



# COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Computer Engineering (Cairo Branch)

Lecturer : Dr. Hisham Salah Rashad

Course Name : Object Oriented Programming

Course Code : CC 316

Total Marks: 40

Date : 4-2-2021

Start Time: 9:00

Time allowed : 2 Hours

## Final Exam

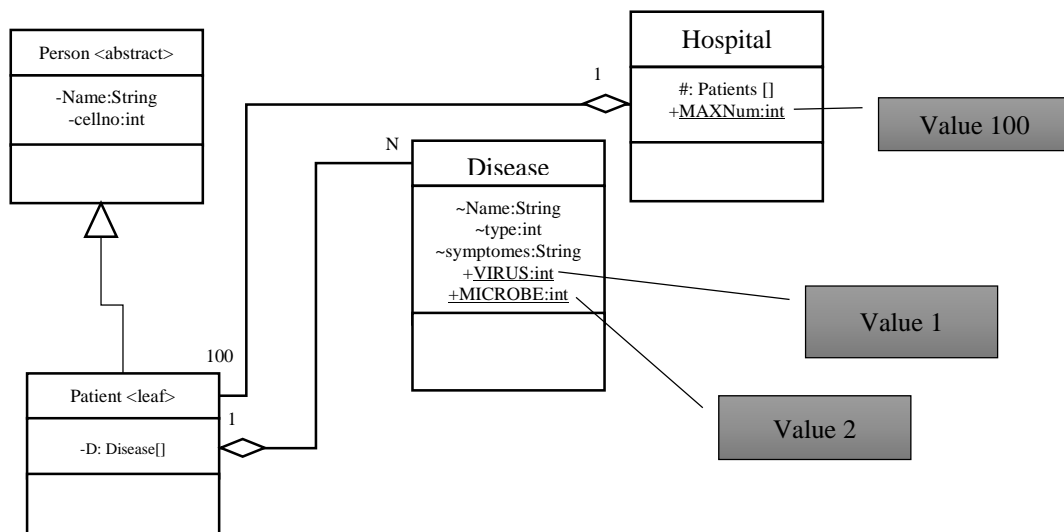
Attempt all questions.

### Question 1 (Total 36 Marks):

Consider the UML diagram below which describes patients in a hospital. The patient can be in hospital to be treated from 1 or more diseases. Each disease is caused by one of two: either a virus or a microbe. The hospital can hold many patients up to MAXNum patients.

In this scope do the following:

- Write the java code which implements the given UML diagram. (12 marks)
- Apply Encapsulation concept to class **Person** and **Patient**. (2 marks)
- In all classes add default constructor to initialize each. (4 marks)
- In both classes **Person** and **Patient** add parameter-based constructor to initialize each. (4 marks)
- In both classes **Person** and **Patient** add a copy constructor to initialize it. (4 marks)
- In all classes add **toString()** method (4 marks)
- It is required to include a new class named Doctor. The doctor is a Person who can be a patient and accordingly can be treated from number of diseases. Add necessary java code to implement class doctor. (4 marks)
- Illustrate your answer in part g using uml. (2 marks)



### Question 2 (Total 4 Marks):

Using templates, write a generic class which can hold an array of 10 numbers. Numbers are restricted to: Float, Integer, Double, Byte, Long...etc. In main define two objects of the class. The first object holds an array of floating point numbers only and the second holds an array of integers only. (4 marks)



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### Question 3 (Bonus 10 Marks):

Consider three types of human Virus families: Flu family, Hepatic (liver) family and Immunity Family. A virus in general can be described by scientific name (String), incubation period (int) in days (number of days till symptoms appear) and the disease it causes.

The Flu family causes cold diseases. A Cold disease is described by two symptoms including: cough and Fever, and two medicines: Panadol and Oplex.

The Hepatic family causes liver diseases. A Liver disease is described by two symptoms: diarrhea and fever and two medicines: Antocide and Panadol.

Finally, the Immunity family causes immunity diseases. An immunity disease is described by having cough, Fever and body weakness and three medicines: Panadol, Oplex and Centrum.

In the scope of this description do the following:

- Write the java classes which implements the problem (7 marks)
- In a separate class and **using Polymorphism**, write a generic method which can accept any virus family object. The method should print to screen the drug name for the virus family. (3 marks)

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Best wishes ☺ ☺