships between classes using examples from the Techno-repairs company system to illustrate your answers:

(i) Association,
(ii) Aggregation or Composition, and
(iii) Generalisation/Inheritance.

(15 marks)

b) Discuss at least two similarities and two differences between class diagrams and entity relationship diagrams.

(10 marks)

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.

(ii) Produce a state machine/statechart for the class job in the Techno-repairs 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.

(18 marks)

End of Exam