

C10-R4: SOFTWARE SYSTEMS

NOTE:

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.

- a) Following are the software life cycle models used in design and development of software systems. Compare the limitations of following software life cycle models in brief.
- | | |
|-------------------------|-------------------|
| Linear Sequential Model | Prototyping Model |
| Incremental Model | Spiral Model |
- b) Briefly explain three primary aspects of a system apart from its identity in Object Oriented analysis methods?
- c) What do you understand by design pattern? What are the design pattern specification components? List and briefly explain all of them.
- d) For a good architectural design, what are the steps and guidelines recommended as a best business practice at process and product (structural) level while designing the architecture of any software system?
- e) What are the data design principles to be remembered while designing a data centric software system?
- f) Explain how instance diagram is represented in UML and useful in the design of object oriented systems. Give suitable examples.
- g) Which are the generic software engineering phases? Explain briefly the umbrella activities involved in the software development process.

(7x4)

2.

- a) Make a checklist of architectural design assessment questions to assess the architecture of any software system. Explain the different architecture styles that can be used and adopted while designing and developing the software system.
- b) How equivalence class partitioning and boundary value analysis are different from each other while testing the software system? Are they used in functional or nonfunctional testing? Give suitable example.
- c) Agents and multi agent systems are virtually everywhere. Give the examples of components that can be modeled (and observed) in terms of agents and the example of software systems that can be modeled as multi-agent systems.

(8+6+4)

3.

- a) What do you understand by agent oriented software engineering (AOSE)? Explain agent and multi agent software system?
- b) Draw the use case diagram for, Time and Resource Management System (State necessary assumptions considered for your use case diagram).

(6+12)

4.

- a) What do you understand by requirement analysis? How is it different from software requirement elicitation? Explain in brief, Facilitated Action Specification Techniques (FAST) and Quality Function Deployment (QFD) with respect to requirement elicitation.
- b) Consider the following example:

Stack	List
push(Item item) : void pop() : Item	insertAt(Item,int) : void delete(Item) : void remove(int) : void itemAt(int) : Item

The problem is to define a Stack class, and to implement the Stack in terms of a List container class. The goal is to implement the Stack methods in terms of the List class methods for insertion, deletion, and retrieval of items in the List. There are two approaches to do this: (i) use inheritance or (ii) use composition.

Implement Stack method using both the approaches and justify which approach is superior in this case.

(8+10)

5.

- a) Consider the example of modeling the objects in Simple Filing System:
- Every object in the filing system has a name, a date modified, and set of permissions (read, write, execute).
 - Some objects, known as directory objects, are containers of any kind of object in the filing system. Other objects, known as file objects, do not contain other filing system objects.
 - Objects cannot be shared among containers.
A directory object allows addition, deletion, and listing of any of its contents.
A file object has a size (in bytes) and a file type associated with it (e.g., text file, executable file,...) as well as an open method. For a text file, the open method should launch a text editor; for an executable file, the open method should launch the executable.

Draw the class diagram and instance diagram for the above example.

- b) What are the generic components of Object Oriented Analysis Model? Explain Class-Responsibility-Collaborator (CRC) Modeling? What are the criteria for the inclusion of a Class on a CRC Card?

(10+8)

6.

- a) What do you understand by software scope? What are the objectives of project planning? What are the capabilities of automated estimation tools? Also explain and define the software scope of one example software system of your choice.
- b) With example, define the term object, class, attribute and operation.

(10+8)

7.

- a) What are the various options to construct a class? Give example of each option. What the advantages are of object oriented architecture?
- b) What are the issues that need to be taken care while designing the object oriented system? Discuss each issue in brief.

(10+8)