Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
A Constituent Institution of Manipal University

VI SEMESTER B.TECH (MECHATRONICS ENGINEERING)
END SEMESTER MAKE UPEXAMINATIONS, JUNE 2017
SUBJECT: PRODUCTION OPERATIONS MANAGEMENT [MTE 4022]
REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL FIVE FULL** questions.
- Missing data may be suitably assumed.

1A. Explain with suitable examples Job shop, Batch and Mass production with suitable examples. **03**

1B. Complete the MRP format shown in the figure below. How many units are on hand at the end of period 8 **03**

Week		1	2	3	4	5	6	7	8
Item ID: X	Gross requirements	40	85	10	60	130	110	50	170
Level Code: 1	Scheduled Receipts								
On Hand: 140	On hand/Available								
Lot Size: 200	Net requirements								
LT: 3 weeks	Planned Order Receipts								
Safety Stock : Nil	Planned Order Release								

1C. Explain in detail the different methods of location analysis. **04**

2A. What do you mean by EOQ? Explain in detail the different cost components of inventory management. Derive an expression for EOQ and total annual cost when replenishment is instantaneous and shortages are not permitted. **05**

2B. A chemical factory specializing in industrial chemicals is experiencing a substantial backlog, and the firm's management is considering 3 options. **A** – Arrange for subcontracting; **B** – Begin overtime production and **C** – Construct a new facility. The correct choice depends upon the future demand, which is categorized as low, medium, and high. By consensus the management allots the respective probabilities to the 3 demands as 0.1, 0.5 and 0.4. Any cost analysis reveals the effect upon profits as shown below: **05**

	Profit in ('000) if demand is		
	Low	Medium	High
A – Arrange subcontracting	10	50	50
B – Begin Overtime	-20	60	100
C – Construct New Facility	-150	20	200

Draw the decision tree and determine the best course of action.

3A. An automobile manufacturing company is planning to expand its capacity to cater to **03**

the growing demand. The search has been maneuvered down to 4 possible locations. Assessment of these sites in terms of 7 location factors, the factor weights and scores (1 = poor, 5 = excellent) are shown in the table below. Calculate the weighted score of each location. Which location would you recommend?

#	Location Factor	Weight Factor	Factor score for each location			
			A	B	C	D
1	Labour Climate	30	2	3	5	1
2	Quality of life	5	5	4	3	5
3	Transportation System	15	2	5	5	4
4	Proximity to markets	25	5	3	4	4
5	Proximity to materials	5	3	2	3	5
6	Land & Construction costs	15	5	4	2	1
7	Utilities	5	3	4	3	5
	Total	100				

3B. Johnson cogs wants to set up a line to produce 60 units per hour. The work elements and their precedence relationships are shown in the following table. Draw the precedence diagram. **05**

a) What is the minimum number of stations?

b) How many stations are required if the longest work element time method is used?

c) How many stations are required if the largest number of followers method is used?

d) Suppose that a solution requiring five stations is obtained, what is its efficiency?

Task	Time (secs)	Predecessor(s)
A	40	---
B	30	A
C	50	A
D	40	B
E	6	B
F	25	C
G	15	C
H	20	D,E
I	18	F,G
J	30	H,I
Total	274	

3C. Enumerate the difference between Goods and Services. **02**

4A. A manufacturer of a certain product feels that the pattern of annual sales of his product is reflected by one of the 4 economic indices. The past six years' data is given below: **04**

Year	Sales ('000)	Index I	Index II	Index III	Index IV
1	4.25	160	105	150	200
2	5	165	100	180	250
3	5	175	95	180	230
4	6	180	100	220	250
5	9.5	185	105	360	220
6	8.5	190	110	320	260

a.) Which of the 4 indices must be chosen for sales forecasting purpose?

Identify the forecasting technique.

b.) Determine the equation by least squares method.

c.) Determine the forecast for the 7^{th} year if the indices for the 7^{th} year are 200, 115, 350 and 240 respectively.

4B. The demand for an item is 40 units /month. The ordering cost is Rs. 250 /order. The inventory holding cost is Rs. 25 / unit / month. The shortage cost is Rs. 100 / unit /month. Calculate EOQ, Maximum shortage in a cycle and total monthly cost if the unit cost of the item is Rs. 1000/-. **04**

4C. Distinguish between simple moving average, weighted moving average and exponential smoothing methods of forecast. **02**

5A. The following data refers to an aggregate planning problem. **05**

Quarter	I	II	III	IV
Demand	960	600	900	1240
Working days	60	60	60	62

The company is considering manufacturing at a uniform rate of 14 units/day during regular time throughout the year and sub-contracts the shortage units to meet the annual demand. The production cost is Rs.I00/unit, during regular time and sub-contracting cost is Rs. 110/unit. Inventory carrying cost is Rs.5/unit/quarter. Calculate the total annual cost of the plan.

5B. Five jobs are to be processed through two machines [1] and [2] in the order 1 first and 2 next. The processing times are given below: **05**

Jobs	A	B	C	D	E
Machine 1	8	10	4	9	7
Machine 2	6	12	7	5	4

Find the optimal sequence in which the jobs are to be processed to minimize the make span. Also determine the idle times for both the machines.