

Answer **THREE** Questions

1. a) What are the key features that distinguish structured development from object-oriented development?

[10 marks]

- b) The object-oriented development process involves building structural, behavioural and functional models of a system. Explain the role of each of these models and how they relate to each other.

[12 marks]

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

[11 marks]

[Total 33 marks]

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

idiom, testing, coupling, polymorphism, conceptual model, formal specification, message passing, maintenance, use case, methodology, public interface

[3 marks each]

[Total 33 marks]

3. a) What is the role 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]

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4. Consider the following short specification for a software system:
“A control program is required to monitor and control energy use in an office block. The building should be properly heated and well lit during working hours, but energy should not be wasted on lightly or unused areas. Sensors located throughout the building provide information about temperature, light levels and room occupancy. Remote control devices allow heating and lighting to be switched on and off. It should be possible to obtain detailed information about energy use patterns.”

a) Identify a set of classes that could be used to model the system and construct a class diagram. Include key attributes and operations on the diagram.

[24 marks]

b) Draw object interaction diagram to show a heater being switched on when a temperature sensor reports a room is cold.

[9 marks]

[Total 33 marks]

5. a) Explain the ideas of architecture pattern and design pattern.

[6 marks]

b) What is meant by the idea of a pattern language? How does the use of a pattern language aid the designer?

[6 marks]

c) Outline the structure used to describe a design pattern, identifying the role of each section present.

[12 marks]

d) How do patterns support “piecemeal growth” whereby an application can evolve to meet changes in requirements?

[8 marks]

[Total 33 marks]

END OF PAPER