INSTITUTE OF TECHNOLOGY BLANCHARDSTOWN

Year	Year 3
Semester	Semester 1
Date of Examination	Tuesday 22nd May 2012
Time of Examination	3:30pm - 5.30pm

Prog Code	BN013	Prog Title	Bachelor of Science in Computing in Information Technology	Module Code	COMP H3032
Prog Code	BN104	Prog Title	Bachelor of Science (Honours) in Computing]	Module Code	COMP H3032
Prog Code	BN302	Prog Title	Bachelor of Science in Computing in Information Technology	Module Code	COMP H3032

Module Title	**Object Orientation with Design Patterns**

Internal Examiner(s): *Ms. Orla McMahon*
External Examiner(s): *Mr. Michael Barrett, Dr. Richard Studdert*

Instructions to candidates:

1) To ensure that you take the correct examination, please check that the module and programme which you are following is listed in the tables above.
2) Section A: Attempt any five parts.
3) Section B: Answer any 3 Questions.

4) All questions carry equal marks.

DO NOT TURN OVER THIS PAGE UNTIL YOU ARE TOLD TO DO SO

Section A

Attempt any 5 parts of this question (5 marks each)

Question 1

a) Define the intent of the Factory Method pattern.
Illustrate your answer with an example.

[5 Marks]

b) What is the intent of the Singleton pattern?
List two consequences of the Singleton pattern.

[5 Marks]

c) Briefly describe how the Proxy design pattern works and give one situation where it might be used.

[5 Marks]

d) Graphical representations of design patterns only capture the end product of the design process.
Why?
List and briefly describe two essential elements that can be used to describe a design pattern.

[5 Marks]

e) Define the intent of the Observer pattern.
List one consequence of applying this pattern.

[5 Marks]

f) Describe the role of design patterns in software development.

[5 Marks]

g) Design patterns can fall into one of three categories.
What are these categories and how do they differ?

[5 Marks]

(Total Marks 25)

Section B
Candidates should attempt any 3 of the following questions.

Question 2

Read the following case study and answer the questions that follow.

Case Study

A car factory contains concrete factories such as Honda, BMW, etc.
Each concrete factory has different types of cars, e.g. a family car, a sports car, an estate car.
The cars have different attributes such as price, engine size, number of doors, etc.

With the aid of UML class diagrams, illustrate and explain how you would implement both the Simple Factory pattern and the Abstract Factory pattern using the above case study.

[16 Marks]

What is the difference between the Builder pattern and the Abstract Factory pattern?
Illustrate your answer with a real-world example and a UML class diagram describing the Builder pattern.

[9 Marks]

(Total Marks 25)

Question 3

a) The following details are an example of classes and/or objects from the Decorator pattern:

Component (LibraryItem)
ConcreteComponent (Book, Video)
Decorator (Decorator)
ConcreteDecorator (Borrowable)

With the aid of a UML class diagram, provide a role description for each participant within this pattern.

[8 Marks]

b) Provide an explanation describing how this library example could be deployed using the Decorator pattern.

[5 Marks]

c) What is the intent of the Iterator pattern?
Use a real-world example to illustrate your answer.
Describe two consequences of applying the Iterator pattern.

[12 Marks]

(Total Marks 25)

Question 4

a) Use an intuitive example to explain the intent of the Chain of Responsibility design pattern.

[6 Marks]

b) With the aid of a UML diagram, describe the components of the Proxy design pattern

[8 Marks]

c) What is the motivation for using the Flyweight pattern?
Use a real-world example to aid your description.
What is the difference between extrinsic and intrinsic states when using the flyweight pattern?

[11 Marks]

(Total Marks 25)

Question 5

a) A common pattern cited in early literature on programming frameworks is the Model-View-Controller (MVC) pattern.

Briefly describe with the aid of an example the role of the various participants in the MVC pattern.

[5 Marks]

b) What is the intent of the Composite pattern?

Draw a UML class diagram for the Composite pattern.

[8 Marks]

c) The Façade pattern and the Adapter pattern may seem similar.
What is the essential difference between the two patterns?
Illustrate your answer with a real-world example for each pattern.
Provide one consequence when applying each pattern.

[12 Marks]

(Total Marks 25)