

PAPER - 6
OPERATIONS RESEARCH AND Q. T. IN LOGISTICS

Date: 13.12.2009
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.
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PART A

Q1. State true or false **(Marks 5)**

- a). A feasible solution to an LPP is a non regenerative vector x satisfying $Ax = b$.
- b). Northwest corner rule is used for solving M/M/1 queue problem.
- c). If arrival rate exceeds the service rate a queue shall not be formed.
- d). Sensitivity analysis is the study of changes in the optimal solution.
- e). In dynamic programming, previous decisions are combined for a new decision.

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

	Column A		Column B
1	VAM Method	A	Goal Programming
2	Arrival Rate	B	Beta Distribution
3	Canonical System	C	Limited queue capacity
4	Partitioning Algorithm	D	Transportation Problem
5	Economic Order Quantity	E	Symmetric LPP
6	Job Time	F	Poisson Distribution
7	Maximizing Payoff	G	Weibull Distribution
8	M/M/1/N	H	Simplex Method
9	Reliability Analysis	I	Inventory Management
10	Inequality and non-negativity	J	Game Theory

Q3. Fill in the blanks

(Marks 10)

- i) The OR discipline began during _____ War ____.
- ii) In a waiting line inter-arrival times follows _____ distribution.
- iii) Graphical method is used to solve a _____ problem.
- iv) CPM stands for _____.
- v) An outcome of an experiment is called a _____ variable.
- vi) The utilization factor of a queue is denoted by ____.
- vii) An assignment problem can be solved using _____.
- viii) Branch and Bound algorithm can be used to solve _____ problem.
- ix) An economic order quantity minimizes total _____.
- x) Least cost rule can be used to solve a _____ problem.

PART B

Q.4. (A). A man borrows Rs. 6,00,000/- at 5% rate of compounded interest annually. if the principal and interest are to be repaid in 10 equal installments, what should be the amount of each installment?

(8 Marks)

Q.4. (B). Discuss service discipline at a queuing system.

(7 Marks)

Q.5. (A). The daily demand for an electronic machine is approximately 25 items. Every time an order is placed, a fixed cost of Rs. 240/- is incurred. The daily holding cost per item inventory is Rs. 0.40. If the lead time is 16 days, determine EOQ and reorder point.

(8 Marks)

Q.5. (B). A departmental store has only one cashier. During the rush hour customers arrive at the rate of 20 customers per hour. Service rate is 24 per hour. Assume the conditions for use of single queue model; find the probability that the cashier is idle.

(7 Marks)

- Q.6.** For the given transportation table, find the initial allocation in the transportation problem using the least cost method. **(15 Marks)**

The figures inside the cells indicate unit transportation cost.

Factory	Warehouse				Supply
	W1	W2	W3	W4	
F1	21	16	25	13	11
F2	17	18	14	23	13
F3	32	27	18	41	19
Demand	6	10	12	15	43

- Q.7.** Five machines are available to do five different jobs. The timer required by each job on each machine is given in the following table. Find optimal assignment in order to minimize time. **(15 Marks)**

Machine	Job				
	I	II	III	IV	V
A	2	9	2	7	1
B	6	8	7	6	1
C	4	6	5	3	1
D	4	2	7	3	1
E	5	3	9	5	1

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

$$\text{Maximize } Z = 4X_1 + 3X_2$$

Subject to the constraints

$$3X_1 + 4X_2 \leq 24$$

$$8X_1 + 6X_2 \leq 48$$

$$X_1 \leq 5$$

$$X_2 \leq 6$$

$$X_1, X_2 \geq 0$$

- Q.9.** Using the principle of dominance, find the optimal strategies for the players in the following game:

	B1	B2	B3	B4
A1	7	6	8	9
A2	-4	-3	9	10
A3	3	0	4	2
A4	10	5	-2	0

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