Reg. No.



VII SEMESTER B.TECH.

(MECHANICAL/IP/MECHATRONICS ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: PRODUCTION /OPERATION MANAGEMENT [MME 401]

REVISED CREDIT SYSTEM (23/11/2016)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ANY FIVE FULL questions.
- Missing data if any may be suitable assumed.
- 1A. Demand forecast for a product that has a 4 month demand cycle is as shown below. Each unit requires 10 man hours to be produced at a labour cost of \$ 6 per hour as regular rate and \$ 9 per hour as overtime. The total cost excluding the labour cost is \$ 200 per unit. There are currently 20 workers employed in the subject department. Company policy is to retain a safety stock of 20% of monthly forecast shown in the table below and each month's safety stock becomes the beginning inventory for the next month. There are currently 50 units in stock carried from the previous aggregate plan. Inventory carrying cost is \$5 per unit per month. Working hours are 8 hours per day. Prepare the aggregate plan by trial and error method and determine the total cost of the plan if the company plans to maintain the present workforce and use over time and idle time to meet the monthly requirement.

	Jan.	Feb.	March	April
Monthly	300	500	400	100
Forecast				
Work days	22	19	21	21

1B. The manager of a utility company in a certain area wants to develop forecast 05 of power loads for the next year. The power loads are seasonal and the data on the quarterly loads in megawatts (MW) for the last two years are as given below.

Year	1	2	3	4
1	103.5	94.7	118.6	109.3
2	126.1	116.0	141.2	131.6

Calculate the seasonal indices for each quarter and perform regression analysis to forecast the demand for next four quarters.

2A. Explain with a neat sketch the production consumption cycle.

05

- **2B.** Write a short note on
 - i) Strategies and variables of aggregate planning.

ii) Preference matrix and load distance methods of location analysis.

3A. Potential locations A, B, C & D have the cost structures shown below.

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05

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Location	А	В	С	D
Fixed Cost/year(Rs)	2,00,000	3,50,000	5,50,000	6,50,000
Variable Cost/year (Rs/Unit)	65	40	30	35

- Plot the total cost curves for 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.
- **3B.** You are given the following information.

Task	Immediate predecessor	Task time(minutes)	
А	None	0.9	
В	A	0.4	
С	В	0.6	
D	С	0.2	
Е	С	0.3	
F	D,E	0.4	
G	F	0.7	
Н	G	1.1	

- Draw a precedence diagram
- Assign the tasks to various stations using the longest work element rule.
- Calculate line efficiency.
- 4A. A Certain factory has a plant capacity sufficient to provide 59,400 hours of machine use. The plant can produce either all "A" type of tools or all "B" type of tools or a combination of two types. The cost data is as follows:

Product	Selling Price (Rs/unit)	Variable Cost (Rs/unit)	Hours required to produce
"A" type Tools	30	24	9
"B" type Tools	45	36	12

Market conditions are such that not more than 4,000Units of "A" type tools and 3,000 "B" type tools can be sold in a year. Annual fixed costs are Rs.29,700.

- Determine the product mix that will maximize the net income and also calculate the maximum Net Income.
- Determine overall break-even quantity & contribution from each product available for recovering fixed cost.
- Plot the data on the profit-volume chart.

4B. Write a short note on

i) Types of capacities.

ii) Factors affecting job shop scheduling

5A. Two jobs are to be processed on 6 machines A, B, C, D, E and F. The **05** processing time required and the technological order for the jobs is as shown below.

Time Required

loh	Machines					
JOD	А	В	С	D	E	F
1	20	30	15	20	25	30
2	15	30	40	30	20	20

Technological Order

Job 1: A-B-C-D-E-F

Job 2: D-E-A-C-F-B

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?

- 5B. The annual requirement of an item is 25,000 units. Its price is Rs. 10/ unit for order quantities up to 1499 units, Rs. 9.95 / unit for order quantities between 1500 and 2999 units. and Rs. 9.9 / unit for order quantities of 3000 and above. The inventory carrying cost is Rs. 2 / unit / year. The ordering cost is Rs. 200 / order. Determine the optimum ordering policy?
- 6A. A company has a demand of 24,000 units per year for an item. The purchase 05 price is Rs.50 / unit. The ordering cost is Rs. 400 / order. The inventory carrying cost is Rs. 10 / unit / year. The shortage cost is Rs. 1.25 / unit / month. Determine total cost per cycle and total shortage cost per year.
- **6B.** Product 800 is made from two 801 subassemblies, three 802 subassemblies **05** and two 803 subassemblies. An 801 subassembly consists of two units of component 406 and two units of component 407. The 802 subassembly is made from two units of component 205 and one unit of component 603. An 803 subassembly consists of one unit of component 407, one unit of component 950 and three units of 747 subassemblies. A 747 subassembly is made from six units of item 910, three units of item 205, and one unit of item 407. Draw the product structure tree for product 800 and determine how many units of components 407, 910 and 205 are required to produce 186 units of product 800?