

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2014****Subject code: 1724605****Date: 23-06-2014****Subject Name: Operation Planning and Control Techniques****Time: 02:30 pm - 05:00 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 what are the factors affecting demand forecasting?
2. What are the types of demand pattern? Explain them with diagram.
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	190	170	220	270	290	330

- (i) Calculate simple 2 month moving average for the data to forecast demand.
- (ii) Calculate 2 month weighted moving average, using weight of 0.6 and 0.4 for successive older data.
- (iii) Calculate forecast for the month of July using single exponential smoothing with $\bar{U} = 0.25$, if June forecast is 260 units.

Q.2 (a) (i) Explain: Fixed Order Quantity System (Q system) with schematic diagram.**07**

- (ii) Demand and forecasting data is collected from an engineering company of its product corresponding to 6 weeks. Compute the Mean Absolute Deviations (MAD) and Mean Squared Error (MSE) from the given data.

Week	1	2	3	4	5	6
Demand	250	260	265	275	280	245
Forecast	260	260	260	260	260	260

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(b) (i) Name various deterministic models of inventory. Explain: "Purchase model without instantaneous Replenishment and without shortage" with diagram.**07**

- (ii) The following is the past two years of quarterly sales information. Assume that the seasonal factor is involved and season cycle is of 1 year. Use time series decomposition to forecast quarterly sales for the third year if total expected demand to be 1000 units.

Year 1 - Quarter	Sales	Year 2 - Quarter	Sales
1	160	1	215
2	195	2	240
3	150	3	205
4	140	4	190

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OR**(b) (i) What are the objectives of Production, Planning and Control in a manufacturing firm?****07**

- (ii) If a product is to be manufactured within the company, the details are as follows:

Annual demand, $r = 10000$ units/year, Production rate, $k = 20000$ units/year, Cost/set-up, $C_o = \text{Rs.}250/\text{set-up}$, Carrying cost, $C_c = \text{Rs.}25/\text{unit/year}$.

Calculate EBQ and cycle time in no. of days using Manufacturing model without shortages.

- Q.3 (a)** Explain: "Master Production Schedule" with flow diagram. **07**
(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	370	320	570	670	550	370	350	480

The firm estimates that it costs Rs.200/unit to increase the production rate, Rs.250/unit to decrease the production rate, Rs. 75/unit /quarter to carry the items on inventory. Compare the cost incurred for **(i) Varying the workforce size, and (ii) Changing the inventory levels** pure strategies.

OR

- Q.3 (a)** The following data were obtained from Alpha manufacturing company, formulate the problem using Linear Programming model. **07**

Demand: $D_1 = 150$, $D_2 = 200$ and $D_3 = 300$ units.

Capacity: Regular time: $M_1 = 200$, $M_2 = 300$, and $M_3 = 150$ units.

Overtime capacity = $Y_1 = 50$, $Y_2 = 75$ and $Y_3 = 35$ units.

Regular time cost/unit (r) = Rs. 10,

Overtime cost/unit (v) = Rs. 15,

Inventory cost/unit/period = (c) = Rs. 5,

Hiring cost/unit (h) = Rs. 15,

Lay-off cost/unit (f) = Rs.10,

Unit produced at $t = 0$, $P_0 = 150$,

Initial inventory (I_0) = 0 units.

- (b)** Axay Engineering Company produces products which 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 = 200 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) Define ERP. What are the modules of ERP? Name softwares available for ERP.
(b) An engineering company manufactures iron box. The Master Production Schedule 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 1150 units. The carrying cost is Rs.3/unit/month and the lead

time is 1 month. The ordering cost /order is Rs. 6000. Develop an EOQ solution and determine EOQ, MRP and total cost.

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OR

Q.4 (a) Explain concept, scope and steps to implement 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.3 / 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) 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	400	600
C02	4000	600
C03	1600	600
C04	3000	600
C05	250	600
C06	300	1200

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(b) (i) Explain the ABC classification of firms, with their significant features. **07**
(ii) Discuss the concept of Drum-Buffer-Rope

OR

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: Hockey-stick phenomenon in your words. **07**
(ii) Explain how Bottleneck in the production process can be transformed to Non-bottleneck?
