Name ______________________________ Student ID ____________

Prince of Songkla University
Department of Industrial Engineering, Faculty of Engineering

Final Examination: Semester 2
Date: February 21, 2009
Subject: 225-601 Supply Chain Management

Academic Year: 2008
Time: 13.30 - 16.30
Room: ห้องหุ่นยนต์

ทุจริตในการสอบ โทษขั้นต่ำ คือ ปรับตกในรายวิชาที่ทุจริต และพักการเรียนหนึ่งภาคการศึกษา

Instructions: Read carefully

1. All materials are allowed.
2. There are 6 problems for this test. Do all of them. Also show your work clearly and legibly.
3. Answer the questions in this test paper, only.
4. You must write your name and your student ID in every page of the test.
5. Total score is 120 points.

Distribution of Score

Problem	Points	Points Gained
1	40	
2	20	
3	15	
4	15	
5	10	
6	20	

Tests are prepared by
Nikorn Sirivongpaisal

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Problem 1: (40 points) Identify the following statements whether true or false. If it is false, provide the reason, why.

(a) Qualitative forecasting methods are most appropriate when there is good historical data available or when experts do not have market intelligence that is critical in making the forecast.

(b) Moving average forecasting method and simple exponential smoothing forecasting method give the last N periods of data equal weight.

(c) The time flexible strategy is where the production rate is synchronized with the demand rate by varying machine capacity or hiring and laying off employees as the demand rate varies.

(d) Inventory planning is the process by which a company determines inventory, stockouts, levels of capacity, production, subcontracting and even pricing over a specified time horizon

(e) Aggregating across products, retailers, or suppliers in a single order allows for a reduction in lot size for individual products because fixed ordering and transportation costs are now spread across multiple products, retailers, or suppliers.

(f) Cycle inventory is primarily held to take advantage of economies of scale but increase cost within the supply chain.

(g) With continuous review, inventory is continuously tracked and an order for a lot size Q is placed at regular intervals of time.

(h) Periodic review policies require more safety inventory than continuous review policies for the same level of product availability.

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Problem 2: (20 points) Given the following data for demand at the fashion store, calculate the monthly forecast at period 10 using a 4-month moving average and trend-corrected exponential smoothing with an $\alpha = 0.2$ and an $\beta = 0.1$. Calculate the MAD. Which one is a good forecast? And why? Write your answer in the table provided below, only.

Month	Demand	Forecast	MAD
1	216		
2	229		
3	255		
4	219		
5	239		
6	245		
7	315		
8	297		
9	286		
10			

Answer of a 3-month moving average forecasting values

Month	Demand	Forecast	MAD
1	216		
2	229		
3	255		
4	219		
5	239		
6	245		
7	315		
8	297		
9	286		
10			

Answer of a trend-corrected exponential smoothing forecasting values

Month	Demand	Forecast	MAD
1	216		
2	229		
3	255		
4	219		
5	239		
6	245		
7	315		
8	297		
9	286		
10			

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Problem 3: (15 points) A major cell phone manufacturer, is making production plans for the coming year. Skycell has worked with its customers (the service providers) to come up with forecasts of monthly requirements (in thousand of phones) as shown in table.

Month	Demand	Month	Demand
January	1,000	July	1,600
February	1,100	August	900
March	1,000	September	1,100
April	1,200	October	800
May	1,500	November	1,400
June	1,600	December	1,700

Manufacturing is primarily an assembly operation, and capacity is governed by the number of people on the production line. The plant operates for 20 days a month, eight hours each day. One person can assemble a phone every 10 minutes. Workers are paid 100 Baht per hour and a 50 percent premium for overtime. The plant currently employs 1,250 workers. Component cost for each cell phone totals 500 Baht. Given the rapid decline in component and finished product prices, carrying inventory from one month to the next incurs a cost of 100 Baht per phone per month. A company currently has a lay-off policy in place. Overtime is limited to a maximum of 20 hours per month per employee. Assume that a company has a starting inventory of 50,000 units and wants to end the year with the same level of inventory. Assuming no backlogs, no subcontracting, formulate the mathematical model for this production plan. **Do not solve for the answer.**

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Problem 4: (15 points) A furniture manufacturer uses 20,000 square feet of plywood per month. And trucking company charges this manufacturer $400 per shipment, independent of the quantity purchased. The manufacturer offers an all unit quantity discount with a price of $1 per square foot for orders under 20,000 square feet, $0.98 per square foot for orders between 20,000 square feet and 40,000 square feet, and $0.96 per square foot for orders larger than 40,000 square feet. This manufacturer incurs a holding cost of 20 percent. What is the optimal lot size for the manufacturer? What is the annual cost of such a policy? What is the cycle inventory of plywood at the manufacturer? How does it compare with the cycle inventory if the manufacturer does not offer a quantity discount but sells all plywood at $0.94 per square foot?

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Problem 5: (10 points) Answer the following questions.

(a) Weekly demand for loaves of bread at a grocery store is normally distributed with a mean of 500 and a standard deviation of 200. Bread takes normal random variable with a mean of 1 weeks and a standard deviation of 2 days. This grocery is targeting a customer service level of 95 percent and monitors its inventory continuously. How much safety inventory of bread loaves should grocery carry? What should their ROP be?

(b) Weekly demand for 12 inches frames at the Frame Shop is normally distributed with a mean of 250 and a standard deviation of 150. The store manager has decided to follow a periodic review policy to manage inventory of frames. They plan to order every three weeks. The manufacturer currently takes two weeks to fill an order. Given a desired CSL of 95 percent, how much safety inventory should the store carry? What should their *order-up-to-level* be?

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Problem 6: (20 points) From the provided data below, calculate the vehicle routing of the transportation network of collecting palm fresh fruit bunch by using the saving algorithm. Capacity of truck is 15 tons.

Table 1. Ton of raw material collected

Node	Tons of Fresh Fruit Bunch
1	40
2	235
3	345
4	700
5	510
6	165

Table 2. Distance Matrix between node

	0	1	2	3	4	5	6
0	0	1.43	1.60	0.26	6.17	1.51	3.99
1	1.43	0	0.90	1.17	7.08	2.42	4.90
2	1.60	0.90	0	1.07	6.98	2.32	4.80
3	0.26	1.17	1.07	0	1.23	1.25	3.73
4	6.17	7.08	6.98	1.23	0	1.83	4.31
5	1.51	2.42	2.32	1.25	1.83	0	2.48
6	3.99	4.90	4.80	3.73	4.31	2.48	0

Note Node 0 is the origin point