INDIAN INSTITUTE OF MATERIALS MANAGEMENT

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

Paper – 18-c

Operations Research

Date: 19.12.2010 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 Game Theory is a widely used mathematical modeling technique.
1.2 VED Analysis Technique is type of replacement policy.
1.3 The minimum stock level represents buffer stock.
1.4 Integer programming can generate integer solution.
1.5 PERT is used for resource control.
1.6 In minimization problem, the objective is minimizing cost.
1.7 Markov models can be applied for many decision making problems.
1.8 A waiting line involves moverment of customers.
1.9 Transportation problem is a particular class of linear programming.
1.10 An outcome of an experiment is a discrete variable.

Q.2 Fill in the blanks. Marks: 05

2.1 Human decision making is an _____ process.
2.2 Assignment model can also be used in making resource ----------.
2.3 The Jockey is a type of ----------behaviour in a queueing situation.
2.Simulation uses theory of _____ numbers.
2.5 Buffer stocks help managers against _____.

Q.3 Expand the following Marks: 05

3.1 SS
3.2 LIFO
3.3 PQ
3.4 PERT
3.5 NLP

PART B

Q.4. Solve the LPP problem using Graphical Method: Marks : 16

Maximize Z = X1 + X2
Subject to the constraints
X1 + X2 <= 1
-3X1 + X2 >= 3
X1 , X2 >=0

Q.5 Solve the following transportation problem. Marks : 16
1. North west corner method.
2. Vogel's approximation method

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.**6**. From the table of activities associated with the project given below:
i) Draw the network
ii) Find the critical path
iii) Find the critical project duration.

Activities	A	B	C	D	E	F	G	H	I
Optimistic time	5	18	26	16	15	6	7	7	3
Pessimistic time	10	22	40	20	25	12	12	9	5
Most likely time	8	20	33	18	20	9	10	8	4

A, B, C are starting actitivies. B triggers F, A triggers E and D, F, E trigger I, D triggers H and C triggers G. H, I J are end activities. Marks : 16

Q.7 Marks : 16

Solve the LPP using Simplex Method:
Maximize Z = 4X1 + 3X2
Subject to the constraints:
2X1 + X2 <= 1000
X1 <= 400
X2 <= 700
X1, X2 >= 0

Q.8. On average 18 customers are served by a barber every hour. What is the probability that a customer shall be free within 3 minutes and what is the probability that a customer shall be serviced in more than 12 minutes?
Marks : 16

Q.9. A company has two plants producing a certain product that is to be shipped to three distribution centers. The unit production costs are the same at the two plants, and the shipping cost per unit is shown below.

	Distribution Centre		
Plant	**I**	**II**	**III**
A	**4**	**6**	**4**
B	**6**	**5**	**2**

Shipments are made once per week. During each week, each plant produces at most 60 units and each distribution center needs at least 40 units.

a) Compute the initial basic feasible solution using Vogel's Approximation Method. Marks: 05

b) Test the solution for optimality and find the optimal basic feasible solution and total transportation cost. Marks: 10