

Section B
Answer Section B questions in Answer Book B

- B4.**
- a) Describe a real-world practical situation in which it would be appropriate to use parametric polymorphism.
(10 marks)
- b) Describe a real-world practical situation in which it would be appropriate to use hybrid inheritance. Provide a class diagram and stub code to show how the specific classes in your scenario will be interconnected.
(15 marks)
- B5.**
- a) Describe a real-world practical situation in which method overloading might be particularly useful.
(10 marks)
- b) Differentiate between the inter-class relationships composition and generalisation and give code examples to show how they may be implemented in practice.
(15 marks)
- B6.**
- a) Describe **TWO** advantages and **TWO** disadvantages of the object oriented approach to programming.
(10 marks)
- b) C++ and Java are statically typed. Other languages, such as Python, are dynamically typed. Define static and dynamic typing and describe how these concepts relate to strong and weak typing.
(15 marks)

End of Examination

BCS THE CHARTERED INSTITUTE FOR IT
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BCS Level 5 Diploma in IT

OBJECT ORIENTED PROGRAMMING

Wednesday 5th May 2021 - Afternoon

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.

Section A
Answer Section A questions in Answer Book A

A1.

a) Describe the following:

- i) Abstract data type;
- ii) Structured programming;
- iii) Encapsulation;
- iv) Untyped languages;
- v) Typed languages.

(15 marks)

b) Choose **THREE** of the above concepts and discuss how each have contributed to the development of object oriented languages.

(10 marks)

A2.

A systems tester is working on a mobile application for an on-line retailer. The system will be developed using object oriented techniques and testing is needed throughout the project life cycle. The tester will have to work with the developers and team leaders to develop test cases. It is expected that the whole project will take 18 months to complete.

a) The team leaders are debating whether to use the *black-box testing* or *white-box testing* techniques. Explain what these terms mean and how they could be used when testing object oriented software. Include the advantages and disadvantages of each technique in your discussion.

(15 marks)

b) Describe what additional approaches to testing could be used for such a system and where they would be used as the project develops.

(10 marks)

A3.

Parcel Plus is a company that specialises in door to door collection and delivery. Customers can either be a Personal Customer, such as someone selling an item online that needs delivering, or a Business Customer that regularly sends parcels. To use their services, all customers must first register for an account. Personal Customers need to provide their name, contact telephone number, email address and credit card details. Business Customers need to provide their company name, telephone number, address, email address and the name of a main contact for any queries.

Once these details have been accepted, the customer will be issued with an account number that they must quote when contacting the company. Business Customers will be allocated a dedicated Account Manager.

When any type of customer requires a parcel to be delivered, they will contact Parcel Plus to arrange collection. The customer needs to provide details of where the parcel will be collected from, where it will be delivered to, how many parcels are to be collected, and which type of service they want, for example, next day delivery.

Once the collection has been arranged, a delivery label will be generated. The details on this will be used by a Dispatcher to schedule the vehicle needed for the collection. Each parcel will be given a priority number by the Dispatcher and those with the highest priority will be collected first.

By 12 noon each day, the Dispatcher needs to generate a delivery schedule to ensure all the collected parcels are delivered in line with the level of service required by the customer.

Each Driver has a mobile device with a copy of the delivery labels; a person at the delivery address must sign this to say that the parcel has been delivered. This will flag that the delivery has been completed and an email will be generated to let the customer know.

Once the parcel has been delivered, Personal Customers will have their credit card debited by the amount required; whilst Business Customers will have their invoice account debited. Once a month, the Accounts Manager will generate the invoices for payment.

a) Draw a Use Case diagram for this system.

(15 marks)

b) Discuss the role of Use Cases (diagrams and descriptions) in the development of an object oriented system.

(10 marks)

[Turn Over]