

D22 resit Exam 2001

2.5 Hours

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Answer THREE Questions

1. The following 11 terms are commonly used in a object-oriented software engineering context. Give a short explanation for each of them:

scenario, use case, aggregation, component, prototyping, association, analysis, substitutability, software architecture, abstraction, idiom

[3 marks each]

[Total 33 marks]

2. Below is the draft specification for a proposed software system:

“A program is required to run the controller of a burglar alarm system. A typical system consists of a number of sensors connected by individual circuits to a central control box containing the controller. The control box has a simple keypad and display. Sensors include switches, heat detectors and motion detectors. Each sensor has an identification code which can be read by the controller to identify the sensor.

The controller allows an operator to select which sensors are active and turn on or off the system. If a sensor is triggered when the system is active, the controller must activate the alarms (a siren and a bell) and display a message on the display panel indicating which sensor is involved. The operator must enter a security code before the system is turned on or off.”

- a) Create a detailed UML class diagram for the alarm program. Make sure each class is labelled with any key attributes or operations.

[20 marks]

- b) Create UML sequence diagrams to show how the program responds to an alarm being triggered, and how the operator can turn the system off.

[13 marks]

[Total 33 marks]

3. a) Engineering activities typically have a ‘process’ or method — a procedure or set of procedures that can be followed to achieve a particular result. Discuss the arguments for and against having a ‘process’.

[10 marks]

- b) Object-oriented development methods are rapidly replacing older structured development methods. Has structured development failed and why should object-oriented development prove to be any better?

[12 marks]

- c) By what criteria can the quality of an object-oriented design be assessed?

[11 marks]

[Total 33 marks]

4. a) What is the purpose of an abstract class?

[5 marks]

- b) Consider the problem of writing seat booking applications for organisations like theatres and cinemas or coach and train companies. Identify a collection or framework of abstract classes that would allow a common framework to be reused across the different specific domains. Construct a class diagram showing the classes and their relationships.

[20 marks]

- c) Identify and briefly describe a development life cycle model that would support the reuse of your abstract class framework across a number of applications.

[8 marks]

[Total 33 marks]

5. a) How are design patterns used? Provide some example patterns to illustrate your answer.

[13 marks]

- b) Describe the idea of software architecture.

[10 marks]

- c) Outline the idea of the ‘layers of change’ and its role in the design and implementation of a software system.

[10 marks]

[Total 33 marks]

END OF PAPER