THE OPEN UNIVERSITY OF SRI LANKA

FACULTY OF ENGINEERING TECHNOLOGY

DIPLOMA OF TECHNOLOGY – LEVEL 04

FINAL EXAMINATION – 2007/2008

MEX4235 – PRODUCTION MANAGEMENT- PART B

DATE : *MAY 17, 2008*

TIME : *1015 HRS. – 1230 HRS.*

DURATION : *2 HOURS 15 MINUTES*

Answer five questions only.

Question 01

(1.1) What is meant by 'capacity' of a production system?

(1.2) Briefly explain the strategies available to the production manager for the control of capacity of a production system.

(1.3) A company is to supply crushed metal for a certain construction project in down south of the country. The company has three quarries in different locations through out the country and their capacities in metric ton are given in table Q1-1 below.

Quarry No.	**Amount of Metal (metric ton)**
Quarry-1	100
Quarry-2	60
Quarry-3	80

Table Q1-1

The company has to deliver the crushed metal to Matara, Galle and Hambanthota. The demands for metal by each location are as shown in table Q1-2.

Location	**Amount of Metal required (metric ton)**
Matara	40
Galle	90
Hambanthota	110

Table Q1-2

The transportation costs per metric ton from each quarry to each location are as shown in table Q1-3 below.

	Matara	Galle	Hambanthota
Quarry-1	4	6	2
Quarry-2	8	7	10
Quarry-3	6	1	4

Table Q1-3

(a) Using the transportation algorithm method, find the initial basic solution for the transportation cost.

(b) Determine whether the solution obtained in part (a), is the optimum cost. Justify your answer.

Question 02

(2.1) Distinguish the difference between the Static case and the Dynamic case with regard to sequencing problems.

(2.2) A workshop receives an order for 6 types of jobs at the same time. All types of jobs will have to be processed on a lathe machine and a grinding machine. (Jobs will first pass through the lathe machine before it can be processed on the grinding machine). Table Q2-1 represents the unit processing time in Hours on respective machines for each job.

Job No	Processing Time (Hrs)	
	Lathe	Grinding
1	6.0	3.0
2	4.0	3.5
3	2.0	3.0
4	10.0	6.0
5	3.0	5.0
6	7.0	7.0

Table Q2-1

(a) Determine the sequence in which the jobs should be processed on the lathe machine and the milling machine in order to minimize the throughput time. State any assumptions you make.

(b) Find out the time taken to finish job no 4, using a Gantt chart.

(c) After undergoing processing on the lathe and grinding machines, all items will have to be painted in a painted booth. This can be performed in any one of the painting booths available, namely, A, B, & C. Each job consists of several identical products. Operation times for each product on each painting booth are given in table Q2-2 below.

Job No.	**Quantity**	Unit Operation Time (Hrs)		
		A	B	C
1	30	2.5	3.0	2.0
2	20	4.0	3.5	3.0
3	25	2.0	3.0	4.0
4	40	1.5	2.5	3.5
5	15	3.0	2.0	4.0
6	10	5.0	4.5	3.0
Capacity		100	150	150

Table Q2-2

Determine the allocation of jobs to painting booth using the indexing method.

Question 03

(3.1) Explain why, inventory control is such a dominant consideration in production management?

(3.2) What is meant by Economic Order Quantity (EOQ)? Derive an expression for EOQ for a simple lot size model. (State any assumption you make during the derivation)

(3.3) A medium scale manufacturer uses 600 items per year of a certain product which is needed in the manufacturing process. The ordering cost for this item is estimated as Rs.800 and each item costs Rs.50. The stock holding cost is Rs.6 per unit per year.

(a) Find the EOQ.

(b) The number of orders per year

(c) The average yearly cost.

Question 04

(4.1) Discuss the requirements that need to be satisfied in order to have an effective quality control procedure in a production system.

(4.2) Explain why each and every item is not inspected during an acceptance sampling activity.

(4.3) A packing company carries out a quality control check on its packing facility. Five samples of 4 bags each are taken and weighed. The figures are as given below in table Q4.

Sample	Weight of bag (kg)			
1	10.2	9.8	9.8	10.1
2	10.1	10.0	9.9	10.4
3	9.7	9.9	9.9	10.1
4	9.8	10.3	10.1	10.5
5	9.8	10.4	10.3	9.7

Table Q4

(a) Calculate the mean and range of each sample.

(b) Is the process in control or out of control? Justify your answer.

Question 05

(5.1) What are the steps involved in a time study?

(5.2) Discuss the considerations that have to be looked into when breaking a job into elements during a time study.

(5.3) A time study on an welding operation yielded the observed times shown below (Table Q5) for which the analyst gave a performance rating of 1.10. Using an allowance of 15% of job time, determine the appropriate standard time for this operation.

Observation	Time (Minutes)
1	4.20
2	4.15
3	4.08
4	4.12
5	4.15
6	4.18
7	4.14
8	4.14
9	4.19
Total	37.15

Table Q5

Question 06

(6.1) Explain the terms 'cost unit' and 'cost centers' giving suitable examples.

(6.2) Enumerate the difference between Depreciation and Obsolescence.

(6.3) A factory is to purchase a machine for a cost of Rs 100,000. This machine will have a useful life of five years and the depreciation is estimated to be Rs18,000 per year when calculated using the straight line rule. Estimate the annual depreciation at the end of the fourth year, using the sum of year digit method.

Question 07

(7.1) Discuss the importance of having a good facility layout in a manufacturing plant.

(7.2) Explain briefly the procedure taken in order to obtain an initial layout for a manufacturing plant.

(7.3) The figure Q7 shown below, gives the layout of various departments A to F, in an exiting factory.

A	B	C
D	E	F

Figure Q7

The movements of material between these departments are as shown below.

From A to B	-	20
From B to A	-	10
From B to C	-	15
From A to F	-	25
From C to D	-	30
From D to C	-	50
From D to F	-	40
From E to F	-	10
From F to E	-	15

Draw a cross chart and arrange the departments in the most optimum locations.

Question 08

(8.1) Why do Economists consider all goods as scarce? Explain briefly.

(8.2) Distinguish between 'Free economy' and 'State planned Economy' and explain what kind of economic system is most suitable for Sri Lanka.

(8.3) In recent times, the value of the Rupee has been devaluated considerably. Explain how this would affect the economy of the country.

(8.4) Explain the behavior of money and real income when,

(a) there is inflation

(b) price levels of all commodities decrease.

Details required for question No.04

Sample Size (n)	Constant (d_n)	Factors (m) for Warning Limits = 1.96 / ($d_n \sqrt{n}$)	Factors (m) for Action Limits = 3.09 / ($d_n \sqrt{n}$)
2	1.128	1.23	1.94
3	1.693	0.67	1.05
4	2.059	0.48	0.75
5	2.236	0.38	0.59
6	2.334	0.32	0.50
7	2.704	0.27	0.43
8	2.847	0.24	0.38

Control limits : $\overline{X} \pm m\overline{W}$

FACTORS IN MEAN CONTROL CHARTS

Sample Size (n)	Factor (R)			
	For warning Limit		For Action Limits	
	Upper	Lower	Upper	Lower
2	2.81	0.04	4.12	0.00
3	2.17	0.18	2.98	0.04
4	1.93	0.29	2.57	0.10
5	1.81	0.37	2.34	0.16
6	1.72	0.42	2.21	0.21
7	1.66	0.46	2.11	0.26
8	1.62	0.50	2.04	0.29

Control limits : multiply W by R

FACTORS IN RANGE CONTROL CHARTS

END

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