The Open University of Sri Lanka
Faculty of Engineering Technology

Study Programme	:	Bachelor of Technology Honours in Engineering
Name of the Examination	:	Final Examination
Course Code and Title	:	**MEX6240 Industrial Engineering** / 6340
Academic Year	:	2014/15
Date	:	12.09.2015
Time	:	0930-1230 hrs
Duration	:	3 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of 08 questions. All questions carry equal marks.
3. Answer any 05 questions only.
4. Work sheets are provided.

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1. 1.1. What do you understand by the terms "Independent Demand" and "Dependent demand"?

1.2. What are the essential components of a Material Requirement Planning system?

1.3. Product Z is made by assembling two units of X and three units of Y. Unit X, which is sub-assembly is made of one unit of A and two units of B. Unit Y, which is another sub-assembly, is made of two units of A and four units of C.

a) Draw the product structure tree showing different levels

b) Develop a Material Requirement Plan, if 100 units of product Z are required in week 8. The lead time and current inventory status are as shown below and C is never made in quantities under 1000. (use the MRP sheet provided)

Item	Z	X	Y	A	B	C
Lead Time (weeks)	1	2	3	2	1	3
Current inventory	20	40	30	50	100	90

2. You have Rs 1,200,000.00 to invest, and three different funds from which to choose. The Treasury bond fund has a 7% return, the local bank savings accounts have an 8% return, and the high-risk account has an expected 12% return. To minimize risk, you decide not to invest any more than Rs 200,000.00 in the high-risk account. For tax reasons, you need to invest at least three times as much in the Treasury bonds as in the bank savings accounts. Assuming the year-end yields are as expected, generate graphical representation and show feasibility region. Calculate the optimal investment amounts according to the feasibility region.

3. A building supply has two locations in town. The office receives orders from two customers, each requiring 10mm plywood. Customer A needs 50 sheets and Customer B needs 70 sheets.

   The warehouse on the east side of town has 80 sheets in stock; the west-side warehouse has 45 sheets in stock. Delivery costs per sheet are as follows: Rs 50.00 from the eastern warehouse to Customer A, Rs 60.00 from the eastern warehouse to Customer B, Rs 40.00 from the western warehouse to Customer A, and Rs 55.00 from the western warehouse to Customer B.

   Find the shipping arrangement which minimizes costs by using graphical method of linear programming.

4. The table below gives the normal duration for activities of a certain project.

Activity	Preceding Activity	Duration (Weeks)
a	-	10
b	-	20
c	-	19
d	b	7
e	b	0
f	a,b	8
g	b	13
h	b	13
j	b	18
k	c,e	10
l	f,g,m	13
m	h	13
n	h	18
o	k	11
p	k	7
q	p	7
r	j,o,q	7

a) Draw the network for the project

b) Find the critical path, calculate minimum time required to complete the project.

c) If time duration of 'h' & 'm' reduce to 4 weeks each by improving facilities, then what is the minimum time required to complete the project?

5.

5.1. What are the objectives of a "Plant Layout"?

5.2. List three types of plant layouts and briefly explain one of them.

5.3. Discuss the factors that influence the Plant Location.

6.

6.1. Discuss the difference between 'batch repetitive flow line' and 'Mixed model repetitive flow line'.

6.2. Differentiate between the terms 'manufacturing strategy' and 'corporate strategy' as applicable to production organization of your choice.

6.3. "Manufacturing policy is the result of translating corporate strategy to long range plan for the production function of an organization". Discuss the above statement with suitable examples.

6.4. Describe how would coordinate the product life cycle with the manufacturing system life cycle for the best results.

7.

7.1 Elimination of waste is vital for any organization. Describe the seven prominent types of wastes defined by the 'Toyota Production System'.

7.2 Taking an example from the manufacturing or service organization, identify the types of wastes you may have come across and suggest possible methodology to eliminate them.

8.

8.1 Describe what is meant by netting, explosion and consolidation in MRP computations.

8.2 A section of the MRP worksheet for a stock item showing the net requirement schedule is as follows.

Week No.	1	2	3	4	5	6	7	8	9	10
Net requirement (units)	0	50	40	40	50	70	60	30	60	0
Batched requirements										
Planned order releases										

The ordering cost for the item is Rs. 500 per order regardless of the order quantity and the stock holding cost is Rs. 4 per unit per week. The opening stock is zero. Based on the average demand for the 10 periods, derive equation $(2DC_O/C_H)^{1/2}$ from fundamentals, calculate the economic order quantity (EOQ) using the $(2DC_O/C_H)^{1/2}$. Using the EOQ determine the planned order release schedule based on an ordering lead time of 2 weeks, assuming that there is no requirement to carry safety stock.

MRP Sheet

Product	On Hand		1	2	3	4	5	6	7	8
		Gross Requirement On hand Net Requirement Planned order receipt Planned order release								
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