

DEC-2010

INDIAN INSTITUTE OF MATERIALS MANAGEMENT
Post Graduate Diploma in Materials Management
Graduate Diploma in Materials Management
PAPER - 2
QUANTITATIVE METHODS

Date: 12.12.2010
Time: 2.00pm to 5.00pm

Max. Marks: 100
Duration: 3 hours

Instructions:

- 1]. The question paper is in two parts- Part A: Objective Type (Compulsory) and Part B: Theory problems.
 - 2]. From part A, answer all questions. Each question carries 1 mark, total 25 marks.
 - 3]. From part B, answer any 5 questions out of 8 questions. Each question carries 15 marks, total 75 marks.
 - 4]. Use of calculator and/or mathematical table is permitted.
 - 5]. Graph sheet can be used wherever necessary.
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Part A (Compulsory)

Q1 (A)	State following statements are true or false	(15)
	a) In the linear programming there may be two implicit non-negativity constraints	
	b) Exponential forecasting is appropriate for trend and seasonal effect	
	c) Alpha in Exp. Forecasting is called smoothing constant	
	d) Mean squared error is absolute value of errors	
	e) Multiplicative model is defined when components of time series are multiplied	
	f) Dummy activity consumes resources	
	g) Poisson distribution is appropriate to model the no. of occurrences of a rare event	
	h) Conditional probability may be explained by Ven diagram	
	i) Finding sample variance we have to divide by one less than the size	
	j) Standard deviation of a random variable is the square root of the variance	
	k) When X and Y are independent every conditional probability is not the same as corresponding marginal probability	
	l) Activity is Vector where event is Scalar	
	m) Co-variance between X & Y cannot be calculated for joint distribution of X & Y	
	n) In Goal programming more than one objective functions are applicable	

	o)	$Y = a + bx$ is linear Regression Equation
Q1 (B)		Define following (any two) :- (10)
	a)	Decision Tree
	b)	Wholesale & retail price index
	c)	Economic Ordering Quantity
	d)	Basic structure of Queuing models

Part B

(Answer 5 out of 8)

Total marks : $15 \times 5 = 75$

Q 2 Using the solution procedure for a mixed strategy game, solve the following game :

	X	Y_1	Y_2
X_1		4	2
X_2		0	10

Q 3 Solve the following problems given these constraints and this objective function :-

Maximize profit = $30x_1 + 40x_2$

Subject to $4x_1 + 2x_2 \leq 16$

$2x_1 - x_2 \geq 2$

$x_2 \leq 2$

$x_1, x_2 \geq 0$

- a) Graph this feasible solution
- b) Evaluate the objective function at each corner point
- c) Identify the optimal solution

Q 4 A recycling co receives trucks to unload AC Cans for recycling; waiting time to unload is 15 minutes, cost of driver and truck when in queue is Rs.60/- per hour. A new automated compactor can be purchased which will empty at constant rate 12 trucks/hour i.e. 5 minutes / truck. Trucks arrive according to poisson distribution at an average rate of 8 per hour. If new system adopted it cost will amortized at rate of Rs.3 per truck unloaded. Analyse Cost vs benefits.

Q 5

<u>Activity</u>	<u>a</u>	<u>m</u>	<u>b</u>	<u>Immediate Predecessors</u>
A	1	2	3	-
B	2	3	4	-
C	4	5	6	A
D	8	9	10	B
E	2	5	8	C, D
F	4	5	6	B
G	1	2	3	E

Find out expected Time and Variance.

Q 6

Transportation Cost is shown below along with warehouse requirement & factory capacity

A	D Rs. 5	E Rs. 4	F Rs. 3	Factory Capacity 100
B	Rs. 8	Rs. 4	Rs. 3	300
C	Rs. 9	Rs. 7	Rs. 5	300
Warehouse Capacity	300	200	200	700

Solve the above problem either by VAM or by North West Corner Rule

Q 7

Activity	Time (Was)		Costs		Crash Cost Per week	Critical path
	Normal	Crash	Normal	Crash		
A	2	1	22,000	23,000	1,000	Yes
B	3	1	30,000	34,000	2,000	No
C	2	1	26,000	27,000	1,000	Yes
D	4	3	48,000	49,000	1,000	No
E	4	2	56,000	58,000	1,000	Yes
F	3	2	30,000	30,500	500	No
G	5	2	80,000	86,000	2,000	Yes
H	2	1	16,000	19,000	3,000	Yes

Find out Crash Cost / week of A, C, E, G & H

Q 8 Write short notes on any three :-

- a) Safety Stock
- b) Seasonal Forecasting
- c) Minimax Criterion
- d) Probability Distribution
- e) ABC Analysis