2023

COMPUTER SCIENCE

Paper : CSMC-104

(Object Oriented Analysis and Design)

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer ***question nos.*** **1** & **2** and ***any four*** from the rest.

2×5

1. Answer ***any five*** from the following :
   (a) What do you mean by Covariant Return Type?
   (b) What is Hybrid Inheritance?
   (c) What is the difference between Error and Exception?
   (d) What do you mean by Finalization in JAVA?
   (e) How to represent a Time Dependent Event through an Activity diagram?
   (f) Explain a Reflexive Association w.r.t. Class diagram.
   (g) What is the difference between Early Instantiation and Lazy Instantiation in Singleton design pattern?

4×5

2. Answer ***any five*** from the following :
   (a) Explain the difference between Method Hiding and Method Overriding in JAVA.
   (b) Why high Cohesion and loose Coupling is desirable for a system?
   (c) Explain how JAVA allows Dynamic Method Dispatch.
   (d) Why the Factory Method design pattern is also called as Virtual Constructor? Explain with example.
   (e) Point out the relative advantages and disadvantages of Class diagram and Object diagram.
   (f) With a suitable example explain how Join and Merge operations are used in an Activity diagram.
   (g) What do you mean by Sequence Diagram Fragments? Write down the usage of Optional, Alternative and Parallel Fragments.

3. (a) Justify the statement — "JAVA is platform independent and secure."
   (b) What are the different type of Constructors available in JAVA? Explain each of them with suitable examples.
   (c) How a Class in Java can be prevented from getting Inherited? Illustrate with an example.

2+5+3

Please Turn Over

4. (a) Explain the difference between Static and Dynamic Polymorphism.

(b) With an example JAVA program explain how Multiple Inheritance is achieved using Interfaces. 4+6

5. Consider a RFID based Hospital Management System where the patient, employees, visitors are wearing a RFID tag and several RFID readers has been deployed in the hospital premises to sense and track their movements / activities. Next, the RFID readers send those sensed data to the Central Server for final processing and storage.

(a) Draw a Sequence diagram to show how the data communication takes place within the system.

(b) Also draw a State Machine diagram to show the flow of events within the system. If you are considering any specific assumptions then mention them clearly. 5+5

6. (a) Explain how Builder design pattern constructs a complex object from simple objects using step-by-step approach.

(b) Justify how Adapter design pattern allows incompatible interfaces between classes to work together. 5+5

7. (a) What are the different relationships between the Actors and Usecases in an Usecase diagram? Explain each of them.

(b) Consider an Online Shopping System containing Customers and Admin. Customers are allowed to check-in, browse Products, Add products to cart, check-out and the Admin is enabled to manage and change the Inventory. Draw an Usecase diagram to show different operations of the system. If you are considering any specific assumptions then mention them clearly. 4+6

8. Write short notes on (***any four***) : 2½×4

(a) Function overloading in JAVA

(b) Reflexive Association

(c) Use of Guard Conditions in Sequence diagram

(d) Difference between Abstract Factory and Concrete Factory

(e) Prototype Registry

(f) Command design pattern.
