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CIT Autumn Examinations 2018/19

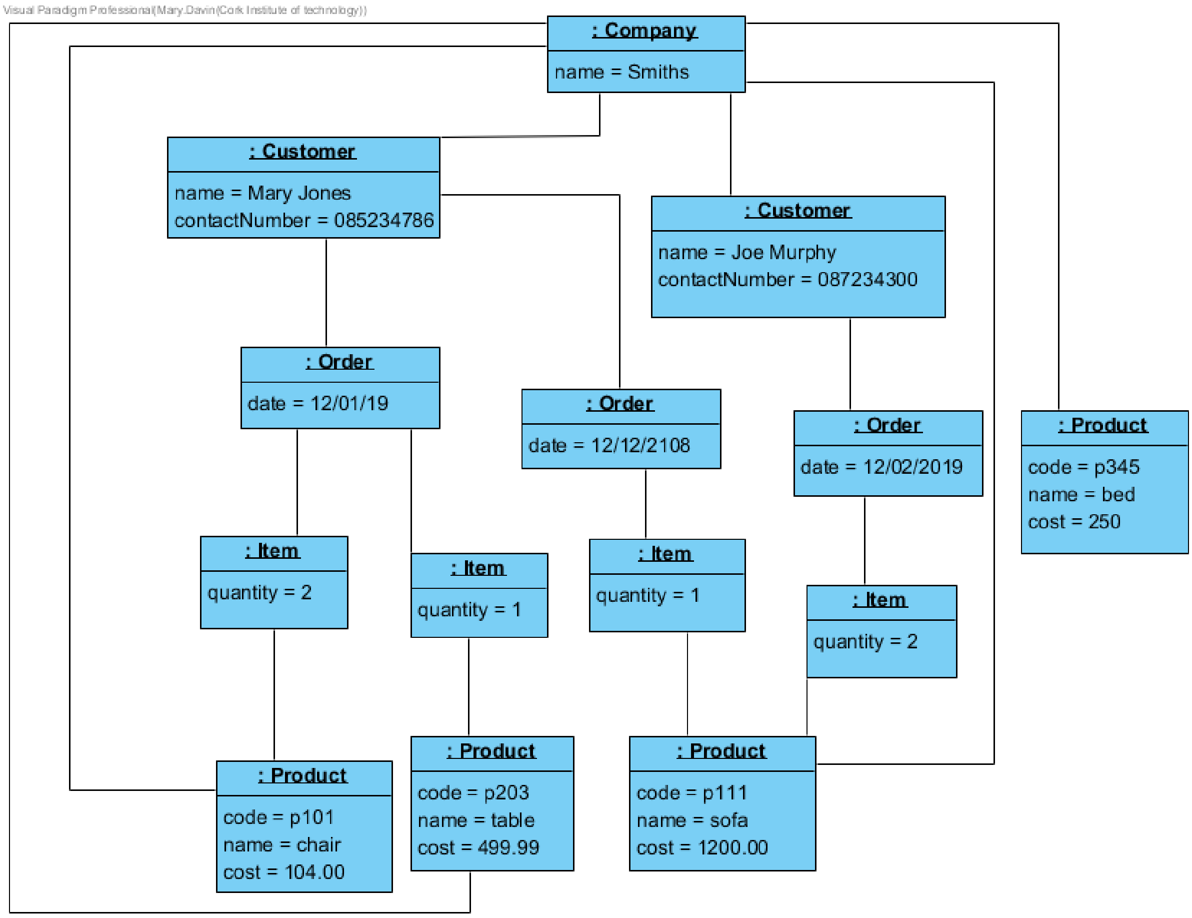
Note to Candidates:	Check the Programme Title and the Module Description to ensure that you have received the correct examination. If in doubt please contact an Invigilator.
Module Title:	**OO Analysis and Design**
Module Code:	**SOFT7005**
Programme Title(s):	BSc Software Development Y2 BSc (Hons) Software Devel Y2 BSc Hons Computer Systems Y2 BSc (Hons) Web Development Y2 HC Software Dev Y2 ACCS
Block Code(s):	**KCOMP_7_Y2** **KSDEV_8_Y2** **KDNET_8_Y2** **KWEBD_8_Y2** **KCOME_6_Y2**
External Examiner(s):	Dr. Michael Brady
Internal Examiner(s):	Ms. Mary Davin, Ms. Deirdre Dunlea
Instructions:	Answer any 4 questions out of 5.
Duration:	2 hours
Required Items:	

Q1

(a) A software model can be used for 4 different reasons. Explain each reason. [4 marks]

(b) What is the purpose of creating an object diagram? [2 marks]

(c) Draw a class diagram that would support the following diagram. [9 marks]



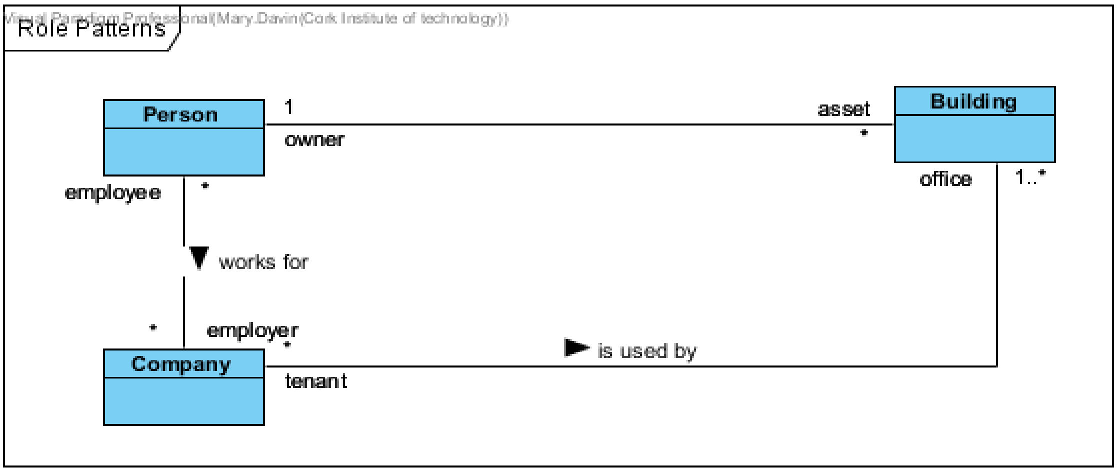
(d) Create a Domain model for the following specification. [10 marks]

Consider a situation where an employee in an IT company can be employed as an analyst, developer or tester. For each category of employment employees will have common attributes such as employee number, name, email and contact number but will also have different attributes such for an analyst the number of years of experience, developer programming languages skill level and for a tester their type (junior or senior). It is possible for an employee to change role during their time working for the company. The current role of and previous roles of all employees needs to be recorded.

Q2

(a) Use the diagram below to explain the meaning of the following

i. Role name.
ii. Mandatory association
iii. Optional Association [6 marks]


Visual Paradigm Professional(Mary.Davin(Cork Institute of technology))
Role Patterns
Person
1
owner
asset
*
Building
office
1..*
employee
*
works for
*
employer
*
Company
tenant
is used by

(b) How would you translate the role names in the diagram in part (a) into java code? [3 marks]

(c) Explain the meaning of an ***Association*** class. [2 marks]

(d) Add **association classes** to the following two many- to -many associations. Show the attributes that might be found in these association classes. [6 marks]

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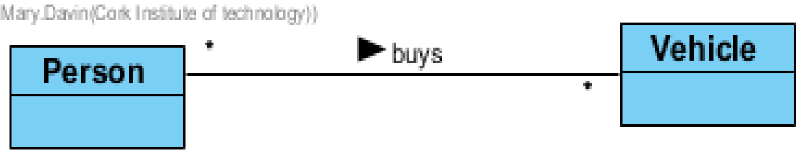
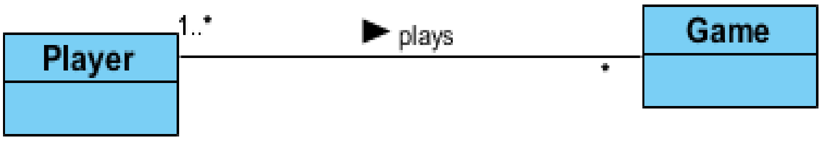
1



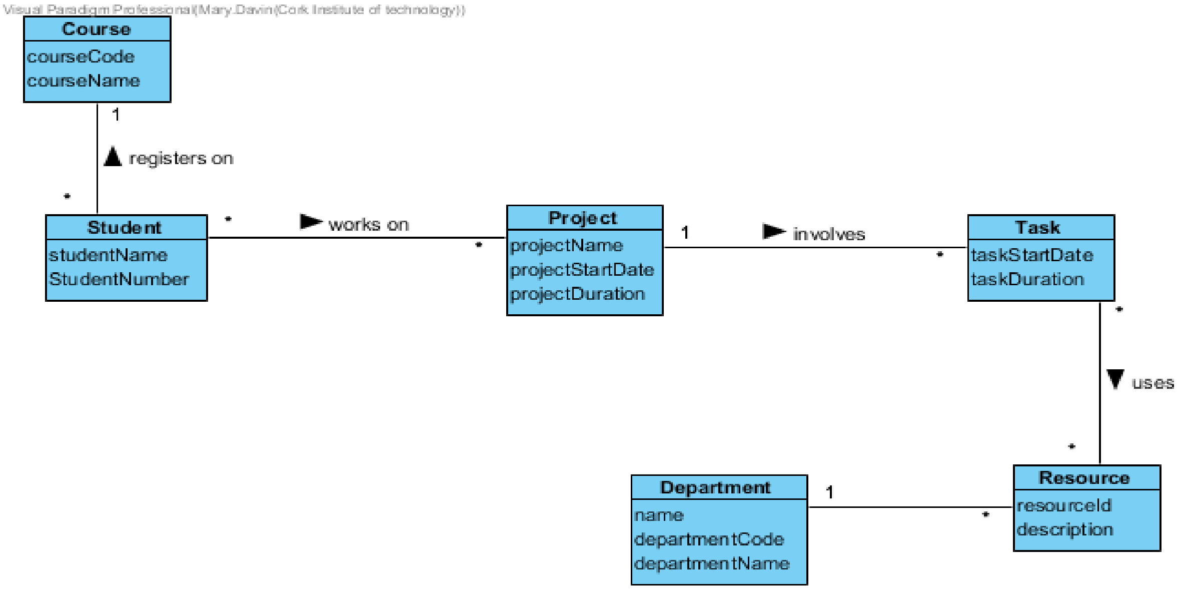
2



(e) The following diagram is used to illustrate students on a course carrying out tasks on projects using different resources. Amend the diagram so that it shows the following

i. The time a resource is used on a task. [4 marks]

ii. The student who leads a project assuming there is only one leader. [4 marks]



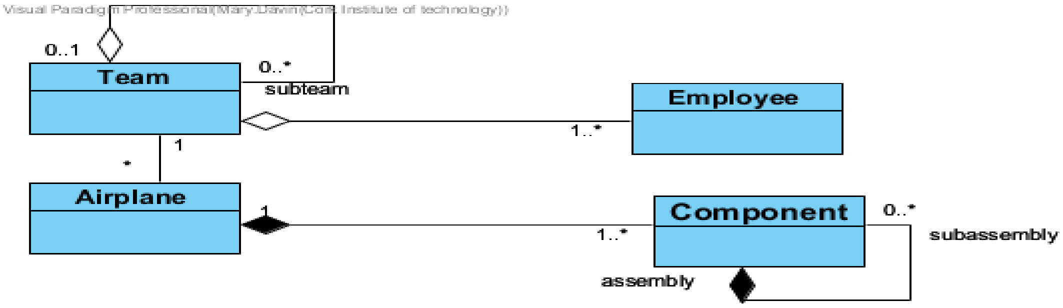
Q3

(a) Use the diagram below to explain the meaning of the following

i. Aggregation relationship.

ii. Composition relationship.

iii. Self association.



[6 marks]

(b) Differentiate between a Domain model and a Design class diagram. [2 marks]

(c) Differentiate between an abstract class and a concrete class and how they are modelled in UML. [4 marks]

(d) Develop a domain model **for each** of following scenarios.

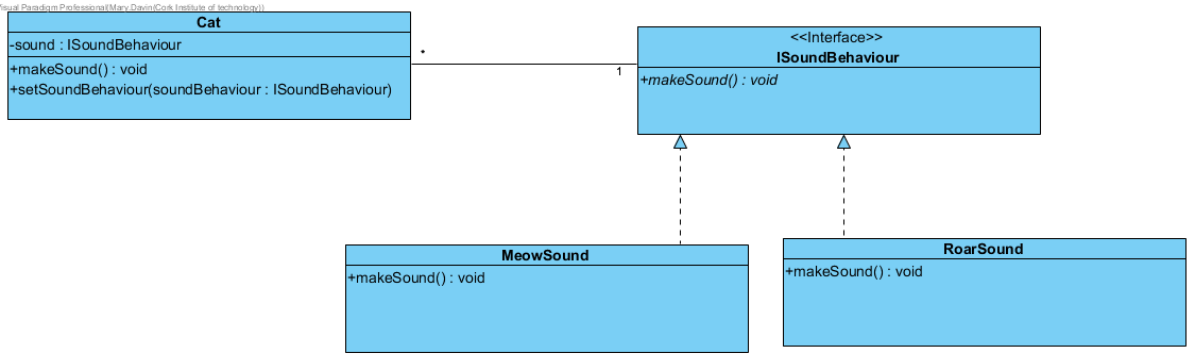
i. A student can take the same module more than once by registering on a different offering of the module. This would be necessary if the student failed the final exam in the module. The result the student gets in the final exam of module needs to be recorded. [6 marks]

ii. Train journeys depart from one station and arrive at another station. Each train journey may involve a number of legs. For each leg of the journey the name of the departing and arrival stations needs to be recorded as well as departure and arrival times. Explain how the names of the departing and arrival stations of a train journey could be derived.

[7 marks]

Q4

(a) Explain the meaning of delegation using the following diagram. [5 marks]



(b) When would you favour delegation over inheritance as a means of reusing code? [4 marks]

(c) What is meant by the Open Closed Design Principle (OCP)?

[4 marks]

(d) Explain how the OCP principle could be applied to the code below.

[4 marks]

```
public interface Shape{
  public double calculateArea();
}

public class Rectangle implements Shape
{
  double length;
  double width;
  public double calculateArea()
{
    return length * width;
  }
}

public class Circle implements Shape{
  public double radius;
  public double calculateArea()
{
    return (22/7)*radius*radius;
  }
}
```

```
public class AreaCalculator{
 public double calculateShapeArea(Shape shape)
{
   return  shape.calculateArea();
  }
}
```

(e) Reverse engineer the code in part (d) into a class diagram.

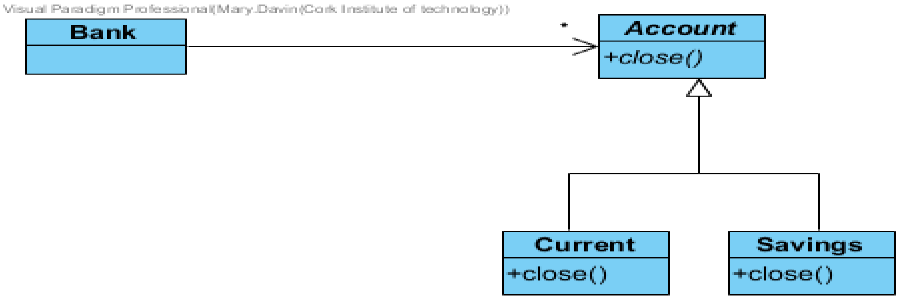
[8 marks]

Q5

(a) Use the following diagram to explain what is meant by each of the following. [6 marks]

i. Unidirectional association.

ii. Polymorphic operation.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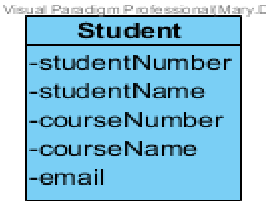
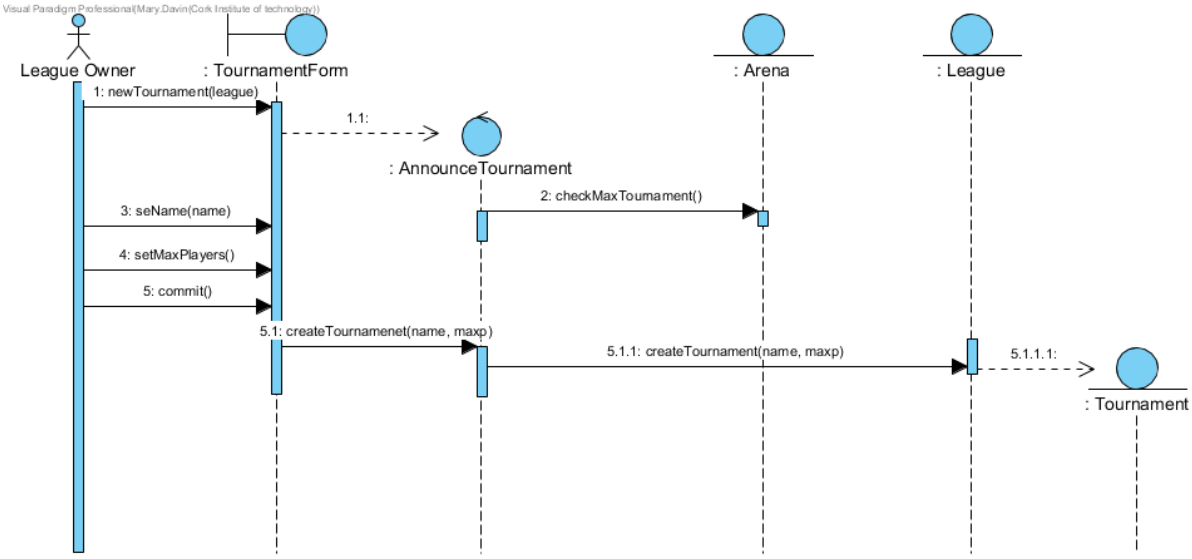
Bank
*
Account
+close()
Current
+close()
Savings
+close()

(b) Explain why the following class is not cohesive. [3 marks]



(c) Use the following diagram to answer the questions below?



i. Differentiate between entity control and boundary objects. [3 marks]

ii. Create classes that would allow for the sequence diagram above. [5 marks]

(d) Give a description of each of the following OO design principles. [8]

i. Single Responsibility principle

ii. Interface Segregation Principle