INDIAN INSTITUTE OF MATERIALS MANAGEMENT

Post Graduate Diploma in Materials Management
Graduate Diploma in Materials Management
Paper No. 2

June 2014

QUANTITATIVE METHODS

Date: 15.06.2014 **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.

PART A (Compulsory)

(Each question caries 1 mark x 25 = 25 marks)

Q.1**. (A). State whether the following statements are true or false :** 15 marks

(a). A linear programming problem with more than three decision variables may be solved by Graphical method.

(b). A transportation problem concerns transportation of a single commodity from origins to destinations.

(c). Vogel's approximation method is applicable to assignment problems.

(d). A decision tree is used in making decision under certainty.

(e). At break-even point of sales there is neither profit nor loss.

(f). If a linear constraint is of less than type a surplus variable is subtracted.

(g). A project is always accepted if its N P V is less than Zero.

(h). Utilization of the float of an activity never affects the float of a succeeding activity.

(i). The simplex method provides an algorithm moving from one B F S to another B F S .

(j). In a two-persons zero sum game the gain of one is equal to the gain of the other.

(k). Inter-arrival time in a queue system follows Poisson distribution.

(l). An exponential probability distribution is a discrete p.d.

(m). Mathematical programming involves optimization of a function subject to certain constraints.

(n). A good net-work will have only one critical path.

(o). A Dummy activity consumes negligible resource

Q. 1 (B). <u>Fill in the blanks :</u> **10 marks**

(a). When supply is equal to the demand the transportation problem is called a ----------

(b). A feasible solution to a transportation problem-------------Rim conditions.

(c). In an integer linear programming problem decision variables have only------values.

(d). A decision point in a decision tree is usually represented by a --------------

(e). If number of independent allocations in a feasible solution of a transportation is less than m + n - 1 then it is called a ---------

(f). A Dummy activity in a net-work ------------no resources.

(g). E. O. Q. is the level at which Holding cost is ------to the ordering cost.

(h). S I R O stands for ------------

(i). In a game the point at which Max-min and Min-max values are equal is called a ---------------

(j). A Binomial distribution applies to a variable taking ----------values.

PART B (answer any five) (15 X 5 = 75 marks)

Q. 2. Solve the following L. P. P. by following two methods:

(a). Graphical Method

(b). Simplex Method

Maximize $Z = 6x_1 + 4x_2$

subject to $2x_1 + 3x_2 <= 120$

$2x_1 + x_2 <= 60$

$x_1 >= 0, x_2 >= 0$

Q.3. Find feasible solutions to the given transportation problem by the following two methods and indicate the difference between the costs obtained :

Destinations

	I	II	III	IV	V	
A	4	3	1	2	6	80
B	5	2	3	4	5	60
C	3	5	6	3	2	40
D	2	4	4	5	3	20
	60	60	30	40	10	

Q.4. Solve the following assignment problem :

	Men				
Jobs	**I**	**II**	**III**	**IV**	**V**
A	6	8	12	7	8
B	9	6	6	7	6
C	7	8	11	8	4
D	11	5	9	5	3

Q.5.(a). What is the usefulness of cost-volume profit analysis

(b). Opus Company produces a component at the cost of Rs. 150 per unit. If the selling price per unit is Rs. 175 Find the break-even point given that the fixed cost is R. 3000.

Q.6. Nine customers arrive and 10 customers are served every 5 minutes on the average at a service centre. If arrival rate and service rate follow Poisson and exponential probability distributions respectively, find :

(a). The average number of customers in the queue.

(b). The average time a customer spends in the queue.

Q.7. A machine costing Rs. 9000 has a maintenance cost of Rs. 1000 in the first year of operation which rises by Rs. 2000 in each of the succeeding years. Assuming that the machine replacement can be done only at the end of a year, determine the best age at which the machine can be replaced if the scrap value at any time is only Rs. 3000.

Q.8. Given the following information about a project :

Activity	A	B	C	D	E	F	G	H	I	J
Preceding activities	-	-	-	A	B	B	D	D	H ,E	G
Duration	7	5	8	3	6	7	6	11	4	9

(a). Draw the Project net work.

(b). Find the critical path and critical duration

(c). If the optimistic, normal and Pessimistic durations for the activity H are respectively

Q.9. For a game the pay-off matrix is given as :

Player B

		b 1	**b 2**	**b 3**
	a 1	2	8	3
Player A	**a 2**	7	3	9
	a 3	6	2	7

Find the optimal strategies of Players A & B and determine the value of the game.

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