**Subject Area Exam – Design**

1. List three characteristics that can serve as a guide to evaluate design quality.

Answer (Section 12.2.1):

Design implements all explicit requirements from the analysis model, as well as accommodating implicit customer requirements.

Design must be understandable to the people who generate the code to implement design, those who test it, and those who support it.

Design must provide a complete picture of the software, addressing the data, functional, and behavioral domains from an implementation perspective.

1. Explain how effective modular design is achieved through functional independence of the individual modules?

Answer (Section 12.3.5):

Functional independence of modules is achieved by making modules single-minded (high cohesion) and preventing excessive interaction (low coupling) with other modules or system elements. Independent modules are easier to develop, maintain, and test, because the impact of side effects is reduced (as is the propagation of errors). This also makes it easier to perform parallel implementation of modules.

1. Describe the principle of information hiding as it applies to software design.

Answer (Section 12.3.6):

The principle of information hiding implies that modules only share information with each other on a "need to know" basis to achieve some specific software function. Hiding enforces the procedural constraints to both the module procedural detail and any data structures local to the module.

4. What are the elements that make up a software architectural style?

Answer (Section 13.3):

* Set of components that perform required system functions.
* Set of connectors allowing communications among the components.
* Constraints describing how the components maybe integrated to form a system.
* Semantic models that enable the designer to understand the overall system properties by analyzing the known properties of its components.

5. What is an archetype?

Answer (Section 13.6.2):

An archetype is a class or pattern that represents a core abstraction that is critical to the design of an architecture for the target system.

6. Explain the key differences between thin client architectures and a rich client architectures.

Answer (Section 13.6.6):

For mobile devices or web apps using thin client only the user interface layer is implemented on the device, A rich client typical allocates the user interface layer, business layer, and often the data layer too on the user’s device.

7. How does the object-oriented view of component-level design differ from the traditional view?

Answer (Section 14.1.1 and 14.1.2):

The object-oriented view focuses on the elaboration of design classes that come from both the problem and infrastructure domains. Classes are elaborated by specifying messaging details, identifying interfaces, defining attribute data structures, and describing process flow for operations. In the traditional view, three of components are refined: control modules, domain modules, and infrastructure modules. This requires representations to be created for data structures, interfaces, and algorithms for each program module in enough detail to generate programming language source code.

8. Describe the differences between the software engineering terms coupling and cohesion?

Answer (Section 14.2.3 and 14.2.4):

Cohesion implies that a component or class encapsulates only the attributes and operations closely related to one another and to the class itself. Coupling is a qualitative measure of the degree to which components are connected to one another.

9. Describe the component-level design for WebApps.

Answer (Section 14.4):

Component-level design incorporates elements of both content design and functional design. Content design at the component level focuses on content objects and then manner in which they may be packaged for presentation to a WebApp end-user. A functional architecture that describes the key functional components in the WebApp and how these components interact with each other is also created.

10. What is the intent of domain engineering in CBSE?

Answer (Section 14.7.1):

The intent of domain engineering is to identify, construct, catalog, and disseminate a set of software components that have applicability to existing and future software products.

11. List three principles that should be applied when building any user interface.

Answer (Section 15.1):

* Place user in control.
* Reduce user's memory load.
* Make the interface consistent.

12. What framework activities are completed when following an evolutionary (or spiral) user

interface development process?

Answer (Section 15.2.2):

* User, task, and environmental analysis
* Interface design
* Interface construction
* Interface validation

13. List four interface design issues present in the development of most user interfaces.

Answer (Section 15.4.3):

* System response time
* User help facilities
* Error information handling
* Menu and command labeling
* Application accessibility
* Internationalization

14. What are the primary design objectives of a WebApp interface?

Answer (Section 15.5):

The WebApp interface should be design a WebApp interface so it answers three primary questions for the end-user:

* Where am I?”
* What can I do now?
* Where have I been, where am I going?

15. List the characteristics of effective design patterns.

Answer (Section 16.1):

* Solve a specific problem
* A proven solution
* Describe a solution isn’t obvious
* Describes a relationship
* Has a significant human component that minimizes human intervention

16. What do architectural patterns contribute to the design process?

Answer (Section 16.3):

An architectural pattern defines a specific approach for handling some characteristic of the system.

17. What do component-level design patterns contribute to the design process?

Answer (Section 16.4):

A component-level design pattern provides a proven solution that addresses one or more subproblems extracted from the requirements model.

18. Define the terms “design focus” and “granularity” in the context WebApp design

patterns?

Answer (Section 16.6):

* Design focus – identifies the aspect of the design model relevant to problem
* Granularity – identifies level of abstraction being considered

19. What are the major attributes should be used to assess the quality of a WebApp?

Answer (Section 17.1):

Usability, functionality, reliability, efficiency, maintainability

20. What are the 6 activities in the Web engineering design pyramid?

Answer (Section 17.3):

Interface design, aesthetic design, content design, navigation design, architecture design, and component design

21. What are the primary design objectives of a WebApp interface?

Answer (Section 17.4):

* Establish a consistent window into the content and functionality provided by the interface
* Guide the user through a series of interactions with the WebApp
* Organize the navigation option and content available to the user

22. What is the role of context in MobileApp design?

Answer (Section 18.1):

Users expect MobileApps to deliver personalized user experiences based on the physical location of a device in relation to the available network features.

23. What are the major attributes should be used to assess the quality of a MobileApp?

Answer (Section 18.2.1):

Usability, functionality, reliability, efficiency, maintainability, portability

24. What questions should be answers to assess usability of a mobile device?

Answer (Section 18.2.2):

* Is the user interface consistent across applications?
* Is the device interoperable with different network services?
* Is the device acceptable in terms of stakeholder expectations?