Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

VII SEMESTER B.TECH

(MECHANICAL/IP ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: PRODUCTION/OPERATIONS MANAGEMENT [MME 401]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.

1A. A manufacturing company has a seasonal demand pattern, with the demand forecast for the first five months of the next year equal to 5120, 5760, 3200, 3840 and 4480 units respectively. The company plans to end the current year with 280 units in inventory. The company policy is to maintain a safety stock of 600 units during every month of the next year. The inventory carrying cost is Rs. 20/unit/month. The company will end the current year with 140 employees and it costs Rs. 4000 to hire and Rs. 6000 to layoff an employee. It takes an employee 4 hours to make a product. Employees are paid at the rate of Rs. 40/- an hour and material & overhead cost is Rs. 100/unit. Working hours are 8 hours/day and working days are 20 days in a month. If the company resorts to the strategy of changing the employment level to meet the demand pattern and has the policy of fully utilizing the workers services, prepare the aggregate plan using the trial & error method and determine the total cost of the plan. **05**

1B. A certain company has been successful in its first two years of operation and is planning to open a second location. Its management is trying to decide whether to build a small, medium or large facility. The level of demand at the new facility can be described as poor, moderate, or good, with the probability of poor 0.20, for moderate 0.55, and for good 0.25.
If a large facility is built and business is good, it is expected to earn Rs.1,75,000. If business is moderate for the large facility, the net present value will be Rs.1,00,000, and if business is poor the facility is expected to lose Rs.50,000.
A medium-sized facility is expected to lose Rs.20,000 if business is poor and will earn Rs.1,10,000 if business is moderate. If business is good, medium sized facility is expected to earn Rs.1,20,000, or it can be enlarged **05**

at a cost of Rs. 50,000 to earn Rs.1,65, 000.
A small facility is expected to earn Rs.15,000 if business is poor. If business is moderate, the small facility is expected to earn Rs. 60,000, or it can be enlarged moderately at a cost of Rs.40,000 to earn Rs. 90,000. If business is good, small facility can be enlarged greatly at a cost of Rs. 60,000 to earn Rs.1,60,000.

- Draw the decision tree for the above data.
- Decide what the company should do to achieve the highest expected payoff.

2A. Two jobs are to be processed on 6 machines A, B, C, D, E and F. The processing time required and the technological order for the jobs is as shown below. **05**

Time Required

Job	Machines					
	A	B	C	D	E	F
1	4	2	4	3	5	4
2	5	4	3	4	2	5

Technological Order
Job 1: A-B-C-D-E-F
Job 2: B-C-A-E-F-D
Determine the order in which the 2 jobs are to be processed on each of the machines to minimize the makespan? What is the makespan?

2B. Karl's copier sells and repairs photocopy machines. The manager needs weekly forecasts of service calls so that he can schedule service personnel. The forecast for the week of July 3 was 24 calls. **05**

Week of	July 3	July 10	July 17	July 24	July 31
Actual Service calls	24	32	36	23	25

- The manager uses exponential smoothing with $\alpha = 0.40$. Forecast the number of calls for the week ending August 7.
- Calculate the tracking signal for each period.
- Plot the tracking signal and comment on the same.

3A. Annual demand for an item is 36,000 units. The production capacity is 10,500 units per month. Production cost per unit is Rs.12.6. Inventory carrying cost rate is estimated to be 20%. The set up cost for each production run is Rs.225. Determine the quantity of inventory consumed during the buildup period and the total inventory carrying cost per year. **05**

3B. An operation manager has narrowed the search for a new facility location to 4 locations. The annual Fixed cost and variable costs are: **05**

Location	A	B	C	D
Fixed Cost/year(Rs)	1,50,000	3,00,000	5,00,000	6,00,000
Variable Cost/year (Rs/Unit)	62	38	24	30

- Plot the total cost curves for the all the locations and identify on the graph the approximate range over which each location provides the lowest cost.
- Using break-even analysis, calculate the break-even quantities over the relevant ranges.
- If the expected demand is 15,000Units per year what is the best location?

4A. Explain the priority rules for sequencing 'n' waiting jobs on a single processing facility and the evaluation criteria for the same. **05**

4B. Explain with a neat sketch production consumption cycle. **05**

5A. Write a short note on **02+03**
i) 'A' and 'C' class items.
ii) Strategies and Variables of Aggregate Planning.

5B. The task timings and precedence relationships for an assembly line are given below. **05**

Task	Task Time (min)	Preceding task
A	10	---
B	24	---
C	17	A
D	49	A
E	12	C
F	14	C
G	27	B
H	9	E
I	20	F,G
J	23	D,H,I
K	36	I
L	18	J,K

Use the 'Most Follower Rule' to assign the tasks to various stations and also calculate the line efficiency.

6A. Product 601 is made from three 740 sub-assemblies, two 810 sub-assemblies and one 900 subassembly. A 740 sub- assembly consists of one unit of component 309 and two units of component 207. The 900 sub-assembly is made from two units of component 400 and one unit of component 782. An 810 sub-assembly consists of one unit of component 309, one unit of component 721 and two 682 sub- assemblies. A 682 sub-assembly is made from one unit of component 400 and one unit of component 207. Draw the product structure tree and determine the gross requirements for components 207, 400 and 309 that are required to produce 150 units of product 601. **05**

6B. The following are the cost and sales data of a manufacturer selling three products X, Y and Z. Selling price of X is Rs.4/Unit, Y is Rs.5/Unit and Z is Rs.8/Unit. Corresponding variable costs of X is Rs.3/Unit, Y is Rs.4/Unit and Z is Rs.6/Unit. Annual capacity of manufacturer is Rs.15,00,000 of total sales value. Annual fixed cost is Rs.2,30,000. Assume that percentage of sales of products Y and Z are double that of sales of product X. **05**

- Determine break-even point in terms of rupee sales volume and the contribution from the respective products that is available for recovering the fixed cost.
- Determine Loss at 35% of the capacity and the contribution available from the three products.
- Represent the above details graphically on Profit volume chart.