



UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 8 Examination in Engineering: September 2023

Module Number: ME8202

Module Name: Lean Manufacturing and Supply Chain Management

[Three Hours]

[Answer all questions, each question carries 10 marks]

Part A

Use a separate answer book for Q1, Q2 and Q3 in Part A

Q1. a) State and briefly explain three elements to avoid in a value stream? [3.0 Marks]

b) i) Identify and briefly explain the wastages in following scenario.

An offset printing plant has 3 printing machines, 4 die cutters and 1 guillotine cutter. The offset press only conducts 4 color orders (This information is given to assume the number of impressions for each job is similar). One printing machine has a capacity of printing 50,000 sheets of 45" x 35" size (maximum size) for a day. Both the other printing machines have the capacity of 80,000 sheets of 18" x 25" size (maximum size) for a day. Each die cutter has the capacity of cutting 75,000 sheets of 18" x 25" size (maximum size) sheets for a day. Guillotine machine (operator) has the capacity to cut 200,000 sheets of any size for a day. Every printing job will follow the below process.

Printing → Die cutting → Guillotine cutting → Checking → Packing

As there is a size limitation in the die cutting machines, maximum size sheet used for printing is 18" x 25".

The production floor is shown in Figure Q1.b

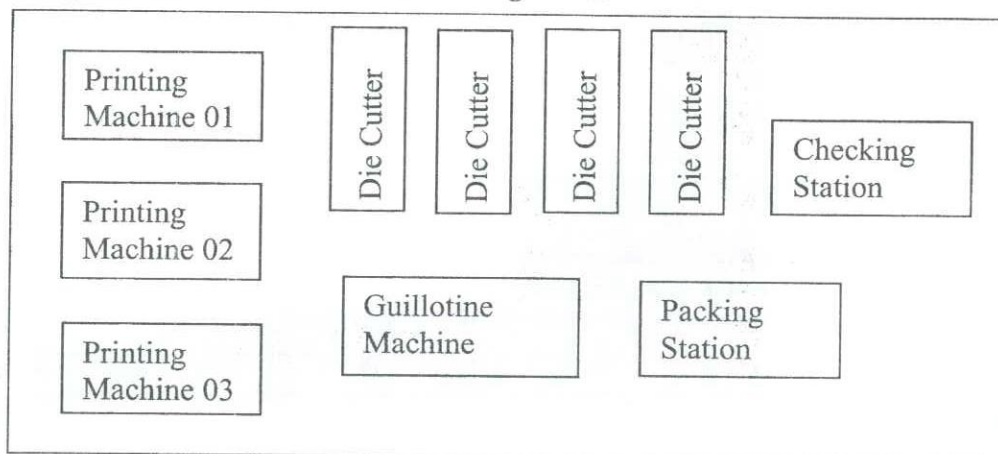


Figure Q1.b

[4.0 Marks]

ii) Suggest a better way of arranging the production floor in Figure Q1.b.

[3.0 Marks]

- Q2. a) Briefly explain the difference between lean and six sigma. [1.0 Mark]
- b) i) What are the five lean principles? [2.5 Marks]
- ii) What are the phases of six sigma methodology? [2.5 Marks]
- c) ABC production plant started to measure On Time Delivery performance of the last months of 2023 and the results are shown in Table Q2. (OTD target is 100% for the plant)

Table Q2

Month	OTD achievement
Jan	87%
Feb	86%
March	87%
April	87%
May	87%
June	86%
July	87%
August	86%

- i) Write the problem statement for the OTD performance of ABC company. [1.0 Mark]
- ii) Explain how you would use six sigma methodology to improve above Q2.c (i) situation? [3.0 Marks]

- Q3. a) i) Explain the Pareto principle. [1.0 Mark]
- ii) Considering Figure Q3.a, explain what will be the issue/issues you are going to solve using your knowledge on Pareto principle.

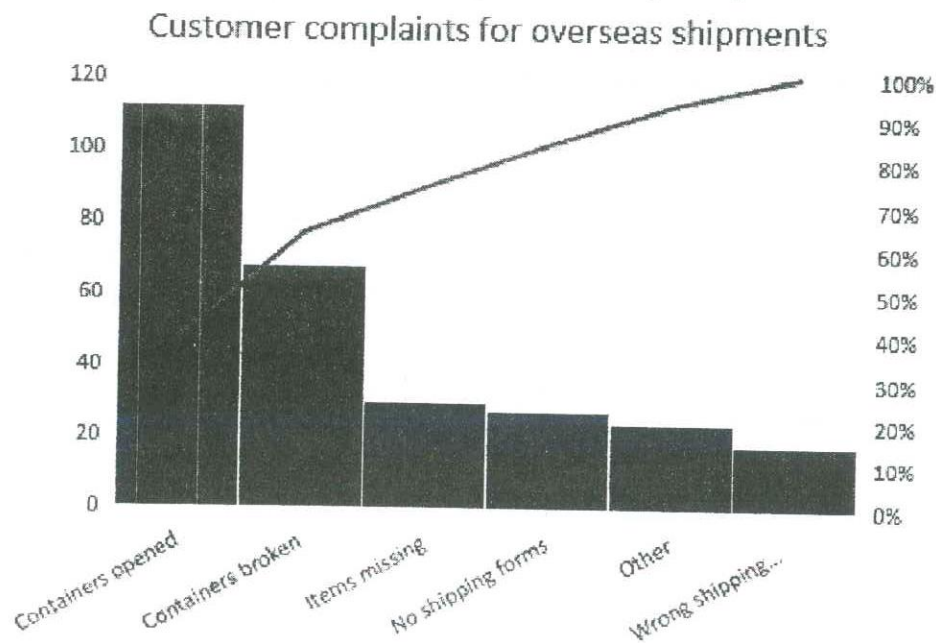


Figure Q3.a

[2.0 Marks]

- b) Explain any four of following tools and techniques
- i) Poka Yoke
 - ii) Jidoka
 - iii) SMED
 - iv) Kan Ban
 - v) Benchmarking

[4.0 Marks]

- c) In a pharmaceutical manufacturing facility, an intern is conducting a test to understand the variations of the weight of the Vitamin C tablets. He has produced 10 tablets in a controlled environment and obtained the results as shown in Table Q3. The standard weight of a Vitamin C tablet is 10mg.

Table Q3

Pill	Weight (mg)
1	9
2	10
3	10
4	8.5
5	10.5

Pill	Weight (mg)
6	11
7	10
8	9
9	10
10	11

- i) Calculate the Average weight of Vitamin C tablet.

[1.0 Mark]

- ii) Calculate its' Standard Deviation.

[2.0 Marks]

Part B

Use a separate answer book for Q4 and Q5 in Part B

- Q4. a) Explain the supply chain management.

[2.0 Marks]

- b) i) What are the main objectives of Supply Chain Management?

[2.5 Marks]

- ii) Explain the typical components of the Supply Chain Management?

[3.0 Marks]

- c) State five advantages of Supply Chain Management.

[2.5 Marks]

- Q5. a) Briefly explain the differences between Logistic Management & Supply Chain Management.

[4.0 Marks]

- b) Explain five Supply Chain drives and provide brief description of its responsiveness/ efficiency.

[6.0 Marks]