

ENGINEERING TRIPOS PART IIA

Wednesday 4 May 2011 9.00 to 10.30

Paper 3E10

OPERATIONS MANAGEMENT FOR ENGINEERS

Answer not more than two questions.

All questions carry the same number of marks.

The approximate percentage of marks allocated to each part of a question is indicated in the right margin.

There are no attachments.

STATIONERY REQUIREMENTS

Single-sided script paper

SPECIAL REQUIREMENTS

CUED approved calculator allowed

You may not start to read the questions printed on the subsequent pages of this question paper until instructed that you may do so by the Invigilator

1 Inventory has been described as both 'dead material' and a 'substitute for information'.

- (a) What is the role of inventory in manufacturing systems? [30%]
- (b) In order to calculate the cost of holding inventory, which costs would you consider? [10%]
- (c) How would you go about reducing inventory? Justify your approach. [20%]
- (d) Just-in-Time manufacturing was initially often described as 'Zero Inventory Production'. Discuss to what extent you agree or disagree with this description. [15%]
- (e) Briefly describe any ordering policy you consider suitable for C-parts. Justify your choice. [15%]
- (f) Briefly outline the impact of variability on the throughput time of a process. [10%]

2 Manufacturing and service operations generally follow several distinct forms.

- (a) Why is this the case? Use diagrams to illustrate your arguments. [30%]
- (b) Describe the basic forms of manufacturing operations, and outline their key distinguishing features. [20%]
- (c) Describe the basic forms of service operations, and outline their key distinguishing features. [20%]
- (d) What are the likely implications if an inappropriate process layout is chosen for any type of manufacturing operation? [15%]
- (e) It is said that: 'An efficient resource is not necessarily a productive one'. Discuss to what extent you agree or disagree with this statement. [15%]

3 Cambridge Ales Ltd. is reviewing its production policy for one of the specialist ales that it produces, 'Cam Brew'. In the past year, average sales for 'Cam Brew' have been 10,000 litres per week (you may assume a 52-week year).

The setup cost for changing the brewing vats over to another type of ale is £500, while the annual cost of keeping one litre in stock is 20% of its value.

The production system operates at a fixed speed of brewing 20,000 litres per week, and the production cost of one litre of ale is £0.40.

(a) Explain the concept of Economic Production Quantity (EPQ), and derive its formula. Calculate the EPQ for the case above.

[30%]

(b) List the assumptions you have made in (a). Are these assumptions appropriate? Justify your answer.

[30%]

(c) Using the Period Order Quantity (POQ) model, and listing any further assumptions that you make, calculate how often an order is placed, and how much the brewery spends each year in setup costs.

[20%]

(d) Cambridge Ales is using a forecast-driven order fulfilment strategy. Discuss the key advantages and disadvantages of this approach.

[20%]

4 You are the operations manager at WingStar, a medium-sized aerospace supplier based in the UK. WingStar's board of directors is considering the outsourcing of several business functions.

(a) Outline the key advantages and disadvantages of outsourcing.

[40%]

(b) WingStar's board is specifically considering the outsourcing of its human resource (HR) function. What aspects of HR processes are most suitable for outsourcing, and which ones are not? Justify your answer.

[20%]

(c) As an alternative to outsourcing parts of the manufacturing operation, WingStar's board is considering offshoring some of its UK manufacturing operations to a low-cost country. Would the strategic risks be different for offshoring, compared to outsourcing?

[20%]

(d) Describe the 'bullwhip effect', and outline why global supply chains are more susceptible to this phenomenon.

[20%]

END OF PAPER