

**BCS THE CHARTERED INSTITUTE FOR IT**  
BCS HIGHER EDUCATION QUALIFICATIONS  
BCS Level 5 Diploma in IT

**SYSTEMS ANALYSIS & DESIGN**

**Monday 19<sup>th</sup> March 2018 – 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
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## **Case Study for both sections A and B**

### **ABC Coaches**

ABC Coaches is a coach company based near London. They specialise in organising day trips to various destinations in England. Customers of ABC Coaches include institutions such as schools, nursing homes etc. They hire coaches with drivers for trips which are organised and arranged especially for them.

The manager of ABC is responsible for allocation of coaches and drivers to trips. Trip records are created when trips are arranged. If a customer (for whom a trip is being arranged) is 'new' then the customer's details are recorded. Otherwise, the customer's record is updated.

Customers will typically request that a day trip be organised for them on a specific date. The number of coaches allocated to a trip depends on the number of seats required. In response to this request ABC will check to see if the required coaches can be made available on that date. If the coaches are available ABC will allocate one or more drivers and create a trip record for the customer. Customers are allowed to cancel a trip before a deposit is paid. The deposit should be paid within 7 days of the booking for the trip being taken. If a trip is cancelled after that, the deposit is kept by ABC Coaches. If a trip is cancelled the trip record will record this. ABC will request full payment for a trip in the week before it takes place.

A cancelled trip is deleted from the system 6 months after cancellation. Other trip records are deleted 12 months after the corresponding trips were completed.

**Section A**  
**Answer Section A questions in Answer Book A**

**A1**

- a) Using information from the case study description above produce a logical top level data flow diagram (DFD) for a booking system for the ABC Coaches system.  
**(12 marks)**
- b) Using information from the case study above create a use case diagram for ABC Coaches.  
**(7 marks)**
- c) Briefly explain the difference between a high-level DFD and a use case diagram.  
**(6 marks)**

**A2**

- a) The following are four phases in the Systems Development Life Cycle (SDLC). For each phase identify TWO deliverables, briefly describe each of these deliverables and identify the techniques used to produce it.
- i) Requirements identification **(5 marks)**
  - ii) Analysis **(5 marks)**
  - iii) Design **(5 marks)**
  - iv) Implementation **(5 marks)**
- b) Briefly describe the waterfall method of systems development and briefly explain why this method is less popular now than it used to be.  
**(5 marks)**

**A3**

- a) What is the difference between the systems prototyping and throwaway prototyping methodologies? Give examples of the application of each approach.  
**(10 marks)**
- b) Discuss THREE different ways of involving users in a development project. Comment on any problems that might arise with each of these.  
**(15 marks)**

**Section B**  
**Answer Section B questions in Answer Book B**

**B4**

This question refers to the case study described above – ABC Coaches. The table below shows an example of a list of coaches, trips to which the coaches are allocated and the corresponding customers.

<b>Coach No.:</b> DV16PPS	<b>No of seats:</b> 50				
	<b>Trip No:</b> 23/17	<b>Trip date:</b> 6/5/17	<b>Trip destination:</b> Windsor	<b>Cust ref:</b> 12	<b>Cust name:</b> Sunrise Home
	<b>Trip No:</b> 35/17	<b>Trip date:</b> 4/6/17	<b>Trip destination:</b> Brighton	<b>Cust ref:</b> 19	<b>Cust name:</b> Ethelburga School
		.....	.....		
<b>Coach No.:</b> RS15VVX	<b>No of seats:</b> 56				
	<b>Trip No:</b> 28/17	<b>Trip date:</b> 18/5/17	<b>Trip destination:</b> Oxford	<b>Cust ref:</b> 23	<b>Cust name:</b> Sutton High
		.....	....		
<b>Coach No.:</b> TD16BBB	<b>No of seats:</b> 62				
	<b>Trip No:</b> 11/17	<b>Trip date:</b> 2/3/17	<b>Trip destination:</b> Windsor	<b>Cust ref:</b> 8	<b>Cust name:</b> Pines Home
	<b>Trip No.:</b> 36/17	<b>Trip date:</b> 5/6/17	<b>Trip destination:</b> Hastings	<b>Cust ref:</b> 14	<b>Cust name:</b> Croydon High
		.....	.....		

- 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**

- a) Consider the following extra information about the ABC Coaches system described above:

*“There are two types of coach drivers: full time drivers and part time drivers. The following data should be stored about each full time driver: Driver name, Date of birth, Contact details, Salary. The attributes of each part time driver are: Driver name, Date of birth, Contact details, Hourly rate, Hours worked.*

*All drivers are required to submit their CVs detailing their past job experience. A CV consists of a header, a number of CV lines, a driver’s signature.”*

Explain the following relationships between classes using examples from the ABC Coaches 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) There are many characteristics/attributes of a good software design. One of them is usability. Explain the meaning of usability and give FIVE examples of poor software system usability.

**(10 marks)**

**B6**

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

**(5 marks)**

- b) Produce a sequence diagram for the use case ‘Allocate coaches to trip’ in the ABC Coaches system described above. A brief description of this use case is given below.

*“A manager enters the trip number and the system displays the trip details. Next the system displays a list of all available coaches. The manager selects one (or more) coach(es) and the system allocates this (these) coaches to the trip and displays a confirmation message“.*

**(8 marks)**

- c) Produce a state machine/chart for the class Trip in the ABC Coaches system described above.

**(12 marks)**

**END OF EXAM**