

INDIAN INSTITUTE OF MATERIALS MANAGEMENT
DEC-2010 Post Graduate Diploma in Logistics Management
PAPER - 6
OPERATIONS RESEARCH AND Q. T. IN LOGISTICS

Date: 12.12.2010
 Time: 2.00 pm to 5.00 p.m

Max. Marks: 100
 Duration: 3 hours

Instructions:

- 1]. Attempt all questions in Part A
- 2]. Attempt any five questions in Part B.
- 3]. Marks for Part A are 25 and marks for Part B are 75.

PART A

Q1. State true or false (Marks 5)

- a). A constraint in an LPP that is satisfied as an equation at the optimal solution is not a binding constraint.
- b). A feasible solution of a transportation problem is a set of non-negative allocations.
- c). Arrivals in a queueing situation follow Poisson distribution.
- d). A dual variable is defined for each primal equation or the constraint.
- e). A goal programming problem can be solved using the cutting-plane algorithm.

Q2. Match the columns A and B (Marks 10)

	Column A		Column B
1	B & B algorithm	A	Order of completing a job
2	Interarrival time	B	Game Theory
3	More than one solution to LPP	C	Only arrivals in the system
4	Processing order	D	Integer Programming
5	Transition probabilities	E	Symmetric LPP
6	Minimizing losses	F	Alternative optima
7	Bath Tub failure rate	G	Monte Carlo simulation
8	Pure birth process	H	Monte Carlo simulation
9	Random numbers	I	Markov process
10	Inequality and non-negativity	J	Weibull Model

Q3. Fill in the blanks

(Marks 10)

- i) The model in OR is an _____ model.
- ii) In a queue service time follows _____ distribution.
- iii) The iso-profit function is the straight line on which every point has same _____.
- iv) PERT stands for _____.
- v) The arrival rate in a queue is denoted by _____.
- vi) The matrix-minima method can be used to solve _____ problem.
- vii) A _____ can be found using maximin and minimax principle.
- viii) A $n \times 2$ game can be reduced to 2×2 game using _____ property.
- ix) The daily demand during the lead time can be approximated by _____ distribution.
- x) The duration of a dummy activity is _____.

PART B

Q.4. (A). An industrialist borrows Rs. 50000/- as a loan from a bank. If the bank interest is 10% per annum., find the amount the industrialist has to return after 3 years when the interest is compounded annually. **(8 Marks)**

Q.4. (B). Discuss the elements of a queuing system. **(7 Marks)**

Q.5. (A). A manufacturing company needs 2500 units of a particular component every year. The company buys it at the rate of Rs. 30/- per unit. Order processing cost for this part is Rs. 15/- and cost of carrying a part in stock is Rs. 4/- per year. Determine EOQ and number of orders. **(8 Marks)**

Q.5. (B). A departmental store has only one cashier. During the rush hour customers arrive at the rate of 15 customers per hour. Service rate is 20 per hour. Assume the conditions for use of single queue model; find the probability that the cashier is idle. **(7 Marks)**

Q.6. Solve the following transportation problem. **(15 Marks)**

From	To			Available
	A	B	C	
I	50	30	220	1
II	90	45	170	2
III	250	200	50	3
Requirement	4	2	2	

Q.7. Determine how should the tasks be allocated so as to minimize total man-hours. **(15 Marks)**

Tasks	Men			
	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

Q.8. Solve the LPP problem using Graphical Method: **(15 Marks)**

$$\text{Maximize } Z = X_1 + X_2$$

Subject to the constraints

$$X_1 + X_2 \leq 1$$

$$-3X_1 + X_2 \geq 3$$

$$X_1, X_2 \geq 0$$

Q.9. Using the principle of dominance, solve the following game: **(15 Marks)**

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8