INDIAN INSTITUTE OF MATERIALS MANAGEMENT

JUN-2010 **Post Graduate Diploma in Logistics Management**

PAPER - 6

OPERATIONS RESEARCH AND Q. T. IN LOGISTICS

Date: 13.06.2010 Max. Marks: 100
Time: 2.00 pm to 5.00 p.m 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 feasible solution to an LPP is an optimal solution./

b). Penalty method is used for solving transportation problem.

c). If arrival rate is less than the service rate a queue shall not be formed.

d). In prohibited routes a quantity can be transported.

e). In game theory 2 x M game can be solved by graphical method.

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

	Column A		Column B
1	Least Cost Method	A	Game Theory
2	Service Rate	B	Beta Distribution
3	Two Variable LP	C	Limited queue capacity
4	Maximin Algorithm	D	Transportation Problem
5	Economic Order Quantity	E	Symmetric LPP
6	Activity Time	F	Exponential Distribution
7	Kendal's notation	G	Weibull Distribution
8	M/M/1/N	H	GraphicalMethod
9	Failure Analysis	I	Inventory Management
10	Inequality and non-negativity	J	Queuing Theory

Q3. Fill in the blanks **(Marks 10)**

i) Probability of a customer waiting in a queue can have a minimum value of ___ .

ii) In a waiting line service time follows _____ distribution.

iii) Hungarian method is used to solve a _____ problem.

iv) PERT stands for _____.

v) If A ^ B is a Null Set, the events A and B are _____ _____.

vi) The utilization factor of a queue is denoted by ___.

vii) A transportation problem can be solved using _____.

viii) Gomory's Algorithm can be used to solve _____ _____ problem.

ix) Iventory carrying cost can be expreesed as percentage of _____.

x) Vogel's rule can be used to solve a ____ problem.

PART B

Q.4. A corporation must decide whether to introduce a new product line. The new product will have startup costs, operational costs, and incoming cash flows over six years. This project will have an immediate (t=0) cash outflow of $100,000 (which might include machinery, and employee training costs). Other cash outflows for years 1-6 are expected to be $5,000 per year. Cash inflows are expected to be $30,000 each for years 1-6. All cash flows are after-tax, and there are no cash flows expected after year 6. The required rate of return is 10%. Calculate the present value (PV) can be calculated for each year. **(15 Marks)**

Q.5. The annual demand for an electronic machine is approximately 3600 items. Every time an order is placed, a fixed cost of Rs. 36/- is incurred. The holding cost per item inventory is 25% of the investment and unit price is Rs. 10/- Determine EOQ and optimal cycle time. **(8+7 Marks)**

Q.6. For the given transportation table, find the initial allocation in the transportation problem using the least cost method. **(8+7 Marks)**

The figures inside the cells indicate unit transportation cost.

Factory	Warehouse				Supply
	W1	W2	W3	W4	
F1	2	3	5	1	8
F2	7	3	4	6	10
F3	4	1	7	2	20
Demand	6	8	9	15	38

Q.7. An electronic company manufactures small electrical devices. Products are manufactured on five different assembly lines (1,2,3,4,5). When manufacturing is finished, products are transported from the assembly lines to one of the five different inspection areas (A,B,C,D,E). Transporting products from five assembly lines to five inspection areas requires different times (in minutes) as shown in the table below:

(15 Marks)

Assembly Line	Inspection Area				
	A	B	C	D	E
1	10	4	6	10	12
2	11	7	7	9	14
3	13	8	12	14	15
4	14	16	13	17	17
5	19	11	17	20	19

Find the optimal assignment using Hungarian Method to optimize time.

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

Maximize $Z = 10X1 + 8X2$
Subject to constraints
$2X1 + X2 \leq 20$
$X1 + 3X2 \leq 30$
$X1 - 2X2 \geq -15$
$X1\ X2 \geq 0$

Q.9. Using the principle of dominance, find the optimal strategies for the players in the following game: (15 Marks)

	B1	B2	B3	B4
A1	3	2	4	0
A2	3	4	2	4
A3	4	2	4	0
A4	0	4	0	8

Player A strategies: A1, A2, A3 and A4, Player B strategies: B1, B2, B3 and B4