

[This question paper contains 9 printed pages.]

4206

Your Roll No.

MBA (FT)

A

**Paper MBAFT-6206 – PRODUCTION AND
OPERATIONS MANAGEMENT**

(Admissions of 2010 and onwards)

Time : 3 Hours

Maximum Marks : 50

*(Write your Roll No. on the top immediately
on receipt of this question paper.)*

*Attempt five questions in all, selecting
atleast two questions from each section.*

SECTION – A

1. (a) What is your most admired company in the area of manufacturing operations management? Give and briefly discuss the unique practices followed by that company. (6)
- (b) What is the concept of manufacturing in a 'work cell'? What are the pre-requisites and advantages for manufacturing in a work cell? (4)
2. A furniture manufacturing company plans to produce a deck table assembly using a production line approach. The shop foreman and lead production supervisor developed a precise description of the work elements required for the table assembly. The company

P.T.O.

operates a standard eight hour day. An estimation of past demand and current orders on hand led the manager to believe that she needs to produce 120 units per day. Given the data in the table, that follows, estimate.

- (a) The cycle time and minimum number of work-stations.
- (b) The re-grouping of tables into work-centres to meet the production target.
- (c) Line efficiency and
- (d) The percentage of idle time on the line.

($2\frac{1}{2} \times 4$)

Activity Code	Description	Time (min.)	Predecessor(s)
1	Inspect top board kit	0.5	Nil
2	Sequence top boards in jig	0.6	1
3	Insert top braces in jig	0.3	2
4	Screw braces to top boards	3.6	3
5	Remove top assembly	0.2	4
6	Inspect bottom sawbuck stand boards	0.5	Nil
7	Insert left end X-boards into jig	0.4	6
8	Drill, insert and tighten centre bolt	1.25	7
9	Remove left end assembly from jig	0.4	8

10	Insert right end X-boards into jig	0.5	6
11	Drill, insert and tighten centre bolt	1.25	10
12	Remove right end assembly from jig	0.4	11
13	Attach centre brace connecting left and right X-boards	2.3	12
14	Attach hinges to top using placement jig	3.6	5
15	Attach base assembly to hinges	1.3	14
16	Inspect	0.7	15
17	Package	1.8	16

3. (a) What is Taguchi's 'offline' approach to quality ?
What does quality loss function refer to ? How
these losses can be quantified ? (3)

(b) A company manufacturing a health supplement
for women controls the quantity of Folic Acid
in mg. The desired levels are 12 ± 2 mg. The
quality control manager takes 10 samples with 4
observations each of the quantity of Folic Acid
filled, the data of which is given in the table that
follows. Given that :

For $n = 4$, $A_2 = 0.73$, $D_3 = 0$, $D_4 = 2.28$;

$n = 10$, $A_2 = 0.31$, $D_3 = 0.22$, $D_4 = 1.78$,

(i) Estimate limits for 3-sigma mean and range chart? Show through a chart.

(ii) Is the process out of control? Comment.

(5)

Sample Number	Observations (Folic acid in mg)			
	1	2	3	4
1	12.5	12.3	12.6	12.7
2	12.8	12.4	12.4	12.8
3	12.1	12.6	12.5	12.4
4	12.2	12.6	12.5	12.3
5	12.4	12.5	12.5	12.5
6	12.3	12.4	12.6	12.6
7	12.6	12.7	12.5	12.8
8	12.4	12.3	12.6	12.5
9	12.6	12.5	12.3	12.6
10	12.1	12.7	12.5	12.8

(c) Estimate whether the process as described in (b) is capable enough? Justify your answer by calculating ' C_p ' and ' C_{pk} ' values. (2)

4. (a) Briefly discuss the various pillars of TPM. (4)

OR

Outline the elements of OHSAS. (4)

- (b) An industrial engineer wants to prepare an estimate of 'proportion' of time that an executive at a beach-side spa spends treating the customers with a 95.45% confidence level. Based on prior experience, the estimate is 85%. If the industrial engineer uses a sample size of 286 observations, what would be the range of the true (absolute) value of the estimate (of the 'proportion' of time). (6)

SECTION - B

5. A company is planning to set up a distribution centre (DC) of FMCG in the suburbs of a city. It has already entered into an agreement with five different manufacturing facilities to source one item each from them. The distance co-ordinates of these five manufacturing facilities from a reference point in the grid map are as follows: Zone 1 (15, 22), Zone 2 (10, 40), Zone 3 (35, 15), Zone 4 (50, 5), and Zone 5 (40, 35). The expected volume of goods (in tons) to be shipped from the five zones to the distribution centre is 200, 130, 80, 170 and 120 respectively.

- (i) What is the centre of gravity of the distribution centre ?
- (ii) If the shipping cost from the manufacturing facilities to the DC involves Rs. 300 per ton, what is the cost implication of locating the DC in the centre of gravity ?
- (iii) The management found that the operational and maintenance cost of the centre of gravity point is as high as Rs. 2,500,000 per annum. In view of this, they are considering other options. They have identified three other candidate locations whose operational and maintenance cost would be less than at the centre of gravity by 10%, 25% and 18% respectively. The locational coordinates of these three are (20, 40), (40; 25), and (35, 45) respectively. What should the company do in this case ? (2,2,6).
6. A company produces a variety of recreation and leisure products. The production manager has developed an aggregate forecast :

Month	Mar	Apr	May	June	July	Aug	Sept	Total
Forecast	50	44	55	60	50	40	51	350

Use the following information to develop an aggregate plan using 'level' strategy.

Regular production cost : Rs. 80 per unit

Overtime production cost : Rs. 120 per unit

Subcontracting cost: Rs. 140 per unit

Regular production capacity: 40 units per month

Overtime production capacity: 8 units per month

Subcontracting capacity: 12 units per month

Holding cost: Rs. 10 per unit per month

Back-order cost: Rs. 20 per unit

Beginning inventory: 0 units

You can use a combination of backlogs, subcontracting and inventory to handle variations in demand. (10)

7. (a) In the basic EOQ model, why does minimizing the total stocking cost also minimize the total material cost? Suppose the EOQ for an item a company uses is 3571. Would it be all right for the company to order 3500 or 4000 instead? (4)
- (b) The manager of a car wash received a revised price list from the vendor who supplies liquid soap and a promise of a shorter lead time of deliveries. Formerly the lead time was 4 days, but now the vendor promises a reduction of 25% in that time. Annual usage of liquid soap is 4500 litres. The car wash is open 360 days a year. Assume that

daily usage is normal and that it has a standard deviation of 2 litres per day. The ordering cost is Rs. 30 and annual carrying cost is Rs. 3 per litre. The revised price list (cost per litre) is shown in the following table :

Quantity	Unit price
1-399	Rs. 2.00
400-799	Rs. 1.70
800 and above	Rs. 1.62

- (i) What order quantity is optimal ?
- (ii) What ROP is appropriate if the acceptable risk of a stockout is 1.5% ? (3,3)
8. (a) Identify three important factors that a location planner may consider with respect to each of the following :
- (i) A super-speciality intensive care unit (ICU).
- (ii) A state-of-the-art design centre for automobile manufacturing

OR

A firm is interested in choosing between the minimization of makespan and minimization of flow time as the performance criterion. What are the pros and cons of using these rules ? (2,2)

- (b) A plastic parts manufacturer makes its products using two machines, 1 and 2. All jobs must be processed on machine 1 first and then on machine 2. The company currently has six jobs to run. The estimated processing times and due dates for these jobs are given below.

Job	Processing time (days)		Due date from now
	M/c1	M/c2	
A	5	9	41
B	4	6	38
C	7	10	37
D	8	8	52
E	12	9	47
F	9	6	41

- (i) Determine the optimal sequence in which the jobs should be run to minimize the makespan.
- (ii) Compute the makespan time.
- (iii) Compute the average job tardiness that results from the sequence in part (i). (2,2,2)