**Computer Science and Engineering Department**

**CSE 2102: Introduction to Software Engineering**

**Midterm #1**

**April 13, 2022**

**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Notes**

1. This midterm is open notes, no internet access is permitted.
2. Each question is designated as either multiple choice or multiple answer.
3. Multiple answer questions will receive full credit only if all the correct answer choices are identified and the wrong answer choices are not identified.

|  |  |
| --- | --- |
| Q. 1 |  |
| Q. 2 |  |
| Q. 3 |  |
| Q. 4 |  |
| Q. 5 |  |
| Q. 6 |  |
| Q. 7 |  |
| Q. 8 |  |
| Q. 9 |  |
| Q. 10 |  |
| Q. 11 |  |
| Q. 12 |  |
| Q. 13 |  |
| Q. 14 |  |
| Q. 15 |  |
| Q. 16 |  |
| Q. 17 |  |
| Q. 18 |  |
| Q. 19 |  |
| Q. 20 |  |

**Multiple Answer**

1. Consider the following FSM, where S1 is the starting state, and S4 is the final state. Which of the following strings are accepted by this FSM?

Shape

Description automatically generated with medium confidence

A) aac (x)

B) abc

C) acdb (x)

D) aab

E) acdaac (x)

**Multiple Choice**

2. Consider the following Petri Net. What is the marking of the net after transition t1 fires?

![Diagram

Description automatically generated]()

A) (3, 2)

B) (2, 3)

C) (1, 3) (x)

D) (3, 1)

E) (3, 3)

**Multiple Choice**

3. Which transitions are enabled in the marking shown in the Petri net in Q.2?

a) t1

b) t2

c) t3

d) All of the above (x)

e) None of the above

**Multiple Answer**

4. Which of the following statements apply to transitions t2 and t3, in the following initial marking of the net in Q.2?

A) Firing of either t2 or t3 will yield the same marking. (x)

B) Transitions t2 and t3 represent a sequence of transitions.

C) Transitions t2 and t3 represent non-determinism (x)

D) Firing of t2 and t3 yield different markings.

E) Transitions t2 and t3 represent concurrency.

**Multiple Choice**

5. How many unique markings does the reachability set of the Petri net in Q.2 has?

A) 4

B) 5

C) 6

D) 7 (x)

E) 3

**Multiple Choice**

6. Can the Petri Net in Q.2 be deadlocked?

A) Yes (x)

B) No

C) If t1 fires before t2

D) If t2 fires before t3

E) If t1 fires before t3

**Multiple Answer**

7. Consider the entity car in a system that models the operations of a car dealer. Which of the following are single-valued attributes?

A) Make (x)

B) Model (x)

C) VIN (x)

D) Color

E) Gas Mileage

**Multiple Choice**

8. If you were collecting and storing information about a music collection, a music album would be modeled as a:

A) Relationship

B) Entity (x)

C) Attribute

D) Cardinality

E) Instance

**Multiple Answer**

9. Which of the following are not concerns of software architecture and design?

A) How the components are allocated to servers.

B) How the system is decomposed into modules.

C) How the components connect with each other.

D) How the user interface is laid out. (x)

E) How the system interacts with external databases. (x)

**Multiple Choice**

10. Each statement below represents a combination of stakeholder and their priority. Identify the mismatch pair, that is, the stakeholder whose priority is not the one listed against them.

A) Database Designer: Information security issues.

B) Users/Customers: How easy it is to use.

C) Application Development team: How to plan for division of work.

D) Release & Configuration Manager: How to replace part of the subsystem with minimal impact (x)

E) Performance Engineer: How to deploy the system across multiple servers.

**Multiple Choice**

11. Which view is concerned with performance and scalability?

A) Logical view

B) Development view

C) Physical view

D) Process view (x)

E) Scenario view

**Multiple Choice**

12. Designing an architecture of an application that is split into three tiers – user interface, application logic, and database is an example of the application of which software engineering principle?

A) Incrementality

B) Reusability

C) Generality

D) Separation of Concerns (x)

E) Formality

**Multiple Answer**

13. Which of the following diagrams are used to specify the requirements of software systems?

A) Petri Nets (x)

B) Finite State Machines (x)

C) Use Case Diagrams (x)

D) Collaboration Diagrams (x)

E) Class Diagrams

**Multiple Choice**

14. Specification inheritance, where a class contains only the definition of the methods but not their implementation, is an application of which of the following software engineering principles:

A) Modularity

B) Abstraction (x)

C) Rigor

D) Formality

E) Generality

**Multiple Choice**

15. Consider the following situation: A chef cooks dinner. Sometimes it is necessary for the chef to get chives from the garden. This situation can be modeled using two use cases “Cook Dinner” and “Get Chives”. What relationship exists between these two use cases?

A) Get Chives extends Cook Dinner. (x)

B) Cook Dinner extends Get Chives.

C) Get Chives includes Cook Dinner.

D) Cook Dinner includes Get Chives.

E) None of the above

**Multiple Choice**

16. How do you model the following situation with a UML Use Case Diagram: The lab director does a lab test together with his assistant. The assistant always has to write a protocol during the lab test. Consider two use cases “Lab Test” and “Write Protocol”. What relationship exists between these two use cases?

A) Lab Test extends Write Protocol

B) Lab Test includes Write Protocol (x)

C) Write Protocol includes Lab Test

D) Write Protocol extends Lab Test

E) None of the above.

**Multiple Answer**

17. In the scenario described in Q.16, which of the associations between actors and use cases are valid?

A) Lab Director is associated with Lab Test (x)

B) Lab Assistant is associated with Lab Test (x)

C) Lab Assistant is associated with Write Report (x)

D) Lab Director is associated with Write Report

E) All of the above

**Multiple Choice**

18. Which traces are possible in the following sequence diagram?

![Diagram

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A) a -> b -> a -> b

B) a -> b -> a -> b -> c (x)

C) a -> b -> c

D) c

E) a -> c

**Multiple Choice**

19. In the following sequence diagram, which operation does class A have?

![Diagram, engineering drawing

Description automatically generated]()

A) x():String

B) y():int

C) z():void

D) z(): int

E) y(int): void (x)

**Multiple Choice**

20. A software requirements specification document conforms to a standard in defining all the terms, referencing all the figures etc. Such a requirement specification document is:

A) Consistent

B) Verifiable

C) Complete (x)

D) Unambiguous

E) Traceable