NORTHEASTERN UNIVERSITY

Department of Mechanical and Industrial Engineering

Supply Chain Engineering **Prof. Gupta**

IE 7200 **Spring 2017-Monday**

Homework No. 3

(Due: February 13, 2017)

Problem 1. 'Power Automoiles' produces small sized cars. It's production line has three production stations, A, B, and C. In-process storage is possible between the stations, but at the monthly cost of $150 for storage between A and B and $200 between B and C. The storage would offset any station downtime in the preceding station(s). Income per item produced is $10 and the maximum monthly production rate is 1000 units. If the downtimes for stations A, B, and C are 2, 4, and 6 percent, respectively, determine the optimum income-cost relationship from the four possible configurations of in-process inventory management. Assume the station downtimes are statistically independent.

Problem 2. A part of a small sized car by 'Power Automobiles' is being evaluated for its economic order quantity. Storage is charged at $9 per unit per month, and this part does not share the particular storage facility with any other part. Purchase order cost is $100, interest rate is 20 percent per year, and capital cost of the part is $450. The demand rate for the part is 2000 units per year. Determine the EOQ value.

Problem 3. Determine the total annual inventory cost for the part in the previous problem.

Problem 4. At what time intervals should the part of the previous problem be reviewed for reorder purposes.

Problem 5. Reevaluate the EOQ, total annual inventory cost, and the ordering time interval, if the part in the previous problem is now one of many that use the same general storage area.

Problem 6. 'Power Automobiles' wants to analyze its inventory of 5000 parts to establish an ABC classification. Following is a random sample of 20 of their parts:

Item Number	Annual Usage ($)	Item Number	Annual Usage ($)
1	1500	11	1300
2	22000	12	11000
3	1200	13	9000
4	100	14	30000
5	600	15	1600
6	130	16	9200
7	15000	17	35000
8	18000	18	6000
9	25000	19	3500
10	1800	20	50000

Following the usual guidelines for ABC breakdown, indicate the parts which will be classified in each category and find the percentage of value for each classification.

Problem 7. A part of a small sized car by 'Power Automobiles' is manufactured in batches within a manufacturing facility and the following data is applicable:

Consumption rate:	750 parts/ month
Production rate:	2000 parts/ month
Storage costs (based on average inventory):	$10 per unit-year
Interest charges:	$5 per unit-year
Setup charges per batch:	$200

The batch is produced so that it is completed exactly when the previous batch is depleted. Determine the EMQ value and associated inventory costs per unit.

Problem 8. For the part given in the previous problem, assume that the batch is to be completed 0.2 month before the previous batch is depleted. Determine the EMQ value and the associated inventory costs per unit.