

School of Engineering

WRITTEN EXAMINATION

Course Fundamentals of Production Engineering

Sub-course

Course code PRO33G

Credits for written examination 3hp

Date 2022-09-27

Examination time 0830-1230

Examination responsible Victor Hedén

Teachers concerned

Aid at the exam/appendices

Other

- Instructions
- on the same paper.
- ☐ Take a new sheet of paper for each teacher.
 - ☒ Take a new sheet of paper when starting a new question (part questions
 - ☒ Write only on one side of the paper.
 - ☒ Write your name and personal ID No. on all pages you hand in.
 - ☒ Use page numbering.
 - ☒ Don't use a red pen.
 - ☒ Mark answered questions with a cross on the cover sheet.

Grade points

Grading results U,G,VG	Grading results: A-F
U = less than 6p/Part	A = 4*VG
G = 6-10p/Part	B = 3*VG + 1G
VG=11-15p/Part	C = 2*VG + 2*G
	D = 1 VG + 3*G
	E = 4*G
	F = Less than G on any Part

Grading limits to get the least pass are required G on each part A, B, C and D. If any part is judged as U, all parts must be re-examined.

Examination results should be made public within 18 working days

Good luck!

Total number of pages 7

Part A (questions 1, 2, 3) General questions Total 15p

Question 1) (8p)

Waste and problems in production sometimes occur. In the course we have talked about 7 + 1 waste based on Lean production

- Most people understand that waste (Muda) is not good. How does a waste turn out if we think in economic terms. We have talked about **2 different ways, which ones?** (2p)
- Two other concepts that come up when we talk about waste are **Muri and Mura, briefly explain these concepts.** (2p)
- In Lean production, people talk about waste. Explain with an **example** how the words Problem, Cause, Symptom and Waste are connected. (4p)

Question 2) (3p)

A common way to categorize time is to divide the time into Value-adding time (VA), Non-value-adding time (NVA) and Non-value-adding but necessary time (NNVA).

Give at least 2 production-related examples for each of these three categories of time. (1p / time category)

Question 3) Time concept (4p)

Summer time, winter time, travel time, leisure time and incubation time are examples of time concepts that are not particularly associated with production.

Describe / define 4 production-related time concepts, you must not discuss them in question 2 above, **and argue** why it is important that these times are known and correct. (1p for each time concept)

Part B (question 4,5,6) Production preparation Total 15p

Question 4 Process planning 6p

Process planning could be described as follows:

Process planning or production preparation means the function that prepare, adjust and modifies product structures, as well as documentations for manufacturing, in terms of operational sequences and operating hours.

Discuss what possible obstacles or limitations in the current manufacturing processes could affect the result of the process planning. (6p)

Question 5 Plant layout 6p

In the course we have talked about 4 different plant layouts. Explain thoroughly and discuss **2 different plant layouts** of your own choice.

The explanations should include which process types are suitable for those 2 different layouts. (6p)

Question 6 Automation 3p

Automation in a really wide sense could regard both automatic machining as well as automatic identification and data capture (AIDC).

Give 3 examples (it could be both automatic machining as well as AIDC) of where in a manufacturing process it could be useful to atomize manual work and **argue why** it would be beneficial. (3p)

Part C (questions 7,8) Production and problem solving Total 15p

Question 7) Leveling (9p)

Right now your company can produce 1000 items per day and you produce 5 days per week.

For 1 months, you produce a total of 20,000 items (20 working days per month). The demand during the month can be seen in the table below:

Article	Number per months
A	6000
B	10000
C	4000

The person responsible for the planning has chosen to produce first 6000 A then 10000 B and then 4000 C, after that the person starts with A again and so on.

a) **Motivate** what is good about this planning. (2p)

The customer now wants to go from having a locked plan of 1 months to 1 week and maybe further down to only 1 day. Locked means that the customer is not allowed to change her plan. This probably means that you need to change the production plan and how you level out your production.

b) **Describe** (in text and graf) how you should plan to cope with 1 week and 1 day locked plan respectively. (Leveling the production correctly regarding to lower the waiting time) (2p)

c) **Describe a clear requirement** that this entails for the process to cope with the new production plan and **motivate** this. (2p)

d) **Describe a tool / method** that can help you more easily meet the requirement in 7C above. **Also give a motivation** for why it helps you (3p)



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Question 8 Problem solving 6p

Using the PDCA- circle or the Deeming wheel is a good way to organize continuous improvement. The first phase P is Plan, where problems are defined, investigated and solutions to problems are suggested.

Discuss **three (3) different tools/methods** which could be used in purpose of problem solving. (max 2p/tool) (6p)

Part D (questions 9,10) Production logistics Total 15p

Question 9 Production planning 8p

The MRP II model separates planning activities in 4 different levels, where the Master production schedule is the actual starting point for planning production.

a) "Master Production Planning" should answer to 4 specific questions.

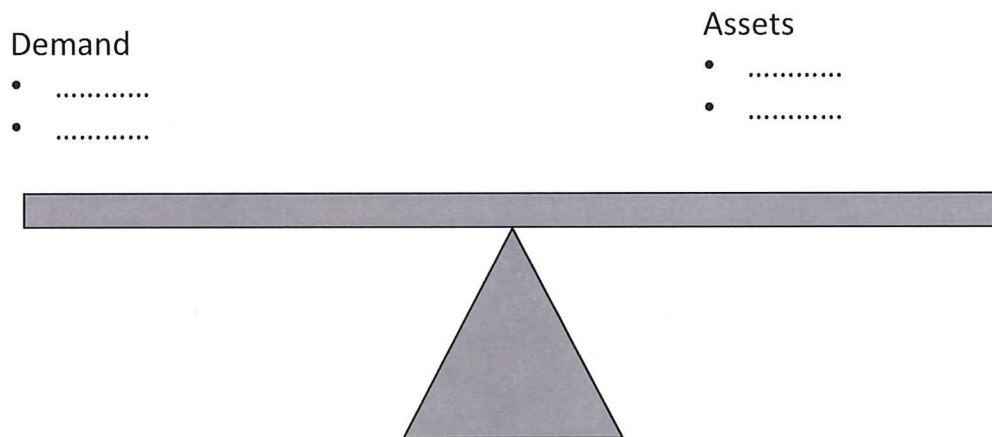
Write down 3 of the questions? (3p)

The picture below describes the balance between assets and demand which has to be accomplished by the master production planning.

b) Define what is meant by assets and demand. (2p)

c) What can happen in case of an unbalanced situation between assets and demand. (3p)

Balance between assets and demand



Question 10 Kanban systems reordering point-system 7p

a) Describe a reordering point-system both in words and with a figure. (3p)

b) Describe a supermarket solution in combination with a Kanban board.

(4p)