INDIAN INSTITUTE OF MATERIALS MANAGEMENT

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

Paper – 18-C

Operations Research

Date: 19.6.2010 Max Marks: 100

Time: 2.00 pm to 5.00pm Duration: 3 hours

Instructions:

1. The question paper is in two parts.
2. Part A is compulsory. Each question carries one mark
3. In part B answers 5 questions out of 7. Each question carries 16 marks.

PART A

Q.1. State true or false. Marks: 10

1.1 Linear Programming is a widely used mathematical modeling technique.
1.2 ABC Analysis Technique is type of inventory management.
1.3 The minimum stock level represents the highest quantitative balance of materials..
1.4 Simulation can generate optimal solution.
1.5 CPM used in research and development.
1.6 In maximization problem, the objective is maximizing the profit.
1.7 Assignment models can be applied for many decision making problems.
1.8 Queuing involves problems of moving.
1.9 Transportation problem is a particular class of linear programming.
1.10 Modern probability theory studies predictions for future experiments.

Q.2 Fill in the blanks. Marks: 05

2.1 Any type of human decision making –---------- as well as qualitative –involves an intellectual process.
2.2 Transportation model can also be used in making location ----------.
2.3 The ---------- mechanism is a description of resources required for service.
2.4 In simulation, the experiment are carried out with out disturbing the ----------.
2.5 Materials controls helps managers in ----------making.

Q.3 Expand the following Marks: 05

3.1 EOQ
3.2 LPP
3.3 FIFO
3.4 SIRO
3.5 CPM

PART B

Q. 4 Solve the LP problem using Simplex method. Determine the following
a) What is optimal solution?
b) What is the value of objective function?
c) Which constraint has excess resources and how much?

Zmax = 5X1 + 6X2
Subject to constraints,
$2X1 + X2 \leq 2000$
$X1 \leq 800$
$X2 \leq 200$
$X1, X2 \geq 0$ Marks: 16

Q.5 The cost of transportation per unit from three sources and four destinations are given here. Obtain initial basic feasible solutions using the following methods.
1. North west corner method.
2. Vogel's approximation method.

Transportation Model

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

Marks: 16

Q.6 The following gives the activities of a construction project and other data.

Construction Project Data

Activity	Normal		Crash	
	Time (days)	Cost (Rs.	Time (dayes)	Cost (Rs.)
1-2	6	50	4	80
1-3	5	80	3	150
2-4	5	60	2	90
2-5	8	100	6	300
3-4	5	140	2	200
4-5	2	60	1	80

If the indirect cost is Rs. 20 per day , crash the activities to find the minimum duration of the project and the project cost associated. Marks: 16

Q.7
a) Explain the scope of Operation Research. Marks: 08

b) Calculate 1) Re-order Level 2) Minimum level 3) Maximum level for each component A and B form the following information.

Normal Usage: 50 Units per week each
Minimum Usage: 25 Units per week each
Maximum Usage: 75 units per week each
Re-order Quantity: A:300 Units, B: 500 Units
Re-order Period : 4 to 6 weeks, B: 2 TO 4 Weeks Marks: 08

Q.8
a) Explain the term breakdown maintenance and preventive maintenance? Marks: 08

b) Truck owner finds from his past records that the maintenance cost per year of a truck whose purchase price Rs. is 8000 are as given.

Replacement Problem

Year	1	2	3	4	5	6	7	8
Maintenance Cost Rs.	1000	1300	1700	2200	2900	3800	4800	6000
Resale Price Rs.	4000	2000	1200	600	500	400	400	400

Determine the time at which it is profitable to replace the truck. Marks 08

Q.9 Solve the following LPP using Big M Method Marks: 16
Minimize the constraints $Z = 3X1 + X2$
Subject to constraints

$4X1 + X2 = 4$
$5X1 + 3X2 \geq 7$
$3X1 + 2X2 \leq 6$

$X1, X2 \geq 0$

10. a) Describe the aims and objective of simulation. Marks: 08

b) An ice cream parlors record of previous month's sale of a particular variety of ice cream as follows

Simulation of Demand Problem

Demand (No. of ice creams)	No. of days
4	5
5	10
6	6
7	8
8	1

Simulate the demand for first 10 days of the month. Marks: 08