Candidate Name	Centre Number					Candidate Number				

AS COMPUTER SCIENCE

UNIT 2

Practical Programming to Solve Problems

SPECIMEN PAPER

2 hours

ADDITIONAL MATERIALS
In addition to this examination paper, you will need a 16 page answer book.

INSTRUCTIONS TO CANDIDATES

Answer **ALL** questions.
The question paper is divided into four main sections. Below are the recommended timings for this assessment.

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 so as to consider its component parts in terms that can be addressed through automated computation.

Section B
You are advised to spend no more than **60 minutes** on this section.
Questions will require you to develop programs that solve computing problems referring to the initial scenario.

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.

Assessment will take into account the quality of written communication used 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.

Remember to save your work regularly.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

Scenario

FITNESS
LEISURE CENTRE

Fitness Leisure Centre is an established organisation based in Trefforest, South Wales. The leisure centre has a large number of clients that take part in various activities on a regular basis.

The leisure centre wishes to offer its clients the facility of being able to track their activities using a computerised training log.

This new system will store the clients' details along with details of the different activities that are available, such as swimming, gym, aerobics, badminton, squash. When a client takes part in one of the activities they will be able to keep a record of this in their training log on the new system. The details stored in the training log include Activity ID, Client ID, Date, Time, Duration, Number of calories burnt, etc.

The main requirements of the new computer system for ***Fitness Leisure Centre*** are:

- The ability to store and search clients details
- The ability to store activity details and search for activities using various preferences, e.g. search for all "swimming classes"
- The ability to store a training log for each client

Fitness Leisure Centre has the following partially completed entity-relationship diagram as an overview of the system they would like to create:

Section A: Analysis and Design (44 marks)
Answer all questions.

You have been asked to analyse the scenario as a preliminary step towards creating a computer system for *Fitness Leisure Centre.*

Answer all questions. Present your answers as a single word-processed document named *Section A Analysis and Design*.

1. Draw two data structure tables that will allow ***Fitness Leisure Centre*** to store client and activity details. [10]

2. Copy and complete the entity relationship diagram provided in the scenario. [6]

3. Construct a flow chart for the process of searching for a specific activity, e.g. Swimming classes. [6]

4. Select and fully justify your proposed method of solution for the three main requirements listed in the scenario. [6]

5. Consider the different methods of changeover available to ***Fitness Leisure Centre.*** Your answer should be related to the impact of these methods on clients and staff. [8]

6. ***Fitness Leisure Centre*** is concerned that their clients will be shown duplicate results on screen when searching for activities.

   Using a recognised convention, design and implement an algorithm that performs a search for duplicate consecutive activities in an array. If a duplicate is found, the algorithm should output the location of the duplicate and the word “TRUE”. If a duplicate is not found, the algorithm should output the word “FALSE”. [8]

Section B: Develop programs (16 marks)

Select the programming language of your choice from section BI, BII or BIII and answer all 3 questions within your chosen section.

BI Visual Basic

***Fitness Leisure Centre* wants a computer system to be developed using Visual Basic that meets the requirements outlined in the scenario.**

1. Open the file Activities.frm
   - Read through the code and familiarise yourself with its contents
   - The file contains incomplete code that displays the activities available to clients.

   Complete this code.

   Remember to save the changes made to the file Activities.frm [4]

2. Create a new form that will allow ***Fitness Leisure Centre*** to:

   - Input customer details
   - Validate customer details
   - Store customer details on disc in a text file called customerdetails.txt
   - Retrieve specified customer details from disc.

   Save your new form as Customers.frm [8]

3. Using the internal facility of your chosen language, add annotated listings to your code from question 2 that would clearly explain the design of your program to another software developer.

   Remember to save the changes made to the file Customers.frm [4]

BII Java

***Fitness Leisure Centre* wants a computer system to be developed using Java that meets the requirements outlined in the scenario.**

1. Open the file Activities.java
   - Read through the code and familiarise yourself with its contents
   - The file contains incomplete code that displays the activities available to clients.

   Complete this code.

   Remember to save the changes made to the file Activities.java [4]

2. Create a new form that will allow ***Fitness Leisure Centre*** to:

   - Input customer details
   - Validate customer details
   - Store customer details on disc in a text file called customerdetails.txt
   - Retrieve specified customer details from disc.

   Save your new form as Customers.java [8]

3. Using the internal facility of your chosen language, add annotated listings to your code from question 2 that would clearly explain the design of your program to another software developer.

   Remember to save the changes made to the file Customers.java [4]

BIII Python

***Fitness Leisure Centre* wants a computer system to be developed using Python that meets the requirements outlined in the scenario.**

1. Open the file Activities.py
   - Read through the code and familiarise yourself with its contents
   - The file contains incomplete code that displays the activities available to clients.

   Complete this code.

   Remember to save the changes made to the file Activities.py [4]

2. Create a new form that will allow ***Fitness Leisure Centre*** to:

   - Input customer details
   - Validate customer details
   - Store customer details on disc in a text file called customerdetails.txt
   - Retrieve specified customer details from disc.

   Save your new form as Customers.py [8]

3. Using the internal facility of your chosen language, add annotated listings to your code from question 2 that would clearly explain the design of your program to another software developer.

   Remember to save the changes made to the file Customers.py [4]

UNIT 2

Coverage of Assessment Objectives

Assessment Objective		Elements	Question									Total
			Section: A						B			
			1	2	3	4	5	6	1	2	3	
AO1	**Demonstrate knowledge and understanding of the principles and concepts of computer science, including abstraction, logic, algorithms and data representation**	a – Demonstrate knowledge of the principles and concepts of abstraction, logic, algorithms, data representation or others as appropriate										**0**
		b – Demonstrate understanding of the principles and concepts of abstraction, logic, algorithms, data representation or others as appropriate										**0**
		TOTAL AO1	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
AO2	**Apply knowledge and understanding of the principles and concepts of computer science, including to analyse problems in computational terms**	a – Apply knowledge and understanding of the principles and concepts of computer science										**0**
		b – Analyse problems in computational terms	10	6	6	6	8					**36**
		TOTAL AO2	**10**	**6**	**6**	**6**	**8**	**0**	**0**	**0**	**0**	**36**
AO3	**Design, program and evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions**	a – Design computer systems that solve problems									4	**4**
		b – Program computer systems that solve problems						8	4	8		**20**
		c – Evaluate computer systems that solve problems, making reasoned judgements about these and presenting conclusions										**0**
		TOTAL AO3	**0**	**0**	**0**	**0**	**0**	**8**	**4**	**8**	**4**	**24**
		TOTAL AO1 + AO2 + AO3	**10**	**6**	**6**	**6**	**8**	**8**	**4**	**8**	**4**	**60**