Reg. No.



VII SEMESTER B.TECH (IP ENGG.) END SEMESTER EXAMINATIONS,

NOV/DEC 2017

SUBJECT: PRODUCTION & OPERATION MANAGEMENT [MME-4112]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

Answer ANY FIVE FULL questions.

1A. 6 jobs must be processed through 3 machines in the order A, B, C. the processing time of each job on the 3 machines are given below. Determine the optimum sequence Determine the sequence for the 5 jobs that will minimize the make span. Determine the idle time of each machine.

Job	M/C A	M/C B	M/C C
1	20	16	6
2	30	11	40
3	15	30	13
4	18	35	22
5	33	16	25
6	8	12	17

- **1B.** Derive the equation for Manufacturing model without shortages to find Total cost /year, 04 EconomicOrderQuantity (EOQ).
- **1C.** List the quantitative and qualitative methods of forecasting
- **2A.** The demand for an item is 50000 units per year. The ordering cost is Rs.400 per order. The inventory carrying cost is Rs.4per unit per year. The purchase price depends on the order quantity and is shown in the table below

Range of order	Linto 2999	3000-5999	6000 & above	
quantity (units)	0010 2333	5000-5999		
Price (Rs./unit)	20	19.9	19.8	

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2B. The processing time in days and the due dates for the six jobs that are to be processed on a

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particular machine are shown below.

Job	1	2	3	4	5	6
Processing	10	8	4	14	6	10
Time (days)		Ũ			Ŭ	
Due date	24	20	18	40	36	28
(days hence)	24	20	10	40		20

Schedule the jobs using Shortest Processing Time(SPT) rule, determine the optimum **03** sequence and calculate mean flow time, average job lateness & average number of jobs in the system.

2C. 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.

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? **03**

3A. Johnson cogs wants to setup a line to produce 60 units per hour. The work elements and their precedence relationships are shown in the following table.

Work element	Time (sec)	Immediate
(task)	Time (sec)	Predecessor(s)
Α	40	
В	30	A
С	50	Α
D	40	В
E	6	В
F	25	С
G	15	С
Н	20	D,E
Ι	18	F,G
J	30	H, I
Total	274	

(i) What is the desired cycle time?

(ii) What is the theoretical minimum number of work stations?

Draw the precedence diagram and balance the assembly line using the longest work element time rule.

3B. The Gross requirement for dependent demand item X is shown in the table. It is purchased and has a lead time of 2 weeks. The order quantity for X is 800 units. At present there are 500 units of X on hand. Show the Material Requirement Planning (MRP) working for the current schedule.

Week	1	2	3	4	5	6	7	8
Gross	150	250	650	500	150	200	550	500
requirements	150	230	050	500	150	200	550	500

3C. A manufacturing company has a seasonal demand pattern, with the demand forecast for the first six months of the next year and the working days available as shown in the table below. The initial inventory available is 100units.

	Jan.	Feb.	March	April	May	June
Demand (units)	860	1152	960	120	512	768
Work days	25	20	24	25	20	24

The company has a constant workforce of 40 workers and each unit requires 10 worker hours to produce at a labour cost of Rs 6 per hour. Working hours are 8 hours per day. If the company plans to resort to the strategy of building inventory at a cost of Rs10 per unit per month and encourages the customers to accept back orders at a penalty of Rs 30 per unit per month, prepare the aggregate plan and determine the total cost of the plan if the manufacturing cost excluding the labour cost is Rs120 per unit.

4A.

A Company manufactures and sells 2 products for which the following information is given:

Product	Selling Price (Rs/unit)	Variable Cost (Rs/Unit)	% Quantity sales
А	15	10	50
В	10	07	50

The total fixed cost is Rs. 125000. Calculate overall Break-even point and contribution available from each product , Loss at a sales volume of 40% below break-even point and corresponding contribution from two products.

Draw Profit-Volume chart showing the above data along with equivalent income line.

4B. The manager of a utility company in a certain area wants to develop forecast 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.

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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.

4C.

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

Time Required

leb	Machines					
300	Α	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?

5A. A supplier to the electric utility industry has a heavy product and the transportation costs are high. More than 600000 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:

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Customer Location	Tonnes shipped	X-Y Co- ordinates
А	5000	(07,13)
В	92000	(08,12)
С	70000	(11,10)
D	35000	(11,07)
Е	9000	(12,04)
F	227000	(13,11)
G	16000	(14,10)
Н	153000	(15,05)

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

5B. A building supply store is considering expanding its capacity to meet a growing demand for its products. The alternatives are to build a new store at a site nearby, expand and refurbish the old store, or do nothing. Here is the regional economic outlook: a 60 percent probability that the economy will remain unchanged, a 20 percent probability of an economic upturn and a 20 percent probability of an economic downturn. The following estimates of annual returns have been prepared:

	Market Upturn (millions)	Stable Market (millions)	Market Downturn (millions)
Build new store	1.9	0.3	(0.5)
Expand old store	1.5	0.5	(0.3)
Do nothing	0.5	0.0	(0.1)

a) Use a decision tree analysis to analyze these decision alternatives.

What returns will accrue to the company if your recommendation is followed?

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- 5C. A company has a demand of 24,000 units per year for an item. The purchase 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 year, EOQ and 03 maximum shortage in a cycle.

b) What should the company do?