



**Question 1** Short Answer Questions (30 marks):

Keep your answers brief. Each part should be no more than half a page.

1. Distinguish between the requirements definition and the requirements specification documents. Who would read them?
2. Briefly explain the differences between functional and non-functional requirements.
3. Using an example, explain the differences between an object and an object class.
4. What is meant by validation of a requirements document? Why is it important to validate the requirements documents?
5. Explain why you should not use the title of a document to identify the document in a configuration management system. Suggest a standard for a document identification scheme that may be used for all projects in an organisation.

**Question 2** (17 marks):

Precision Tools sells a line of high-quality woodworking tools. When customers place orders on the company's web site, the system checks to see if the items are in stock, issues a status message to the customer, and generates a shipping order to the warehouse, which fills the order. When the order is shipped, the customer is billed. The system also produces various reports.

Your tasks are:

1. Draw a context diagram for the order system
2. Draw DFD diagram level 0 for the order system

**Question 3** (20 marks):

From the following list of tasks, durations and dependencies.

1. Construct the corresponding activity network.
2. Identify the critical path, and calculate its length.
3. Draw a bar chart (also known as a Gantt chart) showing the duration of each task, assuming that each task starts at the earliest opportunity.
4. Augment the bars of non-critical path tasks to show how late they could finish without affecting the finish time for the project.

Task	Duration (days)	Depends on
T1	5	--
T2	5	T1
T3	4	--
T4	2	T1,T3
T5	2	T3

**Question 4** (15 marks):

Imagine that you are required to develop a retail business application. The application must deal with sales of items to customers and with ordering of stock items when necessary.

Develop a preliminary class model. Define classes, associations and an initial set of attributes. Add multiplicity annotations to associations. Choose meaningful names for all elements. Don't add operations.

It may help to consider the following situations in developing your model.

1. Customer buys item(s)
2. Item(s) are ordered from supplier(s)
3. Who supplies an item X. Retailer needs to find out which supplier can provide item X.

**Question 5** (18 marks):

Consider the following schemas from a Z specification for a storage tank.

<p><i>StorageTank</i> _____</p> <p><i>contents: N</i></p> <p><i>capacity: N</i></p>
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<p><i>Dispense</i> _____</p> <p><math>\exists</math> <i>StorageTank</i></p> <p><i>amount?: N</i></p> <hr style="width: 20%; margin-left: 0;"/> <p><math>amount? \leq capacity</math></p> <p><math>contents' = contents + amount?</math></p>
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- (a) Describe the purposes of the two main sections of a schema.
- (b) The *Dispense* schema is supposed to describe the operation of dispensing an amount of material from a storage tank, but it has *Four* errors. Fix the errors in the specification and state a correct schema for this operation. You can ignore the possibility of errors occurring in the operation.