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Paper Code : PCC-CS503/PCCCS503/PCCICB502 Object Oriented Programming

UPID : 005504

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.
Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following : [1 x 10 = 10]

   (I) What is an Abstract Data Type (ADT)?
   (II) What is the purpose of the 'this' keyword in object-oriented programming?
   (III) What is the purpose of design patterns in software engineering?
   (IV) What is the difference between abstract classes and interfaces in object-oriented programming?
   (V) What is the purpose of the Swing library in Java?
   (VI) What is the significance of the Text example in understanding ADTs?
   (VII) How does encapsulation help in achieving data abstraction in object-oriented programming?
   (VIII) Explain the concept of encapsulation in object-oriented programming.
   (IX) Give an example of how commands can be implemented as objects in an object-oriented language.
   (X) What is the purpose of the Waterfall model in software development?
   (XI) Explain how the abstraction function can be used to ensure the correctness of an ADT implementation.
   (XII) Explain the concept of dynamic method dispatch in the context of polymorphism in object-oriented programming.

Group-B (Short Answer Type Question)

Answer *any three* of the following : [5 x 3 = 15]

2. Write a Java program to create a simple GUI application with a button and a label. When the button is clicked, the label should display the current date and time. [5]
3. Explain the concept of information hiding in the context of ADTs, and discuss its importance in software engineering. [5]
4. Explain the different types of polymorphism in object-oriented programming with examples. Discuss the advantages and disadvantages of each type. [5]
5. Describe the concept of method overriding and method overloading in object-oriented programming. Provide examples to illustrate their differences. [5]
6. Explain the concept of data abstraction and its relationship with ADTs. Provide examples to illustrate the benefits of data abstraction in software design. [5]

Group-C (Long Answer Type Question)

Answer *any three* of the following : [15 x 3 = 45]

7. (a) Design and implement a software system that demonstrates the use of inheritance and several design patterns, such as the Iterator, Observer, and Decorator patterns. [8+7]
   (b)Provide a detailed explanation of your design choices, class diagrams, and the rationale behind your implementation decisions.
8. (a) Implement a drawing application using object-oriented principles and design patterns. The application should support different shapes (e.g., rectangles, circles, lines), allow users to draw and manipulate these shapes, and provide undo and redo functionality. [9+6]
   (b) Explain the object-oriented design principles and patterns used in your implementation.
9. (a) Explain the Unified Process (UP) in software development. [5+5+5]
   (b) Discuss its phases, disciplines, and best practices.
   (c) Provide examples of how UP can be applied to a software project.
10. (a) Analyze the time and space complexity of the operations in the ADTs you have implemented. [8+7]
    (b) Identify potential areas for optimization and propose improvements to enhance efficiency.
11. ((a)Discuss the importance of software documentation in the software development process. [3+6+6]

(b) Explain different types of documentation (e.g., requirements, design, user manuals) and their purposes.

(c)Provide examples of how documentation can be effectively developed and maintained throughout the project lifecycle.

*** END OF PAPER ***