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PES University, Bangalore

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UE19CS353

May 2022: END SEMESTER ASSESSMENT (ESA) B. Tech.VI SEMESTER

UE19CS353: OBJECT-ORIENTED ANALYSIS AND DESIGN WITH JAVA

Time: 3 Hrs. Answer All Questions Max Marks: 100

1.	a)	Explain the Role of Java Virtual Machine in Java runtime environment. Also justify the following features of java: - i) High performance ii) Portable iii) Robust	6
	b)	Answer the following questions related to Java: i. If you make any constructor protected, you cannot create the instance of that class from outside the package. **True or False** ii. The access level of a protected modifier is within the package and outside the package through child class. If you do not make the child class, it cannot be accessed from outside the package. **True or False** iii. The keyword _____ is used to create fields and methods that belong to the class, rather than to an instance of the class.	3
	c)	What is Dynamic Method dispatch? How is it achieved? Explain it with a suitable java code.	6
	d)	Justify the statements with relevant explanations or code snippets to support your answers. I. There is no destructor in Java. II. Java is Strictly Pass by Value.	5
2.	a)	Explain the concept of java serialization and deserialization with a JAVA program that creates a student object, serializes it, and then deserializes it. Showcase all important methods used in the above process.	6
	b)	Consider the following elements from the problem domain for a hockey league. A hockey league is made up of at least four hockey teams. Each hockey team is composed of six to twelve players, and one player captains the team. A team has a name and a record. Players have a number and a position. Hockey teams play games against each other. Each game has a score and a location. Teams are sometimes led by a coach. A coach has a level of accreditation and number of years of experience and can coach multiple teams. Coaches and players are people, and people have names and addresses. Each player only plays in one team, each captain only captains one team, each team only plays in one league. Draw a **class diagram** for this information and be sure to label all relationships with appropriate multiplicities. Also indicate any assumptions, if made, clearly.	6
	c)	When do we draw a component diagram? Also explain use of **Port** in component diagram with its UML representation.	4

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	d)	Create a **Use Case diagram** for the following scenario: A Video Store Information System supports the following business functions: –Recording information about videos the store owns-This database is searchable by staff and all customers – Information about a customer's borrowed videos-Accessed by staff and customer. It involves video database searching. – Staff can record video rentals and returns by customers- It involves video database searching. – Staff can maintain customer and video information. – Managers of the store can generate various reports Identify the **use cases, actors, the relationships** between the use cases appropriately.	4
3.	a)	Differentiate between Fork and Join with proper notations. In which UML diagram are they used and why? Illustrate with a suitable example.	6
	b)	Assume a Scenario of an Elevator system in a multifloored apartment. The elevator is by default always at the ground floor. It moves up when button at any upper floor is pressed and halts when the requesting floor is reached. When in idle state and a button at lower floor is pressed it moves down and halts when requesting floor is reached. Similarly, when idle and button at higher floor is pressed it moves up and halts when reached the requesting floor. Also, if it is inactive at any floor for more than 5 minutes it moves down to ground floor automatically. i. Define the following terms used in a state diagram: State, Event, Guard conditions . ii. Now identify the states, events and transitions and create a **state diagram** for the above-described elevator system.	3+5
	c)	Explain the following GRASP principles with suitable examples: - i. Creator ii) Protected Variations	3+3
4.	a)	Let's assume that there is a Restaurant interface which contains methods for accepting orders from online customers, telephone customers and walk-in customers. It also contains methods for handling online payments (for online customers) and in-person payments. In-person payments deal with the walk-in customers as well as telephone customers. Moreover, telephone customers pay in-person at the time of order delivery. The Programmer creates a Java Interface for Restaurant and names it as RestaurantInterface.java. **public interface RestaurantInterface** **{** **public void acceptOnlineOrder();** **public void acceptTelephoneOrder();** **public void acceptWalkInCustomerOrder();** **public void payOnline();** **public void payInPerson();** **}** i. Identify the issues with the above interface when a class Online_customer tries to implement it.	2+2+4

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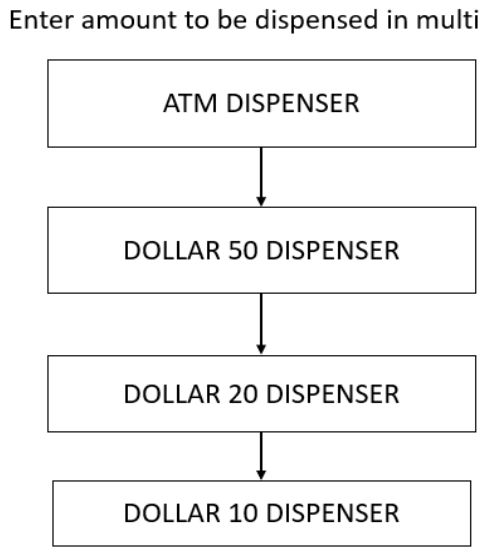
		ii. Which SOLID principle is violated by the above code and why? iii. Propose your design solution with a UML class diagram and explain how it overcomes the issues highlighted in part (i).	
	b)	For the Factory Method design pattern, explain its applicability(when to use it) and how it is implemented in java using a simple example.	8
	c)	What are design patterns and its two main Usages. Identify the type of creational patterns from the hints given: - i. This pattern separates the construction of a complex object from its representation so that the same construction process can create multiple different representations. ii. This pattern is used to create an object without exposing the creation logic to the client. iii. This pattern restricts the instantiation of a class and ensures that only one instance of the class exists. iv. This pattern is used for logging, drivers' objects, caching, and thread pool.	2+2
5.	a)	Let's consider an example of an ATM Dispensing Machine. The user enters the amount to be dispensed in multiples of 10 and the machine dispenses the amount in terms of defined currency bills such as 50$, 20$, 10$ etc. The request is processed as follows: -  i. Identify the issues that will arise if we try to implement this solution in a single program using if and else. ii. Which design pattern can be used instead and why? iii. Implement the above identified design pattern in (ii) with relevant java code.	2+3+5
	b)	Why study of Anti-pattern is important? Explain the anti-pattern "Analysis Paralysis" with respect to the symptoms, consequences, and refactored solution.	10