Modulprüfung: Design of Information Systems
along the Value Chain

o.Univ.-Prof. Dr. H. Missbauer   **Sample**

Advice: Please write your name on every answer sheet.
               Please do not use a pencil for your answers (except for graphs, drawings etc.).

Utilities: Calculator

Time: 90 minutes

Name:

Matriculation number:

Registration number (Studienkennzahl):

Exercise 1: Short theoretical exercises   (25 min)

a)   List and describe different manufacturing systems, which are often referred to
      as "typology of manufacturing system". The different types of manufacturing   (5 min)
      systems refer to production activities, which are driven by customer orders
      or/and forecasts.

b)   What are core processes regarding value chains? Explain the four core processes   (5 min)
       identified by Krajewski and Ritzman.

c)   Outline the general procedure of a Genetic Algorithm (GA) and provide at least
      one example for an appropriate problem domain within Supply Chain   (5 min)
      Management.

d)   Heterarchical coordination is one of the basic concepts of supply chain
      integration: What is the basic idea? Give one example of a supply chain   (5 min)
      integration concept that aims at implementing heterarchical coordination.

e)   APS can be considered as the most recent software products for planning   (5 min)
      and control of logistical processes. The most important properties are?

Exercise 2: Master Production Schedule   (10 min)

What is a master production schedule (e.g. definition, purpose, function, content, stated in terms
of …)? Describe how the master production schedule is developed. Outline the further use of the
output from master production scheduling within a company. What are the linkages to other firm
activities?

Exercise 3: Inventory systems (20 min)

Consider a multi-stage inventory system.

a) Define a multi-stage inventory system with serial structure. For that use a rough sketch and describe it. (5 min)

b) Assuming that capacity is infinite, which also implies that there is no congestion, then a serial system can be decomposed into one (sub-) problem per product. Please discuss this statement from a supply chain manager perspective. (7 min)

c) Select one approach to manage effectively (when to order which amount of a product) a supply chain with either a serial or a divergent structure. For example you can think of a two-stage distribution system consisting of a central warehouse and several regional distribution centres. There are no relevant capacity constraints. The decision maker(s) has (have) access to inventory information at each stage or level. The objective is to minimize system wide costs. Describe this specific approach in detail and explain your decision for choosing this approach. (8 min)

Exercise 4: Demand Planning (10 min)

Forecasting supports the demand planning process.

a) Name three demand models and for each model describe appropriate forecasting methods. (5 min)

b) Describe the "Initial Phase of the Demand Planning Process" and the "Routine Phase of the Demand Planning Process" on the basis of the SAP APO Demand Planning Module. (5 min)

Exercise 5: Global Available-to-Promise (Global ATP) (10 min)

Consider Global ATP as a quantity. The following information is given: one single product, two locations for supply with the same priority for Global ATP. The planning periods are defined by $t = 1, ..., 4$.
In the table below you'll find exact information concerning the current inventory situation as well as the known supply at each location and the committed demand for the entire planning periods.

t	0	1	2	3	4
Starting Inventory	2				
Supply Location A		5	10	15	5
Supply Location B		12	6	6	6
Committed		12	15	4	19

a. For period $t = 1, ..., 4$ compute the *Planned Available Inventory* (I_t) and the *Cumulated ATP Quantity* ($cATP_t$). (5 min)

b. For period $t = 2, ..., 4$ compute the *ATP Quantity* (ATP_t). (3 min)

c. Please explain how the calculation of the ATP Quantity and the Cumulated ATP Quantity support SCM. (1 min)

d.   In literature Available-to-Promise has ambiguous definitions. Please write down two distinctive definitions.   (1 min)

Exercise 6: Benefits   (15 min)
Consider the following two information systems in manufacturing/logistics:

1. An information system that supports sharing information on customer demand and inventory level with supply chain partners.
2. A shop floor control system that provides the possibility to track all manufacturing orders within a manufacturing department. In this case the order status is known to the planners/dispatchers. Automatically a detailed plan/schedule is made/generated that determines in which period the operations should be processed and which resource will be used.
    Remark: This has been discussed in the case study "Steel plant" during the lecture.

Select <u>one</u> of these two cases!

Your task is to assess the benefits of this information system ex ante, which means that you need to estimate the benefits before they are developed.

How, in terms of the definition in which units, would you define "benefit of an information system"?

Provide a procedure to carry out this assessment.