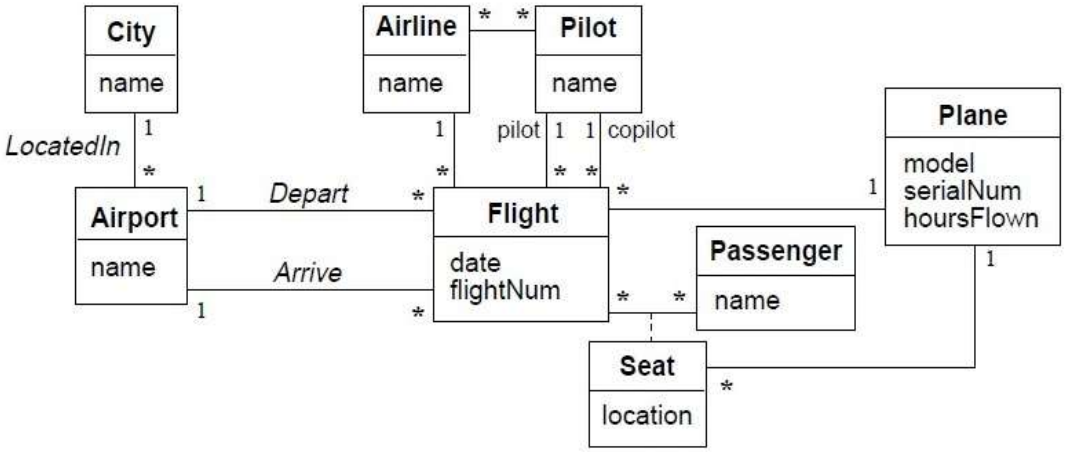
MCA Semester - III
2630001 – SOOADM
Question – 2 [High Level Thinking Skill]

SET-1

Que 2.	**(a) Attempt the Followings.** 1. For following class diagram construct OCL expression.  I. Find the set of airlines that a person flew in a given year. II. Find the nonstop flights from aCity1 to aCity2. III. Find which pilot flew max for a given city. IV. Find plane flew higest time for given airline.	**02** **02** **02** **01**
	(b) Three-phase induction motors will spin either clockwise or counterclockwise, depending on the connection to the power lines. In applications requiring motor operation in both directions, two separate contactors (power relays) will be used to make the connections, one for each direction. Also, in some applications of large motors, the motor starts through a transformer that reduces the impact of the power supply. The transformer is bypassed by a third contactor after the motor has been given enough time to come up to speed. There are three momentary control inputs: requests for forward, reverse or off. When the motor is off, forward or reverse requests cause the motor to start up and run in the requested direction. A reverse request is ignored if the motor is starting or running in the forward direction. An off request at any time shuts the motor off. Analyze above statements and construct State diagram.	**07**
	OR	
	(b) Prepare a class model for a graphical document editor that supports grouping. Assume that a document consists of several sheets. Each sheet contains drawing objects, including text, geometrical objects and groups. A group is simply a set of drawing objects, possibly including other groups. A group must contain at least two objects. A drawing object can be a direct member of at most one group. A geometrical object includes circle, ellipse, rectangles, lines and squares.	**07**

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SET-2

Que 2.	**(a)** Consider the world of libraries. A library has books, videos, and CDs that it loans to its users. All library material has a id# and a title. In addition, books have one or more authors, videos have one producer and one or more actors, while CDs have one or more entertainers. The library maintains one or more copies of each library item (book, video or CD). Copies of all library material can be loaned to users. Reference-only material is loaned for 2hrs and can't be removed from the library. Other material can be loaned for 2 weeks. For every loan, the library records the user, the loan date and time, and the return date and time. For users, the library maintains their name, address and phone number. Draw a class model (or two, if this is more convenient) for the description above. Make sure to show attributes, multiplicities and relationships, where appropriate. No need to show any operations.	**07**
	(b) Construct a state diagram that describes the process of passing a graduate course as a set of concurrent activities. The process has as follows: To pass, a student has to attend all but two lectures, present to the class a paper she read, and complete a course project, due on the last day of the term. To give her presentation, the student is given a date by the instructor, prepares her presentation, and gives it on the assigned day. At any time, the student can drop the course. Make sure to put events, conditions, actions for transitions in your diagram, where appropriate	**07**
	OR	
	(b) Identify UML relationship from following statements which can be applicable to Class and Construct Diagram. 1. A drawing object is text, a geometrical object, or a group. 2. Modems and keyboards are input/output devices. 3. Classes may have several attributes. 4. A person plays for a team in a certain year. 5. A route connects two cities. 6. A car is a vehicle. 7. School has many rooms.	**07**

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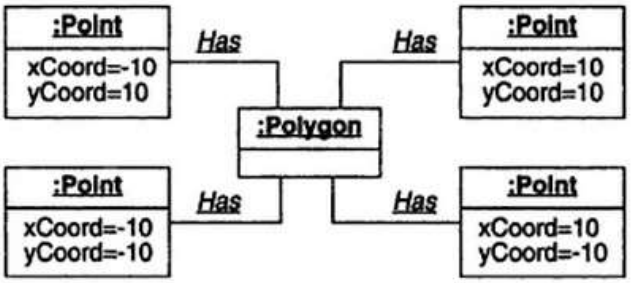
SET-3

Que 2.	**(a)** Prepare an Object diagram for imaginary round tripe you took last weekend to London. Include at least one instance of each class. Fortunately, direct flights on a hyper sonic plane were available. A friend went with you but decided to stay a while and is still there. Captain Johnson was your pilot on both flights. You had a different seat each way, but noticed it was on the same plane because of a distinctive dent in the tail section. You can indicate unknown values with a "?".	**07**
	(b) Draw a State diagram for an extension ladder. 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 the rungs of the ladder. The latch may be re-engaged while raising the extension by reversing directions just as the latch is passing a rung.	**07**
	OR	
	(b) Attempt the Followings. 1. Construct a class model for the dinning philosopher problem. There are 5 philosophers and 5 forks around a circular table. Each philosopher has access to 2 forks, one on either side. Each fork is shared by 2 philosophers. Each fork may be either on the table or in use by one philosopher. A philosopher must have 2 forks to eat. 2. Prepare a class diagram after analyzing following object diagram.  	**04** **03**

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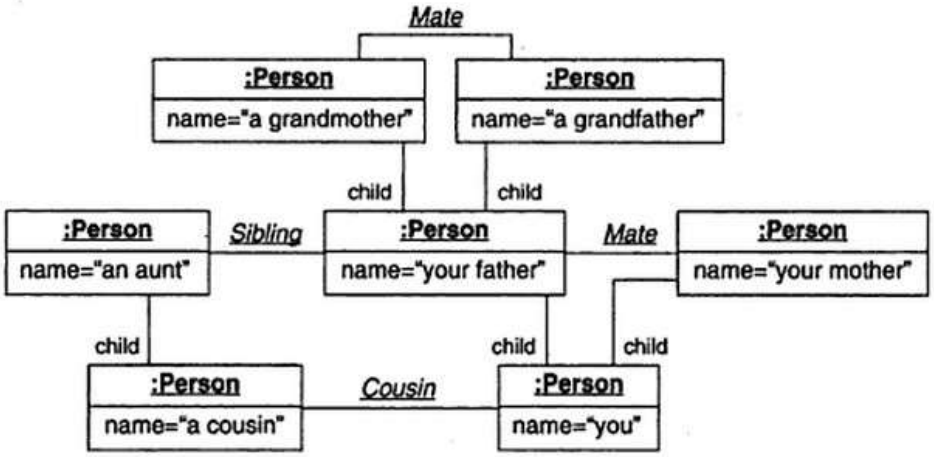
Question – 2 [High Level Thinking Skill]

SET-4

Que 2.	**(a)** A school video library tracking system is to be developed. Videos can be scientific, religious or general. General videos are classified as miscellaneous, sports or entertainment. Students and professors can belong to research groups. A research group must have at least 2 professors. Every student must belong to some research group. Professors that belong to a research group are called research professors. Research professors do not teach courses every semester. Each semester, a student must register for at least one course offered by a professor in his research group. A student cannot register for courses outside the subject areas of the research groups in his academic department. A research group can consist of members with various subject area interests. However, subject areas are only classified as an area of interest for the group if at least two members have interest in the area. In general, professors can check out any number of videos, however, visiting professors can check out at most seven videos. Unlike regular professors, visiting professors can check out videos for the duration of only two weeks. Students can check out any number of religious videos and at most 2 scientific videos. Students can check out only scientific videos in the subject areas represented in their research groups. Analyze above problem statement and construct Class Model for same.	**07**
	(b) Draw a State diagram for an automatic garage door opener based on the following description: When the garage door is fully closed and the control button is pushed the door opens. When the garage door is fully open and the button is pressed the door closes. If the garage door is moving and the button is pushed, the door immediately stops and the next time the button is pushed, the door moves in the opposite direction. There is also a motion sensor that causes the garage door to immediately open if tripped while the door is in the process of closing. Any time the door moves an overhead garage light is turned on for 10 minutes.	**07**
	OR	
	(b) Attempt the Followings. 1. Consider a simple digital watch which has a display and two buttons to set it, the A button and the B button. The watch has two modes of operation, display time mode, the watch displays hours and minutes, separated by a flashing colon. The set time mode has two sub modes: set hours and set minutes. The A button selects modes. Each time it is pressed, the mode advances in sequence: display, set hours, set minutes, display etc. Within the sub modes, the B button advances the hours or minutes once each time it is pressed. Buttons must be released before they can generate another event. Construct the state transition diagram for above described digital watch. 2. Prepare a class diagram after analyzing following object diagram.	**03** **04**


Mate
:Person
name="a grandmother"
:Person
name="a grandfather"
child
child
:Person
name="an aunt"
Sibling
:Person
name="your father"
Mate
:Person
name="your mother"
child
child
child
:Person
name="a cousin"
Cousin
:Person
name="you"