

**PES University, Bengaluru**

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**END SEMESTER ASSESSMENT (ESA) - May 2023****UE19CS353 - Object Oriented Analysis and Design with Java****Total Marks : 100.0**

1.a. Elucidate the four main pillars Abstraction, Encapsulation, Inheritance and Polymorphism of Object Oriented Programming in two to three lines. (8.0 Marks)

1.b. State the reason why the given code prints output as false. Also change the code such that the output in the main function is true.

```
public class Sample {  
    public static void main(String[] args) {  
        Demo objOne=new Demo(10,20);  
        Demo objTwo=new Demo(10,20);  
        System.out.println(objOne.equals(objTwo)); //prints false  
    }  
}
```

```
class Demo{  
    int a;  
    int b;  
    Demo(int a,int b){  
        this.a=a;  
        this.b=b;  
    }  
}
```

**(6.0 Marks)**

1.c. For the following code snippet,

1. Output expected from Line 1 of the code is "SRN of the student is 10 and name is pranitha". Add the required functionalities to the class student to get the desired output.

2. Predict the output of Line 2

```
class student
{
int srn;
String name;
// add required functions
}
class Demo
{
public static void main(String args[])
{
student s1 = new student(10,"pranitha");
System.out.println(s1); // Line 1
Student s2=new student(11,"abhay");
System.out.println(s1==s2); // line 2
}
}
```

(6.0 Marks)

2.a. Identity the relationship (include/extend/generalization) between these pair of use cases and depict the relationship between them using appropriate notation.

- 1: Create new order and validate customer account
- 2: Update order and validate customer account
- 3: Place order and login
- 4: Login account and change password
- 5: Choose folder and upload document
- 6: Purchase item, purchase phone, purchase accessories

(6.0 Marks)

2.b. **Draw a Use Case diagram for a Movie Ticket Booking System considering the scenario below:**

Customer can login to the system to utilise its features. System has provision to check currently streaming movies and upcoming movies. The customer can book a ticket and optionally choose a seat of their choice and accordingly make a card payment for it. The bank validates the payment for the system. Customers can also cancel their ticket. The system admin processes the cancellation as well as update movies when required. Customers can provide their review about a movie.

(8.0 Marks)

2.c. Elucidate qualified association and aggregation relationship w.r.t class diagram with an example for each. (6.0 Marks)

**3.a. Draw a State diagram for the book object based on the following scenario:**

Librarians categorise the library books into loanable and non-loanable books. The non-loanable books are the reference books. However, the loanable books are the non-reference books. After cataloguing the books, the books are available for loan. Students who borrow the library books should return them back before the due date. Books that are 12 months over the due date would be considered as a lost state. However, if those books are found in the future, they must be returned back to the library. When the books are found not required in the library or have been damaged, the book would be disposed (8.0 Marks)

**3.b. Write an activity diagram for Dining Philosophers problem:** Five silent philosophers sit at a round table with bowls of noodles. A chopstick is placed between each pair of adjacent philosophers. Each philosopher must alternately think and eat. However, a philosopher can only eat noodles when he has both "left" and "right" chopsticks. Each chopstick can be held by only one philosopher and so a philosopher can use the chopstick only if it is not being used by another philosopher. After he finishes eating, he needs to put down both chopsticks so they become available to others. A philosopher can take the chopstick on his right or the one on his left as they become available, but cannot start eating before getting both of them, Nor can he take a chopstick that is not immediately on his left or right. The problem is how to design a discipline of behaviour such that no philosopher will starve (6.0 Marks)

3.c. With an appropriate example, explain **controller** and **high cohesion** principles in GRASP (6.0 Marks)

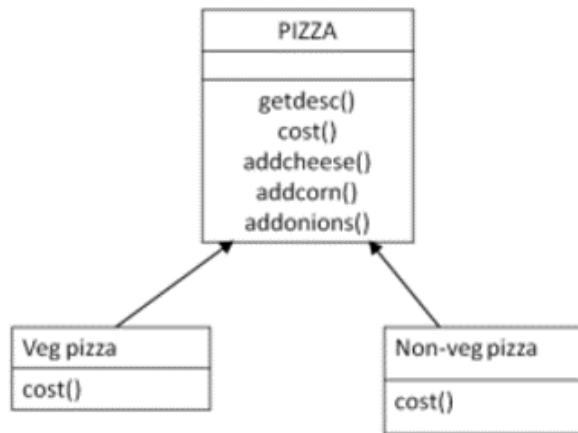
4.a. With an example show how a class can be made a singleton and what are the benefits of making a class a singleton. (5.0 Marks)

4.b. Match the following Design Principle names with their definition.

1: Information Expert	a. Combine related responsibilities into one manageable unit.
2. High Cohesion	b. Provide a well defined interface so that there
3. Indirection	c. Assign responsibility to the class which has the required data to fulfill that responsibility.
4. Protected Variation	d. Introduce an intermediate unit to communicate between the other units, so that the other units are not directly coupled.

(4.0 Marks)

4.c. A software designer for a pizza store has proposed design as shown below.



Identify the issues in proposed design and suggest an appropriate class diagram to address the issues. (7.0 Marks)

4.d. Fill in the blanks:

- i. Violating Dependency Inversion Principle will result in a code with \_\_\_\_\_ coupling.
- ii. Liskov Substitution Principle states that the designer/implementer should be able to replace objects of \_\_\_\_\_ with the objects of \_\_\_\_\_.
- iii. \_\_\_\_\_ Principle states that the design should be extensible however modifying existing design should be avoided.
- iv. The pattern that hides the complexity related to creation of objects from the client is \_\_\_\_\_.

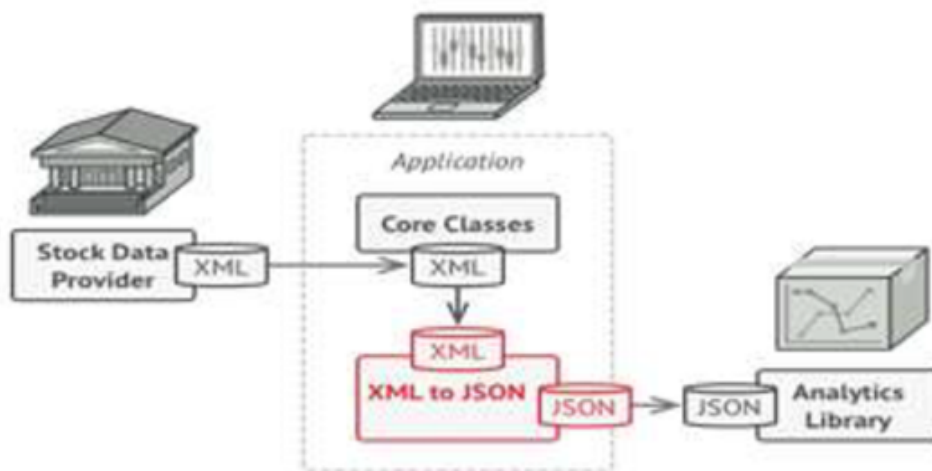
(4.0 Marks)

5.a. Describe the Chain of responsibilities pattern with an example. (4.0 Marks)

5.b. A System has a MediaPlayer interface and a concrete class AudioPlayer implementing the MediaPlayer interface. AudioPlayer can play mp3 format audio files by default. We are having another interface AdvancedMediaPlayer and concrete classes implementing the AdvancedMediaPlayer interface. These classes can play vlc and mp4 format files. We want to make AudioPlayer to play other formats as well.

Identify which design pattern is required to implement the given scenario and Justify. Draw an appropriate class diagram for the scenario with the design pattern. (6.0 Marks)

5.c. For a case study depicted in the diagram shown below, identify the appropriate structural design pattern. Write the class structure of the identified pattern. (6.0 Marks)



5.d. What is an antipattern? State the solution for Blob and Vendor lock-in antipattern. (4.0 Marks)