047

# THE OPEN UNIVERSITY OF SRI LANKA

**FACULTY OF ENGINEERING TECHNOLOGY**
**DIPLOMA OF TECHNOLOGY – LEVEL 04**
**FINAL EXAMINATION – 2008/2009**

## *MEX4235 – PRODUCTION MANAGEMENT*

***DATE*** : ***APRIL 02, 2009***
***TIME*** : ***0930 HRS. – 1230 HRS.***
***DURATION*** : ***3 HOURS***

***Answer five questions only.***

### *Question 01*

(1.1) Discuss the importance of demand forecasting for a manufacturing organization. Why it is necessary to manage the system capacity?

(1.2) The unit sales for a particular brand of battery, vary from month to month but no clear trend or seasonal variation has been found. The combined unit sales of the above brand of battery for the last ten months were as follows.

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | *Oct* |
|---|---|---|---|---|---|---|---|---|---|
| *195* | *140* | *190* | *191* | *306* | *171* | *164* | *213* | *174* | *155* |

The forecast for the month of October, based on simple exponential smoothing was 194 units.

Calculate monthly forecasts for battery sales in November using :

(i) A three-month moving average
(ii) An exponentially weighted average with α (alpha ) = 0.2
(iii) An exponentially weighted average with α (alpha ) = 0.4

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(1.3) Comment on your results obtained in question (1.2)

### *Question 02*

(2.1) What are the major objectives of facilities planning?

(2.2) Compare and contrast between functional layout and flow type layout. Elaborate on your answer by taking suitable examples.

(2.3) An automobile equipment supplier wishes to install sufficient number of ovens to produce 400,000 good castings per year. The baking operation takes 2.0 minutes per casting, but the oven output is typically about 6 percent defective. How many ovens will be required if each oven is available for 1800 hours (of capacity) per year?

***Question 03***

(3.1) Distinguish between externally oriented scheduling and internally oriented scheduling

(3.2) A steel cupboard manufacturing company has received an order for a certain brand of cupboard. This has to be made out of five major parts, each of which has to pass through a shearing operation that could be performed on any three of the shearing machines A, B or C available. Table 3.1 gives the operation times available on each machine.

| Part No | **Operation Times in Minutes on Machine** | | |
|---|---|---|---|
| | **A** | **B** | **C** |
| 01 | 25 | 30 | 40 |
| 02 | 40 | 35 | 30 |
| 03 | 50 | 40 | 30 |
| 04 | 25 | 20 | 30 |
| 05 | 35 | 30 | 40 |
| Capacity (Minutes) | 65 | 40 | 70 |

*Table 3.1*

(a) Assuming that the steel sheets are available for processing on each machine, find the allocation of sheets to each machine using the index method to minimize the through put time.

(b) Once the shearing operation is complete, the above parts are subjected to two operations, first on a forming machine and then on a grinding machine. The unit operation time on respective machines for each part is given in Table 3.2.

| Part No. | Processing time in minutes | |
|---|---|---|
| | Forming machine | Grinding machine |
| 01 | 25 | 30 |
| 02 | 20 | 25 |
| 03 | 50 | 25 |
| 04 | 30 | 15 |
| 05 | 30 | 35 |

*Table 3.2*

Find the sequence of parts to be loaded on the second set of machines (Forming and Grinding) in order to minimize the throughput time.

(c) Find the total throughput time for the entire job using Gantt chart.

***Question 04***

(4.1) Expalin the term 'Capacity smoothing' in the context of capacity management.

(4.2) What are the assumptions that are made in the transportation algorithm method?

(4.3) The LakPride Concrete Company has plants in three locations and is currently working on three major construction projects, located at different sites. The transportation cost per truckload of concrete (Rs '000), plant capacities (tones), and project requirements (tons) are given in Table 4. Find the feasible solution for the above problem by the transportation algorithm method.

| | Project A | Project B | Project C | Plant Capacity |
|---|---|---|---|---|
| Plant 1 | 10 | 4 | 11 | 70 |
| Plant 2 | 12 | 5 | 8 | 50 |
| Plant 3 | 9 | 7 | 6 | 30 |
| Project Requirements | 40 | 50 | 60 | 150 |

*Table 4*

***Question 05***

(5.1) Explain the importance of having an Inventory control system in an manufacturing organization.

(5.2) Describe the operation of a "two-bin" inventory system model.

(5.3) A company manufacturing water pumps requires buying 20,000 bronze bushes with bearing sets of a particular size per year. The stock holding cost for a single component is Rs 25.00 per year and the fixed administrative cost of placing an order is Rs 900.00. The company policy is to allow the stock level to drop to zero. The penalty cost per unit per unit time is Rs 75.00.

Determine,

(a) The economic lot size to be ordered.

(b) The order interval.

(c) The total average yearly cost.

(d) The optimum lot size to be ordered if the supplier offers the price of a set of bearings with the bronze bushes with incremental discounts as shown in Table 5.

| Order Quantity | 0 – 999 | 1000 – 1999 | 2000 and over |
|---|---|---|---|
| Prize per set (Rs) | 100.00 | 98.00 | 95.00 |

*Table 5*

***Question 06***

(6.1) Why is it important to break a job into elements? Explain the important factors that have to be taken into consideration when selecting work elements in time study.

(6.2) State the difference between time study and activity sampling in the context of work measurement.

(6.3) What are the advantages and disadvantages of activity sampling over time study?

(6.4) In order to determine the idle time of a photocopy machine, a time study was conducted and the results are as shown below.

Observations of machine working - 350

Total number of observations - 500

How many observations should you take to determine the idle time of the machine with a confidence level of 95% and an accuracy of 5%.

***Question 07***

(7.1) Distinguish between cost unit & cost center. Elaborate on your answer by giving suitable examples.

(7.2) Explain the terms "Opportunity cost", "Sunk cost" and "Out-of-pocket cost", and state the reasons why sunk cost is not considered when making business decisions

(7.3) State the causes of depreciation.

(7.4) A cupola for a steel foundry was purchased at a cost of RS. 300,000. A further sum of RS. 50,000 was spent on installation and commissioning. The estimated residual valve after 10 years is estimated as RS.70,000. Calculate the annual rate of depreciation of the unit and the depreciation fund collected at the end of 7 years.

***Question 08***

(8.1) Explain how Demand and Supply vary with price.

(8.2) What is equilibrium price? Explain the mechanism of reaching equilibrium price for a certain commodity.

(8.3) Describe what happens when the price of a certain commodity is fixed below or above the equilibrium price. Who are the people expected to be benefited in each case?

(8.4) What action should be taken by the government to make sure that the people of the above category will benefit through price fixing? Explain.

***END***

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