

FACULTY OF MANAGEMENT STUDIES
UNIVERSITY OF DELHI

MBA (FT) 1st year Exam, March/April 2018

Paper 6206: Production & Operations Management

Time: 3 hours

Max. Marks: 50

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

1. (a) What is the difference between order-winners and order-qualifiers? Could a competitive criterion be an order-winner in one market and a qualifier in another market? Elucidate with the help of suitable examples.
(b) Operations strategies can be market-driven, market-driving or both. Explain this statement with the help of suitable examples.

(5+5) = 10

2. (a) Although most organizations may make the location decisions infrequently, there are some organizations that make the location decisions quite regularly. Provide two examples each for the above two types of organizations. How might the approach to location decision in these two categories of organizations differ from each other?

(b) The owner of a restaurant hopes to expand the present operation by adding one new outlet. She has studied three locations. Each would have the same labour and materials costs of \$1.76 per sandwich. Sandwiches sell for \$2.65 each in all locations. Rent and equipment costs would be \$5000 per month for location A, \$5500 for location B, and \$5800 for location C.

- (i) Determine the volume necessary at each location to realize a monthly profit of \$10,000.
(ii) If expected sales at A, B and C are 21,000 per month, 22,000 per month and 23,000 per month respectively, which location would yield the greatest profit?

(4+6) = 10

3. (a) What is the difference between a job shop and batch flow process? Explain with the help of examples. How can the product-process matrix help in making process selection decision?

(b) For the set of tasks provided below, do the following:

- (i) Develop the precedence diagram.
(ii) Determine the minimum and maximum cycle times in seconds for a desired output of 500 units in a 7-hour day. Why might a manager use a cycle time of 50 seconds?
(iii) Determine the minimum number of workstations for output of 500 units per day.

Task	Task time (Seconds)	Immediate Predecessors
A	45	-
B	11	A
C	9	B
D	50	-
E	26	D
F	11	E
G	12	C
H	10	C
I	9	F, G, H
J	10	I

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(4+6) = 10

4. (a) You are a newspaper vendor selling newspaper every morning. Before you get to work, you go to the printer and buy the day's paper for \$0.25 a copy. You sell a copy of the newspaper for \$1.00. Daily demand is normally distributed with mean = 250 and standard deviation = 50. At the end of the morning, any leftover copies are worthless and they go to recycle bin.

- How many copies of the newspaper should you buy each morning?
- Based on part (i), what is the probability that you will run out of stock?

(b) After graduation, you decide to go into partnership in an office supply store that has existed for a number of years. Walking through the store and the stockrooms, you find a great discrepancy in service level. Some spaces and bins for items are completely empty; others have supplies that are covered with dust and obviously been there for a long time. You decide to take on the project of establishing consistent level of inventory to meet customer demands. Most of your supplies are purchased from just a few distributors that call on your store once every two weeks. You choose, as your first item for study, computer printer paper. You examine the sales records and purchase orders and find that demand for the past 12 months was 5000 boxes. Using your calculator, you sample some days' demand and estimate that the standard deviation of daily demand is 10 boxes. You could also manage to collect the following data:

- Cost per box of paper: \$11;
- Desired service level probability: 98%
- Store is open every day;
- Salesperson visits every two weeks
- Delivery time following visit is three days.

How many boxes of paper would be ordered if the salesperson called every two weeks and 60 boxes are in stock?

(4+6) = 10

5. (a) Compare between fixed-order quantity (FOQ) model and fixed-order interval (FOI) model along with the situations under which both of them are used. Further compare between ABC analysis, VED analysis and FSN analysis of classifying the items under three different categories.

(b) A company manufactures hair dryers. It buys some of the components, but makes the heating element, which it can produce at the rate of 800 per day. Hair dryers are assembled daily, 250 days a year, at the rate of 300 per day. Because of the disparity between production and usage rates, the heating elements are periodically produced in batches of 2000 units.

- Approx. how many batches of heating elements are produced annually?
- If production on a batch begins when there is no inventory of heating elements on hand, how much inventory will be on hand two days later?
- What is the average inventory of elements, assuming each production cycle begins when there are none on hand?

$$(5+5) = 10$$

6. Compaq Computer would like to develop an aggregate plan for one of its product types. The monthly demands for the next six months are given below. Compaq can produce approx. 120 computers each month for each production worker. Compaq expects to end March with 15,000 computers on hand and 1000 workers on staff. It costs \$6000 to hire and train a worker and \$4000 to lay off one. Workers receive \$3000 per month in salary and benefits. Any computer held in inventory at the end of a month costs \$50 in holding costs. Compaq would like to end September with at least 10,000 computers on hand and between 1100 and 1200 workers on staff. (a) Develop an aggregate plan for Compaq using a level workforce strategy. (b) Compute the total six-month cost using this plan.

Month	Apr	May	June	July	Aug	Sept
Demand (‘000)	140	125	120	150	155	130

10

7. (a) A process that is considered to be in control measures an ingredient in ounces. The following table shows 10 samples of size $n = 5$. The population standard deviation is 1.36.

Samples									
1	2	3	4	5	6	7	8	9	10
10	9	13	10	12	10	10	13	8	10
9	9	9	10	10	10	11	10	8	12
10	11	10	11	9	8	10	8	12	9
9	11	10	10	11	12	8	10	12	8
12	10	9	10	10	9	9	8	9	12

- What is standard deviation of the sample?
- If $z = 3$, what are the control limits for mean chart?

(iii) What are the control limits for range chart?

(iv) Is the process in control?

(b) What is the difference between C_p and C_{pk} ? Explain what does a C_{pk} value of 1 indicate.

(c) A manufacturing firm produces parts and materials for the heating, ventilation and air conditioning industry. One of its facilities produces metal ductwork in various sizes for home construction market. One particular product is 6-inch diameter round metal ducting. The diameter of the finished ducting is critical. If it is too small or large, contractors will have difficulty fitting the ducting into other parts of the system. The target diameter is 6 inches exactly, with an acceptable tolerance of 0.03 inches. Anything produced outside of specification is considered defective. The line supervisor for this product has data showing that the actual diameter of finished product is 5.99 inches with a standard deviation of 0.01 inches.

(i) What is the current capability index of this process?

(ii) What is the probability of producing a defective unit in this process?

(4+2+4) = 10

8. (a) Product Z is made up of two units of A and four units of B. A is made of three units of C and four units of D. D is made of two units of E. Lead times for purchase or fabrication of each unit to final assembly: Z takes two weeks; A, B, C and D take one week each; and E takes three weeks. 50 units are required in period 10. Assume that currently there is no inventory on hand of any of these items.

(i) Show the bill of materials (product structure tree).

(ii) Develop an MRP planning schedule showing gross and net requirements and order release and order receipt dates.

(b) Discuss the concept of drum, buffer and rope. What is the difference between transfer batch and process batch?

(c) How does Kanban function in a JIT system?

(4+4+2) = 10