B. Tech.

(SEM. IV) EXAMINATION, 2006-07

ORIENTED SYSTEMS

Time : 3 Hours] [Total Marks : 100

Note : Attempt all questions. All question carry equal marks.

1 Attempt any two parts of the following :
   (a) Prepare a class diagram from the following instance diagram.

Fig. 1

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(b) A directory file contains information about files in a directory, including both ordinary files as well as other directory files. Prepare an object diagram which models directory files and ordinary files. Since a directory plus a file name uniquely identifies a file, you will probably want to use file name as a qualifier.

(c) Following portion of a metamodel describes a generalization. A generalization is associated with several generalization roles, which are the roles that object classes play in generalization relationships. Role type is either subclass or superclass. Does this model support multiple inheritance? Explain your answer.

![Generalization diagram]

Fig. 2

2 Attempt any two parts of the following:
(a) Write scenarios for the following activities:
(i) Moving a bag of corn, a goose, and a fox across a river in a boat. Only one thing may be carried in the boat at a time. If the goose is left alone with the corn, the corn will be eaten. If the goose is left alone with the fox, the goose will be eaten. Prepare a scenario in which everything is safely transported across the river.
(ii) An elevator ride to the top.

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(b) An extension ladder has a rope, pulley, and latch for raising, lowering, and locking the extension. When the latch is locked, the extension is mechanically supported and you may safely climb the ladder. To release the latch, you raise the extension slightly with the rope. You may then freely raise or lower the extension. The latch produces a clacking sound as it passes over rungs of the ladder. The ladder may be reengaged while raising the extension by reversing direction just as the latch is passing a rung. Prepare a state diagram of an extension ladder.

(c) Explain the following terms, with example:
   (i) dynamic model
   (ii) aggregation
   (iii) nested diagram.

3 Attempt any two parts of the following:
   (a) Discuss various features of OMT.
   (b) Compare SA/SD and JSD (Jackson structured development) methodologies.
   (c) Prepare a data flow diagram for computing the volume and surface area of a cylinder. Inputs are height and radius of the cylinder. Outputs are volume and surface area. Discuss two ways of implementing the data flow diagram.

4 Answer any two parts of the following: \(7 \times 2 = 14\)
   (a) Explain the notion of Class in C++. How is it defined and instantiated? How are data members of the class accessed? What are inline functions?
(b) What are “friend” functions? Explain, with an example how a non member function can be made a friend function of a class? Can we make a whole class friend of some other class?

(c) What are Constructors? Create a class Vector with an integer array as one of its data members and write a constructor function to initialize any instantiated object of this class with all zeros. Can there be multiple constructors in a Class?

5 Answer any two parts of the following : 6×2=12

(a) Explain the term Reuse. Distinguish between Composition and Inheritance as mechanisms of Reuse. What are the various types of Inheritance?

(b) What are exceptions? Explain how try, throw and catch statements in C++ are used to handle exceptions. What happens if the thrown exception object does not match with the formal argument type in catch block?

(c) List the major advantages of object oriented programming/design. Mention three areas of application of object oriented programming/design.