

RESIT PRODUCTION PLANNING & QUALITY CONTROL (WBIE18004)

10 JULY 2019 14.00-17.00

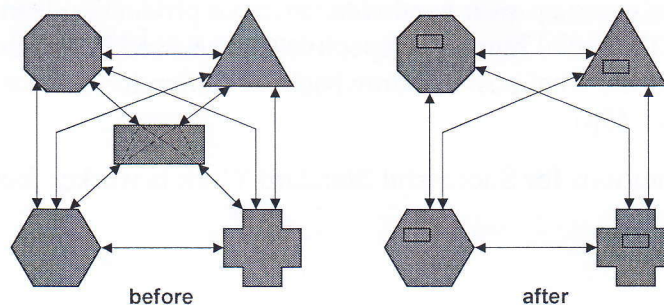
Please take note of the following:

- This exam consists of 3 questions with sub-questions for a total of 100 points. Some questions have additional sub-questions indicated with (i), (ii), etc.
- Start all 3 questions on a fresh sheet of paper. Make sure to address them all explicitly and note on your paper which sub-question you are addressing. Please mark all of your material clearly with name and student number.
- You are required to answer all questions *in English*.
- Books and dictionaries are not allowed.
- Only simple, non-graphic calculators are allowed.
- Telephones and other technical devices must be switched off and stored away.
- Give precise answers to the questions. Your answer must show that you have studied the book and the slides, and that you have actively participated in the assignments. Avoid superficial, generic answers.

Good luck!!

QUESTION 1: GENERAL LEAN PRINCIPLES (40 POINTS)

- List the seven types of waste initially recognized by Toyota. (5p)
- Explain the purpose of Production Flow Analysis. (5p)
- A company considers the best layout for a new line of products. The production manager argues that a product layout will have a negative effect on performance. Explain (i) what a product layout is (3p), and (ii) what performance criteria is/are lower in a product layout vs. a process layout, and why. (3p)
- A company has redesigned their factory through defunctionalization; the drilling department has been closed and the drilling machines are distributed over the other departments. The picture below shows the old and new situation and the product flows (each shape depicts a kind of resource).



Please explain the effects of this change on: (4p)

- Product flexibility
- Lead time
- Inventory cost

- e. What is Kaizen? (3p)
- f. Provide three costs of inventory. (4p)
- g. What is the most important factor which determines if a process is *capable*. (4p)
- h. What is Condition Based Maintenance? Please explain and provide a (fictitious or real) example of a CBM application in your explanation. (3p) (ii) Please provide three requirements for CBM. (3p)
- i. For a lean process, would age-based preventive maintenance be better for flow? Or block-based maintenance? Explain your answer. (3p)

QUESTION 2: THE SOCIAL SIDE OF LEAN (30 POINTS)

START YOUR ANSWER ON A FRESH SHEET OF PAPER

- a. The Toyota production System is an integrated model to form the product and avoid waste created through overburden (Muri) and variation in workloads (Mura). It is often visualized as a pyramid.
 - i. Describe the four elements (levels) of the Toyota Production System pyramid, and indicate their relative position in the pyramid. (4p)
 - ii. Managing the human resource is one of the most crucial aspects of managing change in any organization. What is meant by the elements 'cooperation' and 'control' in the TPS-philosophy? Illustrate your explanation with a clear TPS-related example for both. (4p)
 - iii. How do these elements (cooperation and control) relate to the TPS pyramid? (4p)
- b. The TPS principle Genchi Genbutsu means 'Go see for yourself to thoroughly understand the situation'. A big Italian firm works according to the principles of TPS. The IT-team of the firm deploys a new release on Saturday, midnight. What does this mean for management if they adhere to the above mentioned principle? (4p)
- c. Mention two assumptions about what motivates people for both Theory X and Theory Y. (5p)
- d. In his continuous strive for Lean, your manager proposes to publish both expected and realized performance of all processes and workers on big boards, and to give rewards to employees who come up with good ideas to make production leaner. Argue, from the perspective of the social/human perspective as discussed in Lecture 3, both why this would be a good idea, and what possible drawbacks are. Mention at least two positive and two negative factors. (5p)
- e. One of the conditions for Successful Standard Work is worker focus. What is meant by this? (4p)

QUESTION 3: SCHEDULING AND SHOP FLOOR CONTROL (30 POINTS)

START YOUR ANSWER ON A FRESH SHEET OF PAPER

- a. Is scheduling still necessary in a factory without change-over times? If so, explain why. If not, explain why not. (4p)
- b. Mention at least three performance factors of a planning *process* (so not of the plan itself). (4p)
- c. Consider the following jobs that need to be scheduled:

Job	Processing Time	Due Date
1	15	6
2	22	8
3	8	12
4	4	9
5	12	4

- i. Create a schedule using shortest processing time (3p)
 - ii. Calculate average and maximum due date violation (1p)
- d. What determines the timing in the schedule of a production order in a push production system (2p)? What determines the timing of a production order in a pull production system (2p)? Explain your answers.
- e. What is the difference between a traditional Kanban system and a Milk Run? (4p)
- f. Which of the following is the preferred sequence of handling Kanban cards? Explain why. (3p)
 - 1. Shortest Processing time first
 - 2. Combining cards to optimize setup time
 - 3. First come first serve
 - 4. Earliest due date first
- g. Describe both the Master Production Schedule and the Final Assembly Schedule, and describe their relation. (4p)
- h. Explain, using an example, which coordination between departments is needed in a process layout but typically not needed in a product layout. (3p)