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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - THEORY EXAMINATION (2024 - 2025)

Subject: Design Patterns

Time: 3 Hours

Max. Marks: 100

General Instructions:*IMP: Verify that you have received the question paper with the correct course, code, branch etc.**1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.**2. Maximum marks for each question are indicated on right -hand side of each question.**3. Illustrate your answers with neat sketches wherever necessary.**4. Assume suitable data if necessary.**5. Preferably, write the answers in sequential order.**6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.***SECTION-A**

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1. Attempt all parts:-

- 1-a. In factory method pattern, the framework must instantiate classes but it only knows about the abstract classes, which it cannot initiate. Choose the correct solution. (CO2,K1) 1
- (a) encapsulating the knowledge of which document subclass to is to be created
 - (b) moving this knowledge out of the framework
 - (c) instantiating the application specific documents without knowing their class
 - (d) all of the mentioned
- 1-b. Memento design pattern is a type of: (CO1,K1) 1
- (a) Structural
 - (b) creational
 - (c) Behavioral
 - (d) None of these
- 1-c. Choose the correct statement that describes the Prototype pattern correctly. (CO2,K1) 1
- (a) This pattern builds a complex object using simple objects and using a step by step approach.
 - (b) This pattern refers to creating duplicate object while keeping performance in mind.
 - (c) This pattern works as a bridge between two incompatible interfaces.
 - (d) This pattern is used when we need to decouple an abstraction from its

implementation so that the two can vary independently.

- 1-d. Choose creational pattern . (CO2,K1) 1
- (a) adapter
 - (b) factory method pattern
 - (c) prototype
 - (d) all of the above.
- 1-e. Choose the below answer of the following iterator pattern correct (CO4,K1) 1
- (a) The Mediator pattern provides a means of increasing coupling
 - (b) In the Mediator pattern, interacts with one another, collaborating objects and with a special mediator class
 - (c) The objects are coupled only to the mediator, which contains all the code for coordinating the collaboration
 - (d) All of the mentioned
- 1-f. Choose the from the following for Facade Pattern(CO3,K1) 1
- (a) Interaction is begun by one of the collaborators or a client object outside the collaboration
 - (b) The object directs the collaboration, with all communication going between it and the colleagues in the interactionAll of the mentioned
 - (c) All of the above
 - (d) None of the mentioned
- 1-g. Choose design pattern that is concerned with communication between objects. (CO1,K1) 1
- (a) J2EE Design Pattern
 - (b) Behavioral Design Pattern
 - (c) Creational Design Pattern
 - (d) Structural Design Pattern
- 1-h. An interface contains: (CO3,K1) 1
- (a) Method definition
 - (b) Method declaration
 - (c) Method declaration & definition
 - (d) Method name
- 1-i. Choose one of the following pattern that allows an object to notify interested listeners of changes to its state (CO4,K1) 1
- (a) Chain of Responsibility
 - (b) Command
 - (c) Iterator
 - (d) Observer
- 1-j. If you want to avoid multiple inheritance. Which design pattern would you choose? (CO5) 1

- (a) Abstraction-Occurrence Pattern
- (b) Singleton Pattern
- (c) General Pattern
- (d) Hierarchy Pattern

2. Attempt all parts:-

- 2.a. Describe a design pattern. (CO1,K2) 2
- 2.b. Make the UML Diagram of the Prototype Design Pattern. (CO2,K3) 2
- 2.c. Explain the intent of the Façade pattern. (CO3,K2) 2
- 2.d. Write down the uses of Memento Pattern. (CO4,K2) 2
- 2.e. Elaborate how to implement template method pattern. (CO5,K2) 2

SECTION-B

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3. Answer any five of the following:-

- 3-a. Explain categories of Design Pattern. (CO1,K2) 6
- 3-b. Explain the MVC architecture with the real world example. (CO1,K2) 6
- 3-c. Write the implementation of a Singleton Java class. (CO2,K3) 6
- 3-d. Mention specific problems builder pattern solves.(CO2,K2) 6
- 3.e. Is it problematic for classes to be tightly-coupled. Explain. (CO3,K2) 6
- 3.f. Show the implementation of Iterator design pattern. (CO4,K3) 6
- 3.g. Name the patterns which come in the behavioral pattern. Explain any one. (CO4,CO5,K2) 6

SECTION-C

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4. Answer any one of the following:-

- 4-a. Explain the selection process for the design pattern.(CO1,K2) 10
- 4-b. Discuss the role of design patterns in solving real life problems and show with an example how design patterns makes the code reusable. (CO1,K2) 10

5. Answer any one of the following:-

- 5-a. Explain the intent, applicability and consequences of the builder pattern. (CO2,K2) 10
- 5-b. Write the five creational design patterns and explain two of them.(CO2,K2) 10

6. Answer any one of the following:-

- 6-a. Explain the Façade Design Pattern (FDP). What is the difference between Façade and Mediator. (CO3, CO4,K2) 10
- 6-b. Implement the Flyweight Design Pattern (FDP) or Cache Pattern. (CO3,K3) 10

7. Answer any one of the following:-

- 7-a. Discuss Iterator Pattern with its implementation and UML diagram.(CO4,K3) 10
- 7-b. Define Mediator Pattern with its implementation and UML diagram.(CO4,K3) 10

8. Answer any one of the following:-

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| 8-a. | Implement abstract factory design pattern. Draw UML diagram and provide the intent. (CO2,K2) | 10 |
| 8-b. | Make a UML diagram of Template method. Explain how it works.(CO5,K3) | 10 |

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