



# UNIVERSITY OF RUHUNA

## Faculty of Engineering

End-Semester 7 Examination in Engineering: March 2021

**Module Number: ME7302      Module Name: Production and Operations Management**

[Three Hours]

[Answer **all questions**; each question carries **twelve marks**]

Q1. a) The COVID 19 Pandemic has created several issues within global manufacturing sector. Explain three of such identified issues in the manufacturing sector of Sri Lanka due to COVID 19.

[3.0 Marks]

b) Discuss the role of a "Production and Operational Manager" in overcoming COVID 19 Pandemic created issues in the manufacturing sector.

[3.0 Marks]

c) What strategies could be used to reduce the uncertainty of project management within this Pandemic period ?

[3.0 Marks]

d) Explain the concept of "Ergonomics" in manufacturing facility design.

[3.0 Marks]

Q2. a) Briefly state what you understand by the term "Productivity".

[2.0 Marks]

b) Explain the productivity measures "Total Productivity" and "Partial Productivity".

[2.0 Marks]

c) The output of a process is valued at 100 US\$ per unit. The cost of labour is 50 US\$ per hour. When carrying out process improvement initiatives, the accounting department provided following information about the process for the past four weeks.

	Week1	Week 2	Week 3	Week 4
Units Produced	1,124	1,310	1,092	981
Labor (US\$)	12,735	14,842	10,603	9,526
Material (US\$)	21,041	24,523	20,442	18,364
Overhead (US\$)	8,992	10,480	8,376	7,848

Calculate the multifactor productivity ratio for each week and state whether the process improvements had any effect on productivity. If so, from when the effect is observable? (if required, you can make reasonable assumptions).

[5.0 Marks]

- d) Has labour productivity changed in the process given above in "c)"? Use the labour productivity ratio to support your answer.

[3.0 Marks]

- Q3. An engineering company is planning to obtain funding by going for an Initial Public Offering (IPO). The company is carrying out the IPO as a project. The following activities have to be completed for the IPO to go ahead.

Activity		Duration (Weeks)	Preceding activities
A	Check feasibility	3	none
B	Determine funding	1	none
C	Find possible banks	3	A
D	Select two banks	4	A
E	Interview the two banks	4	B
F	Analyze funding costs	5	B
G	Final selection	2	C,E
H	Signing of contract	3	F
End			D,G and H

- a) Draw the network diagram.

[3.0 Marks]

- b) Identify the critical path.

[3.0 Marks]

- c) When can the project be completed?

[2.0 Marks]

- d) Explain the effect on the project if activity "E" is extended by an extra week?

[4.0 Marks]

- Q4. a) Explain the terms "variables" and "attributes" with respect to quality characteristics. Provide an example for each.

[3.0 Marks]

- b) What are the three different aspects of quality? State them and provide a brief explanation.

[3.0 Marks]

- c) Discuss the weaknesses in the traditional approach to "Statistical Process Control (SPC)" by using your understanding of the "Taguchi Loss Function".

[3.0 Marks]

- d) Explain how "Lean and Six Sigma" is contributed for quality improvement in an organization.

[3.0 Marks]

- Q5. a) Explain the importance of “failure mode effect analysis (FMEA)” when improving the quality of the products in the apparel industry. [3.0 Marks]
- b) Why the “design for manufacture” concept is important for apparel industry. [3.0 Marks]
- c) Explain the importance of “work measurement” techniques to the apparel industry. [3.0 Marks]
- d) What type of work system design could be implemented for overcoming the COVID 19 induced issues within apparel industry in Sri Lanka? [3.0 Marks]