Loughborough University

Manufacturing Management

23WSB210

Semester 2 In-Person Exam paper

This examination is to take place in-person at a central University venue under exam conditions. The standard length of time for this paper is **2 hours**.

You will not be able to leave the exam hall for the first 30 or final 15 minutes of your exam. Your invigilator will collect your exam paper when you have finished.

Help during the exam

Invigilators are not able to answer queries about the content of your exam paper. Instead, please make a note of your query in your answer script to be considered during the marking process.

If you feel unwell, please raise your hand so that an invigilator can assist you.

Answer **ALL FOUR** questions

All questions carry equal marks.

Use of a calculator is permitted - It must comply with the University's Calculator Policy for In-Person exams, in particular that it must not be able to transmit or receive information (e.g. mobile devices and smart watches are not allowed).

1.

a) Production Planning and Control is the task of organising production in a factory.

i. Briefly describe the three stages of Production Planning and Control. In your answer state the time scale associated with each stage [9 marks]

ii. Just-in-Time (JIT) and Materials Requirements Planning (MRP) are two systems for implementing Production Planning. Explain why the attitude to resource utilisation and levels of inventory might be different for the two systems. [5 marks]

b) A company making customised stuffed toys has orders from a range of customers with various requested delivery dates over the next 6 months. The company has enough production capacity with its currently employed staff to meet all the orders by the end of the period, but initial production planning has shown that the requested dates cannot all be met without expanding production capacity for part of the period.

Discuss some options for planning production and production capacity to fulfil the orders, with analysis of each option from the points of view of smoothness of production profile, costs of production and customer satisfaction. [6 marks]

2.

a) The objective of management can be described as seeking to simultaneously achieve efficiency and effectiveness.

i. With the aid of an example, explain the concepts of effectiveness and efficiency in the management of a manufacturing business. [4 marks]

ii. One task of management is selecting a site when a new factory is to be built. A company is considering setting up a new plant to produce fence panels and has shortlisted two locations in Leicester and Shrewsbury. The costs and selling prices associated with each location are listed in the table.

	Leicester	Shrewsbury
Factory buildings	£920,000	£547,500
Labour cost per panel	£55	£45
Material cost per panel	£15	£15
Selling price per panel	£245	£175

Use break-even analysis to estimate at which location the company will break even earliest, assuming the same forecast sales figures. Show your working and state and explain the reasoning behind your conclusion. The equation for break-even quantity is reproduced below to help you. [10 marks]

$Q = F/(p-c)$

b) Identify the “core functions” of a manufacturing business within an “open system model” of the business. Explain how each core function of a manufacturing business contributes to its survival and growth. [6 marks]

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3. A layout strategy defines how manufacturing resources are physically arranged in a factory. There are three main layout strategies for a manufacturing shop floor – process layout, product layout and hybrid layout.

a) With the help of diagrams describe the movement of parts for each strategy. In your answer discuss the implications of each strategy for the amount of and visibility of work in progress (WIP). [9 marks]

b) Explain what group technology is and its relationship to hybrid layout. In your answer describe the influence of group technology on product design. [5 marks]

c) Figure 1. shows the output of the Rank Order Clustering Method when applied to a set of seven parts and the processes required to make them.

PROCESS	PART 7	2	4	1	3	6	5
C	1	1	1	1			
D	1	1	1				
B	1	1	1				
G				1	1		
F				1	1		
E						1	1
A							1

Figure 1. Output of Rank Order Clustering Method for a set of parts

Explain briefly how you would use the diagram in Figure 1 to design a hybrid layout for a factory. In your answer state how you would group the parts. [4 marks]

State two options for dealing with the requirement for Process C to be applied to Part 1 in the diagram in Figure 1. [2 marks]

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4.

a) The Boston Matrix can be used by a company to classify their portfolio of products and determine what products should be supported for further development.

i. Sketch the matrix. [4 Marks]

ii. Describe each of the categories in the matrix, and explain what attitude a company should ordinarily take to products in each category. [8 Marks]

b) In quality management companies seek to meet customer expectations of a product.

i. Comment on the relationship between customer expectations of a product and the product specifications defined by the company. [2 marks]

ii. For an example food product identify two possible customer expectations of the product. For each expectation suggest a specification a company might set to try to ensure the product meets the expectation, and a test or evaluation method to establish whether the specification is met. [6 marks]

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