End Semester Examination

COMPUTER SCIENCE AND ENGINEERING DEPARTMENT

MOTILAL NEHRU NATIONAL INSTITUTE OF TECHNOLOGY, ALLAHABAD

OBJECT BASED MODELING (CA 3305)

MCA III SEMESTER (Odd Semester 2016-2017)

SUBJECT CODE: CA3305 Time: 3.00 Hrs Max Marks: 60

Note: Answer all questions. All the parts of a question shall be answered together in sequence.

Q1. **(a)** Briefly describe the three properties that characterize object oriented programming languages. (2)

(b) Explain through an example how interfaces help in making client code development independent of implementations of those interfaces. List the advantages of programming through interfaces. (02)

(c) Show with an example code how the messages get bound to appropriate methods. Explain also how it is decided what messages can be received by an object. (02)

(d) Describe two kinds of reuse supported through inheritance and polymorphism using OO approach. (02)

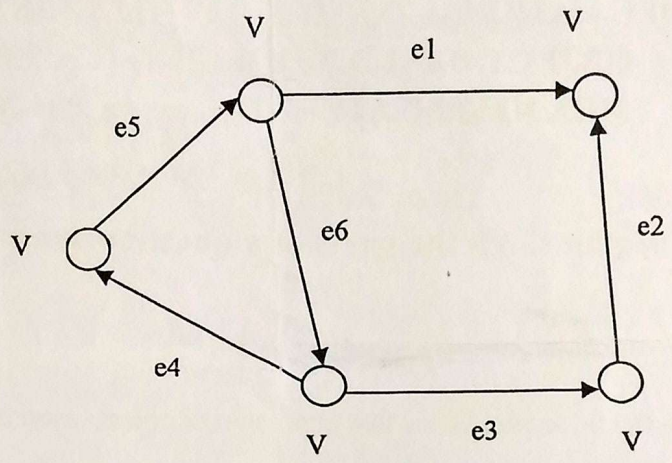
(e) Must all classes have more than one instance? Give an example of a class with more than one instance and of a class with exactly one instance. In addition, give an example of a class with no instances. (02)

Q2. Let's imagine we will develop a browser-based training system to help people prepare for a certification exam. A user can request a quiz for the system. The system picks a set of questions from its database, and composes them together to make a quiz. It rates the user's answers, and gives hints if the user requests it.
In addition to users, we also have tutors who provide questions and hints. And also examiners who must certify questions to make sure they are not too trivial, and are sensible.
Make a use case diagram to model this system. Work out some of your use cases. Since we don't have real stake holders here, you are free to fill in details you think is sensible. Give at least one use case in fully dressed format. (10)

Q3. **(a)** You are familiar with two computer programming languages (C, Java). Give an example of a problem showing how one language would direct the programmer to one type of solution, and the other language would encourage an alternative solution. (05)

(b) Give a simplified state diagram for the control of a telephone answering machine. The machine detects an incoming call on the first ring and answers the call with a pre-recorded announcement. When the announcement is complete the machine records the caller's message. When the caller hangs up the machine hangs up and shuts off. Place the following in the diagram: call detected, answer call, play announcement, record message, caller hangs up, announcement complete.
Also revise your above diagram, so that the machine can be programmed to answer after five rings. If someone answers the call before five rings, the machine should do nothing. (3+2)

Q4. (a) Prepare a class model to describe directed graphs. A directed graph is similar to an undirected graph, except the edges are oriented. Also prepare an object model for the graph below. (05)



(b) Prepare a class diagram for a graphical document editor that supports grouping. Assume that a document consists of several sheets. Each sheet contains drawing object including texts, geometrical objects, and groups. A group is simply a set of drawing objects, possibly including other groups. A group must contain at least two drawing objects. A drawing object can be a direct member of at most one group. Geometrical objects include circles, ellipses, rectangles, lines, and squares. (05)

Q5. (a) Are design patterns a form of reuse? If so, what are you reusing? (02)
(b) List the advantage of design patterns. Write briefly on the use of design patterns. (03)
(c) Describe any one design pattern briefly. (05)

Q6. Write Short notes on any four of the following. (10)
(a) Static and Dynamic binding
(b) Relationship between objects, methods and messages.
(c) Overriding and Overloading
(d) Loosely coupled objects
(e) Abstraction
(f) Aggregation