



**UVA WELLASSA UNIVERSITY**  
**DEPARTMENT OF COMPUTER SCIENCE & TECHNOLOGY**  
**END SEMESTER EXAMINATION – SEMESTER II – 2007/2008**  
**CST201-3 OBJECT ORIENTED DESIGN CONCEPTS & CASE TOOLS**

Time Allowed: **THREE HOURS**

Answer **All** Questions. All questions carry equal marks.

- 1 Define the following terms in the context of Object Oriented systems design using your own terms. You may use illustrations and/or code samples where necessary. (4 × 5 Marks)
  - a. Polymorphism
  - b. Inheritance
  - c. Data Abstraction
  - d. Message Passing
  
- 2 A software system can be developed using either structured programming paradigm or object oriented paradigm. Each method has its own advantages and disadvantages.
  - a. Identify advantages of using Object oriented design paradigm over structured programming methodology. (5 Marks)
  - b. What do you understand by the term “Class” in Object oriented System Design? Explain the term Class by comparing it with the similar concept used in Structured programming methodology giving suitable examples either in C/C++ or Java (10 Marks)
  - c. Explain the concept of **Dynamic Binding** using an appropriate example. You may use skeleton Java/C++ classes to strengthen your answer. (5 Marks)

**Consider the following description of functions of a Health Information System before answering Questions 3, 4 and 5.**

The Health Information System (HIS) consists of a large database of patient’s information admitted to “Suwasetha Hospitals (Pvt) Ltd.” which is a private medical institute.

When a patient arrived at the hospital registration desk, the patient’s information will be recorded by the registration officer and the patient will be directed to either Ordinary Patient’s Division (OPD) or Residential Patient’s Division. The residential patient’s division consists of Emergency Room (ER), Intensive Care Unit (ICU) and Paid Wards. Depending on the patient’s condition, this registration process may happen later after directing the patient to treatment.

Each patient will be assigned to a Medical Doctor for treatment and may be directed to a Medical Specialist later after a preliminary diagnosis. All residential patients will be assigned to Wards and each ward has a Medical doctor supervising it.

The medical tests conducted at the hospital if it is recommend by a doctor treating a patient. The test results are highly confidential and they are available only to the doctors, the patient and the

relatives of the patient only. All records are kept in HIS and paper form for future use.

The treatments given to patients at any unit of the hospital could be a drug dose, injection, physical treatment, mental treatment, or a surgery. The cost of these treatments will be added to the patient's balance outstanding.

There will be charges for rooms of residential patients. Each room has a room fee and the total room fee will be calculated by the number of days the patient has stayed. OPD patients has to pay a doctor's fee for consultation and charges for medicine only.

When the patient leave the hospital, the total bill for the patient will be calculated and the patient will pay the bill through Cash, Cheque, and Credit Card or by a Medical Insurance. However, medical Insurances are subjected to verification with the Insurance company.

- 3
  - a. What is a **Use case** in an Object Oriented System Design? (5 Marks)
  - b. Identify possible use cases in the above System and draw a Use Case Diagram indicating generalizations, extends and uses relationships. You may state any assumptions you have made. (10 Marks)
  - c. Draw a **System Sequence Diagram** for the Admitting a Patient use case. (5 Marks)
  
- 4
  - a. What do you understand by the term Conceptual Model? What is the main difference between a conceptual model and a Class diagram? (3 Marks)
  - b. What are the two basic methods of identifying Concepts in a system? (2 Marks)
  - c. By using either method you have mentioned in part (b) above, derive a conceptual model for the Health Information System. You may state any assumptions you have made (10 Marks)
  - d. What is the purpose of an Interaction Diagram? What are the two types of interaction diagrams present in UML? (5 Marks)
  
- 5
  - a. Derive a Collaboration Diagram for Admitting patients and Releasing patients functions of the Health Information System (2 × 7 Marks)
  - b. Derive a concise System Class Diagram for Health Information System. You may state any assumptions you have made. (6 Marks)