

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

Autonomous Institute Affiliated to VTU

July / August 2019 Supplementary Examinations

Programme: B.E.

Branch : Computer Science And Engineering

Course Code: 16CS6DCOOM

Course: Object Oriented Modeling and Design

Semester : VI

Duration: 3 hrs.

Max Marks: 100

Date: 29.07.2019

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

UNIT - I

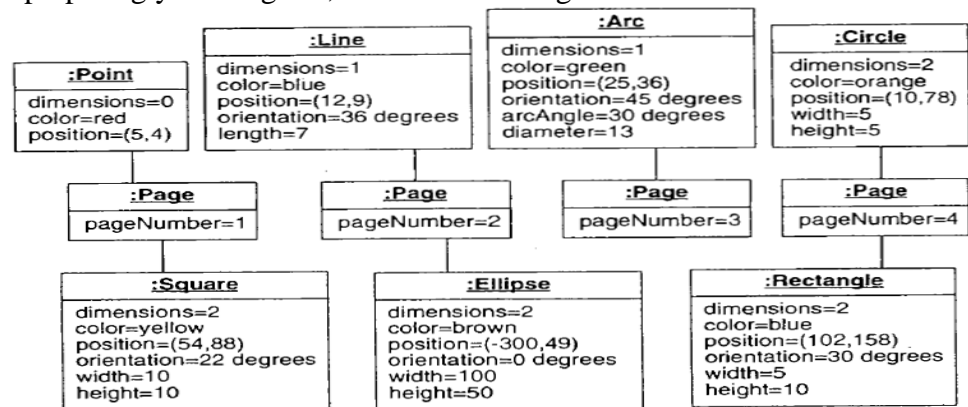
1. a) Define Event. Explain the different types of events with an example. **06**
- b) Categorize and Analyze the following relationships into generalization, aggregation, composition or association. Justify your answer **07**
 - i. A route connects two cities
 - ii. A person plays for a team in a certain year
 - iii. Modems and keyboards are input/output devices
 - iv. Files contains records
 - v. A polygon is composed of an ordered set of points.
- c) D-Rail Inc. is a metropolitan railway corporation operating in a large city and its suburbs. D-Rail has an ambitious plan to computerize ticketing system. The IT department of D-Rail has to come up with OO design. **07**
The ticketing system addresses the need of the metro of D-Rail between the city and its suburbs.
Requirements of the Ticketing System:
A Ticketing Clerk at one of the D-Rail counters can issue the following kinds of tickets to commuters:
One Time ticket: Used for one way travel. It has to be used the same day it is issued.
Return ticket: Used for two way travel. Onward journey has to be done on the day of issue. However, the return journey can be done any time within a week from the date of issue.
Multi-Use Ticket: Used for travelling many times between origin and destination stations. Available for 10, 15 and 20 trips denominations, which are also specified in the ticket. However ticket has the expiry date which is two months from the date of issue. Every time the ticket is used, one trip is deducted.
All tickets have information on the origin and destination stations. A Ticket can be issued for either a single commuter or a group of commuters.
The IT department of D-Rail has plan to computerized ticketing system. Design the suitable class diagram for their ticketing system.

OR

2. a) Explain the different restructuring techniques of workarounds for multiple inheritance with an example. **06**
- b) Analyze and prepare the class diagram from object diagram as shown in figure below. This particular document has 4 pages. The first page has a red **08**

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.

point and a yellow square displayed on it. The second page contains a line and an ellipse. An arc, a circle, and a rectangle appear on the last two pages. In preparing your diagram, use one or more generalization.



- c) Prepare a state diagram for telephone line. It concerns the telephone line not caller or callee. At start of a call, the telephone line is idle. When the phone is removed from hook, it emits a dial tone and can accept the dialing of digits. Upon entry of a valid number, the phone system tries to connect the call and route it to proper destination. The connection can fail if the number or trunks are busy. If the connection is successful, the called phone begins ringing. If the called party answers the phone, a conversation can occur. When the called party hangs up, the phone disconnects and reverts to idle when put on hook again. 06

UNIT - II

3. a) Explain with an example to simplify the state diagram by using sub diagrams. Discuss the importance of expanding states. 06
- b) Consider a computer email system. 08
- i. List three actors. Explain the relevance of each actor.
 - ii. List four use cases at the comparable level of abstraction and prepare a use case diagram for computer email system. Summarize the purpose of each use case with a sentence.
 - iii. Prepare the normal and exception scenario for any two use cases that you have identified.
 - iv. Design the sequence diagram corresponding to the scenario.
- c) Design an activity diagram for computing a restaurant bill. There should be a charge for each delivered item. The total amount should be subjected to tax and a service charge of 18% for group of six or more. For smaller groups, there should be a blank entry for a gratuity according to customer's discretion. Any coupons or gift certificates submitted by the customer should be subtracted. 06

OR

4. a) Discuss the different ways of handling concurrency in state modeling. 06
- b) Consider the software that manages electronic music files. Some use cases are listed below. Analyze and prepare use case diagram and include the appropriate relationship (such as include extend and generalization) for the use cases. You can add an abstract parent for each use case generalization. 08
- Play a song: add the song to the end of the play queue
 Play a library: add the songs in the library to the play queue
 Randomize order: Randomly reorder the songs in the play queue.

Delete a song: Delete a song from a music library

Destroy a song: Delete a song from all music libraries and delete the underlined file

Add a song: add a music file to a music library

Create music library : Create a music library that contains no songs

Delete a music library : Delete the music library

Destroy a music library : Destroy all songs in the music library and then

Delete the music library

View songs by title: Display the songs in a music library sorted by title

View songs by Artist: Display the songs in a music library sorted by Artist

View songs by album: Display the songs in a music library sorted by album

Start play: start playing songs from the queue. If previously stopped, resume playing from last position, otherwise start playing at the start of the queue.

Stop play: Suspend playing of music .

- c) Consider the financial organization which offers loans to the customers. The customers of this organization can get loan based on pledging any of the source to get the loan of required amount i.e. the gold, the life insurance policies or the proof of the service where the customer is working along with the salary certificate. **06**

If a customer wants to apply for the loan by pledging all the three sources. Show how the verification and validation of these sources take place before the loan is sanctioned to the customer. Construct an activity diagram for this process. Use swimlanes to show the various interactions.

UNIT - III

5. a) Define System Conception. List and explain the questions that must be answered by a good system concept. **05**

- b) Analyze the following systems, identify the relative importance of the three aspects of modeling: 1) class modeling 2) state modeling 3) interaction modeling. Explain your answers. **05**

- i. Change-making machine
- ii. Electronic typewriter
- iii. Telephone answering machine
- iv. Spelling checker

- c) Consider the following Problem statement for ATM System: **10**

“Design the software to support a computerized banking network including both human cashiers and automatic teller machines(ATMs) to be shared by a consortium of banks. Each bank provides its own computer to maintain its own accounts and process transactions against them. Cashier stations are owned by individual banks and communicate directly with their own bank’s computers. Human cashiers enter account and transaction data.

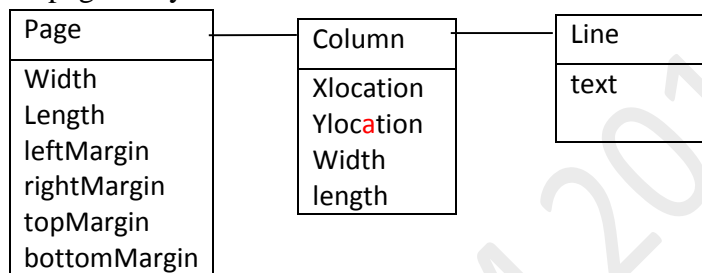
Automatic teller machines communicate with a central computer that clears transactions with the appropriate banks. An automatic teller machine accepts a cash card, interacts with the user, communicates with the central system to carry out the transaction, dispenses cash, and prints receipts. The system requires appropriate recordkeeping and security provisions. The system must handle concurrent accesses to the same account correctly.

The banks will provide their own software for their own computers; you are to design the software for the ATMs and the network. The cost of the shared system will be apportioned to the banks according to the number of customers with cash cards.”

- i. What criteria would you take into consideration to find relevant classes?
- ii. Analyze with an example how to select the good classes from the set of ATM classes that are identified from the knowledge of problem domain.

UNIT - IV

6. a) Differentiate between Frameworks and Patterns. 06
- b) Modify the class diagram in the figure given below so that a separate class provides margins. Different categories of pages may have a default margin and specific pages may override the default. 08



- c) Design the outline architecture of ATM system showing the organization of system into sub systems. 06

UNIT - V

7. a) BookMySeats is a website which provides online ticketing booking for theatres, events and concerts. Identify and describe 10
 - i. Use cases
 - ii. Normal Scenarios
 - iii. Exception scenarios
 - iv. External events
- b) Consider a system for interactive symbolic manipulation of polynomials. 10
 The basic idea is to allow a mathematician to be more accurate and productive in developing formulas. The user enters mathematical expressions and commands one line at a time. Expressions are ratios of polynomials, which are constructed from constants and variables. Intermediate expressions may be assigned to variables for later recall. Operations include addition, subtraction, multiplication, division and differentiation with respect to a variable.
 Design an architecture for the system described above could involve the following subsystem. Organize them into partitions and layers
 - i. Line syntax-- Scan a line of user input for tokens
 - ii. Line semantics—determine the meaning of a line of input
 - iii. Command processing—execute user input, error checking
 - iv. Construct expression—build an internal representation of an input expression
 - v. Apply operation—carry out an operation on one or more expressions
 - vi. Save work—save the current context
 - vii. Load work—read in previously saved context
 - viii. Substitute—substitute one expression for a variable in another expression
 - ix. Rationalize—convert an expression to canonical form
 - Evaluate—replace a variable in an expression with a constant and simplify the expression
