

Con. 9195-12.

*Operation
Planning
& Control*

MMS - III sem

TG-4227

(FURTHER REVISED COURSE)

*Operations
Special.*

(3 Hours)

29/11/12

[Total Marks : 60]

- N.B. : 1) Answer any three questions from Section I.
2) Section II is compulsory.
3) Maximum marks for each question are indicated on the right side of the question.

Section I

1. a) In time series analysis we have the moving averages method and the exponential smoothing method. Which of the method is better ? Give your reasons. 4 Marks
- b) Following data is available about the "Actual Sales Quantities" for the past 12 years. Find the forecast for year 13 using "five years" as well as "four years" moving averages. Which of the two forecasts is more "reliable" on the basis of mean squared error (MSE) criterion ?

Yr	1	2	3	4	5	6	7	8	9	10	11	12
Sales	40	45	35	30	40	50	55	60	65	50	45	50

Annual sales data for 12 years

6 Marks

2. a) A company claims to have achieved 120% capacity utilization. Is this theoretically possible ? Give your reasons for the answer. 4 Marks
- b) Following information is available about a manufacturing company located near MIMR, in Wadala :

Month	Demand (units)	Number of working days
January	275	26
February	200	23
March	350	25
April	300	24
May	270	20

[TURN OVER]

Con. 9195-TG-4227-12.

2

1. a) In time series analysis we have the moving averages method and the exponential smoothing method. Which of the method is better ? Give your reasons. 4 Marks

June	175	22
July	220	24
August	230	23
September	250	24
October	190	26
November	260	19
December	280	23

The manufacturing company works in a single shift of 8 hours and employs 100 workers. In order to manufacture one unit of the product it requires 100 hours of labour time. There is beginning inventory of 500 units of the product and inventory carrying costs are INR 500 per unit of product per month. The cost of stock-out is INR 2000 per unit. Set a level production strategy and compute the cost of the plan. 6 Marks

3. a) When reducing the 3 machine problem to a 2 machine problem for sequencing of jobs using the Johnson's Algorithm, what is the reason for adding the 2nd machine processing time to **BOTH** the first and the third machine ? Can we not eliminate the 2nd machine altogether ? Give reasons for your views. 4 Marks
- b) For the given predecessor relationship & task time in minutes, find out the cycle time, theoretical minimum number of workstations and the efficiency of the assembly line. Use the longest operation time for line balancing

Task	Precedence Requirement	Task Time (mins)
A	---	8
B	---	4
C	---	10
D	A, C	6
E	D	8
F	D	4
G	B, E, F	6
H	G	4

6 Marks

4. a) What are the different kinds of layout? How do you seek optimality in a product layout plant? 4 Marks

b) The table below gives the processing time in hours of seven jobs to be processed on four machines, M_1 , M_2 , M_3 , M_4 , in the same order. Sequence the given jobs using Johnson's method (if applicable) and find the overall processing time.

Job	M_1	M_2	M_3	M_4
A	4	2	5	13
B	9	1	6	16
C	12	4	9	11
D	5	8	4	9
E	6	6	2	11
F	11	3	1	14
G	3	6	7	10

Processing time in hours

6 Marks

5. Write short notes (any 2) :

10 Marks

- (a) Lean Manufacturing systems.
- (b) Bottleneck Operations control.
- (c) Different planning Options in Aggregate planning.
- (d) Differences between continuous production systems and batch production systems.

Section II. Case Study

A European confectionary manufacturer makes highly seasonal products - Easter eggs (chocolate eggs) and Christmas novelties. The myriad of stock keeping units (SKUs) springs from different shapes, chocolate brand and type, eight egg sizes, foils, assembly (a big egg packed with different small eggs or sweets), and packaging.

Production entails piping liquid chocolate and filling from the correct holding tanks to a specific mould machine. The three machines are dedicated to hollow eggs, solid eggs, or hollow novelties. Chocolate pieces travel by conveyor to one of eight foil wrap machine groups. Each group handles a limited range of product dimensions. Moulds and foils can be exchanged quickly, but a switch of chocolate brands consumes a whole shift, and going

from dark to milk type forfeits a complete day's production. Brown chocolate followed by white chocolate wastes 2 to 3 days flushing out of the mould machine. Consequently, the factory tries to schedule a single run per year of the low-volume, white chocolates products. After wrapping, eggs proceed to the packing area. Between February-April, all sales are estimated for the coming year. Throughout June and July representatives canvass customers about their likely Christmas orders forecasts, which generate second phase production targets. Firm Christmas orders begin to arrive in July, and Easter egg orders are received in December (Easter is a Christian festival generally celebrated in March-April). During January and February, the factory addresses pending Easter shortfalls, along with a spate of rush orders from customers topping up their stocks.

The plant runs in two shifts all year round, plus occasional weekend overtime for new product trials, rush orders and to catch up after equipment failures. Items are scheduled as late as possible, but some stockpiling is unavoidable due to insurmountable demand peaks - modified chase. To begin with there are 120-140 operatives. Eventually, the number doubles, but no labour is added until strictly necessary. In general, training times are short. So, temporary workers are hired on 4-50 week contracts. From October onwards, the load in critical sections warrants a third shift. The MPS stretches over 72 weeks. Rigorous capacity planning applies to the front 16 buckets, but the rest, comprising four-week intervals, only undergo a 'rough' workload check. Most manipulations concern the mould stage (chocolate type plus shape). Even then, the final program must satisfy several further constraints.

Questions :

30 Marks

1. Describe the business environment in which the confectionary manufacturer operates.
2. Why does the confectionary manufacturer resort to a 'modified chase' strategy ?
3. Do you think aggregate planning is significant for the confectionary factory? Justify.
4. "Marketing can assist production to fine-tune the MPS." Explain.