OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

Semester I Examinations 2023-2024

Course Instance(s)	1SD1/1MF1
Exam(s)	Higher Diploma in Applied Science (Software Design & Development), M.Sc. in Software Design & Development
Module Code(s)	CT874
Module(s)	Programming I
Paper No.	I
External Examiner(s)	Prof. Carol O'Sullivan
Internal Examiner(s)	Prof. Michael Madden * Dr. Séamus Hill
Instructions:	Candidates are required to answer: **Section A (20 Marks)** Answer all 10 parts of section A, This section consists of 10 multiple-choice questions all of which should be attempted. **Answers are to be written on the MCQ sheet provided, NOT on the Examination paper.** **Section B (80 Marks)** Answer Any **Two** Questions.
Duration	2 hours
No. of Pages	6
Discipline(s)	Computer Science

Requirements

Release in Exam Venue	Yes [ ] No [X]
MCQ Answersheet	Yes [X] No [ ]
Handout	None
Statistical/ Log Tables	None
Cambridge Tables	None
Graph Paper	None
Log Graph Paper	None
Other Materials	None
Graphic material in colour	Yes [ ] No [ ]
Release to Library	Yes [ ] No [X]

Section A (20 Marks)
Attempt all 10 questions
Mark your answers on the MCQ sheet provided

1) Which of the following methods is not contained within the List class?

a) hasNext()
b) add()
c) list()
d) remove()

2) Which of the following is the correct syntax for creating an array.

a) int[] myArray = new int[10];
b) []int myArray = new int[10];
c) int[] myarray = new [10]int;
d) int[] myArray = int[10];

3) Polymorphism allows us to _____.

a) have the same message execute a different method depending on the receiving object.
b) hide the internal workings of a Java program from the client programmer.
c) overload methods and allow the same method name to be used multiple times.
d) extend and modify code.

4) Assume we have three classes, X Y and Z. Y and Z are siblings and are subclasses of the X class. Which classes have access to a private variable in class X?

a) X, Y and Z
b) X and Y only
c) Y and Z only
d) X only

5) How would we access the 6^{th} element of the array, x?

a) x(6);
b) x(5);
c) x[6];
d) x[5];

6) The practice of writing multiple constructors to handle different sets of inputs is known as _____.

a) Inheritance
b) Overriding
c) Overloading
d) Multiplicity

7) When an array is passed to a method _____.

a) only the reference is passed, and a copy of the array is not created in the method.
b) a copy of the array is created within the method.
c) the value of the array is passed into the method.
d) None of the above.

8) What is meant by “returning an object” from a method?

a) It means you are returning a null value to the caller.
b) It means returning a primitive type to the caller.
c) It means returning the object’s address to the caller.
d) It means returning the object’s value to the caller.

9) The use of “this()” _____.

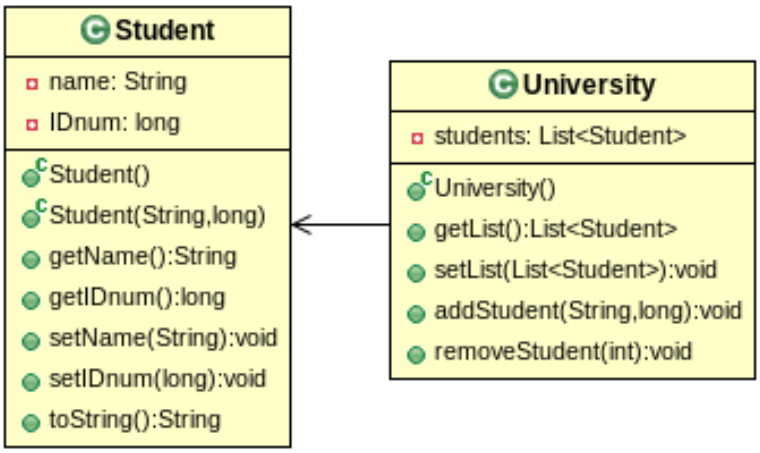
a) is a reference to hello
b) is bad style
c) is illegal
d) is a call to a Function constructor

10) Which of the following is not a Boolean operator?

a) &&
b) !
c) ||
d) ++

Section B (80 Marks)
Answer Any TWO Questions

Question 2.



a) Using the Java language, you are required to implement the UML diagram outlined above.

Note: the List to be implemented is an ArrayList.

[15 Marks]

b) Your are required to write a driver class which:

i. Creates a University object.

ii. Adds three Student objects to the University object using the appropriate methods.

iii. Uses a ListIterator to display the contents of the List in both directions.

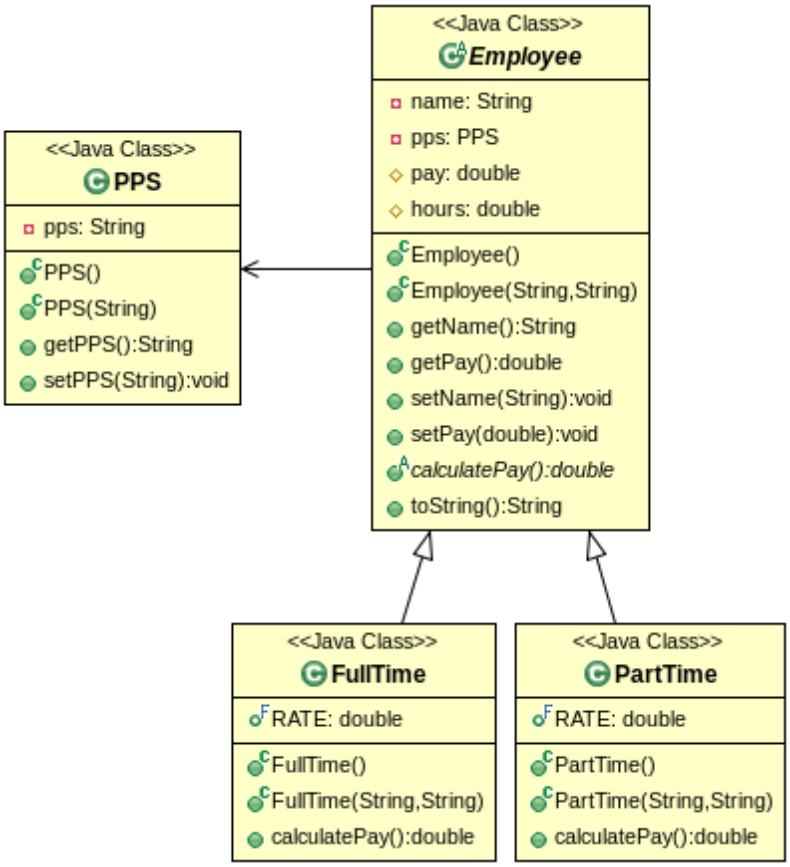
iv. Changes the name of Student object located at index 0 using the appropriate method.

v. Uses an enhanced for loop to display the List contents.

vi. Serializes the List.

[25 Marks]

Question 3



a) You are required to implement the UML diagram outlined above. **Note:** full-time employees are pair at a rate of €22.00 per hour and part-time employees are paid at a rate of €16.50 per hour.

[25 Marks]

b) Create a driver class which implements the following:

i. Creates a LinkedList to hold Employee objects

ii. Adds a full-time and a part-time object to the List.

iii. Using each employees name, asks the user to input the hours worked and calculate the pay by multiplying the RATE by the hours worked.

iv. Uses an enhanced for loop to display the name, PPS number and pay for each employee in the List.

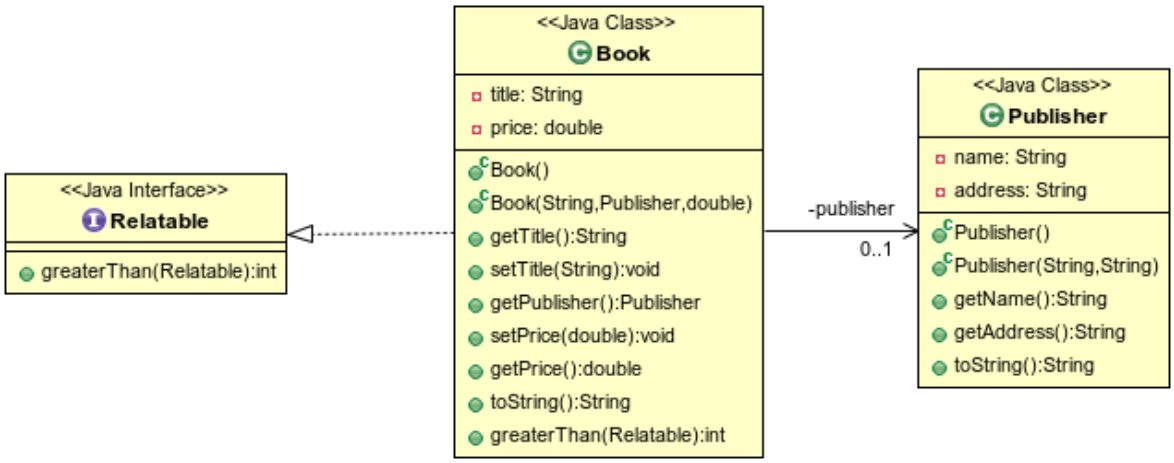
[15 Marks]

Question 4.

a) In relation to Java describe in your own words, what an *Interface* is.

[5 Marks]

b) Using the UML diagram outlined, write a Java application that implements the ***Book*** class, ***Publisher*** class and ***Relatable*** *interface* to allow comparison between *Book* objects based on *price*.



Note: *greaterThan()* returns a 1, 0 or -1 value depending on whether an object is greater than, equal to or less than a similar type of object.

[15 Marks]

c) Write a driver class which:

i. Creates and populates an *ArrayList* with three instances of the Book class.

[6 Marks]

ii. Includes a method with the following signature:

```
public static Book findMostExpensive(List<Book> b)
```

The method uses a *for loop* to traverses the List calling ***greaterThan*** to determine the most expensive in the List, which is then returned.

[12 Marks]

iii. Displays the most expensive book in the List using *toString()*.

[2 Marks]

END