Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech (SE)/SEM-2/PGSE-202/2010

2010

OBJECT-ORIENTED SOFTWARE ENGINEERING & UML

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer Question No. 1 and any *six* from the rest.

1. Give concrete example of the following : 10 × 1 = 10

   i) Association Class

   ii) Reflexive Association

   iii) Composition

   iv) Polymorphism

   v) Method Overloading

   vi) Synchronous Message

   vii) Inheritance

   viii) Method Overriding

   ix) A Component

   x) Dependency.

2. a) Draw a class diagram summarizing the following facts about a library. Discuss your design decisions, and any limitations of your model. 8

For each book held by the library, the catalogue contains the title, author's name and ISBN number of the book. There may be multiple copies of a book in the library. Each copy of a book has a unique accession number. There are many registered readers belonging to the library, each of whom is issued with a number of tickets. The system records the name and address of each reader and the number of tickets that they have been issued with. Readers can borrow one book for each ticket that they process and the system keeps a record of which books a reader has borrowed, along with the date by which the book must be retuned.

b) What is realization ? 2

3. a) Draw a state diagram of following scenario :

The lights in a lecture theatre are controlled by a panel of three switches, labelled 'On', 'Off' and 'Dim'. 'On' switches the light on to their full brightness and 'Off' switches them off. There is also an intermediate level of brightness, used when slides and other projected material are being shown. The 'Dim' switch reduces the lighting level from full to this intermediate level; full brightness can be restored by pressing the 'On' switch again.

Draw a state diagram modelling the behaviour of the lighting system in this lecture theatre. 8

b) What is a composite state ? 2

4. Draw use case diagram of following ATM transactions :

i) Withdraw money

ii) Validate User

iii) Balance Enquiry. 4 + 4 + 2

5. Draw UML diagram of following java codes :

a)
```
public class Triangle{
 private float base;
  private float height;
  private float area;
  private static int no Of Triangles;
  public void setBase(float b){
  }
  public float getBase(){
  }
  public void setHeight(float h){
  }
  public float getHeight(){
  }
  public void calculateArea(){
  }
  public float getArea(){
  }
  public static int getNumber Of  Triangles(){
  }
 }
```
4

b)
```
public class form{
    public collection myLabel;
    public collection myTextBox;
}
public class Label{
    public Form myForm;
}
public class TextBox{
    public Form myForm;
}
```
3

c) Draw a deployment diagram for the following scenario : There is a computer in a college laboratory that is designated as the AI–Server. It has 100 GB hard disk, a 1 GB RAM and a frequency of 3 MHZ. It has start UP (), restart () and shutdown operations. It has the Mat Lab, Octave and Scilab packages installed on it, in addition to Prologue. There are four clients connected to the server. The students store their files on the server as well as execute them. Using the facilities of the server. The clients contain only an editor to type the source code. 3

6. Consider the following scenario :

An object of class CircleDemo creates two objects c1 and c2 of class circle by passing r1 and r2 in the Circle's constructor. It then sends a calculateArea () message to each of the constructed circles. The return value is stored in the variables a1 and a2 respectively. This is followed by sending calculate Circumference () message to c1 and c2. The return value is stored in cir1 and cir2. Then Circle Demo calls its own printArea () and printCircumference () methods. Indicate this scenario by sequence and communication diagrams. 10

7. Write short notes on any *two* of the following : 2 × 5

a) Broker architectural pattern

b) Abstraction-Occurrence pattern

c) Deployment Diagram.

8. Explain the concepts of forking, merging, branching, joining, and swimlane in context of activity diagram. Give concrete example of each. 10