



INDIAN INSTITUTE OF MATERIALS MANAGEMENT

Post Graduate Diploma in Materials Management Graduate Diploma in Materials Management

June 2013

Paper No. 2

QUANTITATIVE METHODS

Date: 09.06.2013

Max .Marks: 100.

Time: 2.00 to 5.00 p.m.

Duration: 3 hours

Instructions:

1. The Question Paper is in two parts- Part A (compulsory) and Part B.
 2. From Part A answer all the questions. Each question carries 1 mark, total 25 marks. (Total Marks 25)
 3. From Part B answer any five questions out of 8 questions .Each question carries 15 marks, total 75 marks.
 4. Use of non-scientific calculator and/or mathematical tables is permitted.
 5. Graph paper can be used wherever necessary.
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PART A (COMPULSORY)

Q.1 (A) State whether the following statements are true or false.

(15 Marks)

1. If any one of the critical activities is delayed, the whole project is delayed.
2. Max-min criterion in decision making is used by a pessimist.
3. Decision tree is used in making decision under certainty
4. Waiting time in the queue system is the total time a customer spends in the queue plus the service time.
5. The transportation problem applies to the transportation of a single commodity from origins to destinations.
6. Game theory considers the interaction between the decision maker and its competitors.
7. A linear programming problem with more than three decision variables may be solved by graphical method.
8. The simplex method provides an algorithm moving from one B .F. S. to another B .F .S.
9. A project cannot have more than one critical paths.
10. In preemptive service a customer is not served immediately.
11. A replacement is called for whenever new equipment offers less efficient service.
12. Utilization of float of an activity never affects the float times of other activities.
13. A project is always accepted if its N P V is less than zero.
14. Max-min criterion selects minimum of the maximum payoffs.
15. In a linear programming problem all the decision variables are positive.

(B). Fill in the blanks :

(10 Marks)

1. In a 2 X 2 zero sum game the gain of one player is _____ to the loss of the other.
2. Linear programming deals with optimization of an objective function subject to _____ constraints.
3. A feasible solution to a transportation problem _____ Rim conditions
4. Laplace criterion of decision making assigns _____ probabilities to all the events of each alternative.
5. A 2 X n game problem which does not reduce to 2 X 2 problem may be solved by _____ method.
6. A linear programming is a technique for -----use of limited resources.
7. Economic order quantity is the level at which the holding cost is ----- the ordering cost.
- 8 . When the total capacity is equal to the total demand the transportation problem is called a -----T.P.
9. A decision node in a decision tree is usually represented by a -----
10. The Total number of customers in the queuing system, both waiting and in service is said to be -----length.

Part B (attempt any five)

Q.2 For the following transportation problem find a feasible solution by Vogel's approximation method and determine the optimal solution.

	A	B	C	D	supply
1	13	3	28	6	26
2	14	28	26	15	30
3	16	14	23	13	30
Demand	15	19	27	27	

Q.3 Solve the following problem :

$$\text{Maximize } Z = 7X_1 + 6X_2$$

$$\text{subject to } 3X_1 + X_2 \geq 18$$

$$2X_1 + X_2 \leq 14$$

$$X_1 \geq 0, X_2 \geq 0$$

(a) By Graphical Method (b) By Simplex Method. i.e., (By both methods)

Q.4 The following table gives the time duration of all the activities in a Project :

Activity	A	B	C	D	E	F	G	H
Preceding activity	-	-	A	A	A	C	D, F	B, E
Duration	9	15	7	12	7	6	9	12

(a). Draw the Project network diagram.

(b). Determine the critical time duration (c) Find the free float of activity D.

Q.5 (a) Describe the behaviour/attitude of customers entering the queue system

(b) At a bank window, on the average, nine customers are served per hour.

Assuming that the service time has exponential probability distribution, what is the probability that a customer shall be served :

(a). Within 15 minutes

(b). In more than 30 minutes.

Q.6. Solve the following assignment problem by Hungarian Method

WORKERS	JOBS			
	A	B	C	D
1	15	10	21	37
2	27	12	33	25
3	19	22	18	34
4	11	15	30	25

Q. 7 (a). Making use of the following data calculate the coefficient of correlation.

Are the two variables highly correlated ?

X1	10	6	9	10	12	13	11	9
X2	9	4	6	9	11	13	8	4

(b). Define time series and briefly describe its components.

Q.8 The maintenance costs per year of a machine and its resale values are estimated to be as given below:

Year	1	2	3	4	5	6	7	8
Main. cost	1000	1200	1400	1800	2300	2800	3400	4000
Resale Price	3000	1500	750	375	200	200	200	200

If the cost of the machine is Rs. 7000 at what age the replacement will be due ?

- Q.9 (a) What is a saddle point in a game ? Explain with an example.
(b) Use dominance property to reduce the given matrix and solve the game.

		Player B		
		b1	b2	b3
Player A	a1	11	-9	-3
	a2	5	6	2
	a3	-11	-7	1
