

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

**SYSTEMS ANALYSIS & DESIGN**

Monday 16<sup>th</sup> March 2020 - 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 <b>NOT</b> allowed in this examination.
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## **Case Study for both sections A and B**

### **Stylish Life Furniture Manufacturer**

Stylish Life is a stylish furniture manufacturing company based in Italy. The company buys all the parts for its furniture from various suppliers around the world. The parts are then assembled in the factory in Italy to produce a number of different types of furniture e.g. armchairs, tables.

Stylish Life sell to furniture shops, not individuals. These shops are therefore Stylish Life's customers and will have registered with Stylish Life and been given a username and password. The furniture shops will typically place orders with Stylish Life over the internet after logging in to the system using this username and password. Once a customer has placed an order, delivery is estimated to take three weeks. Each customer order can consist of more than one type of furniture, and the required quantity of each type is also recorded on the order.

At the end of each week a production plan is produced so the manufacturing department knows how many of each furniture type it needs to produce in the following week. The production plan is based on the number of each type held in stock in the warehouse and the quantity of each type ordered by customers. The production plan is also used to place purchase orders for parts from the suppliers so that all the necessary parts are available for the week's production.

Each individual piece of furniture assembled has a unique code stamped on it. When a customer order is ready for dispatch, the code of each actual piece of furniture allocated to that customer order is recorded so that each piece of furniture can be traced to a particular customer. Deliveries to customers can be arranged for complete or partial orders.

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

**A1.**

- a) List the processes and the external entities that you would include on a top level **Data Flow Diagram** (DFD) of the Stylish Life company. You do not need to draw the DFD.  
**(8 marks)**
- b) Produce a Use Case diagram for a computer system to support Stylish Life's business processes.  
**(9 marks)**
- c) Compare a DFD and a use case diagram. Use your answers to parts (a) and (b) to illustrate your points. You should not compare the notation.  
**(8 marks)**

**A2.**

- a) The computerised system for Stylish Life allows customers to place their orders over the internet. Stylish Life sell to furniture shops, not individuals, therefore they invoice and collect payment after delivery of the furniture. Produce a system use case description for the normal scenario of the use case '*Place an order*'.  
**(10 marks)**
- b) Explain what an alternative scenario is in a use case description, and why it may occur.  
**(5 marks)**
- c) Write the alternative scenarios for the use case description in part a).  
**(10 marks)**

**A3.**

- a) Identify the **FOUR** most important principles of Agile development, justifying your choices.  
**(12 marks)**
- b) Using an agile method of your choice (for example: DSDM, eXtreme programming, Scrum) describe the iterative/incremental project life cycle. You should illustrate your answer with a diagram of your chosen method's life cycle.  
**(13 marks)**

**[Turn Over]**

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

**B4.**

This question refers to the case study described on page 2 (i.e. Stylish Life Furniture Manufacturer). The table below shows an example of a list of furniture parts provided by different suppliers:

<b>Part No.:</b> 1403	<b>Part Name:</b> Armchair frame walnut small	<b>Part Type Code:</b> AF	<b>Part Type Name:</b> Armchair frame	
	<b>Supplier No.:</b> S7	<b>Supplier Name:</b> XFurniture	<b>Supplier's Part Ref No:</b> XF8973	<b>Cost Price:</b> 250.00
	<b>Supplier No.:</b> S11	<b>Supplier Name:</b> TorinoClassic	<b>Supplier's Part Ref No:</b> TC7654	<b>Cost Price:</b> 230.00
	.....	.....	.....	....
<b>Part No.:</b> 1512	<b>Part Name:</b> Armchair frame oak medium	<b>Part Type Code:</b> AF	<b>Part Type Name:</b> Armchair frame	
	<b>Supplier Name:</b> S7	<b>Supplier Name:</b> XFurniture	<b>Supplier's Part Ref No:</b> XF8457	<b>Cost Price:</b> 200.00
	.....	.....	.....	.....
<b>Part No.:</b> 2542	<b>Part Name:</b> Chair frame oak medium	<b>Part Type Code:</b> CHF	<b>Part Type Name:</b> Chair frame	
	<b>Supplier No.:</b> S11	<b>Supplier Name:</b> TorinoClassic	<b>Supplier's Part Ref No:</b> TC5437	<b>Cost Price:</b> 110.00
	....	.....	....	....
<b>Part No.:</b> 3683	<b>Part Name:</b> Table leg oak medium	<b>Part Type Code:</b> TL	<b>Part Type Name:</b> Table leg	
	<b>Supplier No.:</b> S23	<b>Supplier Name:</b> CBDDTables	<b>Supplier's Part Ref No:</b> CB4567	<b>Cost price:</b> 40.00
	.....	.....	.....	.....
	.....	.....	.....	.....

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.**

- a) Discuss the main differences between class diagrams and entity relationship diagrams.

Your discussion must not concentrate on notation.

**(7 marks)**

- b) Consider the following extra information about the Stylish Life Manufacturer described below:

*“There are two types of suppliers: local suppliers and foreign suppliers. The following data is stored about each local supplier: Supplier No, Supplier name, Email address, Town.*

*The attributes of each foreign supplier are: Supplier No, Supplier name, Email address, Country, Currency.*

*Each armchair type consists of a frame, 4 legs, and a seat.”*

Explain the following relationships between classes using examples from the Stylish Life system to illustrate your answers:

- i) Association;
- ii) Aggregation or Composition;
- iii) Generalisation/Inheritance.

The examples should show relevant fragments of a class diagram.

Explain also the differences between generalisation/inheritance and aggregation relationships between classes.

**(18 marks)**

**[Turn Over]**

**B6.**

- a) Discuss briefly the purpose of sequence diagrams and state machines/charts.

**(4 marks)**

- b) Produce a sequence diagram for the use case Receive Parts in the Stylish Life system described above. A brief description of this use case is given below.

*“A list of all current suppliers is displayed by the system. A stores clerk selects the required supplier from the list. The system responds by displaying all pending purchase orders placed by Stylish Life with this supplier. The clerk selects the order which has been delivered and modifies its status from pending to be fulfilled. Finally, the clerk enters quantities for all delivered parts and the system updates the corresponding stock levels.”*

**(13 marks)**

- c) Produce a state machine/chart for the class Purchase Order in the Stylish Life system. You may assume that the objects of this class are affected by the following events (listed below in alphabetical order):

- i) Accept an order request (from warehouse);
- ii) Archive an order;
- iii) Cancel an order;
- iv) Place an order (with a supplier);
- v) Receive an order (from a supplier).

**(8 marks)**

**End of Examination**