Communication Software Exam
5º *Ingeniero de Telecomunicación*
January 21st 2009

Departamento de Ingeniería Telemática
Universidad Carlos III de Madrid

Name:_____

Duration: 2.5 hours
Marks: 8 points (+ 2 points for the Web technologies presentation)

Part 1: multiple-choice questions
Duration: 1 hour
Marks: 4 points

The use of books or notes is not permitted.

Instructions:

- There is **only one** correct response to each question.
- Draw a circle around the letter corresponding to the correct response.
- If you wish to rectify a mistake, draw several lines through the entire column of letters next to the responses and write a new column next to this.
- 4/25 points will be added for a correct answer, 4/3*25 points will be deducted for an incorrect answer and 0 points will be given if the question is not attempted.

Correct	Incorrect	Blank	TOTAL

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Part 2: problems
Duration: 1.5 hours
Marks: 4 points

Answer **two of the following three questions**, each question on a separate sheet of paper. The use of books or notes is not permitted.

Question 1 (2 points)

(a) The database of the sporting activities service of a university contains the following tables (this example should be familiar to you from the labs):

Clients

Login	Password	Name	Surname	Address	Phone

Activities

ID	Name	Description	Start_date	Cost	Pavillion_Name	Capacity

Pavillions

Pavillion	Location

Subscriptions

Client_Login	Activity_ID

Provide SQL sentences that implement the following instructions:

i. List the login, name and surname of each client together with the total cost of all the activities to which they are subscribed.

ii. List the names of all the activities that take place in Leganés and that have free places.

iii. Modify the cost of some of the activities, deducting 10 Euros from the cost of those that take place in Leganés and cost more than 110 Euros.

iv. Delete those activities to which no client is subscribed.

You should assume that "Leganés" is the name of a location occurring in the `Pavillions` table and that the `Capacity` column of the `Activities` table contains the maximum number of clients that can be subscribed to the activity. Note that, unlike the situation in the assignments, the number of free places is **not** stored in a column of the `Activities` table.

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(b) Study the UML class diagram of Figure 1 and then answer the following questions:

i. Describe in natural language the domain modelled in this UML specification; if you do not have time to give an exhaustive description, ensure that you at least illustrate each of the syntactic elements appearing in it.
ii. What other information could have been provided in the boxes?
iii. What is special about the box with the text "TimeInterval" in it?

Question 2 (2 points)

The consortium for the next Jacobean year in Santiago wishes to use Java EE technology in their enterprise servers and consults you about a component, AÑOSANTO, that a different company is developing. This component contains the following two Java interfaces:

Interfaz remota

```
package swc.xacobeo;
public interface AnhoSanto extends javax.ejb.XXX_1 {
   public Description getDescription() throws XXX_2Exception;
   public int getAnho() throws XXX_2Exception;
}
```

Interfaz home

```
package swc.xacobeo;
public interface AnhoSantoHome extends javax.ejb.XXX_3{
   public AnhoSanto create(Description desc, int anho) throws XXX_4,
                                                          XXX_2Exception;
   public AnhoSanto findByPrimaryKey(int anho) throws XXX_5, XXX_2Exception;
}
```

Answer the following questions:

(a) **(0,25 points)** Study the interfaces and then state which type of EJB is being specified here. Justify your answer.

(b) **(0,25 points)** Taking into account that the component accesses persistent storage, describe the minimal database schema that it needs.

(c) (**0,1 points each one**) Now give the value of each of the five character strings that have been replaced by `XXX_#` in the code.

(d) **(1 point)** Implement the code for the bean class taking into account that it is of type CMP. Remember to differentiate between (i) the methods for accessing the persistent data, (ii) the business-logic methods, (iii) the methods related to component creation [*hint*: there are 2] and (iv) the callback methods [*hint*: there are 7].

Question 3 (2 points)

The following code for the `doGet` method of a Java servlet processes client requests to add or delete a book (class `Book`) from a list of books (class `BookList`) or to edit the details of a book on the list. In the request, the client sends the `id` of the book and the name of the operation to be carried out. In the case of adding or editing, the details of the operation are carried out via another Web page. The list of books is accessible for the duration of the session and is manipulated using the methods of a `BookListManager` class. Now answer the questions appearing below the code. Note that certain parts of the code have been replaced with the text *ClassX*, *objectX* and *methodX*.

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```
public void doGet(HttpServletRequest request, HttpServletResponse response)
                          throws ServletException, IOException {

    Class1 object3 = object1.method1();
    String action = object1.method2("operation");
    BookList mylist = (BookList) object3.method4("booklist");
    if (mylist == null) {
        mylist = new BookList();
        object3.method5("booklist", mylist);
    }

    BookListManager manager = new BookListManager();

    long id = 0;
    try{
        id = Long.parseLong(object1.method2("id"));
    }catch(NumberFormatException e){}

    if(action.equals("add")){
        RequestDispatcher dispatcher = method6.method7("/jsp/bookAdd.jsp");
        dispatcher.method8(object1, object2);


    }else if(action.equals("edit")){
         Book book = manager.findBookById(id, mylist);
         object1.method3("book", book);
         RequestDispatcher dispatcher = method6.method7("/jsp/bookEdit.jsp");
         dispatcher.method8(object1, object2);

    }else if(action.equals("delete")){
         manager.deleteBookById(id, mylist);
         object2.sendRedirect(object1.getContextPath() + "/bookList");
    }
}
```

(a) Explain briefly the role of the two parameters of the `doPost` and `doGet` methods in the general case, i.e. the objects of classes `HttpServletRequest` and `HttpServletResponse` (in this example they are called `request` and `response` respectively).

(b) Provide the names of the class *Class1*, the objects *object1* and *object2*, the methods *method1*, *method2*, *method3*, *method4*, *method5*, *method6*, *method7* and *method8*, and give the name conventionally used for *object3*. If you cannot remember the name of a method, instead, explain very briefly what it does.

(c) As far as you can tell, does the application of which this code forms a part follow the MVC design pattern? You must justify your answer (briefly). Explain briefly how you would modify this code to handle the case where the client chooses to edit a book but provides an id which does not correspond to that of any book on the list (you may suppose that `findBookById` returns `null` in this case).

(d) What is the difference between the `sendRedirect` method, used in the treatment of the delete action, and `method8`, used in the treatment of the other two actions? What would be the result of substituting the last two lines of the treatment of the edit action for a call to the `sendRedirect` method like the one used in the treatment of the delete action (but with parameter `/jsp/bookEdit.jsp`).? Do you consider the use of the `sendRedirect` made in this code a suitable use of this method? Justify your answer.