

EXAMINATIONS — 2009  
MID-YEAR

**SWEN 301/COMP 301**  
**Structured Methods/  
Software Engineering Principles**

**Time Allowed:** 3 Hours

**Instructions:** Answer all questions  
Total marks are 180.  
Use the marks for each question as a guide as to how long  
to spend on it.  
No calculators are permitted.  
Paper dictionaries for translating between English and a foreign language  
are permitted.

## Question 1. General Knowledge

[33 marks]

**(a)**

**(i)** [5 marks]

What is the difference between conceptual class diagrams and entity relationship diagrams?

**(ii)** [5 marks]

What are the main components of data flow diagrams?

**(b)** [6 marks]

What is the relationship between copyleft and copyright?

**(c)** [8 marks]

What is the purpose of developing process maturity models? Name two process maturity models.

**(d)** [9 marks]

Discuss how requirements can be used for system testing.

## Question 2. Architecture and Program Design

[40 marks]

(a)

Describe the following architectural styles and discuss the advantages and disadvantages of each.

(i) [5 marks]

Pipes and Filters

(ii) [5 marks]

Layering

(b) [5 marks]

What is the difference between *idioms* and *design patterns*?

(c) [5 marks]

Why might we want high cohesion within objects in an object-oriented design?

(d)

Identify appropriate design patterns for the following problems and justify your choice.

(i) [5 marks] You are building an inheritance hierarchy of products that your company sells; however you want to reuse several classes from one of your suppliers. You can not modify your suppliers' classes. You wish to ensure that the functionality of the suppliers' classes can still be used polymorphically.

(ii) [5 marks] You have created a subsystem with 30 classes. You know that other subsystems will only access about 6 methods across 5 different classes in this subsystem; You wish to simplify the view that the other subsystems have of your subsystem.

(e) [10 marks]

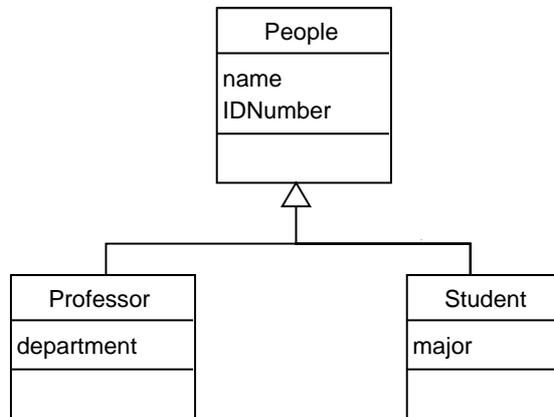
Compare and contrast aspect-oriented design and object-oriented design.

### Question 3. Implementation

[22 marks]

(a)

Consider the following inheritance relationship.



(i) [3 marks] Use vertical mapping to map the inheritance relationship to a relational database schema. Your mapping shall list its attributes and primary key.

(ii) [3 marks] Use horizontal mapping to map the inheritance relationship to a relational database schema. Your mapping shall list its attributes and primary key.

(b) [6 marks]

Discuss the trade-offs involved with the mappings above.

(c) [10 marks]

Describe two arguments in favor of using coding standards during development. Discuss whether the Hungarian Naming Scheme satisfies these arguments.

## Question 4. Testing

[25 marks]

(a) [4 marks]

List the steps in system testing process.

(b) [6 marks]

What is the difference between clear box testing and closed box testing?

(c) [5 marks]

Define the terms *component driver* and *stub*.

(d) [10 marks]

Discuss the advantages and disadvantages of top-down integration testing and bottom-up integration testing.

## Question 5. Deployment & Maintenance

[18 marks]

(a) [12 marks]

Describe four types of maintenance.

(b) [6 marks]

Discuss the differences between user training and operator training. Give two examples of operator functions.

## Question 6. Software Lifecycles

[27 marks]

(a) [10 marks]

Describe the waterfall model of software development and discuss its advantages and disadvantages.

(b) [10 marks]

Discuss the validity of the following statement: “ The cycles in the spiral model are equivalent to the iterations in Extreme Programming”.

(c) [7 marks]

What is the connection between the Extreme Programming practice of Testing and the Extreme Programming practice of Collective Code Ownership?

**Question 7. Free & Open Source Software**

[15 marks]

**(a)** [5 marks]

Discuss the validity of the statement: “Software with a 30 day trial period is Free Software”.

**(b)**

Describe the following two indirect sale-value models:

**(i)** [5 marks] Loss-Leader/Market Positioner model?

**(ii)** [5 marks] Widget Frosting model?

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