Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(SE)/SEM-2/PGSE-202/2013

2013

OBJECT ORIENTED SOFTWARE ENGINEERING AND 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 Q. No. 1 and any *three* from the rest.

1. State *True* or *False* and briefly justify your answer any *five* of the following : 5 × 2 = 10

   (i) Inheritance feature of the object-oriented paradigm helps in code reuse.

   (ii) Aggregate relationship between classes is anti-symmetric.

   (iii) An important advantage of polymorphism is facilitation of reuse.

   (iv) There might be several methods in a class implementing the same operation.

   (v) The implementation of a use case in terms of specific method calls is depicted in a sequence diagram.

(vi) The terms method and operation are equivalent concepts and can be used interchangeably.

(vii) Class diagrams developed using UML can serve as the functional specification of a system.

2. a) What is a design pattern ?

b) What is its significance in software development ? State two aspects of it.

c) What is the difference between framework and toolkit ?

d) Suppose there is an object-oriented software in which a class whose object contains a log file to which the major steps of the execution of the software is logged. Only one log file (and hence object of the class) should exist in the lifetime of the program. What design pattern will you use ? Describe in brief.

e) Let us consider, Stack class would be created from an existing class such as Linked List. The push method of Stack would simply call the add First method of Linked List, the pop method would call the removed First method and the Empty method would delegate to the method of the same name. The other method of the Linked List class would not be used since they do not make sense in a stack. What design pattern will you use ? Describe in brief. 3 + 3 + 4 + 5 + 5

3. a) In the context of object-orientation, distinguish between an operation and a method. Is it true that each operation must be implemented by a unique method ?

b) Explain the concept of dynamic binding as used in object-oriented languages using a simple illustrative example. How is dynamic binding useful ?

c) Explain the mechanisms of method overloading and method overriding using suitable examples.

d) Discuss four different phases involved in Unified Software Development in terms of major participants in each phase, major decisions made in each phase and major output of each phase. What is (4 + 1) view of a system ? 3 + 4 + 5 + 8

4. Draw UML Diagrams representing following interactions :

(i) A client searches for a book in a library. He or she then asks to borrow the book. If a copy is available, a loan object is created.

(ii) Model a simple vending machine that can be in four states : 'Waiting', 'Receiving Money', 'Returning Money' and 'Delivering Item'.

(iii) Draw a class diagram using the UML syntax to represent the fact that an order Register consists of many orders. Each order consists of up to ten order items. Each order item contains the name of the item, its quantity and the date by which it is required. Each order item is described by an item order specification object having details such as its vendor addresses, its unit price, and manufacturer.

(iv) Design a class diagram for the courseware management system. A description of the courseware management system is as follows. The primary objective of the courseware management system is to manage the different courses in an institution that involves faculties, students, course schedules and course coordinator. According to the course schedule, students are taught by different faculties and the overall management is done by course coordinator.

4 + 4 + 6 + 6

5. a) Briefly describe the different phases involved in object-oriented analysis and design. Write down the difference between incremental development and iterative development. Explain the purpose of system acceptance tests. What are the applications of Delegation and Adapter pattern ? 2 + 2 + 2 + 4

b) Write short notes on any *two* of the following : 2 × 5

(i) Extensibility Mechanisms

(ii) Deployment Diagrams

(iii) The Model View Controller Architectural Pattern.