THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF ENGINEERING TECHNOLOGY
BACHELOR OF INDUSTRIAL STUDIES (INDUSTRIAL MANAGEMENT)
FINAL EXAMINATION -2006/2007
MEX4240– OPERATIONS MANAGEMENT

037

DATE : 25th MARCH 2007
TIME : 1330 – 1630 HRS.
DURATION : THREE (03) HOURS

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

1. 1.1 Describe the nature of Operation Management in a Commercial Bank.

   1.2 Describe how feed back can be used to improve the conversion process involved in banking industry.

   1.3 What are the fundamental approaches to be followed by the bank in the process of introducing a new product to the market?

   1.4 Describe the key factors influencing the process selection.

2. 2.1 What is work study?

   2.2 Briefly describe the influence of the work study department in improving the overall performance of the organization.

   2.3 Describe the basic steps involved in method study process with suitable examples known to you.

   2.4 A serious delay in dispatching letters prepared by a particular branch in an enterprise has been detected. Management decided to carryout a time study to determine the point of delay by breaking down the process into nine elements as shown in table Q_2. Among them elements 1,2,6,8 and 9 had been attended to by a male worker and the rest by a female worker. Rest allowance for men is 5% while women are given 8% and the policy allowance is 10%. Calculate the basic time, standard time and allowed time.

Element	1	2	3	4	5	6	7	8	9	10	Rating
1. Read rough draft	.73	.85	.97	.65	.78	.84	.69	.74	.95	.88	95
2. Correct errors	.30	.40	.21	.35	.25	.37	.41	.43	.48	.31	100
3. Set up type writer	.51	.63	.42	.30	.67	.51	.56	.40	.38	.41	105
4. Type letter	1.65	2.03	2.15	1.50	2.20	1.80	1.93	1.75	1.76	1.85	110
5. Proofread letter	.60	.65	.50	.67	.67	.73	.69	.59	.68	.71	100
6. Correct letter	.85	.90	.93	.97	.97	.71	.83	.76	.87	.91	105
7. Type envelopes	.60	.51	.54	.63	.63	.65	.68	.48	.46	.61	110
8. Get signature	-	-	-	-	-	-	-	-	-	-	
9. Mail letter	.21	.20	.19	.18	.23	.21	.22	.23	.21	.19	100

Table Q_2

3. 3.1 Discuss the difference between forecasting and planning with a suitable example.

3.2 Why forecasting is considered as an input to all planning and control of operations function?

3.3 Briefly describe four important factors that have to be considered when selecting a suitable forecasting method.

3.4 Table Q_3 shows the demand data for a product over a fifteen month period. The company forecast its monthly demand using monthly average method. It is assumed that the production in each month is available for the sales during the same month.

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Demand	10	18	29	15	30	12	16	8	22	14	15	27	30	23	15

Table Q_3

(a) Suggest the most suitable moving average period for the company to forecast the sales for year 2007.
(b) Calculate the forecast quantity according to the company policy.
(c) Calculate the forecasting values using exponentially smoothing methods. The smoothing constant can be computed by using the following equation.

$2/(N + 1)$, where N is the selected moving average period.

4. 4.1 What is aggregate planning?

4.2 Discuss the costs involved in aggregate planning.

4.3 Describe the "Level the Work Force Strategy" and "Chase Strategy" of aggregate planning.

4.4 MM Beer Company is preparing an aggregate plan for the next 12 months. Although several types of beer are brewed at the plant and several container sizes are bottled, the management has decided to use "liters of beer" as the aggregate measure of capacity. The demand of beer for the next twelve months is given in table Q_4.

Month	Liters '000 s
January	200
February	250
March	300
April	400
May	450
June	500
July	500
August	400
September	350
October	300
November	250
December	200

Table Q_4

Each worker can produce 2,000 liters of beer per month during regular time and each worker is paid Rs. 15,000/- per month on regular time. The company has to incur Rs 3000/- per person to wards administration and training costs if it were to hire additional workers. It costs Rs. 2,000/- to fire a worker which includes all severance and benefit costs. For inventory valuation purposes, beer costs Rs. 10/- a liter to produce. The cost of carrying inventory is assumed to be 2% a month per liter. Assume that the starting inventory and the desired closing inventory (a year from now) is 300,000 liters.

It is necessary to meet all forecast demand and no stock outs are allowed.

Determine a suitable strategy.

5. 5.1 Loading is a type of scheduling used to develop a load profile by a work center. Describe the two types of loading involved in scheduling process.

5.2 Why input/out put control is an important aspect in scheduling of intermittent processes?

5.3 Machine shop with three work centers, (A,B and, C) consisting of one machine each to perform five jobs (1,2,3,4 and 5). The processing time of each job in each work center is given in the table Q_5. These times will be accumulated to form the load on each work center in machine hours. It has been observed that the wait – move time is an average of 8 hours per work center in addition to the machine processing time. The wait - move time will be incurred each time a job changes form one work center to the next.

Job No	Work centers and machine hours	Due date
1	A (2 Hrs)/ B (3 Hrs)/ C (4 Hrs)	4
2	C (6 Hrs)/ A (4 Hrs)	3
3	B (3 Hrs) / C (2 Hrs) / A (1 Hrs)	4
4	C (4 Hrs)/ B (3 Hrs)/ A (3 Hrs)	4
5	A (5 Hrs)/ B (3 Hrs)	2

Table Q_5

(a) Assuming that the machine hours is the scarce resource in this work shop, detail the jobs among the three work stations using backward loading.

(b) Discuss the shortcomings of your proposed solution.

(c) Give remedial actions to rectify the shortcomings in your solution.

6. 6.1 What is the capacity of a production system?

6.2 State the objectives of capacity management.

6.3 The daily production and the demand of a company having three factories which supply agricultural water pumps to four warehouses are as given in the table below. (Table shows the daily production and the demand).

Factory	Production /Day
A	6
B	6
C	5
Total	17

Warehouse	Demand /Day
1	3
2	7
3	3
4	4
Total	17

The transportation costs (in Rs) vary with the initial location and the final destination as given in the table below.

	Warehouse			
Factory	1	2	3	4
A	6	7	8	5
B	8	5	6	5
C	9	8	6	8

(a) Allocate the production of the three factories in such a way that it incurs the least transportation cost.

(b) Determine whether the cost calculated is optimum or not.

7. 7.1 Describe the type of costs involved in inventory cost structure.

7.2 State the difference between independent demand and dependent demand.

7.3 MM engineering services is the local agent for a variety of imported plant and machinery in the field of power engineering. They are the local dealer for Indian made INDI generators. Suppliers of INDI generators recently agreed to give a $1 freight reduction per 100 kg of weight, if the company ordered a minimum of 100 kg. In order to benefit from this offer, MM should order at least 10 generators at a time instead of the currant order size of 6. Based on this proposal MM is eligible to get $10 per generator set on freight alone.

MM enquired about further discounts/concessions if quantity increased to 15 generator sets at a time. Indian company informed the difficulty in giving further discount on freight but suggested 2% discount on price per set if ordered 15 sets or more. Space available in the warehouse is limited to 15 generator sets, but there would be an opportunity cost, since the space available could not be used for storing other merchandises. Details of the product are given below.

Selling price of a generator	$ 1000
Unit cost	$ 600 (Excludes freight cost)
Average annual sales	60 sets
Ordering cost	$ 40 per order.

Annual stock carrying cost	30% of the total value of goods in warehouse
Safety stock	2 sets
Weight per set	1,000 kg
Lead time	4 weeks

After considering all the above facts, MM decided to order 10 units in an order to get the freight discounts only. Comment on the decision of the management.

08. 8.1 Name and describe different types of Material Requirement Planning (MRP) systems deployed in operations management.

8.2 Describe the importance of MRP in operations management with suitable examples familiar to you.

8.3 Briefly explain the difference between MRP systems and Order Point systems

8.4 An assembled finished "Table" consists of a top and leg assembly. The leg assembly, in turn, consists of four identical legs, two short rails and two long rails. Leg assemblies are built in advance and stored in inventory. Table given below shows the lead time of components which are necessary to complete the table.

Item	No of units required	Lead time (Weeks)
Assemble table – A	1	1
Top - B	1	2
Leg assembly - C	1	1
Legs - D	4	1
Short rails - E	2	1
Long rails - F	2	1

Table Q_8

(Use the MRP sheet attached at the end of the question paper)

(a) Draw the product structure tree.

(b) If 200 tables are required at the end of the 5th week, develop material requirement plan indicating the quantities needed and when they are to be ordered.

MRP SHEET FOR QUESTION NO.08

Item	Description	Week No										
		1	2	3	4	5	6	7	8	9	10	11
	Gross requirement											
	On hand											
	Net requirement											
	Planned order receipts											
	Planned order released											
	Gross requirement											
	On hand											
	Net requirement											
	Planned order receipts											
	Planned order released											
	Gross requirement											
	On hand											
	Net requirement											
	Planned order receipts											
	Planned order released											
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	Gross requirement											
	On hand											
	Net requirement											
	Planned order receipts											
	Planned order released											