

**THE OPEN UNIVERSITY OF SRI LANKA**  
**FACULTY OF ENGINEERING TECHNOLOGY**  
**POSTGRADUATE DIPLOMA IN INDUSTRIAL ENGINEERING - LEVEL 7**  
**FINAL EXAMINATION - 2005/2006**  
**MEX 7215/MEP1205 - PRODUCTION PLANNING AND MATERIALS**  
**MANAGEMENT**



**DATE : 18 April 2006**  
**TIME : 0930 hrs - 1230 hrs**  
**DURATION: Three (03) hours**

**Answer any five (05) questions. All questions carry equal marks.**

- Q1. The price to be paid for a purchase is not always routine as in the case of buying from catalogues but it may involve detailed analysis or negotiation between the buyer and seller.
- 1.1 Describe the cost factors to be considered by a buyer for analysing a supplier's offer of a price in order to arrive at an estimate of the right price as a basis for negotiating with the supplier. [10 marks]
- 1.2 Tender process is a method for getting value for the right price. Explain how this can be ensured by good tender practice. [10 marks]
- Q2. Materials management process can be sub-divided into forecasting sales, materials planning, purchasing and inventory management. The ultimate aim is to make the right material available in the right quantity in the right place at the right cost.
- 2.1 Discuss and compare why there are preferences for the selective use of material requirements planning and Just-In-Time (JIT or Kanban) systems rather than conventional stock control systems in certain manufacturing situations. [12 marks]
- 2.2 Describe the actions that can be taken in designing the layout and handling processes in a warehouse in order to increase the effectiveness and efficiency of materials handling. [08 marks]
- Q3. 3.1 The materials planning and control systems used in industry range from conventional stock control systems to methods of Material Requirements Planning (MRP) and just-in-time approaches. Describe the manufacturing situations under which each approach will be effective. [08 marks]

- 3.2 Figure Q3 shows the bills of material for two products P and Q which are assembled using components. Quantity used per item at the higher level is shown within brackets. Lead time (LT) is given in weeks. Using the material stock information given in the Table Q3(a), you are required to calculate in the worksheet provided, the quantity and timing of planned orders for meeting the delivery requirements given in Table Q3(b). Comment on any management action needed for ordering.

[12 marks]

Figure Q3

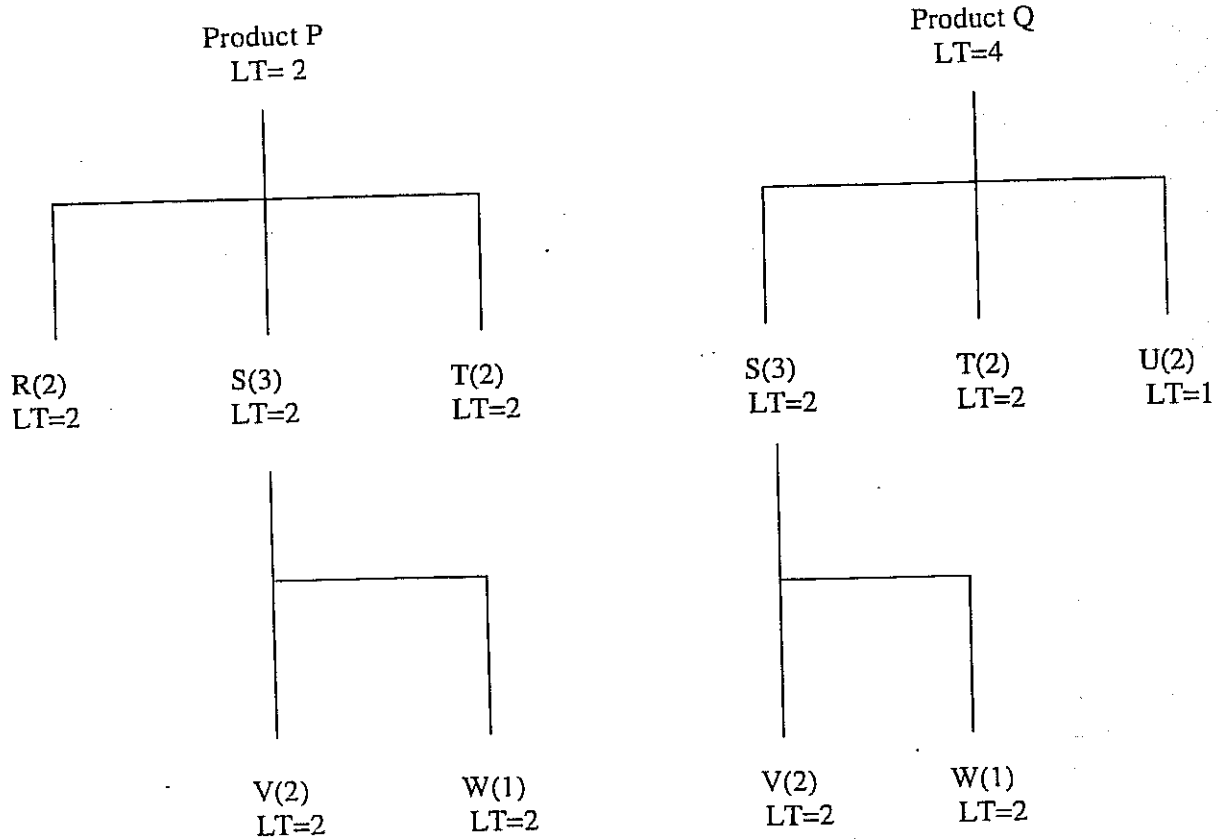


Table Q3 (a)

Item	P	Q	R	S	T	U	V	W
Stock Available	10	20	10	110	15	15	20	20
Safety stock	0	0	0	0	0	0	0	0
Minimum Lot size	LFT	LFT	50	LFT	100	50	150	150
Scheduled receipts			20 in week2				180 in week1	

LFT = Lot for lot ordering

Table Q3 (b)

Week Number	1	2	3	4	5	6	7	8	9
Product P	5	-	5	-	5	-	5	-	10
Product Q	-	10	-	10	-	30	-	30	-

Q4. 4.1 Manufacturing and logistics module of an Enterprise Resources Planning (ERP) System provides powerful support with management information covering many aspects of manufacturing management. List out the many steps of manufacturing and materials planning that are supported by the module.

[10 marks]

4.2 It is said that while putting a manufacturing information house in order, ERP systems provide a comprehensive coverage of business processes. Taking a well known ERP system as an example discuss what is meant by the comprehensive coverage of business processes.

[10 marks]

Q5. 5.1 Differentiate between the roles played by aggregate plan and master production schedule in production planning.

[06 marks]

5.2 Table Q5.2 shows the aggregate production demand for a production system which manufactures a product that can be inventoried. The management has options of using extra hours during periods of peak demand and carrying seasonal inventory by manufacturing in advance of peak demand period. Using the data provided below, you are required to evaluate the costs of a uniform daily rate (level production) strategy and a chase production plan (by the use of extra working time monthly without carrying any stock) and comment on a possible and economical strategy by considering all issues pertaining to the decision.

[14 marks]

Table Q5.2

	Month	1	2	3	4	5	6
Data:	Aggregate demand (units)	1890	1800	3300	3080	2800	2010
Stock	Number of working days	21	18	22	22	20	21

carrying cost per unit per month = Rs. 100

Additional cost of using extra time to manufacture = Rs. 150 per unit

Maximum possible regular production rate per day = 120 units

Any demand that is not met within the month will be lost costing an opportunity cost of lost contribution to profit equal to Rs 50 per unit.

Q6. 6.1 Discuss the criteria for a good factory layout. [06 marks]

6.2 Discuss how the application of factory flow analysis based on group technology can lead to an efficient plant layout and thereby improve the effectiveness of production planning and control. [10 marks]

6.3 Describe the mathematical basis of any cluster analysis technique as applied to the planning of machine layouts. [04 marks]

- Q7. 7.1 There is a standard procedure that is recommended to be followed in conducting method study for methods improvement. Discuss the significance of each step in achieving the intended objectives of method study. [10 marks]
- 7.2 Discuss the key concepts embedded in the Principles of Motion Economy and explain how these can be adopted to benefit in both factory as well as office environments. [10 marks]
- Q8. 8.1 What are the different aspects of man-machine interface design addressed by Human factors Engineering (Ergonomics)? [08 marks]
- 8.2 Describe the variations in the body dimensions of different humans that have been accounted for in structuring the tables of anthropometric data and discuss how such variations can be either accommodated or compensated for in designing systems ergonomically. [06 marks]
- 8.3 How do the conditions in the working environment affect the performance of humans? [06 marks]

WORKSHEET FOR Q 3.2 (to be detached and attached to the answer script)

Product P (Lot for Lot ordering)	Period								
	1	2	3	4	5	6	7	8	9
Gross requirements	5		5		5		5		10
Scheduled receipts									
Projected on Hand 10									
Net requirements									
Planned Order Receipts									
Planned Order Releases									

Product Q (Lot for Lot ordering)	Period								
	1	2	3	4	5	6	7	8	9
Gross requirements		10		10		30		30	
Scheduled receipts									
Projected on Hand 20									
Net requirements									
Planned Order Receipts									
Planned Order Releases									

Item R (Minimum Order size 50)	Period								
	1	2	3	4	5	6	7	8	9
Gross requirements									
Scheduled receipts		20							
Projected on Hand 10									
Net requirements									
Planned Order Receipts									
Planned Order Releases									

Item S (Lot for Lot ordering)	Period								
	1	2	3	4	5	6	7	8	9
Gross requirements									
Scheduled receipts									
Projected on Hand 110									
Net requirements									
Planned Order Receipts									
Planned Order Releases									

Item T (Minimum Order size 100)	Period								
	1	2	3	4	5	6	7	8	9
Gross requirements									
Scheduled receipts									
Projected on Hand 15									
Net requirements									
Planned Order Receipts									
Planned Order Releases									

Item U (Minimum Order size 50)	Period								
	1	2	3	4	5	6	7	8	9
Gross requirements									
Scheduled receipts									
Projected on Hand 15									
Net requirements									
Planned Order Receipts									
Planned Order Releases									

Item V (Minimum Order size 150)	Period								
	1	2	3	4	5	6	7	8	9
Gross requirements									
Scheduled receipts	180								
Projected on Hand 20									
Net requirements									
Planned Order Receipts									
Planned Order Releases									

Item W (Minimum Order size 150)	Period								
	1	2	3	4	5	6	7	8	9
Gross requirements									
Scheduled receipts									
Projected on Hand 20									
Net requirements									
Planned Order Receipts									
Planned Order Releases									

END.