Reg. No.										

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

VII SEMESTER B. TECH (MECHANICAL ENGG.) END SEMESTER MAKEUP EXAMINATIONS, DECEMBER 2019.

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. The following data refers to an aggregate planning problem. **05**

Quarter.	I	II	III	IV
Demand [units]	960	600	900	1240
Working days	60	60	60	62

The company is considering manufacturing at a uniform rate of l4 units/day during regular time throughout the year and sub-contract the shortage units to meet the annual demand. The production cost is $100/unit during regular time and sub-contracting cost is $110/unit. Inventory carrying cost is $5/unit/quarter. Prepare the aggregate plan and calculate the total cost of the plan.

1B. Quoting suitable examples explain the characteristics of a Job Order production activity. **02**

1C. Today is day 42 on the shop calendar and 4 jobs are on order as shown. **03**

Job	Due date	Work remaining [days]
A	48	8
B	46	2
C	44	2
D	50	12

Schedule the jobs according to critical ratio rule and calculate the mean flow time, average job lateness and average number of jobs in the system.

2A. A manufacturer has to process 6 jobs through shearing and pressing machines in that order. Each job has two identical individual units. The processing time in minutes for each unit of each job on the 2 machines are given below. Each machine can process only one individual job unit at a time. Determine the optimum sequence, total elapsed time and idle times for the two machines. **05**

Job	1	2	3	4	5	6
Shearing	8	10	6	7	9	14
Pressing	5	9	10	8	12	8

2B. The following data refers to the sale of T.V. Sets. **03**

Period (weeks)	1	2	3	4	5	6
Sales ('000)	10	14	11	13	14	16

Develop a predictive model taking the smoothing constant of 0.4 and give the forecast for the 7th week.

2C. Explain the Sales Force Estimate method of forecasting. **02**

3A. Explain in detail the various measures of forecast error **05**

3B. Annual demand for an item is 24,000 units/year. The production capacity is 4000 units per month. The production cost per unit is Rs. 20/- Inventory carrying cost is estimated to be Rs. 0.3/unit/month. The cost of one setup is Rs. 400. Determine the quantity of inventory consumed during the inventory production period? **03**

3C. The demand for an item is 18,000 units /year. The purchase price is Rs.1 per unit, ordering cost is Rs. 400 / order, inventory carrying cost is 120 % of unit cost / unit / year. No shortages are allowed. Assume instantaneous supply and determine EOQ and total annual cost. **02**

4A. The demand for an item is 40 units per month. The ordering cost is Rs. 250 per order. The inventory holding cost is Rs. 25 per unit per month. The shortage cost is Rs. 100 per unit per month. Calculate inventory carrying cost per cycle and shortage cost per cycle. **05**

4B. Explain the rough estimate methods of determination of safety stock and reorder point. **03**

4C. Explain the inputs to MRP system. **02**

5A. The assembly of an electronic copier requires a total of 66 minutes. Table below gives the tasks, assembly time and sequence requirements for the copier **05**

Task	Time (minutes)	Immediate Predecessor (s)
A	10	-
B	11	A
C	5	B
D	4	B
E	12	A
F	3	C,D
G	7	F
H	11	E
I	3	G,H
	Total: 66	

Draw the precedence diagram for the above requirement. If 480 productive minutes of work are available per day and if the production schedule requires that 40 units be completed as output from the assembly line each day, balance the assembly line using maximum follower method and calculate the line efficiency.

5B. A medical group is planning to set up a new health care facility in a State to serve seven possible locations. The coordinates for each location and projected population measured in thousands is shown in the table below. Customers will travel from their respective locations to the new facility when they need health **03**

	care. Considering population as loads calculate the center of gravity as a possible location for the new facility.	
5C.	Briefly explain the general factors affecting the suitable location of a plant.	**02**

Location	Population x 10^3	X-coordinate	Y-coordinate
A	2	2.5	4.5
B	5	2.5	2.5
C	10	5.5	4.5
D	7	5	2
E	10	8	5
F	20	7	2
G	14	9	2.5