AMERICAN UNIVERSITY OF BEIRUT

SULIMAN OLAYAN SCHOOL OF BUSINESS

DCSN 200: OPERATIONS MANAGEMENT

MIDTERM EXAM

April 12, 2011

7:00 PM – 9:00 PM

NAME _____

STUDENT ID _____

SECTION _____

INSTRUCTOR _____

This exam is administered in full observance of the Olayan School of Business Honor Code and the penalties it sets for violations of the standard of academic conduct. You are required to fully understand the code and to strongly adhere to it. In particular, cellular telephones, and computers of any shape or size are not allowed. No questions, no comments, no borrowing and no disturbance of the peace of any kind will be permitted or tolerated. You are required to stop working on the exam and hand it immediately when a proctor instructs you to do so. Any cheating or attempted cheating will subject the offender to a zero on the exam and a referral to the Student Affairs Committee for further penalties.

- Do not start the exam (do not turn to the next page) until instructed to do so
- You have 2 hours to complete the exam. You can answer questions in any order
- Your understanding of the questions is part of the exam. No questions will be answered by instructors. If in doubt, write your assumptions and continue solving
- When you start the exam, make sure that your exam paper has 12 pages
- You must hand in every page of the exam when you finish, including the formula sheet. If any page has become detached, your name must be written on it

- "I vow to complete the exam on my own without giving or receiving help from anyone and to adhere to the academic integrity standards reflected in the AUB student code of conduct"

SIGNATURE _____

Write your answers in the space provided. Be concise and follow the instructions closely. If you run out of space, continue on the back of the previous page, but indicate this fact clearly.

PART I.
SHORT ANSWERS for SHORT QUESTIONS (14 points)

1. **(2 points)** List two reasons why a company may wish to move all or part of its operations overseas

2. **(3 points) Bangalore (**also known as Bengaluru) is the capital of the state of Karnataka in India. Today as a large city and growing metropolis, Bangalore is home to many of the most well-recognized colleges and research institutions worldwide. Moreover, Bangalore is known as the *Silicon Valley of India* because of its position as the nation's leading IT exporter. Give two reasons why (to your opinion) Bangalore - despite more expensive rent and higher standard of living - keeps attracting small and large IT companies.

3. **(3 points)** A service blueprint partitions the customer's interaction with the process into three segments, name them and explain in FEW words each segment

4. **(1 point)** Describe the difference between production and productivity

5. **(1 point)** Name one tool that can be used to translate customer wants into a viable product design

6. **(2 points)** Explain briefly what mass customization means

7. **(2 points)** Mobile phone company Nikoa produces the model T1000 phone and the new model T2000. Sales for the T1000 have fallen in North America, due to competition and Nikoa's own newer model. The company sees an opportunity to continue to sell the T1000 in central and southern Africa, in countries such as Mozambique. What potential *disadvantages* of this strategy should Nikoa's senior management keep in mind?

SHORT ANSWERS for SHORT PROBLEMS (12 points)

1. **(3 points).** AUB Olayan School of Business (OSB) has the facilities and faculty to handle an enrollment of 1800 new students per semester. However, in an effort to limit class size to a "reasonable" level (25, generally) Dean Najjar, placed a ceiling on enrollment of 1500 new students. Although there was ample demand for business courses last semester, conflicting schedules allowed only 1200 new students to take business courses

   The OSB utilization rate is ----------% and efficiency rate is ----------%;

2. **(6 points).** Beds R Us targets the budget sector of the hotel market. The company has decided to move into the Mediterranean market. In order to study how competitive the market is, the following data was collected by a consulting firm employed by Beds R Us.

   a. Provide an annual forecast (of the number of hotel rooms in) for 2012 using a moving average with four year time window and weights of 5, 3, 1, 1, where the highest weight is for the newest data

Year	Number of hotel rooms in Beirut
2006	28000
2007	30100
2008	30800
2009	32500
2010	34000

   b. Compare your forecasts to the actual of 2010. Comment.

3. **(3 points).** The weekly output of a production process is shown below, together with data for labor and material input. The standard value of the output is $125 per unit. Labor costs are $16 per hour per employee; a work week is 40-hours. In addition to labor costs, overhead is charged weekly at the rate of $1500 plus .5 times the labor cost. Material cost is $10 per running meter (M). Calculate the weekly multifactor productivity.

Output/ units	Number of Worker	Material (M)
412	6	2840

PART II.

Question 1 (12points)

Faraya Village Club, a ski-resort in Lebanon, is planning the ski lift operation for 2011/2012. Management is trying to determine whether one or two lifts will be necessary. Each lift can accommodate a maximum of 250 people per day. Skiing occurs in the 14-week period from December to April, during which the lift will operate 7 days per week.

During bad economic conditions, it is expected that the first lift will operate at 90% capacity and a second lift, if built, would remain idle; the probability of bad economic conditions is believed to be 30%.

During normal economic conditions the first lift will operate at 100% capacity, and if there is a second lift it will realize 50% utilization. The probability of normal economic conditions is 50%.

Finally, if economic conditions are really good, the probability of which is 20%, the utilization of the second lift can increase to 90%.

The annual cost of installing one new lift is $50,000. The annual cost of installing two lifts is only $90,000. If used at all, each lift costs $200,000 to operate, no matter how low or high its utilization rate. Lift tickets are priced at $20 per customer per day.

As Operation Manager of Faraya Village Club would you purchase one lift or two? Carefully explain your answer.

Question 2 (16points)

You are the operations manager at Zara, Lebanon. The Managing Director is about to introduce the 2011 summer collection for the three categories: Women, Kids and Men. She wants to be sure that these various categories are profitable (i.e. they reach breakeven point during the season). At a recent meeting, she asked you to develop a break-even analysis. Each category will be considered as one product. The estimated variable costs for each category are as follows: $150 for Women, $75 for Kids and $50 for Men. The expected marginal revenues as set by sales are: $350 for Women, $200 for Kids, and $150 for Men. Additional costs include the salaries for designers $40,000 for each category; rental space: 5,000 square meters manufacturing space per category at $6 per square meter. Based on a marketing study, the sales of Women, Kids and Men should account for 45%, 35% and 20% of total sales respectively.

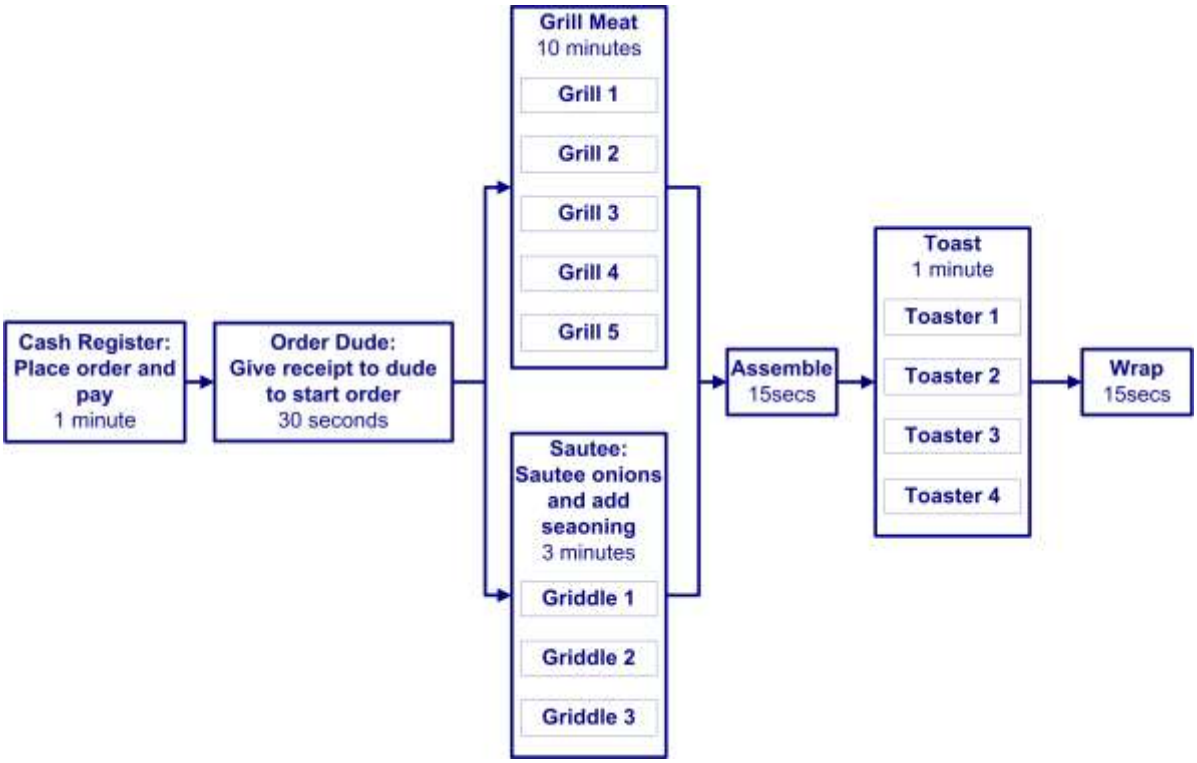
a. **(6 points)** What is your break-even point in dollars for all categories combined?

b. **(4 points)** At breakeven what are the sales AND quantity sold for the women category?

c. **(6 points)** Suppose you expect 90000 customers to visit your store in the coming season. What if each customer spends (on average) $100. How much (positive or negative) profit you will incur at the end of the season? Would you breakeven?

Question 3 (21points)

Those of you who have eaten at Bliss House know that they have a very efficient production process. But is it as efficient as possible? Sandwich preparation at Bliss is as follows: customers place and pay for their order, they give the receipt to the bald dude who shouts their order, the meat is then grilled while, simultaneously, the onions/mushrooms/peppers are sautéed with seasonings, the meat and sautéed items are then assembled in a sandwich, which is toasted, and wrapped. This process is depicted below: each box represents a step in the process and specifies the time required by the person/machine used for that step. Note there are five grilling machines, three griddles for sautéeing, and four toasters.



1. (3 points) What is the process cycle time of this process?

2. (4 points) Where is the bottleneck? Explain. Would the bottleneck be affected if one griddle is out of order?

3. (3 points) What is the process time of the system?

4. (5 points) It is forecasted that in one day (1day = 20 hours), Bliss House experiences demand for 750 sandwiches. Does the current production process have the capacity to accommodate this demand? Explain.

5. (6 points) Assume that the marginal profit from one sandwich is $2. Bliss house has capital of up to $250000 that can be invested to improve the business and increase capacity. The cost of a new toaster is $50000; the cost of a new grill is $125000; and that of a new griddle is $75000. We assume that Bliss House will undertake an investment if that investment generates, in the next two years, additional profits that cover the initial capital; (1 year = 350 days). Having in mind your previous analysis (1-4), what do you recommend Bliss House does?

Question 4 (25points)

Consider the catering business Fool.com: Individuals place orders online or by phone and Fool.com prepares each order and delivers it. The catering is open 24 hours, 7 days a week. The table below gives some information about the current orders. *Process Time* is the time to prepare the order and *Delivery Time* is the time for delivery of the food to the customer. The Work Time is the sum of both Processing and Delivery times.

Orders	Process Time (Hours)	Delivery Time (Hours)	Work Time (Hours)	Due Time (Hours)
Habash	1	3	4	3
Fatte	2	8	10	10
Moughrabieh	5	4	9	6
Kebbe	4	3	7	12

Fool.com is considering processing these orders either FCFS (the way they currently appear in the table) OR based on the Shortest Work Time. Fool.com is interested in reducing average lateness. However, because of freshness of the products, Fool.com also cares about maximizing utilization.

In the first two questions, it is assumed that Fool.com only looks at Work Time i.e. each order is processed then delivered before the next order starts.

1. (6 points) Give the scheduling order for both cases: FCFS and Shortest Work Time. Compute for both scheduling disciplines the lateness and the completion time for each order.

2. (2 points) Which scheduling policy Fool.com should follow? Explain

3. After graduating from AUB, you join Fool.com as a manager of operations. Your first initiative is to dissociate between order preparation and order delivery. (That is, you suggest having ONE person preparing food and another ONE for delivering.)

   <u>In all the questions below you will assume that both activities are dissociated.</u>

   a. (4 points) What schedule do you recommend that Fool.com follows? Explain.

   b. (5 points) Draw a Gantt (load) chart depicting your scheduling policy. Calculate average lateness and total idle time based on that policy

c. (3 points) Suppose that the delivery time for the Fatte order is not 8 but 4. How would this affect your schedule **(of part b.)** and the completion times?

d. (5 points) You want to show management that your policy performs better than Shortest Work Time. List the sequence of jobs if the Shortest Work Time is selected. Draw a Gantt chart to illustrate graphically what happens in this case, now that you have <u>two</u> employees. Compare both policies in terms of lateness and idle time.
(This question is independent of c.)

Formula Sheet:

$$\text{Moving average} = \frac{\sum \text{demand in previous } n \text{ periods}}{n}$$

$$\text{Weighted moving average} = \frac{\sum (\text{weight for period } n) \times (\text{demand in period } n)}{\sum \text{weights}}$$

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

$$F_t = \alpha(A_{t-1}) + (1 - \alpha)(F_{t-1} + T_{t-1}) \qquad T_t = \beta(F_t - F_{t-1}) + (1 - \beta)T_{t-1}$$

$$FIT_t = F_t + T_t$$

$$MAD = \frac{\sum |\text{Actual} - \text{Forecast}|}{n} \qquad MSE = \frac{\sum (\text{Forecast Errors})^2}{n}$$

$$MAPE = \frac{\sum_{i=1}^{n} 100|\text{Actual}_i - \text{Forecast}_i|/\text{Actual}_i}{n}$$

$$\hat{y} = a + bx$$

$$b = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2}$$

$$a = \bar{y} - b\bar{x}$$

$$BEP_{\$} = \frac{F}{\sum\left[\left(1 - \frac{V_i}{P_i}\right) \times (W_i)\right]}$$