

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013****Subject code: 1724605****Date: 05-06-2013****Subject Name: Operation Planning and Control Techniques****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 (a) Explain the following terms.**07**

1. Define 'Demand forecasting' and enlist the applications of demand forecasting.
2. What are the types of demand pattern? Explain any two with sketches.
3. Enumerate the stepwise procedure of Delphi method of demand forecasting.

(b) A private company has following demand data for the current financial year.**07**

Month	January	February	March	April	May	June
Demand	1200	1100	1500	1200	1600	1500

- (i) Calculate simple 2 month moving average for the data to forecast demand
- (ii) Calculate 2 month weighted moving average, using weight of 0.2 and 0.3 for successive older data.
- (iii) Calculate forecast for the month of July using single exponential smoothing with $\alpha = 0.25$, if June forecast is 1300 units.

Q.2 (a) (i) What are the different types of errors in demand forecasting? Explain Mean Absolute Deviation (MAD) error.**07**

(ii) Calculate Mean Absolute Deviation (MAD) and Mean Forecast Error (MFE) using following demand and forecast data.

Period	1	2	3	4	5
Demand	1500	1600	1650	1750	1800
Forecast	1650	1650	1650	1650	1650

(b) (i) Explain: 'Varying Work force size' strategy of Aggregate Planning.**07**

(ii) Name various deterministic models of inventory. Explain: 'Purchase model with instantaneous Replenishment and without shortage' with diagram.

OR**(b) (i) Explain: 'Master Production Schedule' with flow diagram.****07**

(ii) If a product is to be manufactured within the company, the details are as follows:
 Annual demand, $r = 24000$ units/year, Production rate, $k = 48000$ units/year, Cost/set-up,
 $C_o = \text{Rs.}200/\text{set-up}$, Carrying cost, $C_c = \text{Rs.}20/\text{unit/year}$.

Calculate EBQ and cycle time using Manufacturing model without shortages.

- Q.3 (a)** 1. What are the objectives of Production, Planning and Control in a manufacturing firm? **07**
 2. Explain 'Scheduling' in the context of manufacturing industry.

- (b)** The forecast for a group of items manufactured in a firm is shown below. **07**

Quarter	1	2	3	4	5	6	7	8
Demand	420	370	620	720	600	200	300	360

The firm estimates that it costs Rs.225/unit to increase the production rate, Rs.275/unit to decrease the production rate, Rs. 80/unit /quarter to carry the items on inventory and Rs.150/unit if subcontracted. Compare the cost incurred if the following two pure strategies are followed. (i) Varying the workforce size, and (ii) Changing the inventory levels.

OR

- Q.3 (a)** Calculate the cost of mixed strategy for previous problem, with following suggestions. **07**

- (i) The company decides to maintain a constant production rate of 400 units / quarter and 20 % overtime when demand exceeds the production rate. Cost of overtime Rs.40/unit and inventory cost is Rs.50/unit.
 (ii) It plans to meet the remaining demand by varying the work force, with cost of Rs.200/unit for increase or decrease in demand.

- (b)** Delta Associates Company produces accounting hardware that has a seasonal demand pattern. It is required to plan for the optimum production rates and inventory levels for the next four quarter periods. The available production capacities during regular time and overtime, as well as other cost data are as follows. **07**

Period	Regular time	Over time	Subcontract
1	900	350	600
2	1000	350	600
3	1100	350	600
4	700	350	600

Period	Demand(units)
1	700
2	1000
3	2000
4	1200

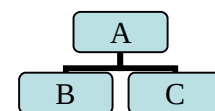
- Available initial inventory = 200 units
- Desired final inventory = 150 units
- Regular time cost/unit = Rs.125
- Overtime cost/unit = Rs.150
- Subcontracting cost/unit = Rs.175
- Inventory cost/unit/period = Rs.25

Formulate the problem as a **transportation model**.

- Q.4 (a)** (i) What the basic inputs for Material Resource Planning? **07**
 (ii) What is Bill of Material structure? Give an example.

- (b)** Consider the manufacturing of a toy. The master production schedule to manufacture the toy is given in the following table. **07**

Week	1	2	3	4
Demand	200	100	175	300



The details of Bill of Material along with economic order quantity and stock on hand for the final product and subassemblies are shown in following table. Complete the material

requirement plan for product A, and parts B and C.

Part required	Order Qty.	No. of units	Lead time (week)	Stock on hand
A	350	1	1	200
B	450	1	2	400
C	400	1	1	375

OR

Q.4 (a) Compare Material Requirement Planning (MRP) and Manufacturing Resource Planning (MRP- II). **07**

(b) A company manufactures steel component. The MPS of the final assembly is as shown below. **07**

Month	1	2	3	4	5	6	7	8
Projected Requirement	-	3500	3000	4500	-	1000	4000	5500

The initial stock on hand is 0 units. The carrying cost is Rs.2.5 / unit / month and the lead time is one month. The ordering cost per order is Rs.10,000. Find MRP solution using Minimum Cost per Period (MCP) method. (Form trial lots as 2,3,4,5 and 6,7,8)

Q.5 (a) (i) What are the different types of costs involved in inventory system? **07**
(ii) Explain stepwise XYZ analysis of inventory management.

(b) (i) Explain the VAT classification of firms, with their significant features. **07**
(ii) Discuss the concept of 'drum-buffer-rope'

OR

Q.5 (a) An engineering manufacturing company stocks the items as shown in the following table in the stores. The unit prices, annual consumption in terms of units/year are also mentioned in the table. Classify the items in to A, B, and C categories. **07**

Component code	Price/unit	Annual Demand
C01	500	600
C02	2500	600
C03	2000	600
C04	3000	600
C05	4000	600
C06	600	1200

(b) (i) Explain: Hockey-stick phenomenon. **07**
(ii) Explain how a non-bottleneck can become a bottleneck?
