INDIAN INSTITUTE OF MATERIALS MANAGEMENT
Post Graduate Diploma in Materials Management

Paper – 18-C

Operations Research

Date: 15.12.2009   Max Marks: 100
Time: 2.00 pm to 5.00pm   Duration: 3 hours
Instructions:
1. The question paper is in two parts.
2. Part A is compulsory. Each question carries one mark
3. In part B answers 5 questions out of 7. Each question carries 16 marks.

PART A

Q.1. State true or false.   **Marks: 10**

1.1 Emotions and guess work is not part of Operation research.
1.2 Operation research is the scientific way to managerial decision making.
1.3 The objective of LP Model is to maximize the total transportation cost.
1.4 Transshipment Problem in which commodity can be transported to a particular destination through only one node.
1.5 A linear programming model can be used to solve the assignment problem.
1.6 PERT stands Project Evaluation and Return Technique.
1.7 CPM applied first in Chemical Industry.
1.8 Queuing involves problems of waiting.
1.9 Inventory Storing is not so important part of inventory control.
1.10 Game Theory is determining irrational behavior in game situation.

Q.2   Fill in the blanks.   **Marks: 05**

2.1 The major advantage of mathematical model is that it facilitates in taking -------------- faster and more accurate.
2.2 A ---------------- is a complete test of the model to confirm that it provides an accurate representation of the ------------ problem.
2.3 --------------- is trying for the best result by manipulating the model to the problem.
2.4 Transportation problem is a particular class of ----------- programming.
2.5 In --------------- method, the time estimates are assumed to be known with certainty.

Q.3 Expand the following   **Marks: 05**

3.1 PERT
3.2 ABC
3.3 FIFO
3.4 SIRO
3.5 CPM

PART B

Q. 5 Geetha Perfume Company produces both perfumes and body spray from two flower extract F1 and F2 . The following data has provided:

Data Collected

	Liters of Extract		
	Perfume	Body Spray	Daily availability (Liters)
Flower Extract, F1	8	4	20
Flower Extract, F2	2	3	8
Profit per liter	7	5	

The maximum daily demand of body spray of 20 bottles of 100 ml each. A market survey indicates that the daily demand of body spray cannot exceed that of perfume by more than 2 liters. The company wants to find out the optimal mix of perfume and body spray that maximizes the total daily profit. Formulate the problem as a linear programming model. **Marks: 16**

Q.6 The cost of transportation per unit from three sources and four destinations are given here. Obtain initial basic feasible solutions using the following methods.
1. North west corner method.
2. Vogel's approximation method.

Transportation Model

Source	Destination				Supply
	1	2	3	4	
1	4	2	7	3	250
2	3	7	5	8	450
3	9	4	3	1	500
Demand	200	400	300	300	1200

Marks : 16

Q.7 A project scheduled has following characteristics

Project Schedule

Activity	Name	Time	Activity	Name	Time (days)
1-2	A	4	5-6	G	4
1-3	B	1	5-7	H	8
2-4	C	1	6-8	I	1
3-4	D	1	7-8	J	2
3-5	E	6	8-10	K	5
4-9	F	5	9-10	L	7

1. Construct PERT
2. Compute Te and Tl for each activity.

Marks: 16

Q.8

a) Explain the process of inventory control. **Marks: 08**

b) From following particulars, calculate
 1) Reorder level
 2) Minimum level
 3) Maximum level
 4) Average level

Normal Usage: 100 units per day
Minimum Usage: 60 units per day
Maximum Usage: 130 units per day
EOQ: 5,000 UNITS
Re-order period: 25 to 30 days. **Marks: 08**

Q.9
a) Explain the types on maintenance cost. **Marks: 08**

b) A machine cost Rs 500/- to operate, while maintenance costs are zero for the first year, increasing by the Rs 100/- every year. If the interest rate is 5 percent every year, determine the best age at which the machine should be replaced. **Marks: 08**

Q.10 Solve the following LPP using Big M Method **Marks: 16**
        Minimize the constraints $Z = 3X1 + X2$
Subject to constraints

$4X1 + X2 = 4$
$5X1 + 3X2 \geq 7$
$3X1 + 2X2 \leq 6$

$X1, X2 \geq 0$