

GUJARAT TECHNOLOGICAL UNIVERSITY
MBA-SEMESTER-II-EXAMINATION- SUMMER-2024

Subject Code: 1529605

Date: 12/06/2024

Subject Name: Production & Operations Management

Time: 10:30 AM TO 01:30 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Use of simple calculators and non-programmable scientific calculators are permitted.

Q.1 Definitions / terms / explanations / short questions based on concepts of theory/practical **14**

- a) State factors affecting plant location decisions
- b) A-B-C analysis in Inventory management
- c) What is Crashing?
- d) Pessimistic time in project management
- e) What is Six Sigma
- f) What is Line Balancing?
- g) Arrival rate Vs Serving Rate

Q.2 (a) For ABC Ltd , it procures gear boxes from their sub vendor as follows. **07**

Annual Demand : 400000 Units
 Purchase quantity : 100000 Units
 Safety stock : 50000 Units

The ordering cost is Rs.1000 per order, irrespective of number of orders. The price of component is Rs. 200/- per unit and annual holding cost is 20% of the value of component used. Assuming 250 working days per year calculate following

- 1) Average inventory level including safety stock
- 2) Cover time
- 3) Reorder point if lead time is 20 days
- 4) Total inventory cost with purchase quantity of 50000 units at at time
- 5) Economic Order Quantity (EOQ)

(b) Differentiate among concurrent engineering, reverse engineering and re-engineering with suitable example. **07**

OR

(b) Discuss the future and scope of production and operations management in Industry 4.0 to Industry 5.0 and also discuss the possible advancements in technologies likely impact POM functions over all. **07**

Q.3 (a) Mr Raghav, new CEO believes that he wants to reduce all 8 types of waste at their company's existing old production plant at Ambarnath Maharashtra and wants to implement 5 S and Sig Sigma -a basic lean concepts at plant to bring over all efficiency of the plant closer to new plant at Ankleshwar Gujarat by having improvement of over 10% in it. What does he mean by 5 S and Sig Sigma concepts here and what are various types of wastes? **07**

(b) Briefly explain with examples, 1) Rough cut capacity planning 2) Cost of Aggregate production planning and 3) Material requirement planning in cost reduction strategies for manufacturing plants. **07**

OR

- Q.3 (a)** What is Job Sequencing, explain with suitable example , How will it be relevant to the operations profitability increment ? **07**
- (b)** State and explain **07**
- 1) Process designs (examples of each)
 - 2) Plant Layouts (With diagram and example of suitability)
 - 3) Master Production Schedule (Relevance and Importance)

- Q.4 (a)** For a particular project data set of activities are given as under. **07**

Activity	Time – Number of Days	Required Predecessor (s)
A	8	-
B	14	-
C	13	-
D	9	A
E	7	B
F	5	B
G	7	C
H	4	D,E
I	4	F,G
J	3	H,I

Draw a network diagram for the above project and identity Critical path. Also explain what does critical path means? How it can help in understanding the project better.

- (b)** For the above data given in Q 3 (a) calculate, Early start, Early finish points and Late Start , Late finish points for the given project and also calculate Total Float and Total Slack in the given project. **07**

OR

- Q.4 (a)** Consider the following single-server queue: the inter-arrival time is exponentially distributed with a mean of 20 minutes and the service time is also exponentially distributed with a mean of 10 minutes. Find the **07**
- 1) Mean wait in the queue
 - 2) Mean number in the queue
 - 3) Mean wait in the system
 - 4) Mean number in the system
 - 5) Proportion of time server is id

- (b)** For following data calculate \bar{X} and R control chart limits from range and standard deviation **07**

Sample Number	x1	x2	x3	x4	x5
1	32	32	30	31	29
2	28	30	30	31	33
3	32	32	30	32	30
4	29	29	29	32	33
5	30	31	32	28	33

Assume values of constants like, $A_2 = 0.6$, $D_4 = 2$, $D_3 = 0.01$, $c_4 = 2.5$

Also assume the other constant values as 1 if not given here.

Q.5

CEO , Adrin Wood who was a strategic consultant and now joined company M/s Mappel Soutions , which is a technology solution provider for lean implementation addressed his team by saying

“You may already know about Lean principles, especially if you are working in a manufacturing or operations role. I hope that you are able to apply those principles to significantly impact waste, quality and efficiency for your scope of work. What about the rest of your organization? What about Marketing, Strategy, HR, the Executive teams? Would they not also benefit from these same principles?”

Let me use my own role as a use-case for Lean operations. I am a member of a strategy team that has a common goal but multiple stakeholders, each with their own initiatives. Since Dassault Systèmes is a large organization, I also collaborate with many other teams and so the result is more than a dozen recurring strategic virtual meetings each month. You can start to visualize (and maybe empathize) with what my calendar looks like.

Since my primary “product” was knowledge, content and ideation, I suppose I cannot claim that I create a lot of physical waste. However, I can tell you that my most precious commodity is time, and that I cannot waste. I have been participating in audio and video conference calls for decades and this year they have become nearly the ONLY way for myself, and my colleagues, to collaborate effectively. Now I am not exactly Jeff Bezos, but every minute of these meetings costs my company time and money that needs an ROI just as much as any physical product, work center or software package.

Since the release of our 3DLean application on the cloud this summer, the majority of these meetings have now been using 3DLean as the collaborative environment for us to structure our time together. Using the same principles as applied to manufacturing we have started to become students in Lean and the difference is quite apparent. The immediate differences that I have noticed are encouraging:

- Meetings now tend to end on time with all topics covered
- No one leaves the meeting without a clear view of actions and who the responsible owners are
- Team members are more engaged and more apt to contribute ideas and content
- Problems are more intensely focused on and resolutions often become more apparent

What’s more, any one of us can go back to the virtual meeting board before or after the meeting and continue to contribute effectively. 3DLean has become a key facilitator of teams across many parts of my organization and as we look at customer feedback, we can see tangible examples of the same benefits:

85% of team members feel more involved in meetings

92% of team members find positive impact to daily tasks

92% of team members say information is easier to find

Customers also find a significant increase in surfacing issues and resolving them effectively.

Therefore, it would seem that the benefits of Lean principles really do apply to many different types of teams outside of manufacturing. In times of social distancing and displaced employees, it would also seem that this is the perfect time for companies to evaluate just how effective their remote teams are and what the ROI could be if they provide them with a simple yet effective way to engage together and make Lean a part of the entire organization.

I encourage you to learn more about 3DLean for manufacturing, operations and beyond; as we say at DELMIA “Lean without Limits!”

Q 5 (a) How technology can support lean manufacturing systems implementation and productivity improvement ? Analyze and explain from case. 07

(b) Critically evaluate Mr Adrin Wood's views.

07

OR

Q.5 (a) What is KANBAN and Poka Yoke systems in Lean which if can be implemented , will increase productivity? 07

(b) What are the key challenges in implementation of lean programmes and integration of technology in lean manufacturing ? How we can overcome them ? 07
