



**GCE AS/A LEVEL**

**2500U20-1**

**TUESDAY, 21 MAY 2024 – AFTERNOON**

**COMPUTER SCIENCE – AS unit 2**

**Practical Programming to Solve Problems**

**2 hours plus your additional time allowance**

**The decryption password for the encrypted media files  
is mines-8C2yKG**

## **INSTRUCTIONS TO CANDIDATES**

The question paper is divided into two main sections. Below are the recommended timings for this assessment.

### **SECTION A**

Answer ALL questions in SECTION A.

You are advised to spend no more than 60 MINUTES on this section.

You will be required to analyse and deconstruct the scenario to consider its component parts in terms that can be addressed through automated computation.

### **SECTION B**

Select the programming language of your choice from section **BI**, **BII** or **BIII** and answer ALL questions within your chosen section.

You are advised to spend no more than 60 MINUTES on this section.

You will be required to develop programs that solve computing problems referring to the initial scenario.

(Turn over)

**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 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.**

## SCENARIO

# Parkwood Vale Pet Rescue



**Parkwood Vale Pet Rescue (PVPR)** is a small charity that provides a temporary home for stray or abandoned pets that are found by the general public. **PVPR** began as a small home-based charity but it now has a new custom-built premises and needs to start storing information in a computerised system. The owner has recently recruited more volunteers. These are local people who give their time to look after the abandoned pets.

(Turn over)

**This new system will need to store details of the volunteers, pets, and potential new owners. Potential owners will be able to register the type of pets that they can accommodate by talking to one of the volunteers. An owner will only ever deal with a single nominated volunteer. An owner may have many pets but each pet stored in the **PVPR** system is assigned to a single potential owner.**

**The information **PVPR** intends to store on each pet includes a unique ID, full name, nickname, species, date of birth (estimated), size and description.**

**The main requirements of the new computer system for **PVPR** are:**

- **the ability to store and search for volunteers details**
- **the ability to store and recall pets details**
- **the ability to calculate the distance that a lost pet may have travelled before being found.**

****PVPR** has a partially completed design for the entity relationship between tables.**

**Pets**

**Owners**

**Volunteers**

## **Section A: Analysis and Design**

**Answer all questions (1–4) in this section.**

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

**Present your answers as a single word-processed document named: SECTION A**

- 1 (a) Copy and complete the entity relationship diagram for PVPR as described in the scenario. Include some exemplar fields. [5 marks]**
  
  - (b) Create a data structure table, including suitable validation checks, for ONE of the tables in your entity relationship diagram. [10 marks]**
- 
- 2. Select and fully justify your proposed method of solution for the main requirements listed in the scenario. [6 marks]**

**(Turn over)**

3. **PVPR** is considering the best way to introduce the new computerised system.

**Discuss TWO methods of changeover available to the charity, justifying the most suitable method for this situation.**

**Your answer should be related to the impact of these methods on the volunteers. [7 marks]**

4. **PVPR** use an algorithm to calculate the distance that a lost pet may have travelled before being found. This is usually dependent on the species and size of the pet. They use this information to calculate the radius within which to advertise the lost pet.

```
1  distance[4,2] is real
2  species is integer
3  sizeOfPet is integer
4  expectedDistance is real
5
6  output "Please enter species code"
7  input species
8
9  output "Please enter size of pet
   code"
10 input sizeOfPet
11
12 for i = 0 to 3
13     distance[i,0] = ((i + 1) * 1.14)
14     distance[i,1] = ((i + 1) * 1.98)
15 next i
16
17 expectedDistance =
   distance[species, sizeOfPet]
18
19 output "Expected Distance:" &
   expectedDistance
```

4 (a) Using this algorithm, opposite, copy and complete the table below showing the contents of the array `distance`. [8 marks]

<code>i</code>	<code>0</code>	<code>1</code>	<code>2</code>	<code>3</code>
<code>distance</code> <code>[i,0]</code>				
<code>distance</code> <code>[i,1]</code>				

(b) Using your answer to 4(a) provide the output of the algorithm with the following inputs: [4 marks]

(i) `species = 0` `sizeOfPet = 1`

(ii) `species = 0` `sizeOfPet = 3`

(iii) `species = 1` `sizeOfPet = 0`

(iv) `species = 1` `sizeOfPet = 2`

(Turn over)

## **Section B: Develop programs**

**Select the programming language of your choice from section BI, BII or BIII and answer all questions within your chosen section.**

### **BI Visual Basic**

**PVPR wants a prototype computer system to be developed using Visual Basic.**

- 1. Open the file VOLUNTEERS**
  - Read through the code and familiarise yourself with its contents.**
  - The file contains incomplete code which attempts to save volunteer details and return the number of volunteers on file that match the search criteria entered.**

**Complete this code.**

**Save the changes made to the file volunteers. [8 marks]**

2. **PVPR** needs to start storing the details of the lost pets on a computerised system. Using the fields provided in the scenario, create a new form that will allow **PVPR** to:

- input pet details
- perform a length check on each field
- store pet details on disk in a text file called `pets.txt`
- confirm storage of the details
- retrieve specified pet details from disk.

**Save your work as `pets.frm` [8 marks]**

3. Using the internal facility of your chosen language, annotate the code from Question 2 to clearly explain the design of this program to another software developer.

**Save the changes made to the file `pets`.  
[4 marks]**

## **BII Java**

**PVPR wants a prototype computer system to be developed using Java.**

- 1. Open the file VOLUNTEERS**
  - Read through the code and familiarise yourself with its contents.**
  - The file contains incomplete code which attempts to save volunteer details and return the number of volunteers on file that match the search criteria entered.**

**Complete this code.**

**Save the changes made to the file volunteers. [8 marks]**

2. **PVPR** needs to start storing the details of the lost pets on a computerised system. Using the fields provided in the scenario, create a new form that will allow **PVPR** to:

- input pet details
- perform a length check on each field
- store pet details on disk in a text file called `pets.txt`
- confirm storage of the details
- retrieve specified pet details from disk.

**Save your work as `pets.java` [8 marks]**

3. Using the internal facility of your chosen language, annotate the code from Question 2 to clearly explain the design of this program to another software developer.

**Save the changes made to the file `pets`.**

**[4 marks]**

## **BIII Python**

**PVPR wants a prototype computer system to be developed using Python.**

- 1. Open the file VOLUNTEERS**
  - Read through the code and familiarise yourself with its contents.**
  - The file contains incomplete code which attempts to save volunteer details and return the number of volunteers on file that match the search criteria entered.**

**Complete this code.**

**Save the changes made to the file volunteers. [8 marks]**

2. **PVPR** needs to start storing the details of the lost pets on a computerised system. Using the fields provided in the scenario, create a new form that will allow **PVPR** to:

- input pet details
- perform a length check on each field
- store pet details on disk in a text file called `pets.txt`
- confirm storage of the details
- retrieve specified pet details from disk.

**Save your work as `pets.py` [8 marks]**

3. Using the internal facility of your chosen language, annotate the code from Question 2 to clearly explain the design of this program to another software developer.

**Save the changes made to the file `pets`.  
[4 marks]**

**END OF PAPER**