



**International Institute of Health Management Research (IIHMR), New Delhi.  
POSTGRADUATE DIPLOMA HOSPITAL AND HEALTH MANAGEMENT  
(Health Management Stream)**

**(Batch 2017-2019)**

**OPERATIONS RESEARCH IN HEALTHCARE**

**(HEM-713)**

**End Term Examination**

**Time allowed: 3 hrs.**

**Max. Marks: 70**

**(Answer any five questions)**

**Each question carries 14 marks**

**(5 x 14 = 70 marks)**

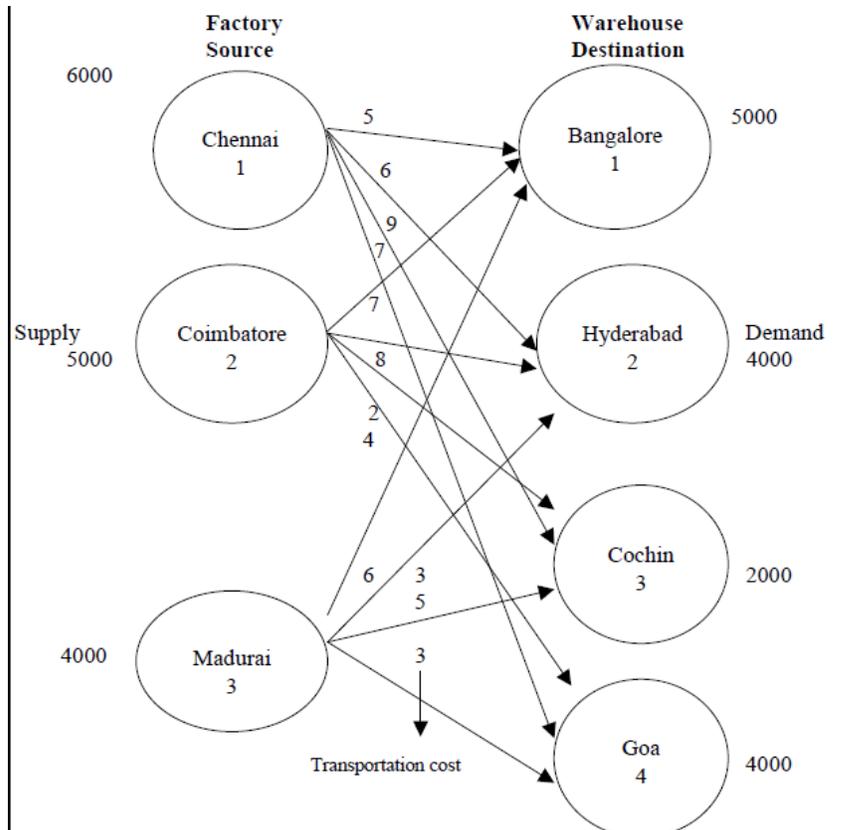
1. Let us assume that a diet for justifiable reasons is restricted to skimmed milk and a salad using well-known ingredients. We know that the nutritional requirements will be expressed as vitamin A and calcium controlled by their minimum quantities (in milligrams). Table 1 summarizes the quality of each nutrient available in foods and their daily requirement for good health conditions of an individual, as well as the unitary cost of these foods. What would be the total diet cost which complies with the minimal nutritional requirements?

Nutrient	Milk (glass)	Salad (500mg)	Minimum Nutritional Requirement
Vitamin. A	2mg	50mg	11mg
Calcium	50mg	10mg	70mg
Cost/unit	Rs.1.50	Rs.3.00	

Table 1:

2. What is OR? Write a detailed note on OR in healthcare. How can OR people help?
3. An ASHA finds that the time spent on counseling has an exponential distribution with a mean of 30 minutes. If she counsels people in the order in which they came in, and if the arrival of sets follow a Poisson distribution with an average rate of 10 per 8-hour day, what is the ASHA's expected idle time each day? How many people are expected to be ahead of you, if you just walked in?

4. HLPPT has decided to set up 3 factories at Chennai, Coimbatore and Madurai. Their warehouses already exist at Bangalore, Hyderabad, Cochin and Goa. As a Manager at HLPPT, make an efficient operational plan and what would be the minimum operational cost you are looking at?



5. A healthcare company has five machines that are used for four jobs. Each job can be given to one and only one machine. The cost of each job on each machine is given in the following table.

		Machines				
		A	B	C	D	E
Job	1	5	7	11	6	7
	2	8	5	5	6	5
	3	6	7	10	7	3
	4	10	4	8	2	4

What should be the total cost incurred in completing these four jobs?

6. A healthcare company uses 5,120 units of a component in a year. The purchase price per unit of the component is Rs. 5.00 and the carrying cost including interest is estimated at 20% of the average inventory investment on annual basis. The cost of placing an order and processing the delivery is Rs. 10.

(a) Ascertain the economic order quantity and the number of orders each of the economic order quantity, to be placed for the component in a year.

(b) Assuming that the average daily consumption of the above component is 14 units and that the normal lead time is 15 days, calculate the ordering level for the component, where safety stock is considered to be equal to 25 days' consumption. State why ordering level is fixed.

7. A small project consisting of eight activities has the following characteristics:

**Time – Estimates (in weeks)**

<i>Activity</i>	<i>Preceding activity</i>	<i>Most optimistic time (a)</i>	<i>Most likely time (m)</i>	<i>Most Pessimistic time (b)</i>
A	None	2	4	12
B	None	10	12	26
C	A	8	9	10
D	A	10	15	20
E	A	7	7.5	11
F	B,C	9	9	9
G	D	3	3.5	7
H	E,F,G	5	5	5

i) Draw the PERT network for the project.

ii) Prepare the activity schedule for the project.

iii) Determine the critical path.

iv) If a 30- week deadline is imposed, what is the probability that the project will be finished within the time limit?

If the project manager wants to 99% sure that the project is completed on the schedule date, how many weeks before that date should he start the project work?

