GCE AS

B500U20-1

S24-B500U20-1

TUESDAY, 21 MAY 2024 – AFTERNOON

COMPUTER SCIENCE – AS component 2
Practical Programming to Solve Problems

2 hours 15 minutes

The decryption password for the encrypted media files is key-hYnBPU7

B500U201
01

INSTRUCTIONS TO CANDIDATES

Answer **all** of questions 1, 2, 3, 4, 5 and **all** parts of question 6.

You will need to record all of your answers to questions 1, 2, 3, 4 and 5 in a **single** word-processed document.

Answer **all** parts of question 6. This is the section which requires you to use the Integrated Development Environment (IDE) of your chosen programming language.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

The total number of marks available is 60.

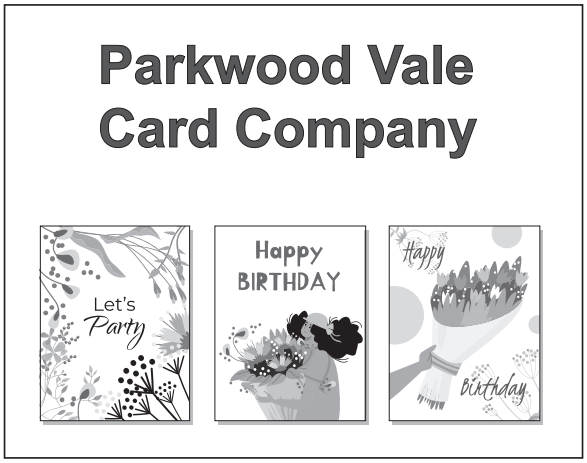
You are reminded of the need for good English and orderly, clear presentation in your answers.

You will need a computer with an installed functional copy of the Integrated Development Environment (IDE) appropriate to your chosen programming language and word processing software.

A calculator is allowed in this examination.

Remember to save your work regularly.

Scenario



Parkwood Vale Card Company (PVCC) is a start-up company that creates homemade, hand-printed greetings cards. **PVCC** produces cards for birthdays, anniversaries and weddings. The company has been keeping its records on paper but now wishes to store its data on a computerised system.

PVCC would like to offer its customers the ability to register the dates of important events, such as birthdays, anniversaries etc, and remind them to consider purchasing a new card. **PVCC** will collect each customer's full name, home address, postcode, email and telephone number.

PVCC would like to accept electronic payment for their cards. They are hoping to understand the electronic payment system before deciding if a custom programmed solution or an off the shelf solution is more appropriate.

Analysis and Design

You have been asked to analyse the scenario as a preliminary step towards creating a prototype computer system for **Parkwood Vale Card Company (PVCC)**.

Present your answers as a single word-processed document named Analysis and Design.

1. Draw a data structure table that will allow **PVCC** to store and validate customer details. [8]

2. Construct a flowchart for the process of searching a list of customers for a specific ID. If the ID is found, the flowchart should output the customer details. If the ID is not found, the flowchart should output "not found". [6]

3. **PVCC** will have to consider different methods of backing up its limited amount of data.

Explain different procedures the company could use for backing up and recovering data and why they are suitable. [6]

4. **PVCC** is considering an object-oriented approach to programming its computer systems. It wishes to use a UML class diagram to describe the relationships between its classes.

PVCC would like a superclass called `Person`.

The `Person` class should have **four** protected attributes: `firstName`, `surname`, `homeAddress`, `postcode`, which are all of type `string`. The `Person` class should have **four** public methods to set each of the four attributes, which all accept a parameter.

PVCC would like a subclass called `Customer` which inherits from class `Person`.

The `Customer` class should have a private attribute called `customerID` of type `integer`. The `Customer` class should have **two** public methods, one for setting the `customerID` which accepts a parameter of type `integer` and a method for returning the `customerID` which returns an `integer` value.

Create a class diagram for this situation. [12]

5. **PVCC** stores the details of its range of card prices in an array, which is sorted in order of price (lowest to highest). [8]

stockArray[ ]:

	0	1	2	3	4	5	6	7	…
Stock ID	0	101	102	103	104	105	106	107	108	…
Price(pence)	1	240	255	275	285	295	310	325	350	…

Write an algorithm using pseudo-code, that performs a search for all the Stock IDs that are available between two entered prices.

The algorithm should output the Stock ID and price for all the matches between the two prices entered. If there are no items available within the price range entered the algorithm should output: “No Match Found”.

For example:

If the user entered a price range of:

Lowest = **260**
Highest = **290**

then the algorithm would output:

Stock ID: 103
Price: 275

Stock ID: 104
Price: 285

Select the programming language of your choice from **Visual Basic**, **Python or Java** and answer **all** parts of question 6.

6. **Parkwood Vale Card Company (PVCC)** wants a computer system to be developed that meets the following requirements:

- store customer details
- search customer details
- store stock details
- count the number of items in stock with particular attributes, for example the total number of "Birthday cards" that are available.

(a) Open the file **PVStock**

- Read through the code and familiarise yourself with its contents.
- The file contains incomplete code, which is intended to save product details and return the number of stock items that match the search criteria entered.

Complete this code. [4]

Save the changes made to the file PVStock

(b) Create a new form that will allow **PVCC** to:

- input customer details
- validate customer details
- store customer details on disk in a text file called PVCustomer.txt
- confirm storage of the details
- retrieve specified customer details from disk. [12]

Save your work as PVCustomer

(c) Using the internal facility of your language, add annotated listings to your code from question **6**(b) that would clearly explain the design of your program to another software developer.

Save the changes made to the file PVCustomer [4]

END OF PAPER

BLANK PAGE

BLANK PAGE

BLANK PAGE