Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
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A Constituent Institution of Manipal University

VII SEMESTER B.TECH. (MECHANICAL/IP/MECHATRONICS ENGG)

END SEMESTER MAKE UP EXAMINATIONS DEC 2016/JAN 2017

SUBJECT: PRODUCTION /OPERATION MANAGEMENT [MME 401]

REVISED CREDIT SYSTEM
(26/12/2016)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. The monthly forecast for a product and production days available are given in the table below **05**

Month	January	February	March	April
Aggregate Demand (Units)	1260	1430	1100	880
Production Days	21	22	20	22

The Management is considering hiring and laying off workers as needed to meet the monthly requirements. Assume that there are 10 workers available at the beginning of January. The workers are paid at the rate of Rs.72 per day for 8 hours of working. It requires 1.6 hours to produce one unit for a worker. The hiring cost is Rs.1000/worker and lay-off cost is Rs.1400/worker. Prepare the aggregate plan using the above strategy and determine the total cost of the plan?

1B. Karl's copier's sells and repairs photocopy machines. The manager needs weekly forecast of service calls so that he can schedule service personnel. The forecast for the week of July 03 was 24 calls. **05**

Week Of	Actual service calls
July 3	24
July 10	32
July 17	36
July 24	23
July 31	25

- The manager uses exponential smoothing with α = 0.4. Forecast the number of calls for the week ending August 7.
- Calculate the tracking signal as at the end of week of July-31
- If the manager wishes to convert to a moving average forecast from exponential smoothing, what length of moving average is approximately equivalent.

2A. Explain the various functions of operations management. **05**

2B. Write a short note on **02½**
i) Variables of Aggregate Planning **02½**
ii) Break even analysis approach in location selection.

3A. A supplier to the electric utility industry has a heavy product and the transportation costs are high. More than 6,00,000 Tonnes are to be shipped to 8 major customer locations whose X-Y co-ordinates and quantity shipped are as shown in the table below: **05**

Customer Location	Tonnes shipped	X-Y Co-ordinates
A	5000	(07,13)
B	92000	(08,12)
C	70000	(11,10)
D	35000	(11,07)
E	9000	(12,04)
F	227000	(13,11)
G	16000	(14,10)
H	153000	(15,05)

- Calculate the centre of gravity and also corresponding load-distance score for these locations using rectilinear distance method.

3B. The task timings and precedence relationships for an assembly line are given below. **05**

Task	Task Time (mins)	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.

4A. A copy center in an office building prepares bound reports for two clients. The center makes multiple copies (the lot size) of each report. The following demand and time standard information is available. **05**

Item	Client X	Client Y
Annual demand forecast(copies)	2000	6000
Standard processing time(hr/copy)	0.5	0.7
Average lot size(copies per report)	20	30
Standard setup time(hours)	0.25	0.40

- The center operates 250 days per year with one 8 hour shift. The utilization is 85% and system efficiency is 90%.
- Determine how many machines are needed at the copying center?

4B. Write a short note on **02½**

i) Decision tree analysis.

ii)Priority rules for sequencing 'n' jobs on a single processing facility **02½**

5A. There are 5 jobs each of which must go through the machines A, B and C in the order A, B, C. The processing time in hours is as shown in the table. Determine the sequence for the 5 jobs that will minimize the makespan. Determine the idle time for each machine. **05**

	Jobs				
	1	2	3	4	5
Machine A	4	9	8	6	5
Machine B	5	6	2	3	4
Machine C	8	10	6	7	11

5B. Derive an expression for EOQ and total annual cost when replenishment is instantaneous and shortages are not permitted. **05**

6A. An item is manufactured at the rate of 2000 units / month. It is consumed at a rate of 800 units / month. The set up cost per production run is Rs.1500. The inventory carrying cost are Rs. 18/ unit / year. The shortage costs are estimated to be Rs. 2/ unit / month. **05**

Calculate

a) Economic Lot Size
b) Maximum shortage in a cycle
c) Maximum level of inventory in a cycle
d) Total annual cost

6B. The Gross requirement for dependent demand item X is shown in the table. It is purchased and has a lead time of 2 weeks. **05**

Week	1	2	3	4	5	6	7	8
Gross requirements	150	250	650	500	150	200	550	500

The order quantity for X is 800 units. At present there are 500 units of X on hand. Show the MRP working for current schedule.