Code No: 156FT **R18**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, July - 2023
SOFTWARE ARCHITECTURE AND DESIGN PATTERNS
(Computer Engineering - Software Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Architecture is a set of software structures. Justify this sentence.	[2]
b)	What makes good architecture? Explain.	[3]
c)	Who are the participants in the ATAM?	[2]
d)	List CBAM outcomes and strengths.	[3]
e)	What do you understand by "moving from one system to many"?	[2]
f)	What are off-the-shelf products? Give any four examples.	[3]
g)	What is a design pattern?	[2]
h)	How do design patterns solve design problems? Explain.	[3]
i)	How are design patterns different from algorithms?	[2]
j)	Differentiate between structural patterns and behavioural patterns.	[3]

PART – B

(50 Marks)

2.a) Suppose software architecture is compared to the architecture of buildings as a conceptual analogy. What are the strong points and weaknesses of that analogy? What is the correspondence in buildings to software architecture structures and views? When does it break down?

b) Discuss the steps of the attribute-driven design method. [5+5]

OR

3.a) Sailing ships have architectures, which means they have "structures" that lend themselves to reasoning about the ship's performance and other quality attributes. Propose a useful set of "structures" for distinguishing and reasoning about ship architectures.

b) Banks are justifiably cautious about security. Sketch the documentation you would need for an Automatic Teller Machine (ATM) in order to reason about its security architecture. [5+5]

4.a) It is not uncommon for an organization to evaluate two competing architectures. How would you modify the ATAM to produce a quantitative output that facilitates this comparison? Explain.

b) Discuss the steps involved in CBAM. [5+5]

OR

5.a) Under what circumstances would you want to employ a full-strength ATAM and under what circumstances would you want to employ a lightweight architecture evaluation? Explain.

b) If you were going to evaluate the architecture for a software system, who would you want to participate in? What would be the stakeholder roles and who could you get to represent those roles? Explain. [5+5]

6.a) What makes software product lines work? Explain any five.

b) Explain the techniques for avoiding interface mismatch. [5+5]

OR

7.a) List the challenges in software product lines.

b) Discuss the steps involved in model problem workflow with a suitable diagram. [5+5]

8.a) What is a proxy design pattern? Explain with an example.

b) What problem does the builder pattern try to solve? Explain. [5+5]

OR

9.a) What is a bridge design pattern? Explain with an example.

b) What is the main advantage of using a prototype design pattern over object creation using a new keyword? What are the components of the composite entity pattern? [5+5]

10.a) Consider a unique safety system for the car that should provide the following functionality (A safety belt locking system). Such a system should prevent the car from being started unless the driver is buckled. Select the most appropriate design pattern/patterns to use to implement the car safety system and show how it is applied. In particular, show an appropriate class diagram(s) and/or enough code fragments to illustrate your use of the pattern to solve the problem.

b) What is a chain of responsibility pattern? In what scenarios to apply this pattern? Explain. [5+5]

OR

11.a) A frequent flyer program works in annual cycles. At the end of each year, a member's activity is calculated for the year and she is assigned to a tier. In the case of this hypothetical program, one of the requirements is to fly 25,000 miles in one year to attain silver status and keep it for the next year; for gold status, a member must fly 50,000 miles. What design pattern or patterns shall be used to capture the Airline Frequent Flyer Program in a software application? Give a short explanation. In particular, show an appropriate class diagram(s) and enough code fragments to illustrate your use of the pattern to solve the problem.

b) What is an observer design pattern? Explain three main components of this design pattern. [5+5]

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