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B.Tech DEGREE EXAMINATION, DECEMBER 2023

Fifth & Sixth Semester

18CSE369T - SOFTWARE MODELING AND ANALYSIS

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks) — Answer **all** Questions

		Marks	BL	CO
1.	What is carried out during design modeling? (A) Developing use case models (B) Developing data flow and entity relationship diagrams (C) Developing static and dynamic (D) Developing software model architectures	1	2	1
2.	A conceptual object is a discrete set of instances of a domain specific concept. These instances _____. (A) Distinctly not identifiable (B) Share similar features (C) Does not share similar features (D) Does not have any states	1	1	1
3.	Goal diagram should characterize each goal through---------- (A) Links (B) Attributes (C) Annotations (D) Model	1	5	1
4.	Which is not a type of conceptual object? (A) Entity (B) Association (C) Aggregation (D) Agent	1	1	1
5.	The attribute AGE is calculated from date-of-birth. The attribute age is-------- (A) Singlevalued (B) Multivalued (C) Composite (D) Derived	1	1	2
6.	The Unified Modeling Language (UML) is a standard diagramming notation; sometimes referred to as a---------- (A) Blueprint (B) Copy print (C) Data (D) Text	1	4	2
7.	Conceptual class category list identifies the ---------- in Domain model (A) Noun phrase (B) Declarative phrase (C) Imperative phrase (D) Verb	1	1	2
8.	A common mistake when building a domain model is to represent something as ---------- when it should have been a conceptual class (A) Attribute (B) Object (C) Class (D) Data	1	2	2

9. Consider the following Road Traffic Control System.Road Traffic Control Systems collect and analyze driving information of vehicles in the area.Perform the optimal traffic signal control in accordance with the constantly changing road traffic situation, and provide useful traffic information to drivers based on the data collected. Police enforce laws of road, Media informs the public of traffic and accidents in major areas, city planners would like the least number of accidents and greatest amount of flow through parts of town, Drivers may avoid roads that are known to be overcrowded during certain times of day etc. In this many agent are acting such as police, media, drivers and so on.Identify which agent type is of driver here? 1 5 3

(A) Mobile agents (B) Adaptive agents
(C) Reactive agents (D) Utility agents

10. Model checking is ---------- 1 1 4

(A) Testing (B) Dynamic testing
(C) Next (D) Static analysis

11. For a goal already identified in the goal model, review all the objects which refers to in order to single out the active ones; that is, those whose instances have the ability of restricting their behavior. Identify which system of building agent models is this? 1 4 3

(A) Goal target (B) Goal enforcer
(C) Goal wisher (D) Controller

12. An agent model captures the ..... of requirements engineering in terms of agents forming the target system, their capabilities, interfaces with each other and responsibilities for goals and operations. 1 2 3

(A) WHO-dimension (B) HOW-dimension
(C) WHY-dimension (D) WHAT-dimension

13. Analysis and design of the static view of an application belongs to behavior model? Identify which among the following it belongs to the behavior model? 1 3 4

(A) Simulation class behaviors (B) Simulation modeling
(C) Objects and classes (D) Modelling class behaviors

14. Point out the INCORRECT statements about multi agent system 1 5 4

(A) Agent is an entity whose state is viewed as consisting of mental components such as belief,capabilities, choices and commitments
(B) An agent is a computational system that interacts with one or more counterparts or real-world system
(C) A system of distinguished agents should substantially change semantically if a distinguished agent is added
(D) Agents are not similar to objects since they don't have strong sense of autonomy

15. Consider the following KAOS model for safe transportation. In this safe transportation, Requirement is the goal for which an automated component is responsible. Identify which among is the requirement from the following figure 1 5 3

(A) Radio other than train (B) Software sensor
(C) Manually radio other than conductors (D) Human

16. A conflict of a goal Is ---------- 1 3 3

(A) Precondition to be satisfied (B) Post condition not to be satisfied
(C) Post condition for a precondition (D) Precondition not to be satisfied

17. ---------is a concept, abstraction, or thing 1 2 4

(A) Entity (B) Text
(C) Object (D) Data

18.	All components in the system change their state variables simultaneously. The statement is about? (A) Synchronous composition (B) Asynchronous composition (C) Behavior composition (D) Active composition	1	4	4
19.	----------is a predicate intended to express that some descriptive or prescriptive property holds in some arbitrarily chosen current state. (A) State Assertion (B) Non-behavioral (C) Object Assertion (D) Behavioral Assertion	1	3	5
20.	LTL is ---------- (A) Linear Temporal Logic (B) Linear Timing Logic (C) Linear Type Logic (D) Line Time Logic	1	2	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	What are the objectives to do the process of elicitation of primary goals?	4	2	1
22.	How to identify the conceptual objects and draw the complete object model with example	4	5	3
23.	Mention the different types of associations that can be found in modeling the class diagram	4	4	2
24.	Write the different types of agents in goal modeling	4	2	4
25.	Design the Kripke's model with your own example	4	3	5
26.	Illustrate with a diagram about goal ,object agent and operation.	4	1	3
27.	Identify the conflict that can't be resolved through individual discussions" Explain identified conflict with an example"	4	1	6

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL	CO
28.	(a) How to identify and refine the relevant branches in goal model using AND,OR ? Give examples	12	3	1
	(OR)			
	(b) Consider the following simplified version of patient-monitoring system.Each patient in an emergency service is monitored by an analog device that measures factors such as pulse,temperature,blood pressure and skin resistance.The software monitors these factors on a periodic basis, customized to each patient and keeps them in a database for patient history tracking for each patient, safe ranges are specified for each factor. If a factor falls outside of a patient's safe range, the nurse station is notified.Elaborate a goal model for it and perform obstacle analysis to complete your goal model towards a more robust system.			
29.	(a) A token-ring based local-area-network (LAN) is a network consisting of nodes, in which network packets are sent around.Every node has a unique name within the network, and refers to its next node. Different kinds of nodes exist: work stations are originators of messages; servers and printers are network nodes that can receive messages. Packets contain an originator, a destination and content, and are sent around on a network. A LAN is a circular configuration of nodes.Draw a class diagram which consists of all the classes in your system with their attributes and operations, relationships between the classes, multiplicity specifications, and other model elements that you find appropriate.	12	4	2
	(OR)			
	(b) How the class behavior is modeled using state model ? Give an example.			

30.	(a) What is an agent ? Explain its categories with an help of Traffic signal management case study?	12	3	3
	(OR)			
	(b) Consider the university admission processing system which covers application checking and validation per university-wide and department-wide requirements, finance requirements,additional information inquiry, decision notification, and other admission processing? Draw the state machine diagram with all possible goals, agents and operations.			
31.	(a) What is LTL? Explain how the temporal logic used to understand the real time constraints in a system behavior.	12	4	4
	(OR)			
	(b) Explain about design by Contract for checking the correctness of stack application			
32.	(a) Explain with an example how you will write LTL formula for expressing system liveness and safety property of system	12	5	5
	(OR)			
	(b) With an example code of SPIN checker, explain the concept of model checking.			

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