

ADVANCED OPERATIONS MANAGEMENT (DM- 541/IB-514)

Trimester-V, End-Term Examination: December 2015

Time Allowed: 2 ½ hours

Max Marks: 50

Roll No:

Instruction: Students are required to write Roll No on every page of the question paper. Writing anything except the Roll No will be treated as Unfair Means. In case of rough work please use the answer sheet.

Section A

Please attempt any THREE questions. Each question carries 5 marks. **Please be brief.**

- A1. A customer is seeking services of a hospital. What would be the parameters on which she would evaluate the services? Name one operations related measure she could use for each parameter.
- A2. Consider a sequential multi-stage process employing labour that gets paid at a fixed rate (per hour). You measure the labour content in each flow unit that goes through this process (money/unit). How will you reduce the labour content
 - a. If the process is demand constrained,
 - b. If the process is capacity constrained.
- A3. In a large hospital, there are 10 births per day. 80% of the deliveries are easy and require mother and baby to stay for 2 days; 20% of the cases are more complicated and require a 5 day stay. What is the average occupancy of the department?
- A4. Remember 'buffer or suffer'? In McDonalds sandwiches wait for customers, while in Subway customers wait for sandwiches. What the pros and cons (pluses and minuses) of each of these strategies?
- A5. Inventory and waiting (customers waiting for resources, or resources waiting for customers) are both considered as waste. Explain why? Give one way in which you can reduce these wastes.

Section B

Please attempt any TWO questions. Each question carries 10 marks.

- B1. A product is manufactured using a 5-step process comprising shearing, stamping, welding, painting and packing, in that order. The time taken for each of these operations is 20, 15, 30, 12 and 6 minutes, respectively. Presently, each stage has only one machine for operation.
 - a. If the production happens only in a single shift of 8 hours, with a 30-minute lunch break, what is the capacity (per shift) of the process (assume zero in-process inventory at the start of the shift)
 - i. For a worker-paced line? (2 marks)
 - ii. For a machine-paced line? (2 marks)

- b. If the process starts at the beginning of a shift with zero in-process inventory, and each machine works *independent of the others* during the available time in the shift, what is the in-process inventory at each stage at the end of the shift? (6 marks)

- B2. Line balancing is a critical aspect of an assembly line. Consider an assembly line comprising 11 operations, as listed in the table below. Please note that combination of tasks at one station of the line is possible.

Sequence	Task	Task time (min)
1	A	20
2	B	10
3	C	5
4	D	10
5	E	15
6	F	5
7	G	10
8	H	30
9	I	10
10	J	5
11	K	30

- Assume that the process is capacity constrained (there is enough demand), and that each task is performed by one worker. What is the maximum capacity of this line? (2 marks)
- Create a balanced line that achieves the maximum capacity, without disturbing the sequence of the tasks. How many stations will you need (draw a schematic diagram of stations and assigned tasks)? (2 marks)
- What will be the average labour utilization of the line (created in part b)? (2 marks)
- If shuffling of tasks were allowed, would your line differ from the one created in part b? Illustrate with a diagram of the new line. (2 marks)
- What will be the average labour utilization now? (2 marks)

- B3. The times required, in hours, to process six jobs through two work centres are shown below.

JOB	WORK CENTRE	
	I	II
A	10	5
B	7	4
C	5	7
D	3	8
E	2	6
F	4	3

- a. Determine a sequence that will minimize the total completion time for these jobs. (6 marks)
- b. Illustrate the throughput time and idle time at the two work centres by constructing a time-phased chart. (4 marks)

Section C

An MRP schedule for an item is given below – for brevity it mentions only the period-wise net requirements. If the ordering cost is Rs.150 and the unit holding cost is Rs.2 a week, find the costs of the following lot sizing policies over the 10 weeks.

- i. Fixed order quantity (EOQ) (5 marks)
- ii. Fixed period (periodic order) (5 marks)
- iii. Part period balancing (5 marks)

Week	1	2	3	4	5	6	7	8	9	10
Net Requirement	20	10	20	25	0	15	10	20	0	30