

B.E. (M.E.) Part – IV 7th Semester Final Examination, 2013
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 Economic Order Quantity? Derive the formula for EOQ when storage is allowed.
 (b) A factory requires 150 units of an item per month, each costing Rs. 27/- . The cost per order is Rs.150/- and inventory carrying charges works out to be 20% of inventory cost. Find out the economic order quantity and the number of order per year.
 Would you accept a 2% price discount on a minimum supply quantity of 1200 number? Compare the total cost in both cases.

2. a) Describe Exponential Smoothing Method of sales forecasting.
 b) A firm producing paint, plans to use simple exponential smoothing to forecast weekly demand and has collected the past data for 15 weeks as shown below:

Week No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Actual demand	30	35	20	15	10	15	20	30	35	30	10	12	20	30	20

3. (a) Describe briefly the various steps involving in the sales forecasting.
 (b) What do you understand by the following
 i) Collective opinion method
 ii) Time series analysis
 Explain using suitable examples and situation.
4. (a) Quality may be viewed from different distinct perspectives. What are these perspectives? Discuss briefly.
 (b) What is Quality Management? State and discuss the Quality Management principles.
5. (a) “Total quality management is too important to be taken up in organizations. Specially, it should not be subsidiary to profit or productivity.” Do you agree to the assertion? Justify your viewpoint.
 (b) What are basic different between Inspection and Quality Control? Discuss statistical Quality Control and operating characteristic curves (OC curve).

Second Half

6. (a) What is concept of duality? What is infeasible and unbounded solution?

(b) Solve the following problem using dual Simplex method

$$\begin{aligned} \text{Minimize, } Z &= 2x_1 + x_2 \\ \text{S.t., } & 3x_1 + x_2 \geq 3 \\ & 4x_1 + 3x_2 + 3x_3 \geq 6 \\ & x_1 + 2x_2 \leq 3 \\ & x_1, x_2, x_3 \geq 0 \end{aligned}$$

7. Maximize, $Z = -x_1 + 3x_2 - 2x_3$

$$\begin{aligned} \text{S.t., } & 3x_1 - x_2 + 2x_3 \leq 7 \\ & -2x_1 + 4x_2 \leq 12 \\ & 4x_1 + 3x_2 + 8x_3 \leq 10 \\ & x_1, x_2, x_3 \geq 0 \end{aligned}$$

- (i) Solve the above L.P. problem and find its solution.
 (ii) Find the corresponding dual problem.

8. A railway wagon manufacturer has three factories at locations Belghoria, Agarpara, and Sodepur which supplies to four warehouses at locations Naihati, Panihati, Kamarhati and Dunlop. Monthly factory capacities are 15, 13, 19 units respectively. Monthly warehouse requirements are 10, 10, 12 and 11 units, respectively. Unit profits for shipping the materials in Rs. are given below.

	Naihati	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 different machines which are assigned to manufacture four different jobs. The estimated cost for manufacturing a particular product is given in the matrix below. How should the jobs be assigned to the various machines so as to minimize the total cost?

	Machine 1	Machine 2	Machine 3	Machine 4
Job 1	5	7	11	6
Job 2	8	5	9	6
Job 3	4	7	10	7
Job 4	10	4	8	3

10. (a) Define quality. Write in brief the various dimensions of quality.

(b) An automobile manufacturer wanted to study whether the process is under statistical control by plotting a control chart of fraction non-conforming (NC) items? The number of fraction non-conforming items for 24 samples of size $n = 50$ are given below. Does the process seem to be statistical control? If not rectify the samples to get the process under statistical control.

Sample No	No. of NC items	Sample No	No. of NC items
1	12	13	10
2	15	14	13
3	8	15	5
4	10	16	11
5	16	17	24
6	7	18	18
7	9	19	15
8	14	20	9
9	10	21	7
10	6	22	12
11	17	23	13
12	22	24	6