Reg No.										

MANIPAL INSTITUTE OF TECHNOLOGY
(Constituent Institute of MANIPAL University)
MANIPAL-576104

VII SEMESTER B.E. DEGREE EXAMINATION

SUBJECT: DESIGN OF OBJECT ORIENTED SYSTEMS WITH UML (CSE 403.4)

Date: 09-12-2010 **TIME: 3 HOUR** **MAX. MARKS: 50**

Instructions to Candidates

- **Answer any five full questions.**
- **Answer should be clear and concise in point form.**
- **Missing data can be suitably assumed**

1. Explain major and minor elements of Object Model with example. (10 Marks)

2A. Briefly explain different types of behavioural diagrams. (5 Marks)

2B. What are tagged values and constraints in UML? Explain with examples. (5 Marks)

3A. What is an association relationship? Explain with examples navigation, visibility, qualification and interface specifier in the context of association relationship. (5 Marks)

3B. Describe the class diagram shown in Figure 1. Identify the classes and their associations.

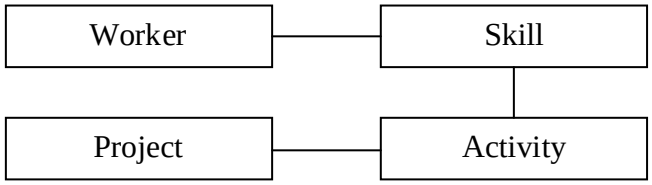

Figure 1: Class Diagram

Update the diagram stepwise to show the class diagram in each case.

i. When a worker has a skill, the years of experience is maintained for the relationship.

ii. A worker may have another worker as a manager, and a worker who is a manager must manage five or more workers. Given a manager, you can determine whom she manages, but given a worker, you are unable to determine who his manager is.

iii. A worker is not simply associated with a set of skills, but a worker has skills. Specifically, a worker must have three or more skills, and any number of workers may have the same skill.

iv. **A project is not simply associated with a set of activities, but a project contains activities. Specifically, a project must have one or more activities, and an activity must belong only to one project.**

v. **Projects and activities are specific types of work.** **(5 Marks)**

4A. Describe Figure 2 shown below. Identify the various elements of this diagram.

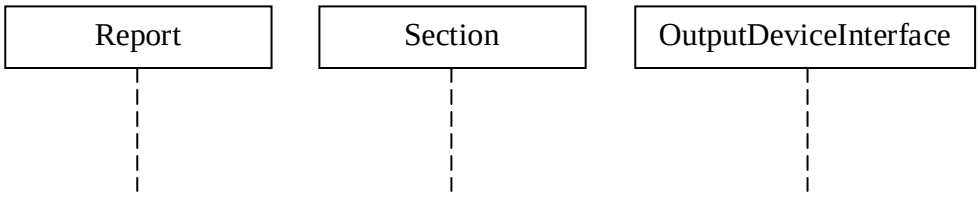

Figure 2: Sequence diagram for generating a report and its sections

Update the diagram stepwise to show following interactions.

i. **For each section, the `Report` element retrieves the section's data using the `OutputData := GetData ( )` communication sent to the `Section` element, and formats the data using the `OutputData := FormatData (OutputData)` communication sent to itself.**

ii. **If the section's data is not summary data, the `Report` element simply outputs the data to the `OutputPrinterInterface` element using the `OutputNonSummaryData (OutputData)` communication sent to the `OutputPrinterInterface` element.**

iii. **If the section's data is summary data, the `Report` element simply outputs the data to the `OutputPrinterInterface` element using the `OutputSummaryData (OutputData)` communication sent to the `OutputPrinterInterface` element.**

(6 Marks)

4B. Explain the following modal elements of an activity diagram with an example. **(4 Marks)**

- **Forking and joining of concurrent flow of control.**
- **Swimlanes.**

5A. How do you model the context of the system using use case diagrams? Give an example. **(4 Marks)**

5B. Describe Figure 4. Identify the various elements and their relationships.

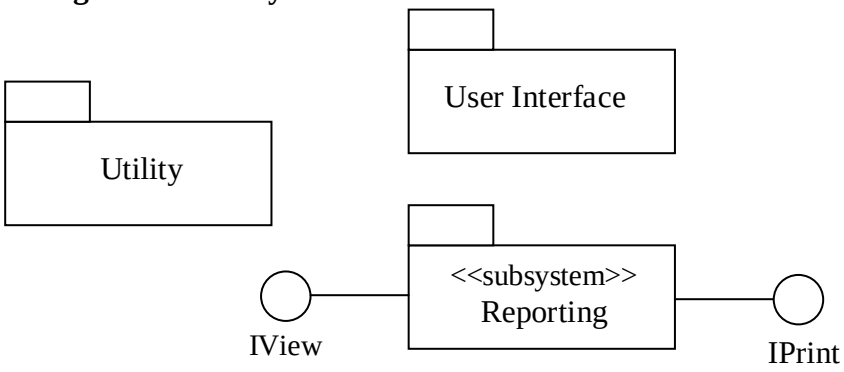

Figure: Packages and a subsystem

Update the diagram stepwise to show the following details in each case.

i. **The `User Interface` package uses the `IView` and `IPrint` interfaces provided by the `Reporting` subsystem.**
ii. **The `User Interface` and `Utility` packages resides in a `User Interface` component.**
iii. **The `Reporting` subsystem and `Utility` package reside in a `Reporting` component.**
iv. **The `User Interface` component is deployed on a `Desktop Client` node.**
v. **The `Reporting` component is deployed on a `Report Server` node.**
vi. **The `Desktop Client` node is connected to the `Report Server` node, and the `Report Server` node is connected to a `High-speed Printer` node.**

(6 Marks)

6A. Explain different types of message notations. (3 Marks)

6B. How do you represent concurrent substates and complex transitions in a state diagram? Explain with an example for each. (3 Marks)

6C. What is proxy design pattern? How do you model proxy design pattern in UML? Give example. (4 Marks)