



INDIAN INSTITUTE OF MATERIALS MANAGEMENT  
Post Graduate Diploma in Materials Management

Dec 2012

PAPER – 18 C  
OPERATIONS RESEARCH.

DATE: 15.12.2012  
TIME: 2.00 p.m to 5.00 p.m.

Max. Marks: 100  
Duration: 03 Hrs.

Instructions:

1. The question paper is in two parts.
  2. Part A is compulsory. Each question carries one mark Total 25 marks
  3. In part B answers 5 questions out of 6. Each question carries 16 marks. Total 75 marks
- 

**PART A**

**Q.1. State true or false.**

**Marks: 10**

- 1.1 Competitive strategies can be modeled by game theory technique.
- 1.2 ABC Analysis Technique is a technique of inventory management.
- 1.3 The lead time is the inventory depletion cycle time.
- 1.4 Gomory's method is used to solve dynamic programming problem.
- 1.5 CPM is used for project monitoring and control.
- 1.6 An assignment problem of maximization type cannot be solved.
- 1.7 Markov models can be applied for many decision making problems.
- 1.8 A queue involves transformation of facilities.
- 1.9 Transshipment problem cannot be solved through linear programming.
- 1.10 Mutually exhaustive events can occur together.

**Q.2 Fill in the blanks.**

**Marks: 05**

- 2.1 Dynamic programming deals with optimization of \_\_\_\_\_ decision process.
- 2.2 Baye's Theorem is used for finding the \_\_\_\_\_ probability.
- 2.3 Tie in the choice of leaving variable is \_\_\_\_\_ in Simplex Algorithm.
- 2.4 A stochastic variable is also called as a \_\_\_\_\_ variable.
- 2.5 Stockouts can be reduced by maintaining a \_\_\_\_\_ of items.

**Q.3 Expand the following.****Marks: 10**

- 3.1 Renege
- 3.2 CPM
- 3.3 SIRO
- 3.4 CPM
- 3.5 FCFS

**PART B****Q.4.** Solve the following LPP by graphical method.**(Marks 15)**

$$\text{Maximize } Z = f(x,y) = 3x + 2y$$

$$\text{subject to: } 2x + y \leq 18$$

$$2x + 3y \leq 42$$

$$3x + y \leq 24$$

$$x \geq 0, y \geq 0$$

**Q.5** For the following transportation cost table answer the questions: **(Marks 15)**

WAREHOUSES		MARKETS				Supply
		A	B	C	D	
	I	6	3	5	4	22
	II	5	9	2	7	15
	III	5	7	8	6	8
	Requirement	7	12	17	9	

The shipping department has worked out the following schedule from experience: (I->B-12, I->C-1, I->D-9, II->C-15, III->A-7, III->C-1).

- a. Find the optimal transportation cost and optimal schedule.
- b. If the department is approached by a carrier of route III to B who offers to reduce the rate in the hope of getting some business, find the amount by which cost can be reduced to maintain the optimality.
- c. If the supply from warehouse II reduces to 12 and simultaneously the requirements at market C reduces to 14, find the optimal transportation schedule.

- Q.6.**
1. Construct a PERT network for the project shown in the table below.
  2. Find all the early and late event times and the event slack.
  3. Determine the critical path and its length. **(Marks 15)**

Activity	Immediately Preceding Activity	Expected Completion Time
a	-	2
b	-	3
c	-	2
d	b	4
e	a, b	3
f	b	2
g	f, c	5
h	g	4
i	f	3
j	i, d	2
k	j	1
l	e	6

- Q.7.** **(Marks 15)**

Solve the LPP using Simplex Method:

$$\text{Minimize } Z = X_1 - 3X_2 + 3X_3$$

Subject to the constraints:

$$3X_1 - X_2 + 2X_3 \leq 7$$

$$2X_1 + 4X_2 \geq 12$$

$$-4X_1 + 3X_2 + 8X_3 \leq 10$$

$$X_1, X_2, X_3 \geq 0$$

**Q.8.** R & B Beverage Company has a soft drink product that has a constant annual demand rate of 3600 cases. A case of the soft drink costs R & B Rs.3/-. Ordering costs are Rs.20/- per order and holding costs is 25% of the value of the inventory. R & B has 250 working days per year, and the lead time is 5 days. Find economic order quantity and total annual cost. **(15 Marks)**

**Q.9.** Four persons P1, P2, P3 and P4 have to do five jobs J1, J2, J3, J4 and J5. Each job is to be done by one person only. Each person does exactly one job except P2, who can do two jobs. Find an optimal assignment to minimize total cost.

**(Marks 15)**

	J1	J2	J3	J4	J5
P1	6	4	5	7	8
P2	7	5	8	6	9
P3	8	6	7	9	10
P4	5	7	8	4	6

\*\*\*\*\*