# UNIVERSITI KUALA LUMPUR
# MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

## FINAL EXAMINATION

## JANUARY 2016 SEMESTER

| | | |
|---|---|---|
| COURSE CODE | : | JQB 31203 |
| COURSE TITLE | : | LEAN MANUFACTURING |
| PROGRAMME LEVEL | : | BACHELOR |
| DATE | : | 22 MAY 2016 |
| TIME | : | 9.00 AM – 12.00 PM |
| DURATION | : | 3 HOURS |

### INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consists of ONE (1) section.
4. This question paper consists of FIVE questions. Answer FOUR (4) questions only.
5. Please write your answers on the answer booklet provided.
6. Table and formula are enclosed as reference.
7. Please answer all questions in English only.

THERE ARE 5 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

**SECTION A (Total: 100 marks)**

**INSTRUCTION: Answer FOUR (4) questions only.**
**Please use the answer sheet provided.**

**Question 1**

Figure 1 below shows lean production model. It comprise of steps and activities in a lean manufacturing as being implemented in Toyota Production system. Study carefully the model and please take note all questions for Question (1) are reference to this figure.

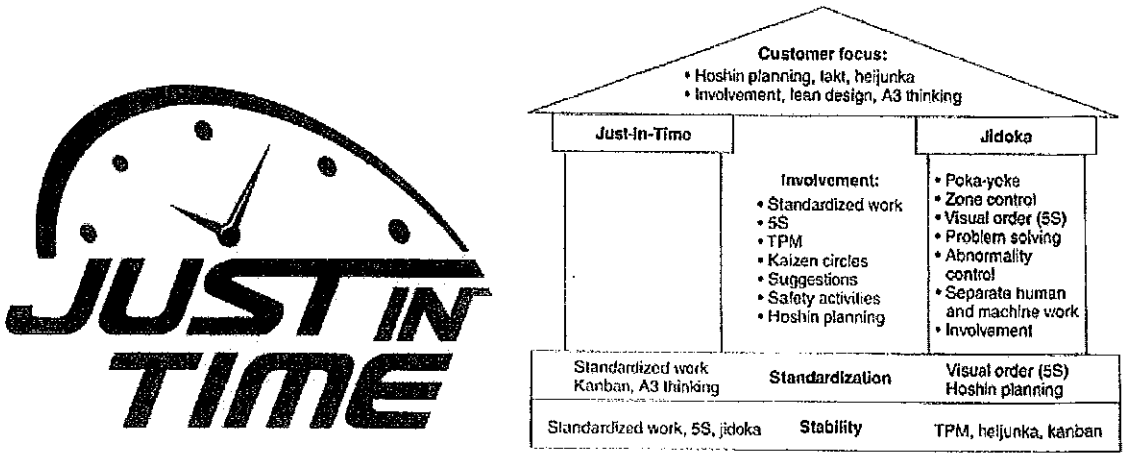



Figure 1: Lean Production Model

**Question 1**

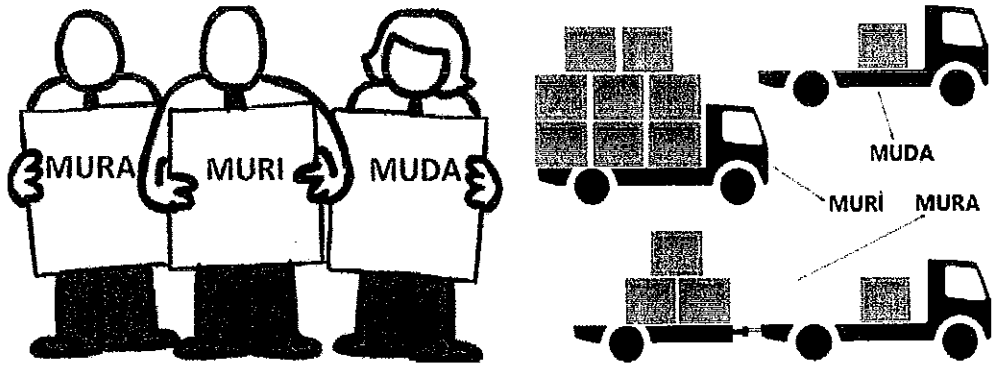
i. Based on the figure, define the concept of **"JIT"** and explain how by implementing JIT can lead to waste elimination in lean production. (7 marks)

ii. State three (3) examples of activities in JIT approach. (6 marks)

iii. Discuss why "Stability" needed to be established first before implementing JIT and Jidoka in lean activities. (6 marks)

iv. List the three (3) goals of customer focus in lean production. (6 marks)

Question 2




i. Explain briefly the concept of waste in Lean Manufacturing.

(7 marks)

ii. Explain the concept of 3M as shown in the above figure which showing different ways of transporting the loads.

(6 marks)

iii. From the 7-waste of manufacturing, explain the difference between "over production" to "over processing".

(6 marks)

iv. Discuss the concept of MURI in supporting lean manufacturing.

(6 marks)

**Question 3**

Since the first mass production of Model-T by Ford in 1908, manufacturing trend has changed from Low-mixed High volume (LMHV) to High-mixed Low-volume (HMLV). Unfortunately HMLV is not preferable by manufacturers as it create many problems.

i. Discuss two (2) main advantages when running with LMHV production.

(7 marks)

ii. Discuss how cell production system facilitate HMLV requirement.

(8 marks)

iii. Explain the concept of mass customization.

(4 marks)

iv. List out three (3) benefits when implementing JIT.

(6 marks)

**Question 4**

Based on 8hrs/ day

| Division | Line | Model | Output | Input | Pitch |
|---|---|---|---|---|---|
| Final Assembly | FA1 | Panasone | 2000 | | |

| No | Process Description | Std.Time (sec) | 1st.Pass Yield% | Cum. Yield% | Input Quantity | # Operator | |
|---|---|---|---|---|---|---|---|
| | | | | | | Cal | Assg |
| 1 | Assembly 1 | 50.00 | 80.00 | | | | |
| 2 | Assembly 2 | 30.00 | 100.00 | | | | |
| 3 | Assembly 3 | 90.00 | 95.00 | | | | |
| 4 | Assembly 4 | 20.00 | 97.00 | | | | |
| 5 | Final Test | 25.00 | 95.00 | | | | |
| 6 | Packing | 15.00 | 100.00 | | | | |
| 7 | | | | | | | |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| | | 230 | 3.833 | | Total Direct Opr. | | |

i. Based on line efficiency of 85%, determine the "target tact-time"

(4 marks)

ii. Determine the number of operators required to staff the assembly line.
Note: you are required to fill the necessary details in the table to derive the answer.

(12 marks)

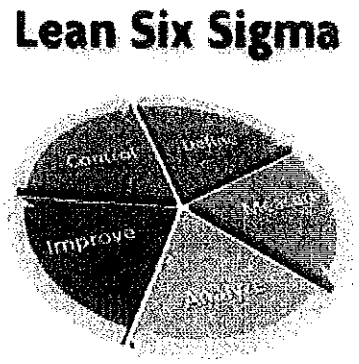
iii. Draw a line balancing chart for the process.

(5 marks)

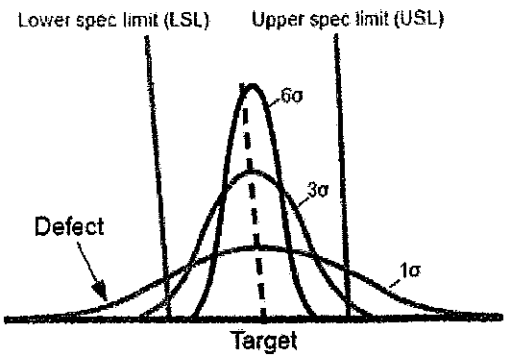
iv. Suggest two (2) possible methods how to reduce the number of operators but still maintaining the number of output.

(4 marks)

Question 5




| Sigma level | DPMO | Yield (%) |
|---|---|---|
| 1σ | 692,462 | 30.7538 |
| 2σ | 308,538 | 69.1462 |
| 3σ | 66,807 | 93.3193 |
| 4σ | 6,210 | 99.3790 |
| 5σ | 233 | 99.9767 |
| 6σ | 3.4 | 99.9997 |




i. Explain the concept of Six sigma. (7 marks)

ii. Lean and Six sigma focusing on different elements towards continuous improvement. List out the three (3) different focus element between Lean and Six sigma. (6 marks)

iii. A company produces steel rods. If the process LCL is 20.322mm and the UCL is 25.818mm. Determine the mean and standard deviation of the samples if we want the process to be within 5 sigma limit. (6 marks)

iv. Justify why we need to use Lean six-sigma instead of using Lean or six-sigma only. (6 marks)

**END OF EXAMINATION PAPER**