OOSE Re-exam 2012 (Also OOADP Re-exam 2012)

1.

a. Increasing the number of people involved generally increases the amount of communication required. This can increase with the square of the number of people, whereas, in the best case, the time actually taken by each person to do the non-communication work can decrease linearly. (4 marks)

b. *encapsulation*: also called data-hiding, hiding implementational details from the user of a module. (2 marks)

modularity: structuring a software system as a system of parts such that each part depends as little as possible on other parts of the system (2 marks)

context dependencies: the context dependencies of a module is the set of other modules on which the module depends. The modules is a client of these other modules that provide services to the module. (2 marks)

2.

a. (4 marks)

```
1
1.5
105
555
```

b. (6 marks)

```
0
2
4
2
0
10,0
```

3.

a. (2 marks) Private interface is all the methods and attributes that are defined in the class of the object. Public interface is all the members that are visible outside the object.

b.

i. (1 mark) 2

ii. (1 mark) none

iii. (1 mark) setMinute

iv. (1 mark) public

v. (1 mark) setHour(Integer)

c.

i. (1 mark) 6

ii. (1 mark) overridden

iii. (1 mark) subclass

4.

a. behavioural (1 mark) and structural (1 mark).

Behavioural diagrams are: Activity, use case, State machine, Sequence, Communication, Interaction overview, Timing. (1 mark for any one).

Structure diagrams are: Class, Composite structure, Object, Component, Deployment, Package. (1 mark for any one)

b.

i. (1 mark) BookBorrower is an Actor

ii. (1 mark) Use case

iii. (1 mark) The system.

c.

i. (1 mark) class diagram.

ii. MemberOfStaff is a subclass of LibraryMember (2 marks)

5.

a.

i. class diagram (1 mark)

ii. no (1 mark)

iii. 1 or more (1 mark)

b.

i. B (1 mark)

ii. aggregation (1 mark)

iii. they are deleted (1 mark)

iv. 1 or more (1 mark)

c.

i. not specified in the diagram (1 mark)

ii. 0 or 1 (1 mark)

iii. an attribute (1 mark)

6.

a. (4 marks)

```
(2,4)
(2,4)
```

b. (4 marks in total)

i. There is no no-args constructor for Animal because the default one has been removed on the definition of the constructor starting on line 8 (2 marks). Can be fixed by defining a no-args constructor for Animal such as

Animal() {}

(2 marks for constructor)

ii. (2 marks)

```
Fred (5 years old)
Albert (4 years old)
```

7.

a. a is a final field that has already been assigned so it cannot be re-assigned (2 marks).

b. A is an abstract class and therefore cannot be instantiated. (2 marks)

c.

```
leap message and leap2 message
```
(2 marks)

d. TreeSet (1 mark). Because a TreeSet sorts its members by their natural ordering defined by the element type's compareTo method and does not allow duplicates (1 mark)

e. An ArrayList (1 mark) because each new sensor value can be "add"ed to the end of the list in constant time and the order of the elements is the order in which they are added to the list (with any duplicates included).

8.

a. Sequence diagram. (1 mark)

b. Unknown (1 mark)

c. Unknown (1 mark)

d. Lecturer (1 mark). The value returned is "David Meredith". (1 mark)

e. This is the lifeline of the Lecturer object. It represents the life of that object, with time increasing down the page. (1 mark)

f. That the Lecturer object is destroyed (i.e., removed from memory). (1 mark)

g. The arrows with solid arrow heads are synchronous messages, the arrows with stick heads are asynchronous messages meaning that a new thread of execution is started. (2 marks)

h. Because the PersonnelOfficer is an Actor, representing a user of the system; whereas the Lecturer object is a software object storing information about a person. (1 mark)

9.

a. State-machine diagram (1 mark)

b. History pseudo-state. Indicates initial state of sub-diagram when there is no history storing the final state of that subdiagram the last time it was started. In this case, if there is no memory of the whether the device was playing radio or CD last time it was turned off, then the device will start by playing the radio. (2 marks)

c. no (1 mark)

d. no (1 mark)

e. yes (1 mark)

f. Displays time and plays the same thing it was playing when it was last switched off, unless it can't remember, in which case it plays the radio. (2 marks)

g. yes (1 mark)

h. a "radio" event (1 mark)

10.

a. Interface (1 mark)

b. Class (1 mark)

c. Lots of possibilities. Must contain each number on a different line. Numbers must be 0, 1, 2, 3, 4 (in that order) and 100, 99, 98, 97, 96 (in that order), interleaved in any way. (2 marks)

d. Put thread1.join() between lines 33 and 34. (2 marks). Must also but a try-catch clause to catch the InterruptedException (2 marks). Alternatively, enclose the lines inside the run methods in synchronized(System.out) (need to do it on both, even though just doing it on thread1 will work most of the time) (4 marks).

e. The interrupted flag on thread1 becomes set. The next time Thread.sleep(10) is executed in line 11, an InterruptedException will be thrown and line 13 will be executed. The thread will then continue to iterate in the for loop until it is completed. That is, this does not stop thread1! (2 marks)

11.

a. Any number limited only by memory resources. (1 mark)

b. MulticastServer (1 mark)

c. No. (1 mark)

d. Prints out the time (generated by line 18 in MulticastServerThread) 5 times on 5 separate lines. (2 marks)

e. MulticastServer sends packets to 230.0.0.1:4446 (2 marks). This is a multicast group that can be joined by any number of clients to which the output of the server is broadcast. (1 mark)

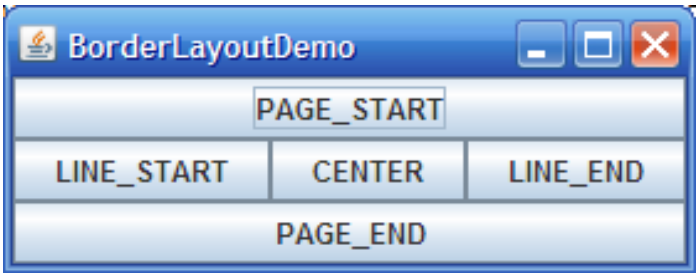
f. It is used to store the data received from the MulticastServer (i.e., the date string represented in bytes). (2 marks)

12.

a. In the JFrame class inherited by the GUI class. (2 marks)

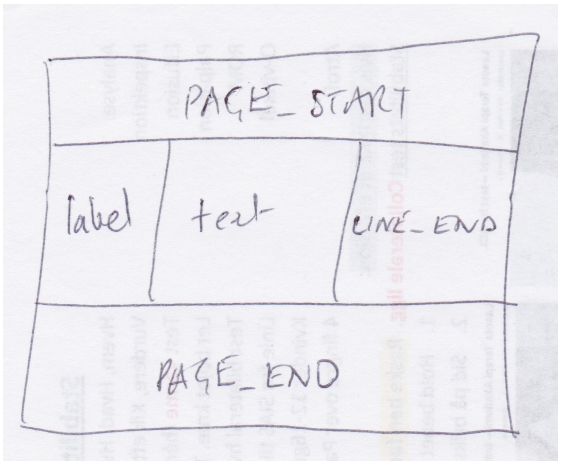
b. Type ENTER. This generates an ActionEvent which is heard by the actionPerformed method defined in lines 25-27. (2 marks)

c.



(2 marks)

d.



(2 marks)

e. invokeLater causes the anonymous Runnable object defined as its argument to be run on the Swing event dispatch thread. (2 marks)