

School of Engineering

WRITTEN EXAMINATION

Course Fundamentals of Production Engineering

Sub-course

Course code PRO33G

Credits for written examination 3hp

Date 2024-11-07

Examination time 1430-1830

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) General questions Total 15p

Question 1 MUDA, MURA, MURI 9p

- a) Muda is an expression of waste, in the course we have discussed 7+1 waste, name 5 of the wastes and explain how can we detect each of them? (5p)
- b) Explain what Mura **means** and **give one** example Mura. (2p)
- c) Explain what MURI **means** and **give one** examples of Muri. (2p)

Question 2 Takt time and cycle time 6p

- a) Explain what the purpose of Takt-time is and which 2 parameters you need to calculate the Takt time. (3p)
- b) Define and explain cycle time. (2p)
- c) Define and explain throughput time. (1p)

Part B (question 3,4,5) Production preparation Total 15p

Question 3 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.

Give 3 examples and describe possible obstacles or limitations from the current manufacturing processes that could affect the process planning for the new product. (6p)

Question 4 Plant layout 6p

Explain thoroughly and discuss **2 different plant layouts**, one of them should be **line-based** the other one is of your own choice.

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

Question 5 Automation 3p

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

Give 3 small examples 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 6, 7) Production and problem solving Total 15p

Question 6) Leveling (9p)

Right now, your company can produce 1000 items per day and you produce 5 days per week. They have time for 3 changeovers in the process per month. For 1 month, you produce a total of 20,000 items (20 working days per month). The demand during this month can be seen in the table below:

Article	Number per months
A	10000
B	8000
C	2000

The person responsible for the planning has chosen to produce first 10000 A then 8000 B and then 2000 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** 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 and **motivate** this. (2p)

d) **Describe a tool / method** that can help you more easily meet the requirement in 6C above. **Also give a motivation** for why it helps you (3p)

Question 7 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** which could be used in purpose of problem solving in the Plan phase of PDCA-circle. (6p)

Part D (questions 8, 9) Production logistics Total 15p

Question 8 Production planning 8p

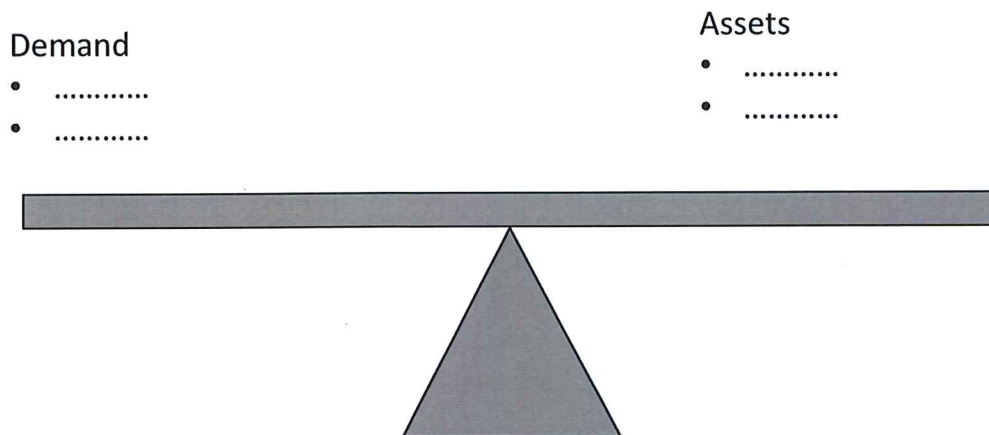
The MRP II model separates planning activities in 4 different levels, where the Master production schedule is the actual starting point for planning production.

- a) This schedule/plan should answer to 4 specific questions. The first is which product we should produce. Which are the following 3 questions? (3p)

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

- b) What is meant by assets and demand. (2p)
c) Explain possible consequences in case of an unbalanced situation. (3p)

Balance between assets and demand



Question 9 Kanban systems 7p

- a) Describe thoroughly a Kanban system and explain the function of it. (4p)
b) Describe a reordering point-system both in words and with a figure. (3p)