

MANIPAL INSTITUTE OF TECHNOLOGY (A Constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (MECHANICAL ENGG.) END SEMESTER **EXAMINATIONS, NOVEMBER 2018**

SUBJECT: PRODUCTION PLANNING & CONTROL [MME 4103] **REVISED CREDIT SYSTEM**

Time: 3 Hours

MAX, MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data if any may be suitably assumed
- 1A. Demand forecast for a product that has a 4 month demand cycle is as 05 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 strategy to meet the monthly requirement.

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

1B. i) Quoting suitable examples explain the characteristics of a job order 02+03 production activity.

ii) Explain the strategies and variables of aggregate planning.

2A. There are two jobs A and B which are to be processed on five machines 05 1,2,3,4 & 5. The time required for these jobs and the technological order are as shown below.

Time Required

	Machines				
Job	1	2	3	4	5
А	2	4	6	10	2
В	8	10	6	4	2

Technological order Job A -1-2-3-4-5 Job B- 3-1-4-5-2 Determine the job sequence on each machine and the total elapsed time?

2B. A farmer strongly believes that his farm yield in a year is dependent on the **05** rainfall in that year and has maintained the following record.

Year	Rainfall in meters	Yield (tons)
1	3	1.3
2	3.4	1.7
3	2.8	1.2
4	3.6	1.9
5	3.5	1.8
6	3.3	1.4

If the likely rainfall next year is 3.7 metres, what yield should he expect?

- **3A.** Explain in detail the various measures of forecast error
- **3B.** A company has a demand of 12,000 kgs/year for an inventory item and it **05** can produce 2000 kgs of such item per month. The cost of one setup is Rs. 400 and the holding cost/kg/month is Rs. 0.15. Determine the quantity of inventory consumed during the inventory production period and the total cost per cycle if the cost of the item is Rs.4 per kg.
- 4A. An item is manufactured at the rate of 2000 kgs/month. It is consumed at a rate of 800 kgs/month. The set up cost per production run is Rs.1500. The inventory carrying cost is Rs.18/kg/year. The shortage cost is estimated to be Rs.2/kg/month. Calculate the quantity of inventory consumed during the inventory buildup period and the shortage fulfilling period if the unit cost of the item is Rs.1000/kg.
- **4B.** Each unit of end product M requires 2 units of sub component N. The lead **05** time for M is one week and the standard order quantity is 400 units. The current availability for M is 350 units. Gross requirements for the next 6 weeks are 250, 300, 200, 150, 250 and 900 units respectively. For item N lead time is two weeks, standard order quantity is 800 units, safety stock is 600 units and current availability is 900 units. A scheduled receipt of 800 units of N is due in week 1. Develop the MRP schedule for M & N showing the safety stock as part of on hand/available inventory and considering the replacement demand of 400 and 1800 units for component N in the 3rd and

05

6th week respectively.

5A. The following information refers to an assembly line

Task	Task Time (Minutes)	Immediate Predecessor(s)
М	1	NONE
Ν	1.2	М
0	0.4	М
Р	0.8	O,R,S
Q	1.1	NONE
R	0.5	O,Q
S	0.6	U
Т	1.8	NONE
U	0.2	Т
V	2.2	T,S
W	2.6	N,P,V

- Draw the precedence diagram
- Assign the tasks to various stations by using the maximum follower task rule.
- Calculate the line efficiency.
- **5B.** Potential locations L1, L2, & L3 have the cost structures shown below. The **05** company has a demand of 2, 60,000 units for a new product and the product is expected to sell for Rs. 20/unit. Which location should be selected and calculate the expected profit? Determine the volume ranges where each location is desirable.

Location	L1	L2	L3
Fixed cost/year (Rs)	3,00,000	7,00,000	19,00,000
Variable Cost (Rs/Unit)	20	16	12