OR iii. Discuss the significance of the GRASP design principles, focusing on any two principles of your choice. Provide examples to illustrate the application of these principles in designing object-oriented systems. **6**

Q.6 Attempt any two:

i. Design a sequence diagram for the ATM Machine case study, using suitable terminology. Highlight key interactions and dependencies. **5**

ii. Design a class diagram for the Traffic Management System case study. Incorporate appropriate aggregation, generalization, and specialization concepts where needed. **5**

iii. Design an activity diagram for the Weather Monitoring Station case study. Utilize suitable terminology and illustrate the flow of activities in monitoring weather conditions. **5**

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Science / Engineering

End Sem Examination Dec-2023

CA3EL07 Object Oriented Analysis & Design

Programme: BCA / BCA-MCA (Integrated) Branch/Specialisation: Computer Application

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. In the Unified Process Model, what is the primary purpose of the Elaboration phase? **1**

(a) Writing user documentation
(b) Conducting market research
(c) Establishing architectural foundation and mitigating risks
(d) Performing system maintenance

ii. In UML, what does a package diagram represent? **1**

(a) Static structure of the system
(b) Dynamic behaviour of the system
(c) Logical architecture of the system
(d) Deployment of the system

iii. What does aggregation represent in the context of UML diagrams? **1**

(a) Inheritance (b) Dependency
(c) Whole-part relationship (d) Realization

iv. At the conceptual level, what is included in the Domain Model in Static Modelling? **1**

(a) Use Cases
(b) Classes and Attributes
(c) Sequence Diagrams
(d) Deployment Diagrams

v. What do System Sequence Diagrams depict in Dynamic Modelling? **1**
(a) Static nature of the system
(b) Logical architecture of the system
(c) Dynamic interactions between actors and the system
(d) Class hierarchies

vi. In UML, what is the purpose of an Activity Diagram? **1**
(a) Representing the structure of a system
(b) Showing the flow of activities and actions
(c) Describing the deployment of components
(d) Capturing user system requirements

vii. According to GRASP, which design principle suggests designing objects with well-defined responsibilities? **1**
(a) Creator (b) Information Expert
(c) Low Coupling (d) High Cohesion

viii. What does coupling in module indicate? **1**
(a) Can be written more compactly
(b) Focuses on just one thing
(c) Is able to complete its function in a timely manner
(d) Is connected to other modules and the outside world

ix. The user system requirements of a Library Management System are typically captured through which document? **1**
(a) Software Design Document (SDD)
(b) System Requirements Specification (SRS)
(c) Domain Driven Design (DDD)
(d) System Requirements Document (SRD)

x. In the context of Object-Oriented Analysis & Design, which case study involves designing a system to manage and organize books, patrons, and transactions in a library environment? **1**
(a) Satellite Based Navigation
(b) Traffic Management
(c) Library Management System
(d) Point-of-sale

Q.2 i. Explain the significance of Unified Process Model in the context of Object-Oriented Analysis and Design. **2**

ii. Differentiate between Use Case Modelling and Class Diagrams in the Unified Process Model, highlighting their respective roles. **3**

iii. Elaborate on the importance of the Inception phase in the Unified Process Model, focusing on the activities involved and their contributions to the overall software development process. **5**

OR iv. Explain the phases of the Unified Process Model, emphasizing the key activities and deliverables associated with each phase. **5**

Q.3 i. Define the term "Domain Model" in the context of Object-Oriented Analysis and Design. **2**

ii. Differentiate between aggregation and composition in UML. Provide examples and discuss the implications of choosing one over the other in designing object-oriented systems. **8**

OR iii. Explain the process of finding conceptual classes and creating a domain model in the static modelling phase. Provide examples and discuss the significance of this phase in software development. **8**

Q.4 i. Define the term "System Sequence Diagram" in the context of Object-Oriented Analysis and Design. Highlight its role in the dynamic modelling phase. **3**

ii. Describe the process of mapping design to code in UML. Discuss the role of UML interaction diagrams, activity diagrams, and state diagrams in dynamic modelling, and how they contribute to the overall software design. **7**

OR iii. Differentiate between UML class diagrams and UML interaction diagrams. Provide examples and discuss the scenarios in which each of these diagrams is most useful in dynamic modelling. **7**

Q.5 i. Explain how the application of the Singleton design pattern contributes to better help in class and object design. Provide a real-world example. **4**

ii. Differentiate between the Factory Method and Observer design patterns. Provide examples and discuss the scenarios in which each of these patterns is most beneficial in software design. **6**

Marking Scheme

CA3EL07(T)-Object Oriented Analysis & Design

Q.1	i)	c) Establishing architectural foundation and mitigating risks	**1**
	ii)	c) Logical architecture of the system	**1**
	iii)	c) Whole-part relationship	**1**
	iv)	b) Classes and Attributes	**1**
	v)	c) Dynamic interactions between actors and the system	**1**
	vi)	b) Showing the flow of activities and actions	**1**
	vii)	b) Information Expert	**1**
	viii)	d) Is connected to other modules and the outside world	**1**
	ix)	b) System Requirements Specification (SRS)	**1**
	x)	c) Library Management System	**1**
Q.2	i.	providing a clear explanation. 1Mark presenting a concise overview of the importance. 1 Mark	**2**
	ii.	clearly distinguishing between the two. 1 Mark for highlighting the role of Use Case Modelling. 1 Mark for highlighting the role of Class Diagrams. 1 Mark	**3**
	iii.	discussing the activities in the Inception phase. 1 Mark elaborating on the contributions of the Inception phase. 1 Mark linking the activities to the overall software development process. 1 Mark emphasizing the importance of the Inception phase. 1 Mark clarity and coherence in the explanation. 1 Mark	**5**
OR	iv.	for addressing each phase. 1 Mark for emphasizing key activities in each phase. 1 Mark for mentioning key deliverables in each phase. 1 Mark for overall clarity, coherence, and completeness. 2 Marks	**5**
Q.3	i.	for providing a clear and accurate definition. 1 Mark for precision and clarity in the explanation. 1 Mark	**2**
	ii.	for a concise definition of aggregation and composition. 2 Marks for a detailed and accurate comparison with examples. 4 Marks for discussing the implications of choosing one over the other. 2 Marks	**8**
OR	iii.	for providing a comprehensive explanation. 2 Marks for incorporating examples. 4 Marks for emphasizing the significance of this phase. 2 Marks	**8**
Q.4	i.	for a clear definition. 1 Mark	**3**
	ii.	for highlighting its role in dynamic modelling. 2 Marks for detailing the process. 2 Marks for discussing the roles of UML interaction diagrams, activity diagrams, and state diagrams. 2 Marks for demonstrating an understanding of how they contribute to software design. 3 Marks	**7**
OR	iii.	for a clear distinction. 2 Marks for providing examples and discussing utility. 4 Marks for coherence in presentation. 1 Marka	**7**
Q.5	i.	for clarity in explanation. 2 Marks for providing a real-world example. 2 Marks	**4**
	ii.	for a detailed comparison with examples. 3 Marks for discussing scenarios where each pattern is beneficial. 3 Marks	**6**
OR	iii.	for offering a comprehensive discussion. 3 Marks for focusing on two principles. 2 Marks for providing relevant examples. 1 Marks	**6**
Q.6		(Any two of three must be attempted)	
	i.	for accurately representing key interactions. 2 Marks for illustrating dependencies. 3 Marks	**5**
	ii.	for incorporating appropriate aggregation, generalization, and specialization. 2 Marks for demonstrating a comprehensive understanding of class diagram construction. 3 Marks	**5**
	iii.	for constructing an activity diagram using suitable terminology. 2 Marks for effectively illustrating the flow of activities in monitoring weather conditions. 3 Marks	**5**

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