



Post Graduate Diploma in Logistics Management

Paper 6

OPERATION RESEARCH AND QUANTITATIVE TECHNIQUES IN LOGISTICS

Date : 12.06.2011
Time : 2.00 p.m. to 5.00 p.m.

Max Marks : 100
Duration : 3 hours

Instructions :

- 1) Answer all questions in PART A
 - 2) Attempt any five questions in PART B.
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PART A

Q.1 State TRUE or FALSE:

[1 Mark Each]

- a) Probability is the study of random or nondeterministic experiments.
- b) A feasible solution is a solution for which all constraints are satisfied.
- c) Optimal solution does not have the most favourable values of the objective function.
- d) The objective of Transportation Problem is to maximize cost.
- e) The selection of the appropriate order in which waiting customers are served is called sequencing.
- f) The time lag required to obtain the delivery of fresh supplies is Safety Stock.
- g) Payback Period is period required to recover original cash outflow invested in a project.
- h) The Breakeven Point is the point where the sales volume generates huge amount of profit.
- i) Fixed costs remain unchanged within a relevant range of activity.
- j) Simulation is imitation of reality.
- k) Any realistic business situation involves probabilistic or random features.
- l) Variable costs change in direct proportion to an activity level.
- m) An activity is an effort that requires resources and time for completion.
- n) Probability of a customer waiting in a queue can have a minimum value of zero.
- o) North West Corner method is used to solve Assignment Problem.

Q.2 Match the columns A & B:

[1 Mark Each]

(1) Least Cost Method	(A) Two variable LPP
(2) Inventory Management	(B) Service Rate
(3) Graphical Method	(C) Safety Stock
(4) Hungarian Method	(D) Transportation Problem
(5) Exponential Distribution	(E) Assignment Problem

Q.3 Give the full form of the following:

[1 Mark Each]

- (a) EOQ; (b) PERT; (c) NPV; (d) FIFO; (e) ROI.

PART B
[15 Marks Each]

Q.4 An automobile company uses bolts at an approximate consumption rate of 2500 kg per annum. The bolts cost Rs 30 per kg and the company estimates that it costs Rs 130 to place an order and the inventory carrying cost is 10% per annum. How frequently should orders for bolts be placed and what quantity should be ordered?

Q.5 The cost of transportation per unit from three sources and four destinations are given in table as per below. Obtain the initial basic feasible solution using Vogel's Approximation Method:

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

Q.6 Three jobs A,B,C are to be assigned to three machines X,Y,Z. The processing cost (Rs) are as given in the matrix shown below. Find the allocation which will minimize the overall processing costs.

Jobs	Machine		
	X	Y	Z
A	19	28	31
B	11	17	16
C	12	15	13

Q.7 Please solve the problem using Graphical Method:

$$\text{Maximize } Z = 3x + 5y$$

Subject to

$$3x+2y \leq 18$$

$$x \leq 4$$

$$y \leq 6$$

$$x,y \geq 0$$

Q.8 Auto car service provides a single channel water wash service. The incoming arrivals occur at the rate of 4 cars per hour and the mean service rate is 8 cars per hour. Assume that arrivals follow a Poisson distribution and the service rate follows an exponential probability distribution. Determine the following measures of performance:

- (a) What is the average time that a car waits for water wash to begin?
- (b) What is the average time a car spends in the system?
- (c) What is the average number of cars in the system?

Q.9 Please solve the following by Simplex Method:

Maximize

$$Z = 40x + 100y$$

Subject to

$$10x + 5y \leq 250$$

$$2x + 5y \leq 100$$

$$2x + 3y \leq 90$$

$$x, y \geq 0$$

Q.10 The annual cost of two machines A & B when time value of money is neglected is shown in Table.

YEAR		2007	2008	2009
MACHINE	A	1800	1200	1400
	B	2800	200	1400

Find their cost patterns if time value of money is 10% per year and hence find which machine is economical.
