FACULTY OF MANAGEMENT STUDIES

UNIVERSITY OF DELHI

MBA (FT) 1st year Exam, March/April 2017

Paper 6206: Production & Operations Management

Time: 3 hours

Max. Marks: 50

Attempt any **Five** questions. All questions carry equal marks

1. (a) What do the expressions order winning and order qualifying attributes mean? Give two examples each from both manufacturing and service industries.

(b) Why does the operations strategy keep changing for companies that are world-class competitors?

(c) An organization is currently engaged in manufacturing basic cooking utensils for household use. Although it has been in operation for the last ten years, of late there has been a margin squeeze due to a fall in its sales volume. The organization is trying to decide if it should provide a wider range of product choices to its customers in order to improve its margins. What are your suggestions to the organization for resolving this confusion? Would your answer have been different if they were manufacturers of high end premium cookware?

(3+2+5 = 10)

2. (a) Time Clocks Ltd. is considering two location options for locating its new clock manufacturing facility, Pune and Noida. The company has its existing manufacturing facility at Chennai, which caters to the markets in the southern part of the country. The new plant will cater to the northern and central regions of the country. The company estimates that the FC and VC at Pune are Rs. 2 million and Rs. 30 per clock respectively. On the other hand, the FC and VC are estimated at Rs. 1.8 million and Rs. 40 per clock respectively at Noida. The sales revenue estimates are also different for the two locations because of the consumers' perception of the quality of products manufactured at Pune being better. A clock can be sold for Rs. 100 if manufactured at Noida and the same clock can fetch Rs. 120 if manufactured at Pune. The management of the company will choose that location option for its new facility at which the break-even volume is lower. Which option should the company choose according to this criterion?

(b) What trade-offs are involved in deciding to have a single large, centrally located facility instead of several smaller, dispersed facilities? Identify few important factors that a location planner may consider with respect to setting up a multi-speciality hospital.

(5+5 = 10)

3. (a) A large catalog retailer of fashion apparel reported $100,000,000 in revenues over the last year. On average, over the same year, the company had $5,000,000 worth of inventory in their

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warehouses. Assume that units in inventory are valued based on cost of goods sold (COGS) and that the retailer has a 100 percent markup on all products.

(i) How many times each year does the retailer turn its inventory? The company uses a 40 percent per year cost of inventory. That is, for the hypothetical case the one item of $100 COGS would sit exactly one year in inventory, the company charges itself a $40 inventory cost.

(ii) What is the inventory cost for a $30 (COGS) item? You may assume that inventory turns are independent of the price.

(b) International Cranberry Uncooperative (ICU) is a competitor to the National Cranberry Cooperative (NCC). At ICU, barrels of cranberries arrive on trucks at a rate of 150 barrels per hour and are processed continuously at a rate of 100 barrels per hour. Trucks arrive at a uniform rate over eight hours. from 6:00 a.m. until 2:00 p.m. Assume the trucks are sufficiently small so that the delivery of cranberries can be treated as a continuous inflow. The first truck arrives at 6:00 a.m. and unloads immediately, so processing begins at 6:00 a.m. The bins at ICU can hold up to 200 barrels of cranberries before overflowing. If a truck arrives and the bins are full, the truck must wait until there is room in the bins.

(i) What is the maximum number of barrels of cranberries that are waiting on the trucks at any given time?

(ii) At what time do the trucks stop waiting?

(iii) At what time do the bins become empty?

$$(5+5 = 10)$$

4. (a) A high-end fashion goods store has to decide on the quantity of handbags to sell during the Christmas season. The unit cost of the handbag is $28.50 and the handbag sells for $150. All handbags remaining unsold at the end of the season are purchased by a discounter for $20 each. Further, there is a significant 40% inventory holding cost incurred for each unsold bag. Demand for bags is distributed normally with mean 150 and standard deviation 20. How many bags should be purchased to maximize expected profit?

(b) A company currently has 200 units of a product on hand that it orders every two weeks when the salesperson visits the premises. Demand for the product averages 20 units per day with a standard deviation of 5 units. Lead time for the product to arrive is 7 days. Management has a goal of 95% probability of not stocking out for this product. The salesperson is due to come late this afternoon when 180 units are left in stock (assuming that 200 units are sold today). How many units should be ordered? (1 week = 7 days)

$$(5+5 = 10)$$

5. You are supplied with a monthly demand forecast, an organizational policy of requiring 10% of a month's forecast as safety stock and the number of operating days available each month. There is no inventory available at the beginning of the first month, January. The following table contains the demand requirements:

Period	Forecasted demand	Operating days
January	10,000	22
February	15,000	19
March	30,000	21
April	27,000	21
May	30,000	22
June	16,000	20

The costs for the Organization are as follows:

Manufacturing cost/unit:	Rs. 100
Inventory holding cost:	Rs. 2/unit/month
Hourly wage rate:	Rs. 8
Stockout cost per unit:	Rs. 5
Hourly overtime wage rate:	Rs. 12
Labour hours/unit:	4 hours
Layoff cost/worker:	Rs. 500
Hiring and training cost:	Rs. 400

Produce to exact production requirements by varying the size of the workforce on regular hours (i.e. apply chase strategy for formulating the production plan). Assume there are 250 workers available in January. Some of the above data might be redundant.

(10)

6. (a) Assume that you are the manager of Assembly, Inc. You have just received an order for 40 units of an industrial robot, which is to be delivered at the start of week 7 of your schedule. Using the following information, determine how many units of subassembly G to order and the timing of those orders, given that subassembly G must be ordered in multiples of 80 units and all other components are ordered lot-for-lot. Assume that the components are used only for this particular robot.

Item	Lead time (weeks)	On hand	Components
Robot	2	10	B, G, C(3)
B	1	5	E, F
C	1	20	G(2), H
E	2	4	-
F	3	8	-
G	2	15	-
H	1	10	-

(b) How is continuous production different from intermittent production? Give two examples for each of the following production system

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(i) Job production

(ii) Batch production

(iii) Flow production

(5+5 = 10)

7. (a) The manufacturing Engineers at Suny Manufacturing were working on a new remote controlled toy Monster Truck. They hired a production consultant to help them determine the best type of production process to meet the forecasted demand for this new product. The consultant recommended that they use an assembly line. He told the manufacturing Engineers that the line must be able to produce 600 Monster Trucks per day to meet the demand forecast. The workers in the plant work 8 hours per day. The task information for the new Monster Truck is given below:

Task	Task time (Secs)	Task that must precede
A	28	-
B	13	-
C	35	B
D	11	A
E	20	C
F	6	D, E
G	23	F
H	25	F
I	37	G
J	11	G, H
K	27	I, J
Total	236	

i. Draw the schematic diagram.
ii. What is the required cycle time to meet the forecasted demand of 600 trucks per day based on 8-hour work day?
iii. What is the theoretical minimum number of workstations given the answer in part b?
iv. Use longest task time with alphabetical order as the tie breaker and balance the line in the minimum number of stations to produce 600 trucks per day.

(b) Identify an appropriate layout for each of the following situations. Justify your choice.

(i) A multi-cuisine restaurant in a posh residential area in New Delhi
(ii) An automobile manufacturer manufacturing four product groups for the export markets

(8+2 = 10)

8. (a) An ad agency tracks the complaints about the billboards in its city on weekly basis as follows:

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Week	No. of complaints
1	4
2	5
3	4
4	11
5	3
6	9

(i) What are three sigma control limits for this process? Assume that the historical complaint rate is unknown.

(ii) Is the process mean in control, according to the control limits? Why or why not?

(b) An appliance manufacturer wants to contract with a repair shop to handle authorized repairs in Indianapolis. The company has set an acceptable range of repair time of 50 minutes to 90 minutes. Two firms have submitted bids for the work. In test trials, one firm had a mean repair time of 74 minutes with a SD of 4.0 minutes and the other firm had a mean repair time of 72 minutes with a SD of 5.1 minutes. Which firm would you choose and why?

(c) Write a short note on lean manufacturing.

(3+4+3 = 10)