NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: V - THEORY EXAMINATION (2023 - 2024)

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.*

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SECTION A   **20**

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1. Attempt all parts:-

1-a.   Patterns are important due to...(CO1)   1

        (a) They captured design accessible to novices and other experts

        (b) They capture expert design knowledge

        (c) None of these

        (d) All of these

1-b.   Select from the below author that is not a part of GOF (Gang of Four). (CO1)   1

        (a) Richard Helm

        (b) Gang Pattern

        (c) Ralph Johnson

        (d) Erich Gamma

1-c.   Choose the correct statement about design patterns.   (CO2)   1

        (a) Design patterns represent the best practices used by experienced object-oriented software developers.

        (b) Design patterns are solutions to general problems that software

developers faced during software development.

(c) Design patterns are obtained by trial and error by numerous software developers over quite a substantial period of time.

(d) All of the above.

1-d. Which of the following is a generic structure that is extended to create a more specific subsystem or application? (CO2) 1

(a) Software reuse

(b) Object-oriented programming language

(c) Frameworks

(d) None of the mentioned

1-e. Choose one of the pattern in which all the classes coupling is reduced(CO3) 1

(a) Iterator

(b) Facade

(c) Mediator

(d) Proxy

1-f. Choose the from the following for Facade Pattern(CO3) 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 works on data and action taken based on data provided.(CO4) 1

(a) Command Pattern

(b) Singleton Pattern

(c) MVC Pattern

(d) Façade Pattern

1-h. The use of design patterns for the development of object-oriented software has important implications for   (CO4) 1

(a) Component Based Software Engineering

(b) Reusability in general

(c) All of the above

(d) None of the above

1-i. Pattern prevents one from creating more than one instance of a variable(CO5)　　1

      (a) Factory Method

      (b) Singleton

      (c) Observer

      (d) None of the mentioned

1-j. Choose one of the following are correct for copy constructor(CO5)　　1

      (a) A copy constructor is a constructor that takes an instance of its class as an argument and creates a clone of its argument

      (b) A copy constructor must be used when a final field must be set in creating the clone because only a constructor can set a final field

      (c) All of the mentioned

      (d) None of the mentioned

2. Attempt all parts:-

2.a. Give differences between design principles and design patterns. (CO1)　　2

2.b. Write the difference between factory and builder pattern.(CO2)　　2

2.c. Write a short note on Adapter pattern.(CO3)　　2

2.d. Elaborate the term Concrete Class.(CO 4)　　2

2.e. Does command design pattern provides extensibility ?(CO5)　　2

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SECTION B　　30

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3. Answer any <u>five</u> of the following:-

3-a. Explain the purpose and scope of the behavioural pattern.(CO1)　　6

3-b. Draw the catalogue of the Design patterns(CO1)　　6

3-c. Write the goals of the document structure.(CO2)　　6

3-d. Mention specific problems builder pattern solves.(CO2)　　6

3.e. In discussing the essence of the Decorator, it is said that "the structure is not the pattern." What does this mean? Why is this important? (CO3)　　6

3.f. Write a java code to print diamond pattern.(CO4)　　6

3.g. Discuss why access to the non-static variable is not allowed from static method in Java. (CO5)　　6

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SECTION C　　50

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4. Answer any <u>one</u> of the following:-

4-a. Write the difference between Abstraction and Encapsulation in Java.(CO1)　　10

4-b. Explain the selection process for the design pattern.(CO1)　　10

5. Answer any <u>one</u> of the following:-

5-a.   Mention three examples of builder design pattern In java(CO2)   10

5-b.   Define what is creational design patterns and Factory pattern.(CO2)   10

6. Answer any <u>one</u> of the following:-

6-a.   Explain the two issues addressed by the composite design pattern(CO3)   10

6-b.   Elaborate the consequence of applying the Composite pattern(CO3)   10

7. Answer any <u>one</u> of the following:-

7-a.   Explain mediator and memento pattern. (CO4)   10

7-b.   Show how to restore state of an object to previous state in Memento   10
         Pattern.(CO4)

8. Answer any <u>one</u> of the following:-

8-a.   Make a UML diagram of Template method. Explain how it works.(CO5)   10

8-b.   Differentiate between State Design Pattern and Strategy Design Pattern. (CO5)   10