U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Computer Science and Engineering **Duration: 3 hrs.**

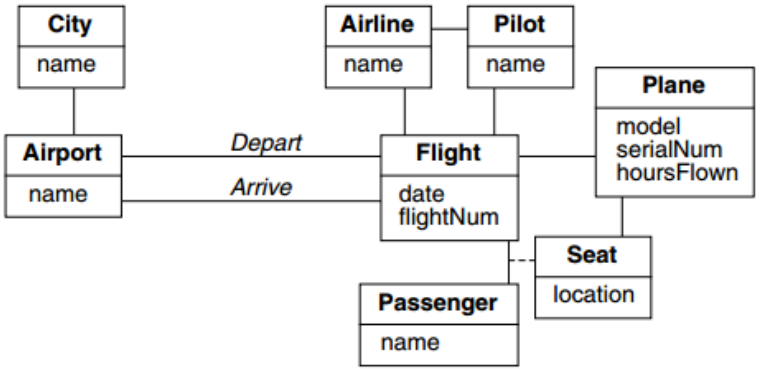
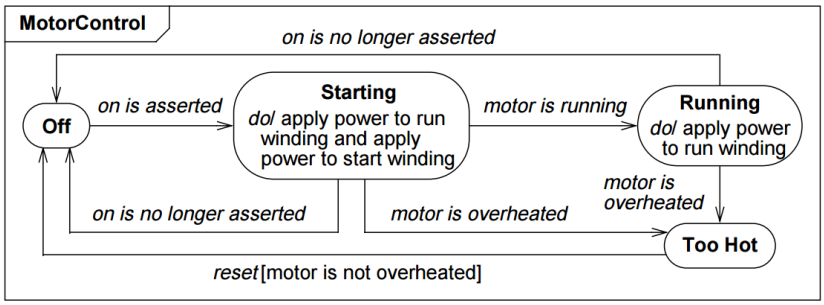
Course Code: 23CS5PCOOM **Max Marks: 100**

Course: Object Oriented Modelling

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Prepare a class diagram from the given classes and methods; also add suitable multiplicity between the classes. Classes: Engine, Automobile, Exhaust system, Wheel, Muffler, Tailpipe, Brake, BrakeLight, Door and Battery. Methods: On(), Off(), Open(), Close(), Charge(), and Discharge()	CO3	PO3	**6**
	b)	Categorize the following relationships into generalization, aggregation, or association. Beware, there may be n-ary associations in the list, so do not assume every relationship involving three or more classes is a generalization. Explain your answers. 1. A file is an ordinary file or a directory file. 2. Files contain records 3. A person uses a computer language on a project. 4. Modems and keyboards are input/output devices. 5. Classes may have several attributes 6. A route connects two cities.	CO2	PO2	**6**
	c)	Describe with suitable diagrams, the different restructuring techniques that can be utilized to overcome the implementation issues associated with multiple inheritance.	CO1	PO1	**8**
		OR			
2	a)	With a neat diagram explain the difference between i. Link and Association ii. Aggregation and Composition	CO1	PO1	**8**
	b)	Below figures shows partially completed class model of an air transportation system. Identify and add at least three association end names along with multiplicity for the given diagram.	CO2	PO2	**6**

						
	c)	Prepare a class diagram 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 drawing objects. A drawing object can be a direct member of at most one group. Geometrical objects include circles, ellipses, rectangles, lines, and squares.	*CO3*	*PO3*	**6**
		UNIT - II			
3	a)	A simple digital watch 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 and set time. In the display time mode, the watch displays hours and minutes, separated by a flashing colon. The set time mode has two submodes, set hours and set minutes. The A button selects modes. Each time it is pressed, the mode advances in the sequence: display, set hours, set minutes, display, etc. Within the submodes, the B button advances the hours or minutes once each time it is pressed. Buttons must be released before they can generate another event. Prepare a state diagram of the watch.	*CO3*	*PO3*	**6**
	b)	Revise the below state diagram, given the commonality of the starting and running states. There is a transition from either the starting or the running state to the off state when "on" is not wanted. 	*CO2*	*PO2*	**6**
	c)	A cash dispensing machine dispenses cash and returns the user's card at the end of a transaction. The machine must not reset itself until the user takes both the cash and the card, but the user may take them in either order or even simultaneously.	*CO3*	*PO3*	**8**

			The order in which they are taken is irrelevant, only the fact that both of them have been taken. Prepare a suitable state diagram that illustrates concurrent activities			
			OR			
	4	a)	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 latch 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.	*CO3*	*PO3*	**10**
		b)	The direction control for some of the first toy electric car was accomplished by interrupting the power to the car. Prepare state diagrams for the headlight and wheels of the car, corresponding to the following sequence of events: Power is off, car is not moving. Power is turned on, car runs forward with its headlight shining. Power is turned off, car stops and headlight goes out. Power is turned on, headlight shines and car does not move. Power is turned off, headlight goes out. Power is turned on, car runs backward with its headlight shining. Power is turned off, car stops and headlight goes out. Power is turned on, headlight shines and car does not move. Power is turned off, headlight goes out. Power is turned on, car runs forward with its headlight shining.	*CO3*	*PO3*	**10**
			UNIT - III			
	5	a)	Draw an advanced use case diagram for an electronic gasoline pump and also provide description of at least three use cases.	*CO3*	*PO3*	**10**
		b)	With a suitable example illustrate passive and transient objects using a sequence diagram.	*CO1*	*PO1*	**10**
			OR			
	6	a)	With a suitable example, state the guidelines to be followed in the construction of use case models and explain in detail.	*CO1*	*PO1*	**10**
		b)	Draw an activity and sequence diagram that illustrates order processing in stock trade.	*CO3*	*PO3*	**10**
			UNIT - IV			
	7	a)	Assume you are responsible for constructing the domain class model of an online shopping website. Summarize the steps that you would follow during the construction of the domain class model and explain in detail.	*CO1*	*PO1*	**10**

		b)	For each of the following systems, identify the relative importance of the three aspects of modeling: 1) class modeling, 2) state modeling, 3) interaction modeling. a. bridge player b. change-making machine c. car cruise control d. spelling checker e. telephone answering machine Justify your answers stating their relative importance.	*CO2*	*PO2*	**10**
			OR			
	8	a)	The following is a list of candidate classes. scheduling software, meeting, user, chairperson, software, meeting entry, schedule, attendee, scheduler, room, time, everyone, attendance, acceptance status, meeting notice, invitation, meeting information, invitee, notice. Prepare a list of classes that should be eliminated for any of the following reasons (Redundant, Irrelevant, vague, Attributes, operations, roles, Derived classes and Implementation constructs). Give reasons for elimination. If there is more than one reason, give the main one.	*CO2*	*PO2*	**10**
		b)	Assume you are responsible for the construction of interaction model of an online gaming application. Summarize the steps that you would follow in the construction of the application interaction model and explain each of them in detail.	*CO2*	*PO2*	**10**
			UNIT - V			
	9	a)	Describe the different range of scale or abstraction used in categorizing patterns. Also, provide an example pattern at each level of abstraction.	*CO1*	*PO1*	**10**
		b)	Suggest a suitable design pattern for inter-process communication when the peers have different underlying communication mechanisms. Explain the same with a neat diagram, also list the benefits and liabilities of this design pattern.	*CO2*	*PO2*	**10**
			OR			
	10	a)	Explain the structure of the Client-Dispatcher Server design pattern with a neat diagram	*CO1*	*PO1*	**10**
		b)	Flex-N is a large software organization and has several different teams working on hundreds of projects. The teams need to stay informed / updated with information relevant to their projects. The organization is planning to develop a suitable message board so that the teams stay updated with latest news, events and information relevant to their projects. Suggest a suitable design pattern for the message board which relives the team from being boggled by irrelevant information. Also list the benefits of using this design pattern	*CO2*	*PO2*	**10**

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