

K3 Level -Unit 2 Basic structural and Behavioural Modelling

Question:1

Make a class diagram for an Order System of an application. It describes a particular aspect of the entire application.

First of all, Order and Customer are identified as the two elements of the system. They have a one-to-many relationship because a customer can have multiple orders.

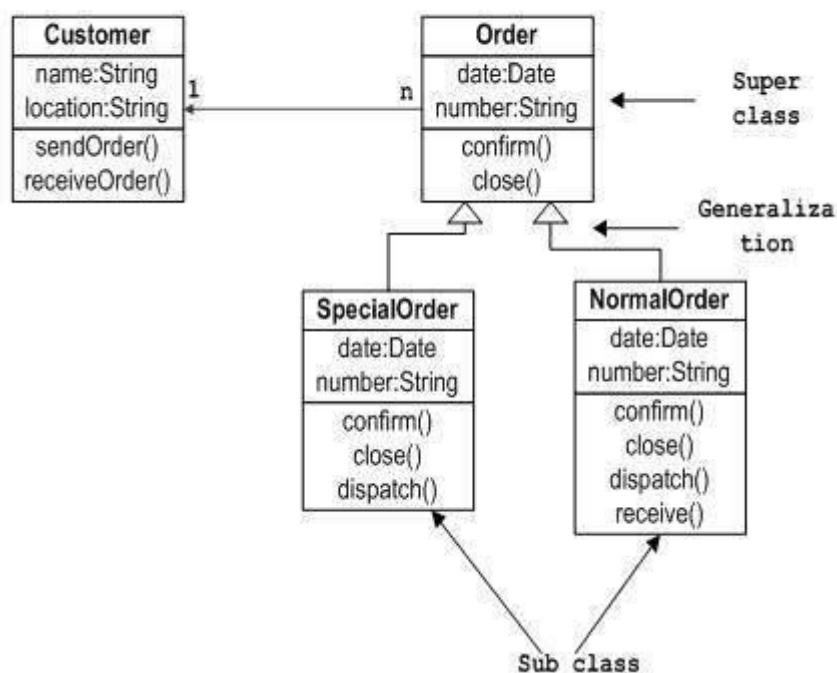
Order class is an abstract class and it has two concrete classes (inheritance relationship) SpecialOrder and NormalOrder.

The two inherited classes have all the properties as the Order class. In addition, they have additional functions like dispatch () and receive ().

Solution: 1 (With step wise marking)

The following class diagram has been drawn considering all the points mentioned above.

Sample Class Diagram



Question:2

Draw a component diagram for order management system. Here, the artifacts are files

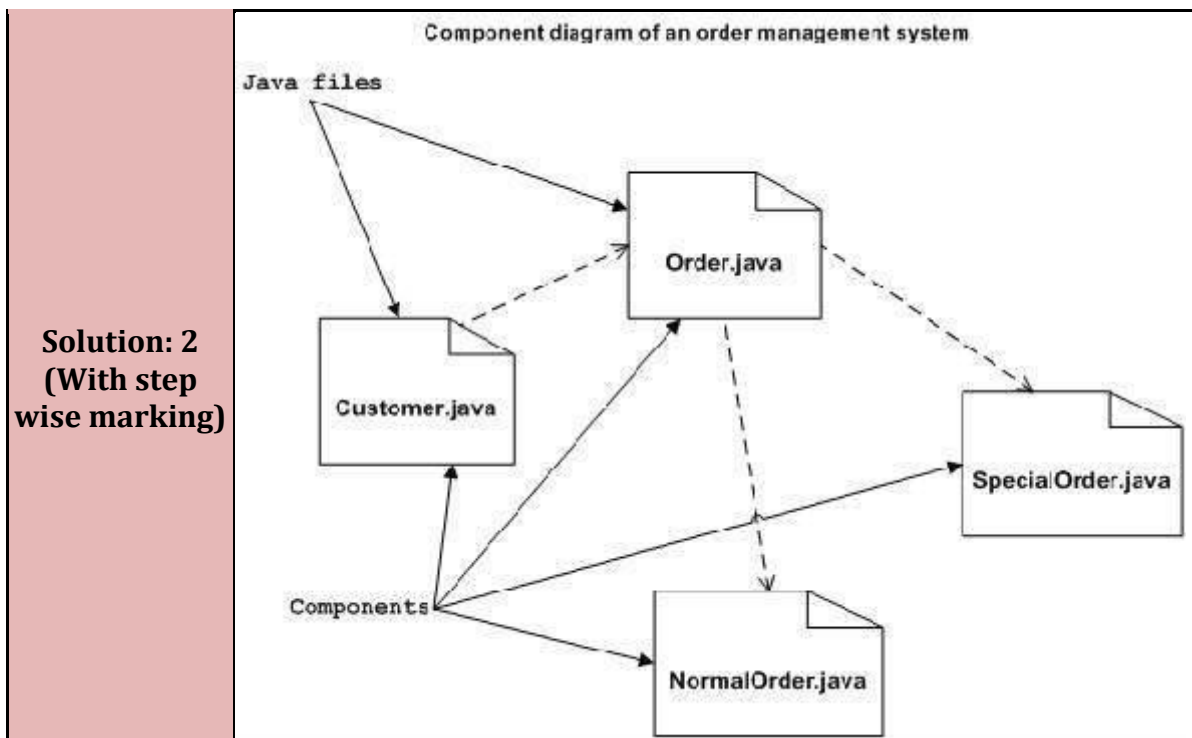
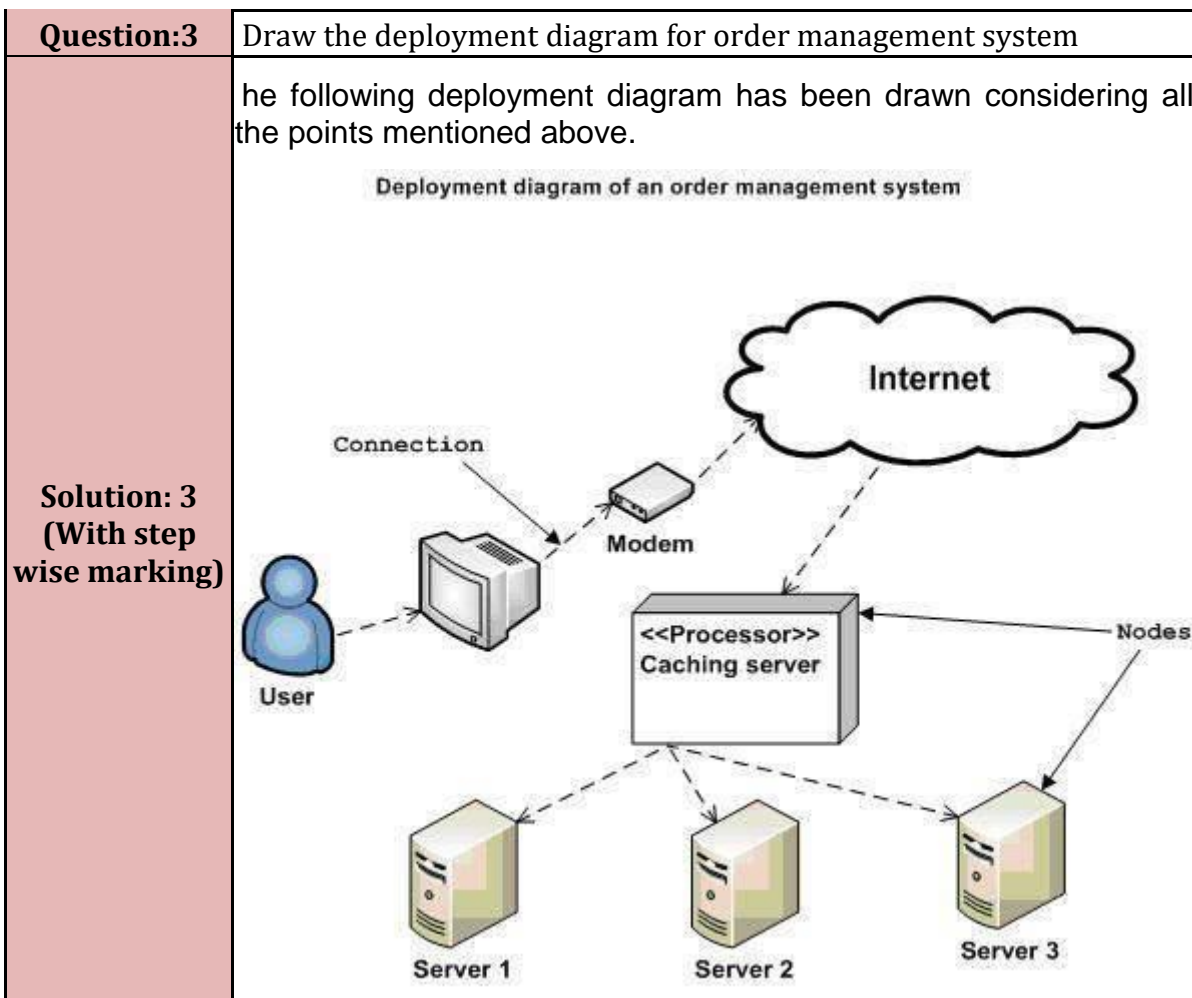
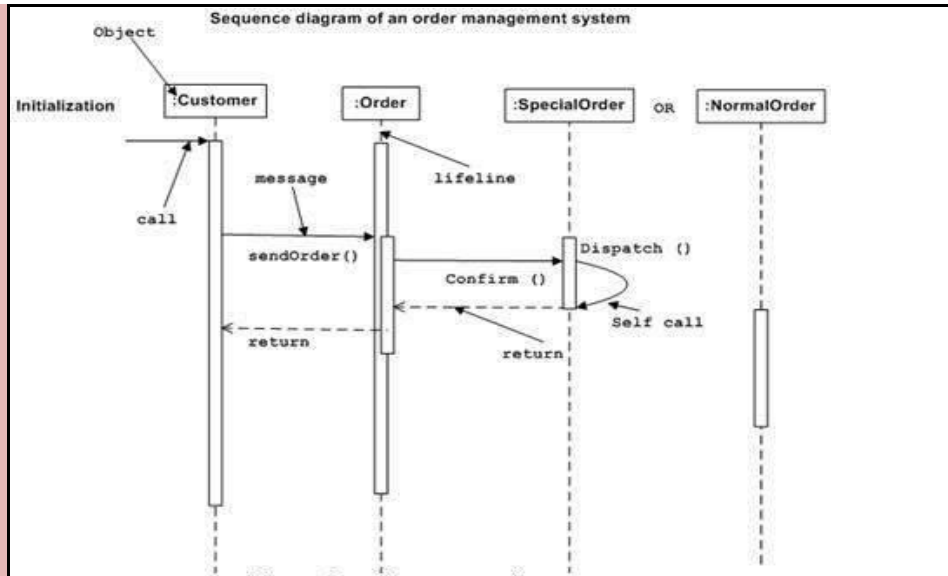


Table 1



Question:6	Draw use case diagram representing the order management system.
Solution: 6 (With step wise marking)	<div data-bbox="379 331 1257 902"> <pre> graph LR subgraph SystemBoundary [System boundary] direction TB subgraph UseCases [Use cases] Order((Order)) SpecialOrder((SpecialOrder)) NormalOrder((NormalOrder)) end Order -.-> <<extends>> SpecialOrder Order -.-> <<extends>> NormalOrder end Customer[Customer] -- actor --> Order </pre> <p>Figure: Sample Use Case diagram</p> </div> <p>Above is use case diagram representing the order management system. Hence, if we look into the diagram then we will find three use cases (Order, SpecialOrder, and NormalOrder) and one actor which is the customer.</p> <p>The SpecialOrder and NormalOrder use cases are extended from Order use case. Hence, they have extended relationship. Another important point is to identify the system boundary, which is shown in the picture. The actor Customer lies outside the system as it is an external user of the system.</p>

Question:7	Make an sequence diagram of of order management system
Solution: 7 (With step wise marking)	



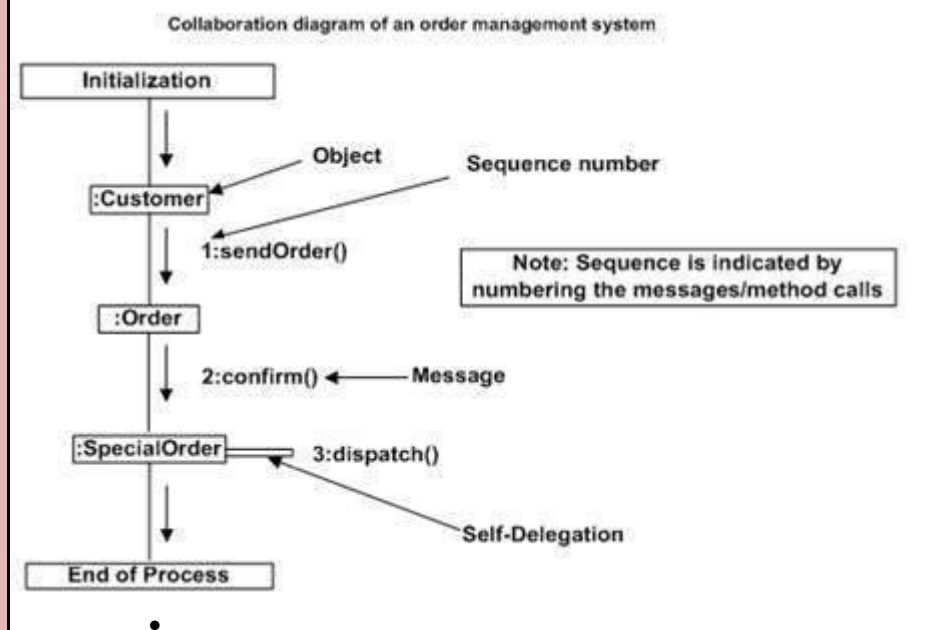
The above diagram shows the message sequence for SpecialOrder object and the same can be used in case of NormalOrder object. It is important to understand the time sequence of message flows. The message flow is nothing but a method call of an object.

The first call is sendOrder () which is a method of Order object. The next call is confirm () which is a method of SpecialOrder object and the last call is Dispatch () which is a method of SpecialOrder object. The following diagram mainly describes the method calls from one object to another, and this is also the actual scenario when the system is running.

Question:8

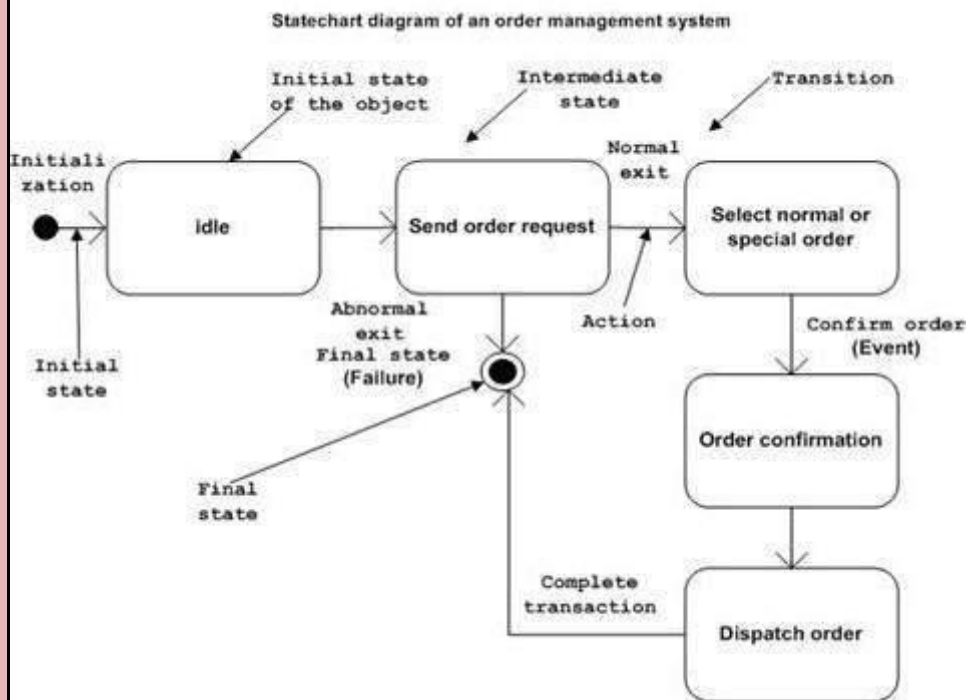
Make an Collaboration diagram of of an order management system

Solution: 8
(With step wise marking)

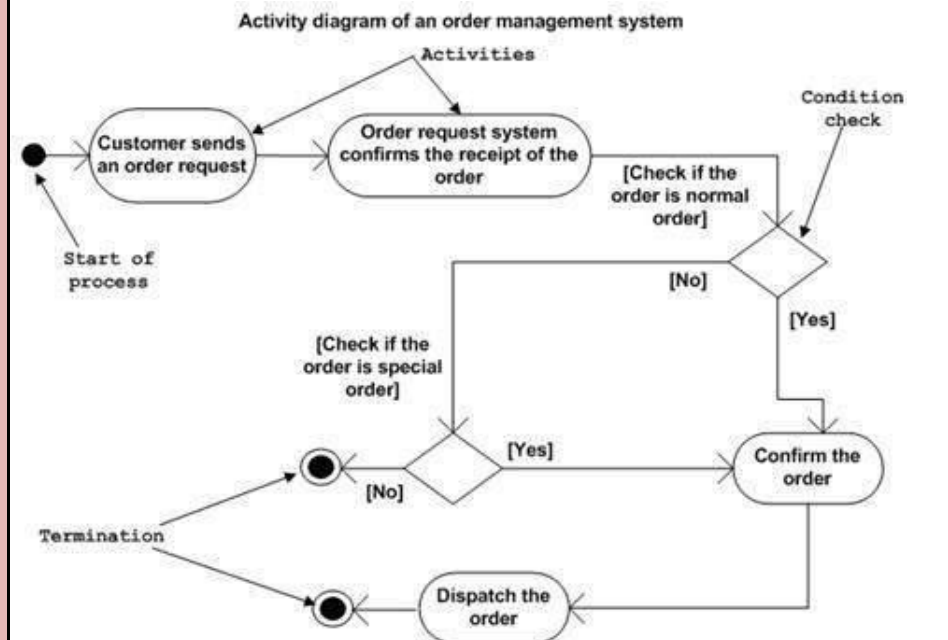


Question:9

Make an state chart diagram of an order management system

Solution: 9
(With step wise marking)**Question:10**

Make an activity diagram for an order management system

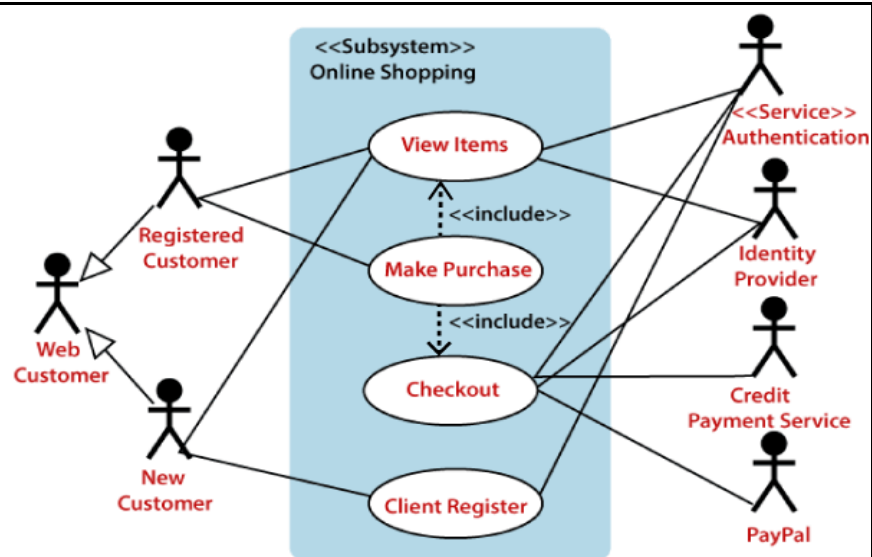
Solution: 10
(With step wise marking)

Above is an example of an activity diagram for order management system. In the diagram, four activities are identified which are associated with conditions. One important point should be clearly

	<p>understood that an activity diagram cannot be exactly matched with the code. The activity diagram is made to understand the flow of activities and is mainly used by the business users</p> <p>Following diagram is drawn with the four main activities –</p> <p>Send order by the customer</p> <p>Receipt of the order</p> <p>Confirm the order</p> <p>Dispatch the order</p>
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Table 2

Question:11	Make a Component Diagram for online shopping system
Solution: 11 (With step wise marking)	<p>component diagram for an online shopping system is given below:</p> <pre> graph TD Product -- "Item code" --> Order Customer -- "Customer Details" --> Order Account -- "Account details" --> Order Account -.- "Payment" --> Order </pre>

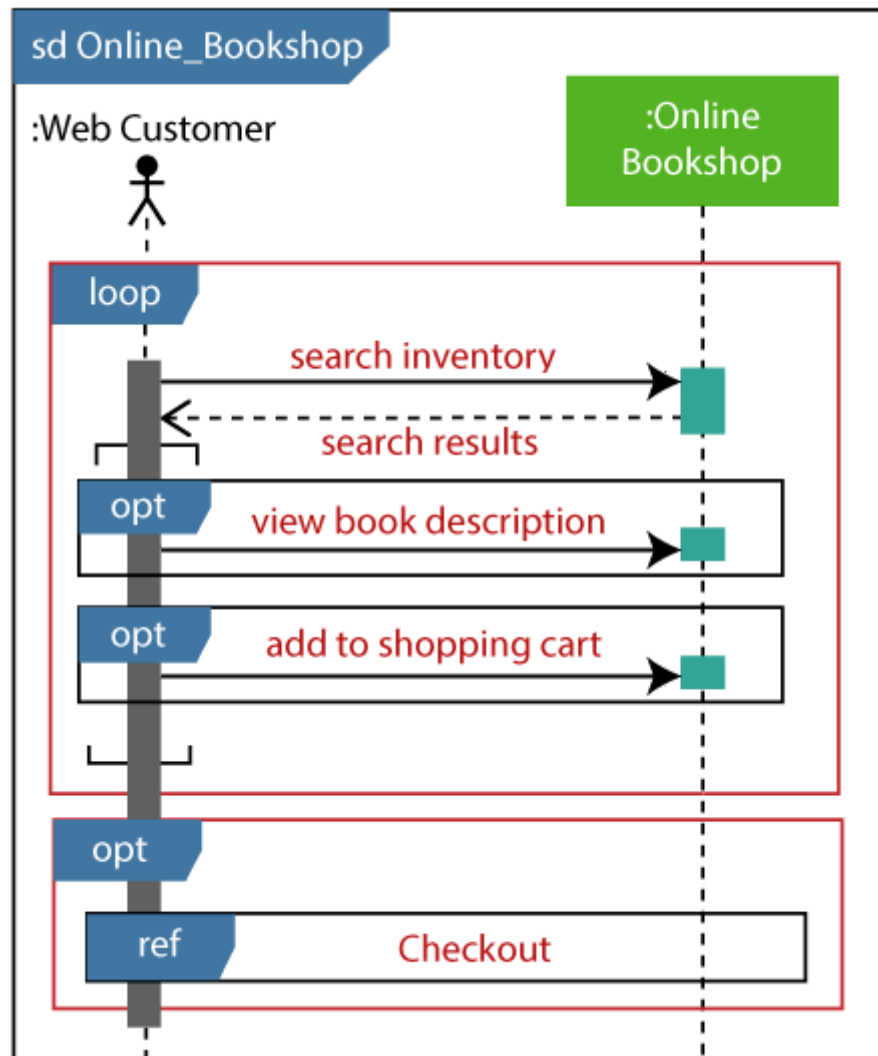


Here the Web Customer actor makes use of any online shopping website to purchase online. The top-level uses are as follows; View Items, Make Purchase, Checkout, Client Register. The View Items use case is utilized by the customer who searches and view products. The Client Register use case allows the customer to register itself with the website for availing gift vouchers, coupons, or getting a private sale invitation. It is to be noted that the Checkout is an included use case, which is part of Making Purchase, and it is not available by itself.

Question:14 Make a sequence diagram for online book shop

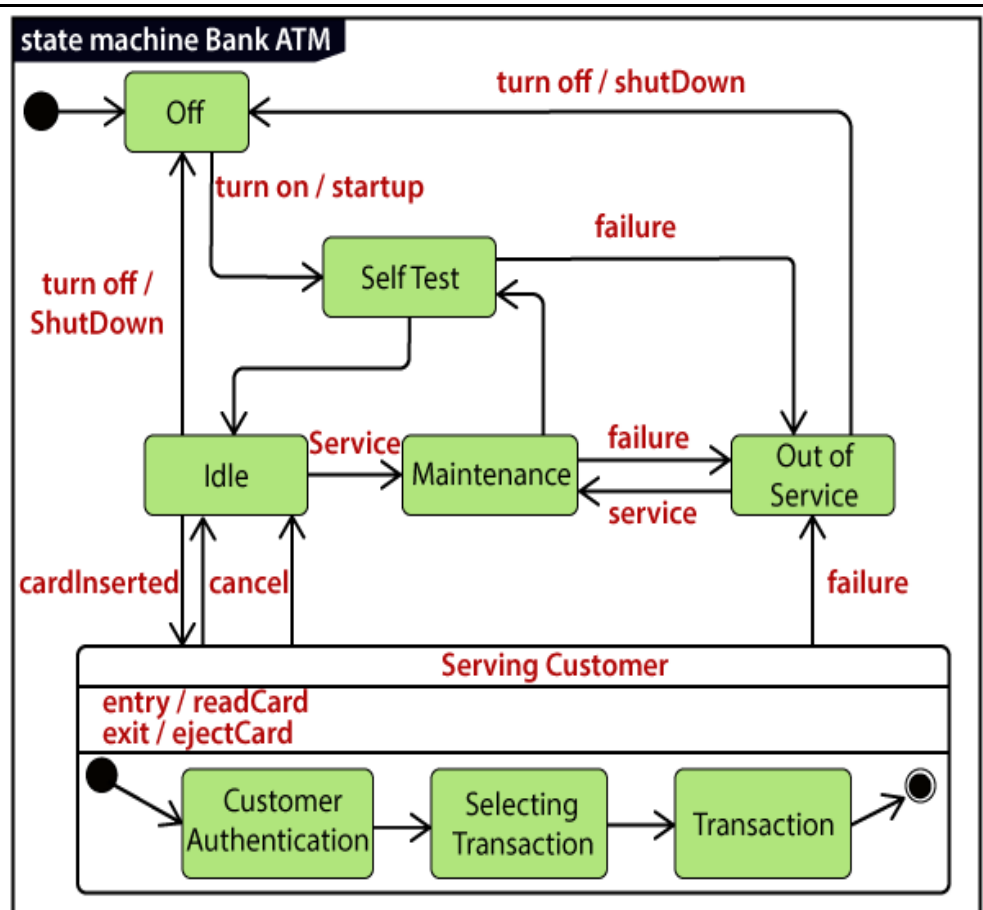
Solution: 14
(With step wise marking)

Any online customer can search for a book catalog, view a description of a particular book, add a book to its shopping cart, and do checkout.



Question:15 Make an State Machine diagram

Solution: 15
(With step
wise marking)



An example of a top-level state machine diagram showing Bank Automated Teller Machine (ATM) is drawn above.

Initially, the ATM is turned off. After the power supply is turned on, the ATM starts performing the startup action and enters into the Self Test state. If the test fails, the ATM will enter into the Out Of Service state, or it will undergo a triggerless transition to the Idle state. This is the state where the customer waits for the interaction.

Whenever the customer inserts the bank or credit card in the ATM's card reader, the ATM state changes from Idle to Serving Customer, the entry action readCard is performed after entering into Serving Customer state. Since the customer can cancel the transaction at any instant, so the transition from Serving Customer state back to the Idle state could be triggered by cancel event.

Here the Serving Customer is a composite state with sequential substates that are Customer Authentication, Selecting Transaction, and Transaction.

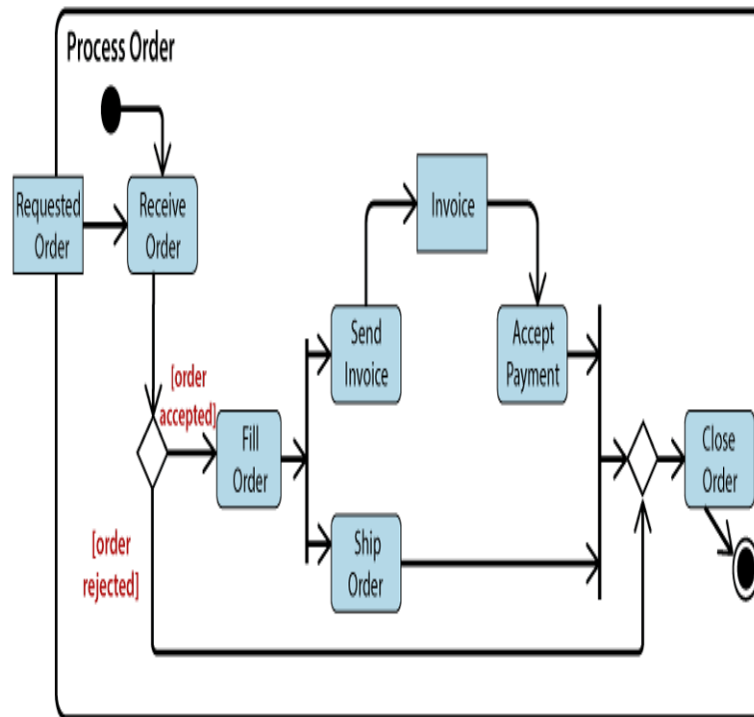
Customer Authentication and Transaction are the composite states itself is displayed by a hidden decomposition indication icon. After the transaction is finished, the Serving Customer encompasses a triggerless

transition back to the Idle state. On leaving the state, it undergoes the exit action ejectCard that discharges the customer card.

Question:16

Sketch activity diagram showing the business flow activity of order processing

Solution: 16
(With step wise marking)

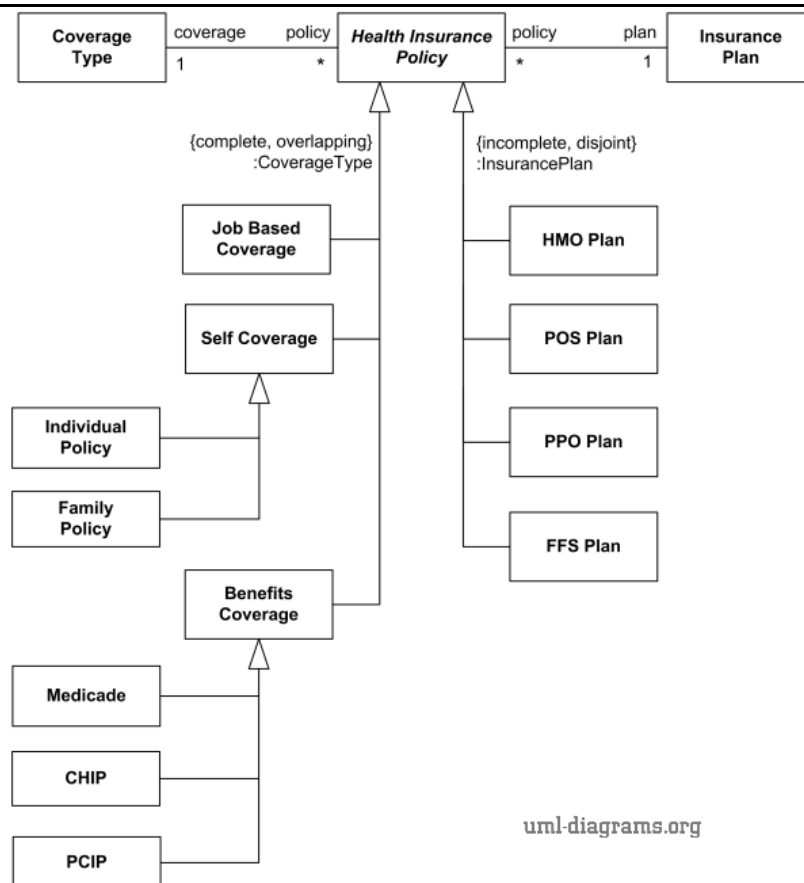


Here the input parameter is the Requested order, and once the order is accepted, all of the required information is then filled, payment is also accepted, and then the order is shipped. It permits order shipment before an invoice is sent or payment is completed.

Question:17

Make an UML class diagram for Health insurance policy

Solution: 17
(With step wise marking)



Each US state operates a Medicaid program that provides health coverage for lower income people, families and children, the elderly, and people with disabilities. All states provide coverage for eligible children through Medicaid and the Children's Health Insurance Program (CHIP). People who have a pre-existing health condition and have been uninsured for the past six months, may qualify for the Pre-Existing Condition Insurance Plan (PCIP) created under the Affordable Care Act.

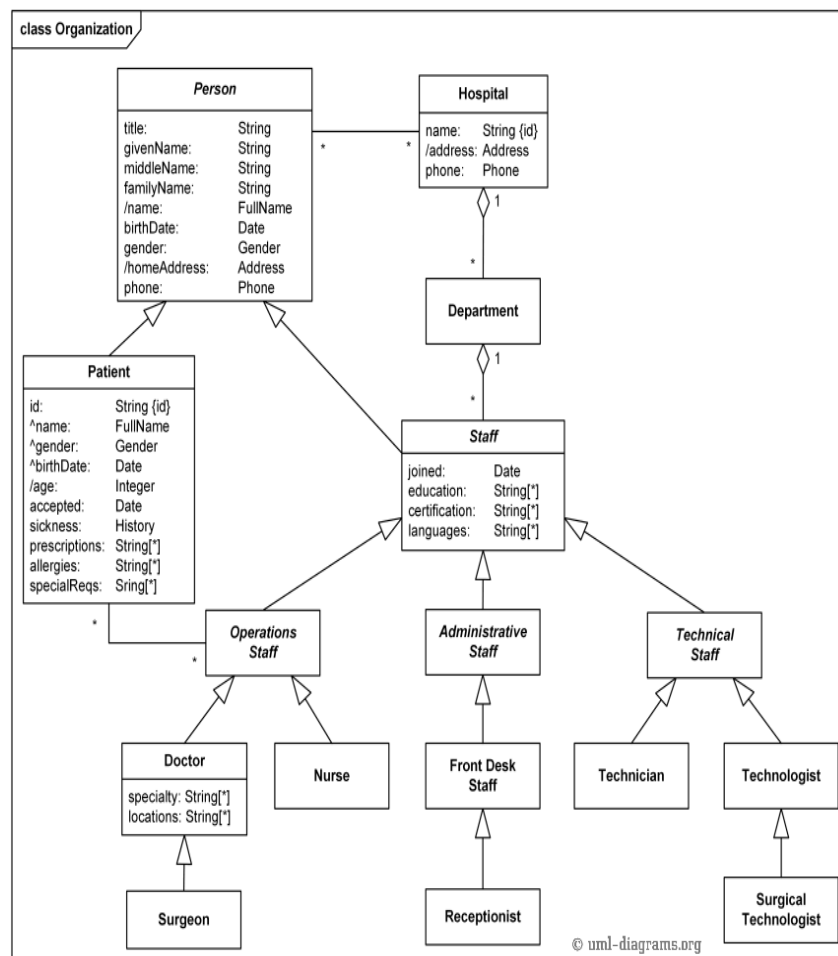
Another generalization set for the Health Insurance Policy could be grouped by the insurance plan. Some common types of health insurance plans are Health Maintenance Organization (HMO), Point Of Service (POS), Participating Provider Option (PPO), and Fee For Service (FFS). Because this list is incomplete, as there are other insurance plans, Insurance Plan generalization set has {incomplete} constraint. Usually there is no overlapping in insurance plans, that is the reason for another {disjoint} constraint.

The HMO is one of the most affordable and common as a family health insurance choice. Usually it restricts patients to receive health care from certain "in-network" doctors and hospitals (health care providers). The PPO is another popular

and flexible choice for families, as it provides both coverage from preferred in-network providers, while also allowing to get help from out-of-network health care providers. The POS plan is a combination of HMO and PPO. The FFS plan usually provides the same coverage from all available health care providers, while it does not work with any health care provider networks. Most services are covered because it is the most expensive health insurance plan.

Question:18 Make an UML class diagram for Hospital Management

Solution: 18
(With step wise marking)



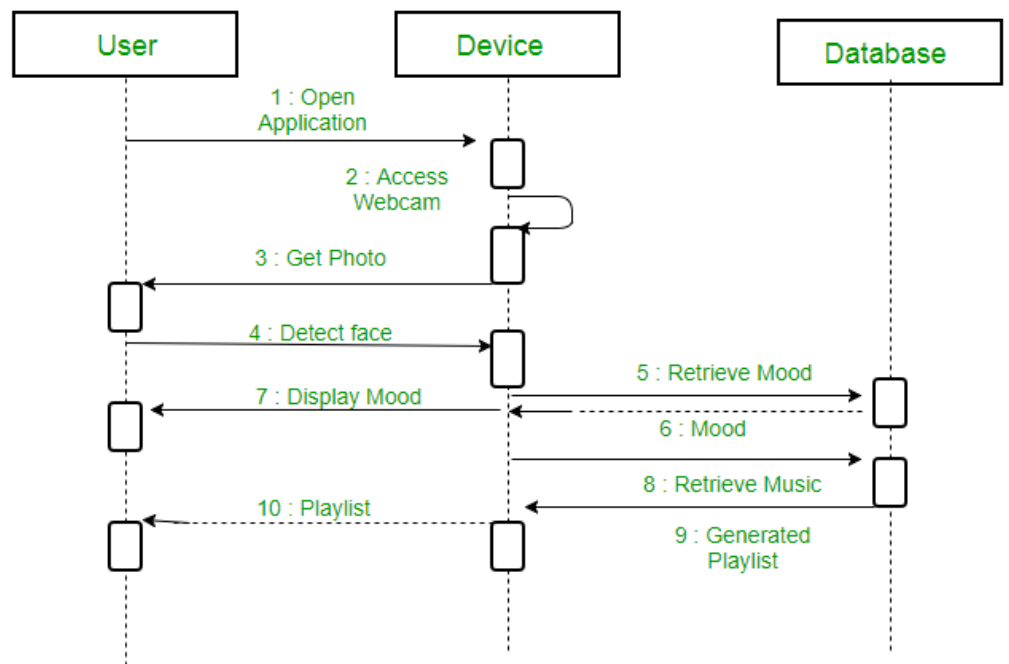
The domain model for the Hospital Management System is represented by several class diagrams. The purpose of the diagram is to show and explain hospital structure, staff, relationships with patients, and patient treatment terminology.

On the diagram above a Person could be associated with different Hospitals, and a Hospital could employ or serve multiple Persons. Person class has derived attributes name and homeAddress. Name represents full name and could be combined from title, given (or first) name, middle name, and

family (or last) name. Patient class has derived attribute age which could be calculated based on her or his birth date and current date or hospital admission date.

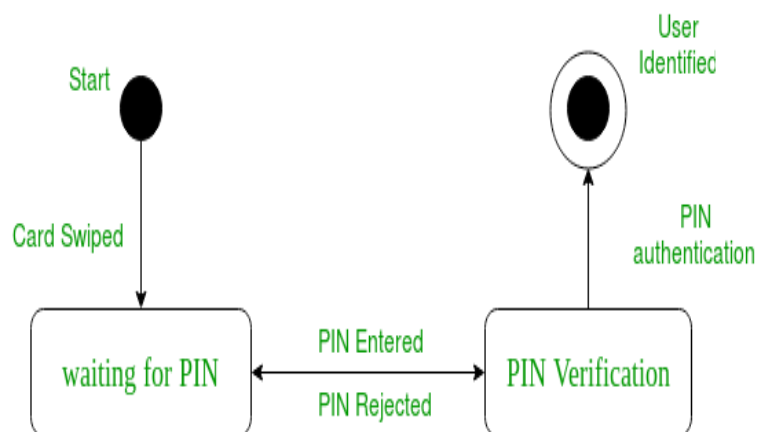
Question:19 Draw A sequence diagram for an emotion based music player

Solution: 19
(With step wise marking)



Question:20 Make an UML state diagram for user verification

Solution: 20
(With step wise marking)

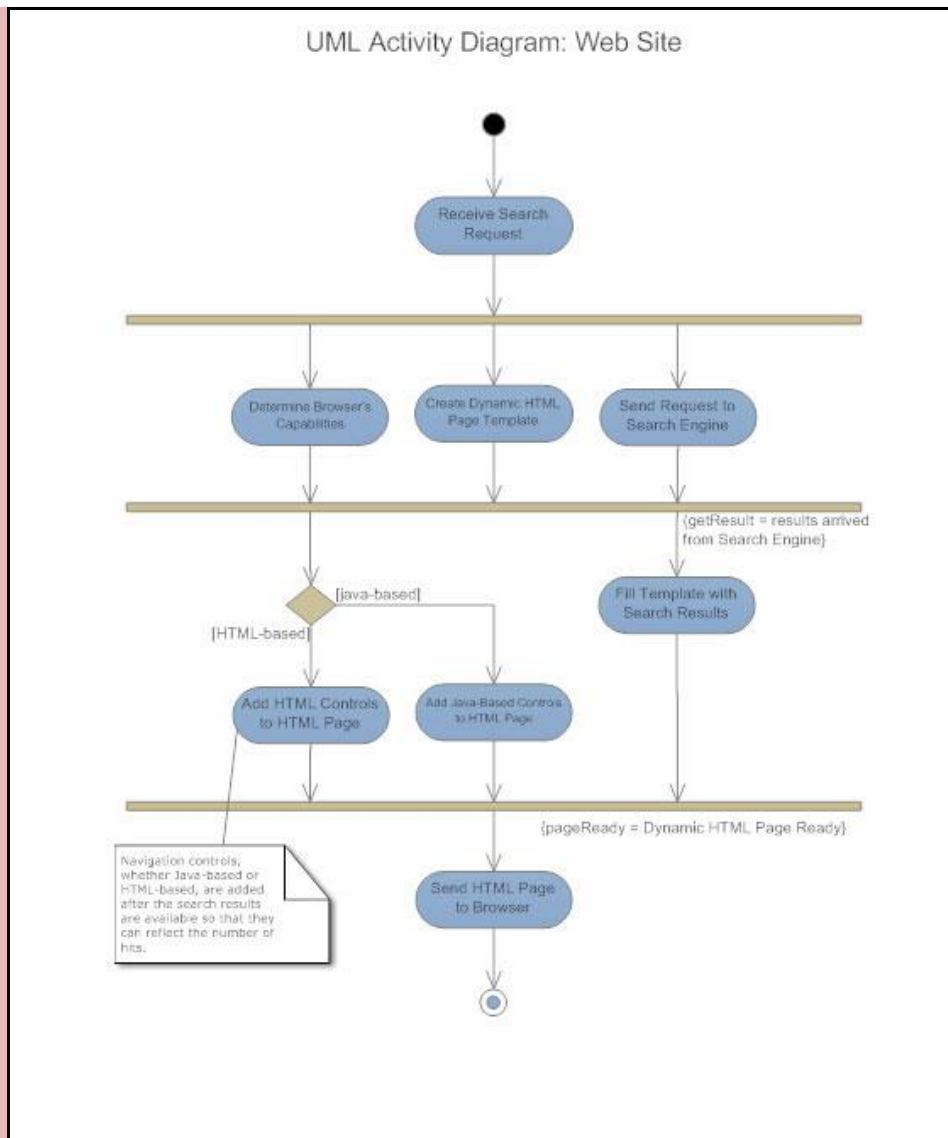


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Question:21	Make an activity diagram for emotion based music player
Solution: 21 (With step wise marking)	<pre> graph TD Start(()) --> OpenApp[Open Application] OpenApp --> D1{ } D1 --> Start D1 -- Yes --> AccessWebcam[Access Webcam] AccessWebcam --> GetPhoto[Get Photo] GetPhoto --> DetectEmotion[Detect Emotion] DetectEmotion --> D2{ } D2 -- Wallpaper --> ChangeWallpaper[Change Wallpaper] ChangeWallpaper --> End((())) D2 -- Play Music --> RetrieveMusic[Retrieve Music] RetrieveMusic --> GeneratePlaylist[Generate Playlist] GeneratePlaylist --> End </pre>

Question:22	Make an activity diagram for web site
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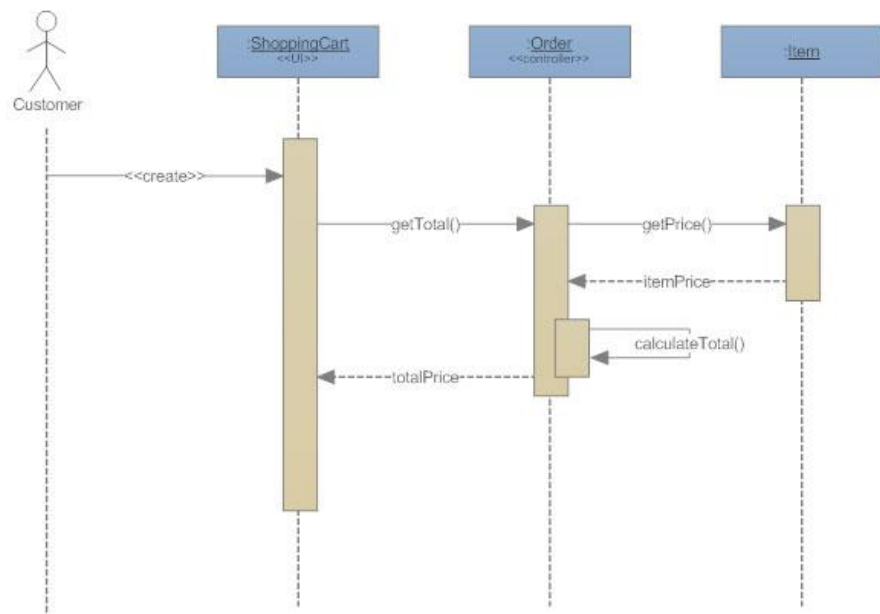
Solution: 22
(With step wise marking)



Question:23 Sketch sequence diagram for shopping cart

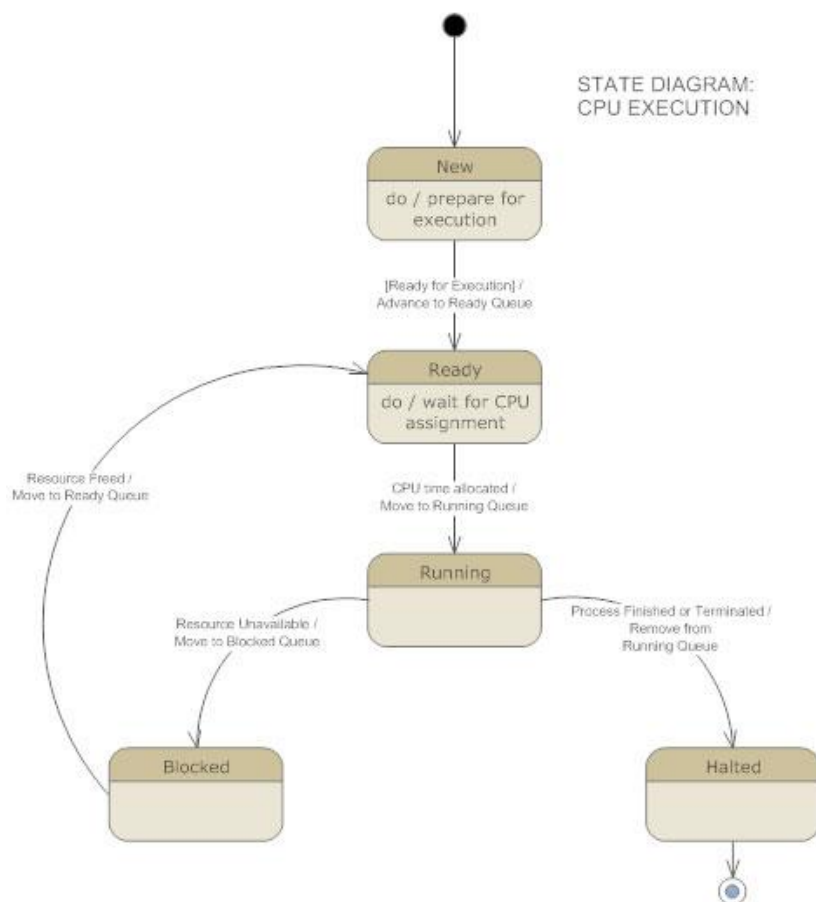
Solution: 23
(With step wise marking)

Sequence Diagram: Shopping Cart



Question:24 Draw a state diagram for CPU execution

Solution: 24
(With step wise marking)



Reference Book/Link:	