MANUFACTURING MANAGEMENT
(22WSB210)

Semester 2 2023   In Person Examination

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.

Questions carry the marks shown.

Any University-approved calculator is permitted.

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1. **Moving Window** and **Exponential Smoothing** are two Forecasting methods used in the management of a manufacturing business.

   a) Describe briefly the Moving Window method, and explain what advantage the Exponential Smoothing method has over it. [6 marks]

   b) The time series data in the table covers actual sales for a company over four quarters and the forecast sales for Quarter 1.

Quarter	Actual Sales (units)	Forecast sales (units)
1	1120	1050
2	940	
3	870	
4	980	
5		

   Use the exponential smoothing method to calculate a sales forecast for Quarter 5, based on a smoothing constant value of 0.25. Show your working. The equation for exponential smoothing is reproduced below to help you. [8 marks]

   $$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

   c) It can be useful for forecasting to identify patterns in time series data such as sales data. Identify two kinds of such patterns and comment on what may influence them, using an example of time series sales data for a product you identify. [6 marks]
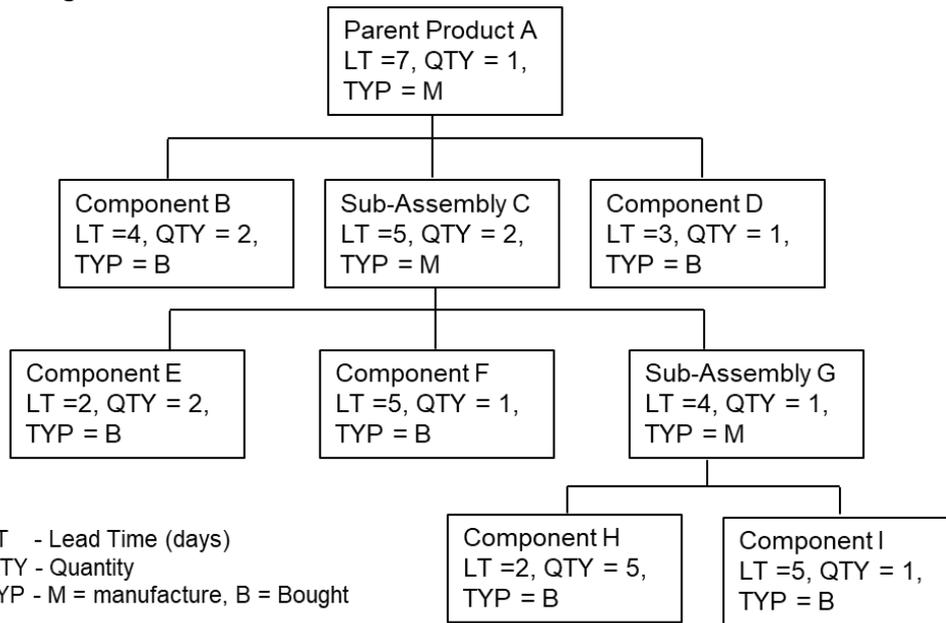
2. **Managers** seek to achieve the goals of a business while balancing efficiency with effectiveness.

   a) In the context of achieving the goals of a business explain the concepts of efficiency and effectiveness. [2 marks]

   b) In the context of a business discuss the difference between "leadership" and "management". Give an example of each. [6 marks]

   c) The three levels of management are typically identified as top, middle and line management, while the skills managers exhibit are typically classified as Technical, Human and Conceptual. Describe briefly the role of managers at each level, and discuss the importance at each level of Technical, Human and Conceptual skills. [12 marks]

3. **Production Scheduling** is a stage in Production Planning and Control.

    a) Briefly describe what Production Scheduling consists of and how it fits into Production Planning and Control. State the timescale over which it operates. Explain what is meant by saying production scheduling is carried out under constraints. Give two examples of such constraints, and explain the benefits to a manufacturing business of meeting the constraints you identify.   [10 marks]

    b) The diagram shows a bill of materials (BOM) for a product and a key defining the abbreviations.


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                    ┌─────────────────────┐
                    │ Parent Product A    │
                    │ LT =7, QTY = 1,     │
                    │ TYP = M             │
                    └─────────────────────┘
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        LT   - Lead Time (days)
        QTY - Quantity
        TYP - M = manufacture, B = Bought

        Refer to the diagram to answer the following questions.

        i.   How many of Component E are required to produce one instance of Parent Product A?   [1 mark]

        ii. What is the total time required from ordering the purchase of component I to producing Sub-assembly G?   [1 mark]

        iii. How many manufacturing operations are required to produce one-instance of Parent Product A?   [2 marks]

        Discuss the advantages and disadvantages of holding inventory to a manufacturing business   [6 marks]

4. **Layout strategies** are ways of arranging resources on a factory floor to suit the type of manufacturing being undertaken.

   a) There are three main layout strategies for a manufacturing shop floor – process layout, product layout and hybrid layout. Describe each strategy with the help of a diagram illustrating the movement of parts. For each strategy state what sort of manufacturing it is suited to in terms of the volume and variety of production. [12 marks]

   b) A **Load-distance calculation** is a tool used for optimisation of Process Layout. The diagram shows a table of the number of loads per week moving between six areas, numbered 1 to 6, for a job shop. The diagram also shows tables of distances as multiples of a base unit, for movements between the six areas for two potential layouts of the job shop, layout A and layout B.

Loads per Week

	1	2	3	4	5	6
1	x	600	120	145	95	0
2		x	410	170	0	0
3			x	0	0	0
4				x	55	20
5					x	55
6						x

Layout A Distances

	1	2	3	4	5	6
1	x	4	5	2	1	3
2		x	1	2	3	1
3			x	3	4	2
4				x	1	1
5					x	2
6						x

Layout B Distances

	1	2	3	4	5	6
1	x	1	2	1	2	3
2		x	1	2	3	4
3			x	3	4	5
4				x	1	2
5					x	1
6						x

Calculate which layout, A or B, is preferable in terms of the total load-distance associated with it. Show your working. [8 marks]

P. Webb