Reg. No.



## VII SEMESTER B.TECH (I&P ENGG.) END SEMESTER MAKE-UP EXAMINATIONS, 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.** Five aircrafts have to be processed through a sheet metal centre (work centre 1) and a painting centre (work centre 2) in an aircraft repair facility. The time durations required for the 5 aircrafts at the two work centers are shown below.

Work	Aircrafts								
Centers	Α	В	С	D	E				
1	4	17	14	9	11				
2	5	7	12	2	6				

Determine the optimal sequence, total elapsed time and idle times for both the work centers.

- **1B.** Derive the equation for Purchasing model without shortages to find Total cost /year, EOQ. **04**
- **1C.** List the Cost involved in Inventory problems
- **2A.** The demand for an item is 75000 units per year. The ordering cost is Rs.144 per order. The inventory carrying cost is 25 %. The purchase price depends on the order quantity and is as shown in the table. Minimum of 500 units are to be ordered at a time.

Range of order quantity(units)	500-999	1000-1299	1300-1499	1500 & above
Price (Rs/ unit)	62	60	58	56

Determine the most economical order quantity.

04

**2B.** A production planner must decide the sequence in which to process the 6 customer orders on a single manufacturing facility. The processing time in days and their due dates are given below.

04

Job	Processing	Due date
( in order	time	(days
of arrival)	(days)	hence)
А	2	4
В	5	18
С	3	8
D	4	4
Е	6	20
F	4	24

03

Schedule the jobs using Earliest Due date (EDD) rule, determine the optimum sequence and calculate mean flow time, average job lateness & average number of jobs in the system.2C. A firm has developed the following data for an item affected by seasonality.

Period	Quarter I	Quarter II	Quarter III	Quarter IV	
Demand[units]	520 1700		800	480	
Working days available	60	65	63	62	

The management is considering producing at a uniform rate of 10 units/day and subcontract the necessary additional units at a cost of Rs 120/unit. Prepare the aggregate plan and determine the total cost if the Inventory carrying cost is Rs 4/unit/quarter and Regular time production cost is Rs 80/unit.

**3A.** ABC Ltd.is planning to diversify into the production of sandals. The following demand and time standard information is available.

	Time	standards		
Product	Processing time (hr/pair)	Set up time (hr/lot)	Lotsize (pairs/lot)	DemandForecast (pairs / year)
Men's Sandals	0.05	0.5	200	84000
Women'sSandals	0.1	2.2	180	63000
Children'sSandals	0.02	3.8	360	126000

The same production line is capable of producing all the 3 products. The firm operates on two 8 hour shifts, 5 days per week and 50 weeks per year. The production line is used only 80 % of the time and the system efficiency is 95 %. Determine how many production lines are required.

**3B.** Use the longest work element time rule to balance the assembly line described n the following table so that it will produce 40 units / hour. The work elements and their precedence relationships are shown in the following table. Draw the precedence diagram

Work	Time	Immediate
element	(seconds)	Predecessor
(task)		(s)
А	40	
В	80	А
С	30	А
D	25	В
E	20	С
F	15	В
G	60	В
Н	45	D
Ι	10	E,G
J	75	F
Κ	15	H,I,J
	Total =	
	415	

a) What is the cycle time?

b) What is the theoretical minimum number of **03** stations?

c) Which work elements are assigned to each work stations?

d) What are the resulting efficiency and balance delay percentage?

**3C.** The following table shows the actual demand and forecast data of a manufacturer for the last eight months. Calculate CFE, MAD, MSE & Tracking signal for this product.

Month	1	2	3	4	5	6	7	8
Demand	400	480	600	540	460	520	420	550
Forecast	450	440	570	580	500	480	500	480

4A.

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

						Week	C		
		1	2	3	4	5	6	7	8
Item ID:	Gross	40	85	10	60	130	110	50	170
Х	Requirements								
Level	Scheduled								
Code: 1	receipts								
On Hand	On Hand /								
:140	Available								
Lot size :	Net								
200	Requirements								
LT:3	Planned order								
weeks	Receipts								
Safety	Planned order								
Stock:	Release								
Nil									

4B. A supplier to the electric utility industry has a heavy product, and transportation costs are high. One market area includes the lower part of the Great lakes region and the upper portion of the Southeastern region. More than 600000 tons are to be shipped to eight major customer locations as shown in table.

Customer	1	2	3	4	5	6	7	8
Location								
Tons shipped	5	92	70	35	9	227	16	153
(000's)								
XY coordinates	(7,13)	(8,12)	(11,10)	(11,7)	(12,4)	(13,11)	(14,10)	(15,5)

Calculate the centre of gravity as a possible location from the new facility, and draw the diagram.( round to the nearest value)

- **4C.** Distinguish between simple moving average, weighted moving average and exponential smoothing with a suitable example.
- Shipment in tons of welded tube by an aluminum producer is given 5A. below

Year	1	2	3	4	5	6	7	8	9	10	11
Tons	2	3	6	10	8	7	12	14	14	18	19

- Compute a 3 year moving average and use it to forecast shipment in year 12
- Using a weight of 3 for the most recent data, 2 for the next and 1 for the oldest, forecast shipment for the year 12
- Use the least square method to develop a linear trend equation for the data and forecast a trend value for the year 16
- **5B.** A factory has the capacity to produce 300units of product per month. The product is sold at Rs.150/Unit and variable cost is Rs.100/Unit. The fixed expenses are estimated to be Rs.96,000Per year.

Determine the break-even quantity and Estimate the profit if 240units are produced per month

The sales to be made to earn a profit of Rs.7000/month

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

b) What should the company do?

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

**5C.** An aircraft company uses rivets at a rate of 2500 Kg per year. The rivets cost Rs. 30 per kg and the company personnel estimate that it costs Rs.130 to place an order and the inventory carrying cost is 10% per year. How frequently should the orders for rivets be placed? And 03 what quantities should be ordered?

03

04

04