

Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Operations Management	Semester: I
Programme: MBA LSCM	Course Code:LSCM7001
Time: 03 hrs.	Max. Marks: 100
Instructions: As per sections	

SECTION A

S. No.	Attempt all questions(20 marks)	Marks	CO
Q 1	Mark True/False (T/F) for the following		
a)	In Build to Order, the product is completely made into their final form and stocked as finished goods(T/F)	2	CO 2
b)	Scheduled receipt is derived from MPS or planned order release of the parent(T/F)	2	CO 5
c)	In Gap model, Gap 1 is the discrepancy between customer expectations and management perceptions of those expectations(T/F)	2	CO 6
d)	Order qualifiers are dimensions by which a potential customer determines which suppliers of a product or service meet certain criteria(T/F)	2	CO 1
2	Fill in the blanks		
a)	_____ is the interval between successive outputs coming off the assembly line	2	CO 2
b)	The original approach to JIT focused on _____ reduction.	2	CO 6
c)	_____ inventory is the inventory purposely placed between operations to allow them to operate independently of one another.	2	CO 5
d)	_____ is the difference between the completion time and the due date (either positive or negative)	2	CO 4
e)	A useful tool for depicting a schedule graphically is a _____ chart	2	CO 4
f)	_____ capacity is the maximum output per unit time the process can achieve for a short period of time under ideal operating conditions	2	CO 3

SECTION B

	Attempt any four questions	20	
Q3	Compare the four types of facility layouts based on Demand Volume, Equipment utilization, Flexibility and Type of equipment.	5	CO 3
Q4	What do you understand by Operations Strategy?	5	CO 1
Q5	What are the various types of inventory control techniques?	5	CO 5
Q6	What do you understand by Acceptance Sampling? What are the various types of sampling errors?	5	CO 6
Q7	How do you measure capacity in job shops?	5	CO 3

SECTION-C

Note: Attempt any three questions. Each question carries 10 marks.

30

Q8 Find the optimal order quantity of a product for which the price breaks are as follows:

Quantity(units)	Price per unit(Rs.)
$0 < Q_1 < 100$	20.00
$100 \leq Q_2 < 200$	18.00
$200 \leq Q_3$	16.00

10

CO 5

The monthly demand of the product is 200 units, the storage cost is 20 percent of the unit cost and the cost of ordering is Rs. 25 per order.

Q9 We have five jobs, each of which must go through two machines in the order BA. Their processing times are given below:

Job	1	2	3	4	5
Machine A	10	2	18	6	20
Machine B	4	12	14	16	18

10

CO 4

Decide the optimum sequence of processing of jobs in order to minimize the total time required. Also find the total minimum elapsed time.

Q10 Find the forecast for the month of May using exponential smoothing method

Demand data

Jan 32.1 Feb 36.2 Mar 28.0 Apr 27.5

And the January Forecast was: 27

Smoothing constant = 0.15

b) Find the mean absolute deviation (MAD) if the actual demand for May is 30.0

10

CO 5

Q11 Formulate the capacitated plant location model for 3 potential plant locations and 2 number of markets. Classify the same for n potential plant locations and m number of markets.

10

CO 3

SECTION-D

Note: Attempt any two questions. Each question carries 15 marks

30

Q12

Product X is made from two components, A and B. It takes two A's and one B to make a single product X. Component A is made from three parts C's. Component B is made from two part C's and 5 part D's. Use this information together with data below to answer the following questions:

Part	Lead Time	Lot Size	On hand	Scheduled Rcpts
X	2	Lot for Lot	50	None
A	3	100	75	None
B	1	50	35	None
C	2	300	100	300, week 1
D	2	300	20	None

a) Make MRP records for each of X, A, B, C, and D. Production quantities and production start dates for X are: 20 each in week 1, 2, 3, 10 each in week 4, 5, 20 in week 6, 40 in week 8, and 40 in week 10.

Use the below MRP record template:

Week	
Gross Requirement	
Scheduled receipts	
Projected Available	
Net requirements	
Planned order receipt	
Planned order release	

15

CO 3

Q13

The required data for a small project consisting of different activities are given below:

Activity	Immediate Predecessors	Normal time (weeks)			Normal cost	Crash time	Crash cost (Rs.)
		Optimistic	Pessimistic	Most likely			
A	None	4	12	5	300	5	400
B	None	6	10	8	400	6	600
C	A	4	14	6	400	5	600

15

CO 4

D	B	4	20	12	1000	4	1400
E	C	8	8	8	800	8	800
F	B	5	13	6	400	6	500
G	D,E	3	7	5	1000	3	1400
H	F	4	12	8	500	5	700

- a) Draw the network diagram for the project and find the normal and minimum project length
- b) If the project is to be completed in 21 days with minimum crash cost which activities should be crashed to how many days?

Q14

- a) Assume that the company is going to manufacture the item with the equipment that is estimated to produce 100 units per day. The consumption of the item is 10000 units/year. The cost of the unit thus produced is Rs 3.50 per unit. The set-up cost is Rs. 150 per set-up and the inventory carrying charge is 25% of the unit cost. What is the optimum production lot size(Q^*)? Assume 250 working days in the year.
- b) In the above question, if the lead-time to receive an order is 9 days, standard deviation of demand is 5 and the customer service level is 95%, find the reorder point.

15

CO 5

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SECTION A

S. No.		Marks	CO
	Attempt all questions	20	
Q 1	What are your learnings from Toyota case study?	10	CO 1,2,3
Q 2	What are your learnings from CRU Computer Rentals case study?	10	CO 4,5

SECTION B

	Attempt any four questions	20	
Q3	What do you understand by process layout and product layout?	5	CO 4
Q4	What are the various techniques of capacity expansion? Explain.	5	CO 4
Q5	What do you mean by Economies of scale, Vertical Integration and mass customization?	5	CO 2
Q6	What are the various qualitative measures of forecasting?	5	CO 3
Q7	Explain the most commonly used Six Sigma process.	5	CO 6

SECTION-C

	Attempt all questions	30							
Q8	<p>Find the optimal order quantity of a product for which the price breaks are as follows:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Quantity(units)</th> <th style="text-align: center;">Price per unit(Rs.)</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">0 < Q₁ < 500</td> <td style="text-align: center;">10.00</td> </tr> <tr> <td style="text-align: center;">500 ≤ Q₂</td> <td style="text-align: center;">9.00</td> </tr> </tbody> </table> <p>The monthly demand of the product is 200 units, the storage cost is 2 percent of the unit cost and the cost of ordering is Rs. 350 per order.</p>	Quantity(units)	Price per unit(Rs.)	0 < Q₁ < 500	10.00	500 ≤ Q₂	9.00	10	CO 5
Quantity(units)	Price per unit(Rs.)								
0 < Q₁ < 500	10.00								
500 ≤ Q₂	9.00								

Q9	<p>A book binder has one printing press, one binding machine and manuscripts of 7 different books. The process is first printing and then binding. The times required for performing binding and printing operations for different books are shown below:</p> <table border="1" data-bbox="203 438 1265 699"> <thead> <tr> <th>Book</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> <th>7</th> </tr> </thead> <tbody> <tr> <td>Binding time(hours)</td> <td>20</td> <td>90</td> <td>80</td> <td>20</td> <td>120</td> <td>15</td> <td>65</td> </tr> <tr> <td>Printing time(hours)</td> <td>25</td> <td>60</td> <td>75</td> <td>30</td> <td>90</td> <td>35</td> <td>50</td> </tr> </tbody> </table> <p>Decide the optimum sequence of processing of books in order to minimize the total time required to bring out all the books. Also find the total minimum elapsed time.</p>	Book	1	2	3	4	5	6	7	Binding time(hours)	20	90	80	20	120	15	65	Printing time(hours)	25	60	75	30	90	35	50	10	CO 3	
Book	1	2	3	4	5	6	7																					
Binding time(hours)	20	90	80	20	120	15	65																					
Printing time(hours)	25	60	75	30	90	35	50																					
Q10	<p>A quality characteristic under study has a manufacturing specification (in cm) of 0.200 ± 0.05. Historical data indicates that if the quality characteristic takes on values larger than 0.25 cm or smaller than 0.15 cm, the product fails and the cost of \$75 is incurred. Based on these data,</p> <p>a) Determine the Taguchi Loss function b) Estimate the loss for quality characteristic of 0.135 cm.</p>	10	CO 6																									
SECTION-D																												
	Attempt any two questions	30																										
Q11	<p>Product A is made from two components, B and C. It takes one B and three C's to make a single product A. Component B is made from two parts D's. Component C is made from one part D and 2 part E's. Use this information together with data below to answer the following questions:</p> <table border="1" data-bbox="298 1436 1268 1843"> <thead> <tr> <th>Part</th> <th>Lead Time</th> <th>Lot Size</th> <th>On hand</th> <th>Scheduled Rcpts</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>1</td> <td>Lot for Lot</td> <td>50</td> <td>None</td> </tr> <tr> <td>B</td> <td>1</td> <td>Lot for Lot</td> <td>10</td> <td>None</td> </tr> <tr> <td>C</td> <td>2</td> <td>200</td> <td>100</td> <td>None</td> </tr> <tr> <td>D</td> <td>1</td> <td>300</td> <td>120</td> <td>None</td> </tr> </tbody> </table>	Part	Lead Time	Lot Size	On hand	Scheduled Rcpts	A	1	Lot for Lot	50	None	B	1	Lot for Lot	10	None	C	2	200	100	None	D	1	300	120	None	15	CO 3
Part	Lead Time	Lot Size	On hand	Scheduled Rcpts																								
A	1	Lot for Lot	50	None																								
B	1	Lot for Lot	10	None																								
C	2	200	100	None																								
D	1	300	120	None																								

E	2	500	0	500, week 1
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a) Make MRP records for each of A, B, C, D, and E. Production quantities and production start dates for A are: 20 in week 2, 50 in week 4, 30 in week 6, 40 in week 7, 50 in week 9, and 40 in week 11.

Use the below MRP record template:

Week	
Gross Requirement	
Scheduled receipts	
Projected Available	
Net requirements	
Planned order receipt	
Planned order release	

Q12

Patel Machinery Co. has been offered a contract to build and deliver nine extruding presses to the ABC Bottling Co. The contract price is contingent on meeting specified delivery time, a bonus being given for early delivery. The marketing department has established the following cost and time information:

Activity	Normal time (weeks)			Normal cost	Crash time	Crash cost (Rs.)
	Optimistic	Pessimistic	Most likely			
1-2	1	5	3	15000	5	19000
2-3	1	7	4	18000	6	24000
2-4	1	5	3	14000	5	16000
2-5	5	11	8	15000	4	16000
3-6	2	6	4	13000	8	15000
4-6	5	7	6	12000	6	13000
5-7	4	6	5	20000	3	24000
6-7	1	5	3	17000	5	20000

normal delivery time is 16 weeks for a contract price of Rs. 1,24,000. Based on the

15

CO 4

	<p>probability for each of the specified delivery time, recommend the delivery schedule that the Patel Machinery Co. should follow:</p> <table border="1" data-bbox="203 304 1295 495"> <thead> <tr> <th data-bbox="203 304 748 342">Contract Delivery Time(weeks)</th> <th data-bbox="748 304 1295 342">Contract Amount(Rs.)</th> </tr> </thead> <tbody> <tr> <td data-bbox="203 342 748 380">15</td> <td data-bbox="748 342 1295 380">1,42,500</td> </tr> <tr> <td data-bbox="203 380 748 417">14</td> <td data-bbox="748 380 1295 417">1,45,000</td> </tr> <tr> <td data-bbox="203 417 748 455">13</td> <td data-bbox="748 417 1295 455">1,50,000</td> </tr> <tr> <td data-bbox="203 455 748 495">12</td> <td data-bbox="748 455 1295 495">1,52,500</td> </tr> </tbody> </table>	Contract Delivery Time(weeks)	Contract Amount(Rs.)	15	1,42,500	14	1,45,000	13	1,50,000	12	1,52,500				
Contract Delivery Time(weeks)	Contract Amount(Rs.)														
15	1,42,500														
14	1,45,000														
13	1,50,000														
12	1,52,500														
Q13	<p>The Costello Music company has been in business for 5 years. During that time its sales of electric organs have grown from 12 units to 76 units per year. Fred Costello, the firm's owner wants to forecast next year's organ sales. The historical data follows:</p> <table data-bbox="203 646 716 716"> <tr> <td>Year</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>Sales</td> <td>12</td> <td>28</td> <td>34</td> <td>50</td> <td>76</td> </tr> </table> <p>a) What forecasting method do you recommend and why? b) Use your recommendation to obtain the forecast for Years 6 and 7.</p>	Year	1	2	3	4	5	Sales	12	28	34	50	76	15	CO 6
Year	1	2	3	4	5										
Sales	12	28	34	50	76										