

**VPM's**  
**DR VN BRIMS, Thane**  
**Programme: MMS (2017-19) (Operations)**  
**Second Semester Examination April 2018**

<b>Subject</b>	<b>Operations Applications &amp; Cases</b>		
<b>Roll No.</b>		<b>Marks</b>	<b>60 Marks</b>
<b>Total No. of Questions</b>	<b>7</b>	<b>Duration</b>	<b>3 Hours</b>
<b>Total No. of printed pages</b>	<b>3</b>	<b>Date</b>	<b>20-04-2018</b>

**Note:** 1. Question 1 is compulsory Marks: 20

2. Attempt any four out of remaining six questions Marks: 10 each

3. Use Excel Spreadsheet for questions which need to be solved on Excel.

1. A manufacturing firm has discontinued production of a certain unprofitable product line. Considerable excess production capacity was created as a result. Management is considering devoting this excess capacity to one or more of three products X1, X2, and X3. Machine hours required per unit for each of these products are:

Machine Type	Product			Machine hours available per week
	X1	X2	X3	
Milling machine	8	2	3	800
Lathe	4	3	0	480
Grinder	2	0	1	320

The sales people estimate that they can sell all the units of X1, and X2 that can be made. But the sales potential of X3 is 80 units per week maximum.

Unit profits for the three products are:

	Unit Profits (in \$)
X1	20
X2	6
X3	8

- Set up the equations that can be solved to maximize the profit per week (5 marks)
- Solve these equations using excel solver** (5 marks)
- What is the optimal solution? How many of each product should be made, and what should the resultant profit be? (2 marks)
- What is this situation with respect to machine groups? Would they work at capacity, or would there be unused available time? Will X3 be at maximum sales capacity? (3 marks)
- Suppose that an additional 200 hours per week can be obtained from the milling machines by working overtime. The incremental cost would be \$1.50 per hour. Would you recommend doing this? Explain how you arrived at your answer. (5 marks)

2. **Answer any two from the following questions (Marks: - 5 \* 2 = 10)**

- What do you understand by "dependent demand" and "independent demand"? Is knowledge of this useful to an organization? If so, in what way is this information useful?
- What is meant by bill of materials (BOM)? Why do organizations need BOMs? Are BOMs and product structures the same? Explain with an example.
- Product X is made of two units of Y and three of Z. Y is made of one unit of A two units of B. Z is made of two units of A and four units of C. Lead time for X is one week: Y, two weeks: Z, three weeks: A, two weeks: B, one week: and C, three weeks.

Draw the bill of materials (product structure tree).

If 100units of X are needed in week 10, develop a planning schedule showing when each item should be ordered and in what quantity. **(Use Excel Spreadsheet for the analysis)**

3. **Answer any two from the following questions (Marks: - 5 \* 2 = 10)**

- Discuss the various types of tendering processes and briefly explain the characteristics of each.
- Jason Enterprises (JE) produces video telephones for the home market. Quality is not quite as good as it could be at this point, but the selling price is low and Jason can study market response while spending more time on R & D. At this stage, however, JE needs to develop an aggregate production plan for the six months from January through June. Following data are available:

**Demand and Working Days**

	January	February	March	April	May	June
<b>Demand forecast</b>	500	600	650	800	900	800
<b>No: of working days</b>	22	19	21	21	22	20

Marginal cost of subcontracting	100/unit
Labor hours required	4/unit
Straight time cost (8 hours each day)	12.50/hour
Beginning inventory	200 units
Safety stock required	0% of month demand

Develop a production plan using constant workforce of 10 workers and using subcontracting whenever required. What is the total cost of this plan using this strategy? Develop the solution using Excel Spreadsheet.

- (c). How do you define capacity in an operating system? Are input measures of capacity more appropriate than output measures of capacity? How does the knowledge of capacity help an operations manager?

**4. Answer any two from the following questions (Marks: - 5 \* 2 = 10)**

- (a). How is inventory planning for independent demand items different from that for dependent items?
- (b). Why do you need aggregate units while planning for production? Give two examples each from the manufacturing and service sectors of industry for aggregation of products and services.
- (c). A manufacturer of condiments has to decide between Machines A, B, and C, three alternative machines available for final packaging. While the initial fixed costs are high for Machines B and C compared to Machine A, their operating costs are lower. The relevant cost data for each of the machines is given below:

	Machine A	Machine B	Machine C
Fixed Cost	INR 20000	INR 40000	INR 80000
Variable Cost	INR 5 per unit	INR 4 per unit	INR 3 per unit

The manufacturer is not sure which machine he should choose. What is your advice to him? The selling price is INR 10 per unit.

**5. Answer any two from the following questions (Marks: - 5 \* 2 = 10)**

- (a). Suppose an organization prepared an MRP on the basis of incorrect data on lead time of the components. What will be the impact of this on the actual operations?
- (b). Ram runs a small roti shop. People can place their order over the phone and collect the roti. Orders are taken for standard pack of 5 rotis. The entire process is done in batches of 5 rotis only. Roti making and delivery process has five steps: preparing the dough (3 minutes), rolling (5 minutes), heating (4 minutes), packing (2 minutes), billing and cash (1 minute). Given this process, answer the following:
- (i). Prepare a process flow chart and identify the bottleneck for the shop.
- (ii). If Ram keeps his shop open for 4 hours, how many rotis can he hope to make?
- (c). How is MRP II different from MRP? What are additional advantages that an organization will obtain by using an MRP II system?

**6. Answer any one from the following questions (Marks: - 10 each)**

- (a). A manufacturer of electrical switchgears is in the process of preparing the aggregate production plan for the next year. The capacity is measured in terms of working hours available per month. The table below shows details pertaining to forecast demand for the "equivalent" model of switchgears and the number of working days available during the planning horizon. The following relevant details are also available:
- (i). The manufacturer currently works on a single shift basis and employs 125 workers.
- (ii). One unit of switchgear requires 100 hours of production time.
- (iii). It is expected that at the beginning of the planning horizon, there will be a finished goods inventory of 200 switchgears.
- (iv). Inventory carrying costs are INR 1000 per switchgear per month and unit shortage/back ordering costs are 200% of the unit carrying cost.

Forecast demand for models of switchgears and the number of working days:

Month	Demand (in units)	No: of working days
April	250	23
May	220	22
June	300	21
July	290	24
August	260	22
September	180	22
October	200	19
November	220	23
December	250	21
January	200	23

February	240	20
March	270	24

Devise a level production strategy with constant workforce and constant working hours and compute the cost of the plan.

**Use Excel Spreadsheet for the analysis.**

(b). The following scores are obtained during tender evaluation of a project for non-price criteria:

Criteria	Weight	Scores obtained by tenderers			
		Tender 1	Tender 2	Tender 3	Tender 4
1. Quality requirement	20%	90	70	80	60
2. Delivery terms	15%	80	80	90	70
3. After Sales Service	5%	90	80	60	70

Compute the weighted scores for each criterion, total weighted scores, and Normalized total non-price score for each tender. How will you use these scores in the tender evaluation? **Use Excel Spreadsheet for the analysis.**

**7. Answer any two from the following questions (Marks: - 5 \* 2 = 10)**

- (a). An organization has not invested any efforts in maintenance in a formal sense and they react to breakdowns as and when they happen. What are the consequences of such a method of maintenance?
- (b). A garment manufacturer **200** sewing machines of a particular make. Since sewing machines are a critical production resource, the manufacturer would like to ensure that an appropriate maintenance program (PM) is in place. Based on the equipment cards, the manufacturer estimates the following probabilities of failure of the sewing machines in the months following a preventive maintenance cycle, as shown in the table below:

Probabilities of failure	
Month following PM	probability of breakdown
1	0.10
2	0.15
3	0.30
4	0.20
5	0.15
6	0.10

Based on the cost estimates made available by the costing department, it has been found that the **cost of preventive maintenance per sewing machine** works out, on an average to be **Rs. 300**. On the other hand, the **cost of breakdown maintenance** will be about **Rs. 950** per sewing machine. What is the right PM cycle for the manufacturer?

- (c). What do you understand by "Tender Evaluation Plan" what are the objectives of tender evaluation?