

Time: 3 Hours

MANIPAL INSTITUTE OF TECHNOLOGY

VI SEMESTER B.TECH. (MECHATRONICS ENGINEERING) END SEMESTER EXAMINATIONS, APRIL 2018

SUBJECT: PRODUCTION & OPERATIONS MANAGEMENT [MTE 4022]

(20/04/2018)

MAX. MARKS: 50

03

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be assumed suitably.
- 1A Explain the load distance method of plant location.
- **1B** The sale of a product is compared with 3 economic indices for the purpose of possible **03** correlation.

Month	Sales ('00)	Index I	Index II	Index III
Jan	8	10	10	10
Feb	12	9.5	12	11
Apr	15	9.0	14	12
May	19	8.8	15	14
June	23	8.4	13	15

Make a choice of the proper correlation index for forecasting the sales of the product, using the economic index chosen. Give the forecast for March month if the expected values of the indices in March are as follows.

Index I: 8.8 Index II: 15 Index III: 13
1C A master scheduler would like to determine whether an order for 200 units of A can be supplied 04 in period 8. The product structure tree is as shown below. Not stock of any components is on hand or on order and all order sizes are on LFL basis. Determine the amount and date of the planned order release for all the components.



2A Joanne Rowling is a writer of fantasy series. A movie company, a TV network and book04 publisher wants exclusive rights to one of her more popular works. If she signs with the TV

network, she has to decide for term contract based on the TRP rating of the shows. Probability of getting high TRP is 50%. If TRP is in favor, she receives \$900000 per series with a bonus of \$150000 and she may opt for the extension offer for next term contract for \$900000 if not \$0 for the termination from the contract. If TRP is not in favor a flat rate of \$900000 will be paid. But if she signs with the movie company, the amount she will receive depends on the market response to her movie. Small box office - \$200,000, Medium box office - \$1,000,000, Large box office - \$3,000,000 with the probabilities of P(Small Box Office) = 0.3, P(Medium Box Office) = 0.6, P(Large Box Office) = 0.1. If she agrees for only book publication she will receive \$1200000 but it also costs her \$300000 for advertisement and promotions.

2B Complete the MRP format shown in the figure below. How many units are on hand at the end 03 of period 8

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								

- 2C Derive an expression for EOQ and total annual cost when replenishment is instantaneous and 03 shortages are not permitted.
- **3A** Explain with a neat sketch, the production consumption cycle.
- **3B** Chowgule Corporation has developed a forecast for an item that has the following demand. **06**

Month	Demand
1	220
2	170
3	400
4	600
5	380
6	200
7	130
8	300

Cost of carrying inventory is Rs.50/unit/month. Cost of OT is Rs.20/unit. Cost of hiring is Rs.100/unit. Cost of layoff is Rs.150/unit. The management decides to maintain a constant production rate of Rs.200 units/month on R.T. basis and permit 25% of the R.T. production as O.T., whenever the demand exceeds R.T. production rate. To meet further demand the firm chooses to Hire and Layoff strategy. Find the total cost of this mixed strategy.

4A Five jobs are to be processed on two machines, machine A and machine B, in the order first on machine B and then on machine A. Determine the optimal sequence and total elapsed time. The following data with regard to the processing time is given :

Jobs	Time in hours				
	Machine 'A'	Machine'B'			
Ι	1	9			
II	7	4			
III	3	8			
IV	5	6			
V	10	2]		

4B Explain the differences between simple moving average, weighted moving average and **03** exponential smoothing methods of forecasting.

04

4C A supplier to the electric utility industry has a heavy product, and transportation costs are high. 03 One market area includes the lower part of the Great lakes region and the upper portion of the South Eastern region. More than 600000 tons are to be shipped to eight major customer locations as shown in table.

Customer Location	1	2	3	4	5	6	7	8
Tonne's shipped	5	92	70	35	9	227	16	153
XY Co ordinate	(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)

- 5A An item is manufactured at the rate of 2000 units/month. It is consumed at the rate of 800 units
 04 /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. Calculate
 - a) Economic Lot size.
 - b) Maximum shortage in a cycle.
 - c) Maximum level of inventory in a cycle.
 - d) Total annual cost.
- **5B** You are given with the following information. Design a precedence diagram. Assign the tasks **04** to various stations using the longest work element rule. Calculate the efficiency.

Task	Immediate Predecessor	Task Time (Minutes)
А	None	0.9
В	А	0.4
С	В	0.6
D	С	0.2
Е	С	0.3
F	D, E	0.4
G	F	0.7
Η	G	1.1

5C How do factor and location ratings affect facility location planning?

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