



Management of Machines & Materials

Date: 11.6.2008

Marks: 100

Time: 11.00 am to 2.00 pm

Instructions

Candidates should read carefully the instructions printed on the question paper and on the cover of the answer book.

1. Question no 1 is compulsory
2. Out of the remaining attempt any four questions
3. In all five questions are to be attempted
4. Answer to each new question to be started on a fresh page
5. Figure on the right indicate full marks

- 1a Wow, 20 new car models to be introduced in 2008. A rough assumption: 20 could be the number of new vehicles introduced by all vehicle companies in India combined from 1950 to 1975. All said and done, one is not sure if our companies are ready for so many models. A thing to note here is that we are talking of 20 models and that may mean about 300 variants (colour, air conditioning, etc). 15

Most Indian plants, including lines of Suzuki, Hyundai and Tata Motors have been set up to mass produce a few models / variants. Most of them are setting up new plants and these new facilities will be tuned for mass customisation*. So, till this time the new facilities come online, producing multiple variants from the old facilities is going to be taxing.

It is impossible for automobile companies to not introduce new models and yet get the necessary sales. It is also similarly very expensive for Indian auto companies to produce multiple variants from existing facilities. So the companies are introducing new models and hoping that the new facilities come up soon.

It is a catch 22 situation. Though it seems that the new facilities will come up in a year and two and that this is going to be a short term challenge, it is otherwise. The volumes in India are much lower than volumes in other countries. The specific challenge here is providing all the models / variants at much lower volume.

- i. Tata Nano is a low cost car. Mercedes is an expensive car with high performance and appeal. What would be the differences in Operations of the two factories? In which car would you expect the customer to get more choices?
- ii. Why is it difficult to produce multiple variants from the current factories?
- iii. Why is providing multiple models in low volumes a challenge?

* mass customisation: producing goods and services to meet individual customer's needs with near mass production efficiency

- 1b Explain the role of PDCA cycle in Operations Management. 7
- 1c The different types of maintenance systems are outlined below. Explain where these systems would be useful 6
a. Breakdown Maintenance b. Preventive Maintenance c. Condition based maintenance
- 1d ILO recommends SREDIM – Select, Record, Examine, Develop, Implement and Maintain as the steps for Method study. Explain these steps using a relevant example. 6
- 1e Write a brief description of the purchasing process. 6
- 2a. What factors would you weigh most heavily in locating (i) Steel Plant OR (ii) Retail mall? Justify your answer for any one by giving suitable examples. 6

- 2b. A product layout has machines arranged linearly according to the needs of the product. A process layout has the organisation divided into various 'departments' of similar machines. A project layout essentially has a product that is fixed and the machines that are moved. Justify the layout that would suit the following situations.
- Porsche cars are 'produce to order' as and when the exact specification comes from the customer. The volume required in the market is not very large.
 - A hospital operation theatre.
 - A soft drink bottling plant
- 3a. Describe the Material requirement planning (MRP) process. Include the inputs, the process and the output of MRP. 6
- 3b. There are 5 jobs to be processed on each of the two machines M_1 and M_2 in that order. The processing time in hours is given below. 9
- | Jobs | A | B | C | D | E |
|------|---|---|---|---|---|
| M1 | 3 | 8 | 7 | 4 | 9 |
| M2 | 4 | 3 | 2 | 5 | 1 |
- Find the optimum sequence and find the time taken to complete jobs.
- 4a What is the fundamental difference between acceptance sampling plans and process control charts? 4
- 4b What is the purpose of X bar and R charts? How are the Upper and lower specification limits decided? 8
- 4c '*Quality is everyone's business.*' What do you mean by the statement?
- 5a Explain the ABC method to classify inventory. Should A and C class items be given equal importance? What should be the difference? 5
- 5b Find out the EOQ and the total minimum yearly cost using the following data 7
- Purchase price per unit: Rs. 15
 Yearly requirement : 48,000 units
 Carrying cost per year: 20% of price
 Ordering cost: Rs. 20 per order
- 5c A factory can make 200,000 soaps per year. However the current market demand is only 120,000 soaps. The factory wants to make a decision whether to make 120,000 soaps in one batch or break them up into multiple batches. What factors should be considered to be able to make this decision? 3
- 6a Write a note on Vendor evaluation and vendor rating. 6
- 6b What are the functions of a materials store? 6
- 6c What are the bases for selecting a new vendor? 3
- 7 Write short notes on any three 15
- Applications of Materials Management in retail industry
 - Applications of Materials Management in hospitals
 - Applications of work measurement (time and motion studies)
 - Line balancing
 - Make or buy decision
 - Principles of a good layout