B.E. (M.E.) Part – IV 7th Semester Final Examination, 2012
Operation Management
(ME-704)

Time : 3 hours   **Full Marks : 70**

Use separate answer script for each half.
Answer SIX questions, taking THREE from each half.
The questions are of equal value.

FIRST HALF

1.   (a) What is the importance of sales forecasting? Explain all the points. What are the objectives of Short term and Long term objectives of sales forecasting.
        (c) A firm find that demand a product during the last 10 years is given below. Estimate the demand for the next two years by the method of regration.

Years	1	2	3	4	5	6	7	8	9	10
Units	124	135	145	150	167	157	161	170	187	168

2.   (a) What are the factors to be considered for selecting the particular method of sales forecasting? Write down different methods of sales forecasting.
        (b) A nursing home has one year moving average forecasting method to produce a particular medicine requirement. The actual demand for the item is shown in the table below.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Demand	90	80	65	70	100	85	60	75	90	85	60	75

Using the 12 month moving average, find the exponential smoothing forecast for the 13th month.

3.   (a) What is inventory function or need for inventory? Explain advantage of Inventory Control. What is Reordering point, Lead time and Safety stock?
        (b) What is Economic Order Quantity? Derive the formula for EOQ when shortage is allowed.

4.   (a) Explain different type of Inventory models and also explain assumption in Deterministic model.
        (b) The rate of consumption of a particular item is 30 units per year. The cost of procurement per unit is Rs.50.00. The unit cost is Rs.120.00. The inventory carrying cost is 0.15% and it depends upon the average stock. Determine (i) EOQ, (ii) If lead time is 3 months, determine reorder point

5.   (a) Explain ABC analysis used in inventory control. State its applications.
        (b) Describe the objectives of TQM in an organization and how they could be achieved. What are the philosophy and concept of TQM.

6. (a) What is duality concept? What is infeasible and unbounded solution?
    (b) Solve the following problem using dual Simplex method

Minimize, $Z = 30x_1 + 64x_2 + 36x_3$
S.t., $\quad 3x_1 + 4x_2 + 4x_3 \geq 4$
$\quad\quad 4x_1 + 8x_2 + 3x_3 \geq 6$
$\quad\quad x_1, x_2, x_3 \geq 0$

7. Maximize, $Z = 2x_1 + 5x_2 + 8x_3$
S.t., $\quad 2x_1 + 3x_2 \leq 12$
$\quad\quad 2x_2 + 6x_3 \leq 10$
$\quad\quad 3x_1 + 5x_2 + 4x_3 \leq 18$
$\quad\quad x_1, x_2, x_3 \geq 0$
(i)   Solve the above L.P. problem and find its solution.
(ii)   Find the corresponding dual problem.

8. A company has three factories at locations Belghoria, Agarpara, and Sodepur which supplies to four warehouses at located Barrackpore, Panihati, Kamarhati and Dunlop. Monthly factory capacities are 15, 13, 19 units respectively. Monthly warehouse requirements are 10, 10, 12 and 15 units, respectively. Unit profits for shipping the materials in Rs. are given below.

	Barrackpore	Panihati	Kamarhati	Dunlop
Belghoria	21	16	25	13
Agarpara	17	18	14	23
Sodepur	32	27	18	41

Determine the optimal distribution for the company.

9. In a machine shop, there are four workers and four tasks to be performed in the four machines. The workers differ in efficiency and the tasks differ in their intrinsic difficulty. The estimate of time each worker would take to perform each task is given in the matrix below. How should the tasks be assigned one to a worker so as to minimize the total manhours?

	Machine 1	Machine 2	Machine 3	Machine 4
Worker 1	18	26	17	11
Worker 2	13	28	14	26
Worker 3	38	19	18	15
Worker 4	19	26	24	10

Determine the optimal locations for the machines.

10. (a) Define quality. Write the various dimensions of quality.
   (b) In a bearing manufacturing process, the measurements are made on the inside diameter of the bearing where the last three decimals are recorded. The data shown below are $\bar{x}$ and R values for 24 samples of size n = 5.

Sample No	$\bar{x}$	R	Sample No	$\bar{x}$	R
1	34.5	3	13	35.4	8
2	34.2	4	14	34.0	6
3	31.6	4	15	37.1	5
4	31.5	4	16	34.9	7
5	35.0	5	17	33.5	4
6	34.1	6	18	31.7	3
7	32.6	4	19	34.0	8
8	33.8	3	20	35.1	4
9	34.8	7	21	33.7	2
10	33.6	8	22	32.8	1
11	31.9	3	23	33.5	3
12	38.6	9	24	34.2	2

Draw $\bar{x}$ and R charts for the above process. Does the process seem to be statistical control? The values of $D_3 = 0$; $D_4 = 2.115$ and $A_2 = 0.577$ for the sample of size n = 5.