Name _____ Student ID _____

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

Final Examination: Semester 2   Academic Year: 2007
Date: 19 February 2008   Time: 13:30-16:30
Subject: 225-601 Supply Chain Management   Room: A401

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 clear y 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 100 points.

Distribution of Score

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

Tests are prepared t y
Nikorn Sirivongpais il

Problem 1: (15 points) Given the following data for demand at the XYZ Company, calculate the monthly forecast for 2003 using a 3-month moving average and simple exponential smoothing with an $\alpha = 0.2$. Calculate the MAD and the tracking signal. Which one is a good forecast? And why? Write your answer in the table provided below, only.
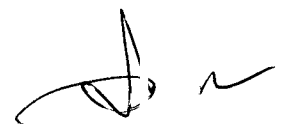
Period	Demand	Forecast	MAD	TS
Oct 02	850			
Nov 02	950			
Dec 02	900			
Jan 03	1000			
Feb 03	950			
Mar 03	1050			
Apr 03	850			
May 03	1100			
Jun 03	900			
Jul 03	1150			
Aug 03	1100			
Sep 03	900			
Oct 03	1000			
Nov 03	800			
Dec 03	1000			

Answer of a 3-month moving average forecasting values

Period	Demand	Forecast	MAD	TS
Oct 02	850			
Nov 02	950			
Dec 02	900			
Jan 03	1000			
Feb 03	950			
Mar 03	1050			
Apr 03	850			
May 03	1100			
Jun 03	900			
Jul 03	1150			
Aug 03	1100			
Sep 03	900			
Oct 03	1000			
Nov 03	800			
Dec 03	1000			

Answer of a simple exponential smoothing with an α = 0.2 forecasting values
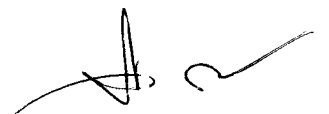
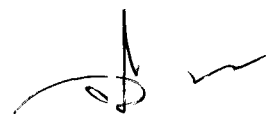| Period	Demand	Level	Forecast	MAD	TS
Oct 02	850				
Nov 02	950				
Dec 02	900	983			
Jan 03	1000				
Feb 03	950				
Mar 03	1050				
Apr 03	850				
May 03	1100				
Jun 03	900				
Jul 03	1150				
Aug 03	1100				
Sep 03	900				
Oct 03	1000				
Nov 03	800				
Dec 03	1000				

Problem 2: (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 25 days a month, eight hours each day. One person can assemble a phone every 15 minutes. Workers are paid 100 Baht per hour and a 50 percent premium for overtime. The plant currently employs 1,350 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 no lay-off policy in place. Overtime is limited to a maximum of 30 hours per month per employee. Assume that a company has a starting inventory of 30,000 units and wants to end the year with the same level of inventory. Assuming no backlogs, no subcontracting, and no new hires, formulate the mathematical model for this production plan. **Do not solve for the answer.**

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Problem 3: (20 points) A company purchases components from three suppliers. Components purchased from Supplier A are priced at 150 Baht each and used at the rate of 20,000 units per month. Components purchased from Supplier B are priced at 120 Baht each and used at the rate of 2,500 units per month. Components purchased from Supplier C are priced at 150 Baht each and used at the rate of 900 units per month. Currently, a company purchases a separate truckload from each supplier. Later, a company has decided to aggregate purchases from the three suppliers. The trucking company charges a fixed cost of 12,000 Baht for the truck with an additional charge of 3,000 Baht for each stop. Thus, if a company asks for a pickup from only one supplier, the trucking company charges 15,000 Baht; from two suppliers it charges 18,000 baht; and from three suppliers it charges 21,000 baht. Suggest a replenishment strategy for this company that minimizes annual cost. Compare the cost of your strategy with a company's current strategy of ordering separately from each supplier.
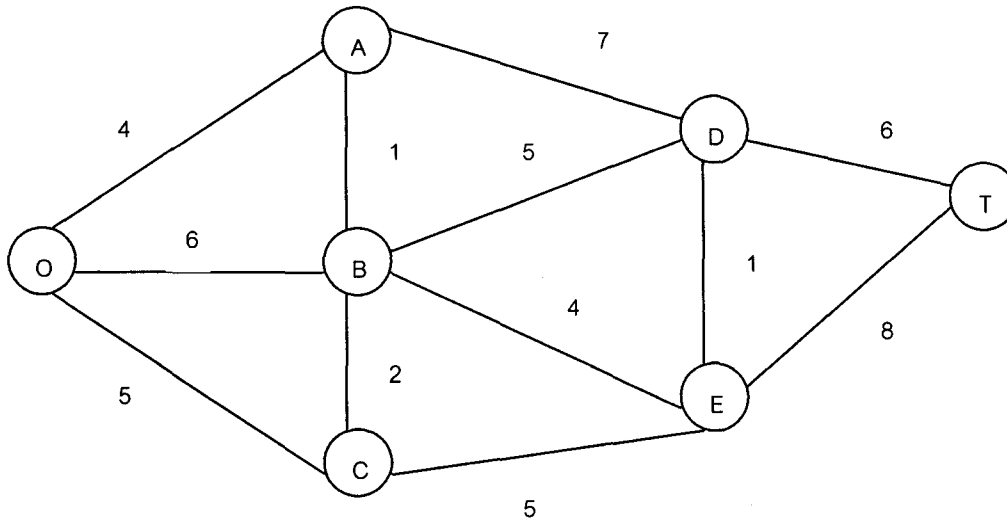
Problem 4: (20 points) Answer the following questions.

(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 two weeks to supply a grocery's order. This grocery is targeting a CSL of 90 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?

Problem 5: (10 points) The transportation manager needs to find the shortest path from his factory (node O) to the retailer (node T) through the road system shown in the figure below. Find the shortest path on this road system. Number on each arc represents distance.
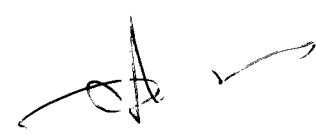
Problem 6: (20 points) Answer the following questions.

(a) What factors should be considered when making sourcing decisions?

(b) Explain how differential pricing can benefit a firm.

(c) Explain the characteristics information must have to be useful for decision making in a supply chain.

(d) What is the impact of lack of coordination on the performance of the supply chain?