



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

INFORMATION TECHNOLOGY

TUTORIAL QUESTION BANK

Course Name	:	DESIGN PATTERNS
Course Code	:	A70530
Regulations	:	R15 - JNTUH
Class	:	IV B. Tech I Semester
Branch	:	Information Technology
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Course Coordinator	:	Ms. B.REKHA, Assistant Professor, Dept of IT.
Course Faculty	:	Ms. B.REKHA, Assistant Professor, Dept of IT.

OBJECTIVES

To meet the challenge of ensuring excellence in engineering education, the issue of quality needs to be addressed, debated and taken forward in a systematic manner. Accreditation is the principal means of quality assurance in higher education. The major emphasis of accreditation process is to measure the outcomes of the program that is being accredited.

In line with this, Faculty of Institute of Aeronautical Engineering, Hyderabad has taken a lead in incorporating philosophy of outcome based education in the process of problem solving and career development. So, all students of the institute should understand the depth and approach of course to be taught through this question bank, which will enhance learner's learning process.

PART – A (SHORT ANSWER QUESTIONS)

S. No	Question	Blooms Taxonomy Level	Course Outcome
UNIT – I			
INTRODUCTION:WHAT IS A DESIGN PATTERN			
PART – A (SHORT ANSWER QUESTIONS)			
1.	Define Design pattern.	Remember	1
2.	List the four elements of design patterns.	Remember	1
3.	Distinguish a class and an object.	Remember	1
4.	Give an example for class structure.	Understand	2
5.	Sketch MVC architecture.	Remember	2
6.	State the meaning of a solution.	Remember	1
7.	Write the different sections of design patterns.	Understand	1
8.	Give the meaning of Intent.	Understand	3
9.	List the four essential elements of design pattern	Remember	2
10.	Define catalog of design patterns	Remember	2
11.	Define the two categories on which design pattern depends	Remember	2
12.	Explain how design patterns solve design problems	Understand	2

S. No	Question	Blooms Taxonomy Level	Course Outcome
13.	Differentiate Inheritance and composite	Remember	2
14.	Explain how to select a design pattern	Understand	3
15.	List out the patterns used in design patterns	Remember	2
PART – B (LONG ANSWER QUESTIONS)			
1	List the advantages of design patterns. Write short notes on use of design patterns.	Remember	2
2	Discuss the MVC architecture in small talk.	Understand	2
3	Explain how to describe design patterns.	Understand	1
4	List the different sections of design patterns. Explain about them.	Remember	1
5	Name the patterns along with their intents that are included in the catalog of design patterns.	Understand	2
6	State and explain the classification of design patterns.	Remember	3
7	List the various ways of organizing the design patterns.	Remember	2
8	Compare inheritance versus parameterized types.	Understand	3
9	Explain the Design patterns relationships	Remember	2
10	Compare run-time and compile-time structure	Understand	2
11	List the common causes for redesigning of design patterns	Understand	3
12	Explain the Frameworks in detail	Remember	2
13	Write about the role of Toolkit in designing pattern	Remember	3
14	Explain how Delegation is used in design pattern	Remember	2
15	Explain the Catalogs of design patterns	Understand	2
PART – C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1.	A reputed software company is developing CAD software. It is required that the software should read licenses details, number of simultaneous users, permitted features etc., from a configuration file with a specific syntax. Design the software with suitable design pattern and explain with a class diagram. Briefly discuss the consequences and implementation issues.	Understand	2
2.	Discuss the following aspects of behavioral patterns briefly: (i) Should communication be encapsulated or distributed. (ii) Decoupling senders and receivers.	Understand	2
3.	Write about (i) documentation and learning aid. (ii) Alexander's pattern languages.	Understand	3
4.	Write the code for connecting two objects by Understanding suitable design pattern.	Remember	1
5.	Explain about which optimization technique is used to hide the data from client.	Understand	2
6.	Distinguish between inheritance and composition	Understand	3
7.	What is the use of object diagram in modeling? Explain.	Remember	1
8.	Explain the step - by - step approach for selecting the design pattern.	Remember	1
9.	Explain the compile time structure of a object oriented program	Understand	2
10.	List and explain the reusable object oriented design aspects of a pattern.	Remember	3

S. No	Question	Blooms Taxonomy Level	Course Outcome
UNIT – II			
A CASE STUDY: DESIGNING A DOCUMENT EDITOR			
PART – A (SHORT ANSWER QUESTIONS)			
1.	Give the meaning of “WYSIWYG”.	Understand	3
2.	Define Lexi.	Remember	2
3.	Define an abstract class.	Remember	2
4.	Write the meaning of a document.	Understand	3
5.	Differentiate compositor and composition.	Understand	2
6.	Define formatting.	Remember	2
7.	Define an Iterator class.	Remember	4
8.	Define creational patterns.	Remember	2
9.	List five types of creational patterns.	Remember	2
10.	Define abstract factory design pattern.	Remember	4
11.	Define builder pattern.	Remember	5
12.	Give example of class diagram.	Understand	2
13.	Define structure and applicability of abstract factory method.	Remember	2
14.	Define the User operations	Understand	3
15.	Define Prototype design pattern	Understand	3
PART – B (LONG ANSWER QUESTIONS)			
1.	Explain the process of recursive composition in building a document.	Understand	4
2.	Explain in detail about the ‘Glyph’ abstract class.	Understand	3
3.	Discuss the goals and constraints in choosing an internal representation for a document.	Understand	3
4.	Explain partial Glyph class hierarchy with a neat diagram.	Understand	3
5.	Explain composition and compositor class relationship with a neat diagram.	Understand	2
6.	Define formatting. How can the textual analysis problem of document editor be solved using design patterns?	Remember	2
7.	Discuss the two embellishments that can be added to Lexi’s user interface. Signify the role of decorator pattern in embellishment.	Understand	2
8.	Explain about abstracting object creation in detail.	Understand	2
9.	Memorize the useful techniques for implementing the abstract factory pattern.	Understand	2
10.	Give the sample code for abstract factory design pattern.	Understand	4
11.	Explain the implementation of abstract factory.	Understand	2
12.	Discuss about structure, applicability, participants of abstract factory method.	Understand	3
13.	Discuss the implementation issues of builder design pattern.	Understand	3
14.	Explain the structure of builder design pattern with class diagram and describe the collaboration with a sequence diagram.	Understand	3
15.	Describe in detail about how Multiple Window Systems is supported	Remember	5

PART – C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1.	Explain how design patterns can solve the design problems of a document editor.	Remember	3
2.	Discuss in detail about the representation of a document structure	Understand	2
3.	What is the importance of creational patterns in design of particular pattern?	Understand	2
4.	Draw and explain the structure of abstract factory and also explain the various participants involved in it.	Remember	4
5.	Explain the role of formatting in creation of a document editor	Remember	2
6.	What are the liabilities and techniques for implementing the abstract factory pattern? Explain them.	Remember	3
7.	Draw and explain the interaction diagram that illustrates the cooperation between a builder and director.	Remember	4
8.	What are the different criteria that select the right pattern for a given problem?	Remember	3
9.	What is the relationship between different participants present in prototype pattern?	Remember	2
10.	Explain the importance of Look-and-Feel standards in design of a document	Understand	5
UNIT – III STRUCTURAL PATTERN			
PART – A (SHORT ANSWER QUESTIONS)			
1.	Define structural patterns.	Remember	4
2.	List different types of structural patterns.	Remember	3
3.	Discuss the role of participants.	Understand	3
4.	Define bridge pattern.	Remember	6
5.	Define Intent and Consequences of bridge pattern.	Remember	3
6.	Define composite design pattern.	Remember	4
7.	Define the intent of composite patterns.	Understand	5
8.	Sketch the structure of composite pattern.	Remember	3
9.	Define adapter design pattern.	Remember	5
10.	List out the participants in adapter design pattern.	Remember	3
11.	Define Intent and Consequences of composite pattern.	Understand	3
12.	List out the applications of adapter design pattern.	Remember	5
13.	Discuss the consequences of adapter design pattern.	Remember	3
14.	List out the participants in bridge pattern.	Remember	4
15.	Sketch the structure of bridge pattern.	Remember	6
16.	Define the motivation of composite patterns.	Understand	5
17.	Define the intent of adapter patterns.	Understand	6
18.	Sketch the structure of adapter design pattern.	Understand	3
19.	List out the applications of composite design pattern.	Remember	4
20.	Define the motivation of adapter patterns.	Understand	5
21.	Define the motivation of bridge patterns.	Understand	4
22.	Define the intent of bridge patterns.	Understand	6
23.	List out the participants in composite design pattern.	Remember	3

24.	List out the applications of bridge design pattern.	Remember	7
PART – B (LONG ANSWER QUESTIONS)			
1.	Describe the intent, motivation and applications of composite patterns.	Remember	7
2.	Discuss the importance of implementation in composite structural pattern.	Understand	9
3.	Give the intent, applicability and structure of composite design pattern and explain it.	Understand	8
4.	Explain the structure of composite pattern with a class diagram.	Understand	8
5.	Describe the consequences of composite design pattern.	Remember	7
6.	Explain composite pattern with an example from drawing editor.	Understand	9
7.	Explain the structure of decorator pattern with suitable example.	Understand	8
8.	Explain the motivation for decorator method with relevant patterns.	Understand	7
9.	Explain the structure of decorator design pattern with a class diagram.	Understand	9
10.	Explain the structure of façade design pattern with class diagram and consequences.	Understand	8
11.	Explain the consequences of flyweight method with its structure.	Understand	8
12.	Explain structure of flyweight pattern with suitable example.	Understand	7
13.	Explain the structure of decorator design pattern with a class diagram.	Understand	9
14.	Explain the structure of Proxy design pattern with a class diagram.	Understand	9
15.	Explain the structure of Adapter design pattern with class diagram and consequences.	Understand	10
PART – C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1.	Explain the significance of proxy patterns with a suitable example.	Understand	10
2.	Explain the applicability and collaborations of a adapter pattern	Understand	9
3.	Explain how to decouple the abstraction from its implementation.	Remember	10
4.	Write and explain the consequences, applicability and implementation issues of a flyweight patterns.	Understand	8
5.	Explain the role of creational patterns in design of the patterns	Remember	8
6.	Distinguish between abstract class and concrete class	Understand	9
7.	Explain the role of interaction diagrams in design patterns.	Understand	10
8.	What are the different issues to be considered while Understanding the decorator pattern?	Understand	9
9.	What relation exists between the different participants involved in composite pattern? Explain it in detail.	Understand	10

10.	Draw and explain the multiple inheritance interface that illustrates relation between different participants in the adapter pattern.	Remember	10
UNIT – IV			
BEHAVIORAL PATTERNS			
PART – A (SHORT ANSWER QUESTIONS)			
1.	Define behavioral pattern.	Remember	11
2.	Define behavioral class pattern.	Remember	12
3.	Define behavioral object pattern.	Remember	12
4.	Define command pattern.	Remember	10
5.	Sketch sequence diagram for any example pattern.	Remember	10
6.	Sketch the structure of server in election commission.	Remember	11
7.	Define interpreter pattern.	Remember	10
8.	Write the intentions of mediator pattern.	Understand	13
9.	Define mediator pattern.	Remember	11
10.	Sketch the structure of mediator pattern.	Remember	10
11.	Write about Chain of Responsibility	Understand	10
12.	Define Memento pattern	Remember	12
13.	Define Observer pattern	Remember	10
14.	Define Iterator pattern	Remember	13
15.	Sketch the structure and applicability of Observer pattern	Remember	11
PART – B (LONG ANSWER QUESTIONS)			
1.	Explain the uses of command design pattern and its structure with class diagram. Also explain the implementation issues.	Understand	11
2.	Explain the implementation and consequences of command pattern.	Understand	11
3.	Explain the implementation issues of command pattern with sample code.	Understand	10
4.	Explain the collaborations and consequences of command method.	Understand	10
5.	Explain the interpreter design pattern and discuss the consequences and implementation issues.	Understand	11
6.	Discuss the implementation issues of Iterator.	Remember	12
7.	Explain the structure of mediator design pattern with a class diagram and discuss the collaboration with a sequence diagram.	Understand	13
8.	Discuss about intent, motivation, structure, applicability and consequences of a mediator behavioral pattern.	Remember	12
9.	Explain the participants, collaborations, implementation and sample code of the mediator pattern.	Understand	12
10.	Explain the known uses of memento method.	Understand	12
11.	Explain the uses of Chain of Responsibility design pattern and its structure with class diagram. Also explain the implementation issues.	Understand	12
12.	Explain the Observer design pattern and discuss the consequences and implementation issues.	Understand	12
13.	Discuss the consequences and implementation issues of memento design pattern.	Remember	12

14.	Explain the uses of Iterator design pattern and its structure with class diagram	Understand	12
15.	Explain the known uses of Observer method.	Understand	12
PART – C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1.	List and explain the various constructors and functions present in iterator and list-iterator	Understand	12
2.	What are the issues to be considered when designing the chain of responsibility pattern?	Remember	13
3.	List and explain the variants and alternatives of iterator pattern.	Understand	12
4.	What is the motivation for mediator pattern? Explain	Understand	12
5.	What is an iterator? Explain the various operations that an iterator supports. Explain them in detail.	Remember	13
6.	List and explain the variants and alternatives of iterator pattern.	Remember	14
7.	Give brief description about the command history.	Remember	13
8.	List and explain the various participants involved in design of the interpreter.	Remember	14
9.	Explain Double Dispatch and Single Dispatch for behavioral design pattern.	Understand	12
10.	What are the two models used in behavioral pattern?	Remember	14
UNIT – V BEHAVIORAL PATTERNS-II			
PART – A (SHORT ANSWER QUESTIONS)			
1.	Write the intent of memento pattern.	Understand	13
2.	Sketch the structure of memento pattern.	Remember	12
3.	Define the phrase “objects for states”.	Remember	13
4.	Define state pattern.	Remember	12
5.	Sketch the structure of state pattern.	Remember	13
6.	List the situations where state pattern can be used.	Remember	12
7.	Define table driven approach.	Remember	14
8.	Write the sample code for Strategy pattern	Understand	13
9.	Write about the collaborations of Visitor pattern	Remember	15
10.	Explain about the consequences of Template pattern	Remember	13
11.	Write about the Pattern community	Remember	13
12.	Explain about the patterns in software	Remember	15
13.	Write about the lifecycle of Object Oriented Software	Understand	14
14.	Explain how objects are used as arguments	Remember	14
15.	Define double-dispatch and single-dispatch	Understand	13
PART – B (LONG ANSWER QUESTIONS)			
1.	Explain the implementation issues of Strategy design pattern.	Understand	12
2.	Explain the implementation issues of observer design pattern.	Understand	12
3.	Explain how design patterns affect the way object-oriented software is designed.	Understand	13
4.	Discuss the several ways the design pattern affect the way Object-oriented software is designed.	Understand	13

5.	Discuss design patterns as a supplement to the existing methods.	Understand	14
6.	Discuss the history of design patterns.	Understand	12
7.	Differentiate Alexander's patterns and Design patterns.	Understand	14
8.	Write about the two ways of grouping the patterns according to Christopher Alexander.	Understand	15
9.	Compare and contrast between Abstract Class vs Concrete Class	Understand	15
10.	Discuss about Alexander's pattern languages.	Remember	12
11.	Discuss a briefly history of design patterns.	Remember	12
12.	Discuss the consequences and implementation issues of Visitor design pattern.	Remember	14
13.	Discuss about intent, motivation, structure, applicability and consequences of a Template Method behavioral pattern.	Remember	13
14.	Explain the State design pattern and discuss the consequences and implementation issues.	Understand	13
15.	Write the sample code for Template method and Visitor patterns	Understand	15
PART – C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1.	Discuss with suitable scenarios, how state, strategy and visitor patterns can solve design problems.	Understand	12
2.	What to except from design pattern	Understand	15
3.	Explain the importance of object diagram in modeling, With the help of a suitable example	Remember	14
4.	What is a template? In which way a design pattern will be described. Explain in detail	Understand	12
5.	Explain the common causes for redesign a design pattern	Understand	12
6.	Explain the role of behavioral patterns in design of the patterns.	Understand	12
7.	What is the key idea of state pattern? Explain it in detail.	Understand	12
8.	Explain Documentation, Learning –Aid and An Adjunct to existing systems in detail.	Remember	14
9.	“Should Communication encapsulated or distributed” Explain.	Remember	14
10.	Explain Decoupling senders and receivers.	Remember	15

Prepared by: Ms. B.Rekha, Assistant Professor, IT

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