Build a Requirements Specification and Test Plan

Goals and motivation for the assignment: The purpose of this assignment is to give the student firsthand experience with the challenges entailed in creating a requirements specification, and being sure that the requirements specified are also suitable as the basis for constructing a testing and evaluation plan.

What is the assignment?:
In assignment #1 you informally described a complex software system of interest to you. In assignment #2 you have demonstrated that you understand the power and difficulties of being precise in specifying such a system. In this assignment you will go further and use some of the precise software product notations introduced in the course as the basis for defining a precise specification of some aspects of the requirements for the complex system you have previously described informally. You will also use appropriate notations and formalisms to specify elements of a test plan aimed at supporting demonstration that a running software system satisfies some representative parts of your requirement specification.

SPECIFICALLY:
Develop a specification of the requirements for two representative high-level functional capabilities of the system you described in assignment #1. A suggested approach to doing this is to:

• Start by selecting an approach for structuring this high level functional capability: One structuring approach might be to use functional decomposition hierarchies of nodes such as were presented in class. Another approach might be through the use of use cases, perhaps patterned after the Use Cases in the Tokeneer requirements specification, or hierarchies of Z schemas.

• Augment your structuring choice with specifications of different kinds of requirements that elaborate on different kinds of details of the selected high-level functions: Thus, for example you might choose to elaborate upon specified functions with additional specifications of robustness, security, etc.

For 520 Students: Your requirements specification elaborations should address at least four of the following types of requirements.
  Functional
  Environmental
For 620 Students: 
Your requirements specification must include at least some Z schemas.

The specification should address all of the following types of requirements. 
Introduction 
Functional 
Environmental 
Robustness 
Accuracy 
Timing 
Security 
Safety

But, in case you feel that any of the above types of requirements are not applicable or relevant to one of the selected aspects of your system, be sure to explain why.

For each type of requirement you should select a formalism or notation that seems to you to be appropriate for the clear and precise exposition of the type of requirement. Some examples of how to use DFGs, CFGs, Predicate logic, FSMs and other formalisms, have been provided in the lecture material.

2. Develop a test plan for one of the high-level functions that you have specified (as above). For this part of the assignment assume that there now exists an implementation of the system that is purported to meet the requirements specified as described above. For this part of the assignment, specify how you would go about testing that system to determine its adherence to the specified requirements.

As noted in the lecture material, a test plan should have an overall structure, and a decomposition down to the level of specific sets of test cases. So your test plan should indicate the structure of your proposed test cases in a way that makes the structure clear. It will probably be both expedient and effective for this structure to build upon the structure you have selected for your requirements specification. Your test plan should consists of sets of test cases grouped together (perhaps in the form of a Testplan Structure Specification—TSS), and labeled to identify the requirements element(s) that are to be evaluated by the group. This identification is essentially a relation, and so you must indicate the relation that connects the requirements element(s) and the test case group. Finally, each test case group will consist of individual test cases (e.g. Test Element Specifications-TESS). It is not necessary that you include all test cases that you deem necessary, but you should provide some example test cases, and indicate informally the nature of the other test cases that you think would be needed to make a complete test case group. Each test case should specify inputs to be provided, outputs expected, timings,
resource requirements, responses to failures, setup procedures, and any other information that you think is necessary to support definitive testing.

**Anticipated length:**
For CS 520 Students: 10-15 pages
For CS 620 Students: 15-25 pages

BUT NOTE: If you are confident that you can provide good answers to the questions in fewer pages, then do so. Under no circumstances should you put in extra time and effort writing more if you don’t feel that doing so is helping you to learn and understand more.