

Roll No.

JAMIA HAMDARD
MBA II SEMESTER EXAMINATION 2018
QUANTITATIVE TECHNIQUES & OPERATIONS MANAGEMENT
MBA - CG - 205

MM: 75

Time: 3hr.

(Attempt any five)

1. The Watson Electric Co. produces incandescent light bulbs. The following data on the number of lumens for 40 watts light bulbs were collected when the process was in control.

Samples	Observation			
	1	2	3	4
1	604	612	588	600
2	597	601	607	603
3	581	570	585	592
4	620	605	595	586
5	590	614	608	604

Calculate control limits for an R-Chart and an X-Chart.

(For sample size $n = 4$, $A_2 = 0.729$, $D_3 = 0$ & $D_4 = 2.282$)

2. How Acceptance Sampling lets us control the level of outgoing quality?
3. A museum of natural history opened a gift shop two years ago. Managing inventories has become a problem. Low inventory turnover is squeezing profit margins and causing cash-flow problems. One of the top-selling items in the container group at the museum's gift shop is a birdfeeder. Sales are 18 units per week, and the supplier charges \$60 per unit. The cost of placing an order with the supplier is \$45. Annual holding cost is 25% of feeder's value, and the museum operates 52 weeks per year. What is the annual inventory cost of using EOQ lot size?
4. Consider a transportation problem with three warehouses and four markets. The warehouses capacities are $a_1 = 3$, $a_2 = 7$, and $a_3 = 5$. The market demands are $b_1 = 4$, $b_2 = 3$, $b_3 = 4$ and $b_4 = 4$. The unit transportation costs are given by the following table:

	M_1	M_2	M_3	M_4
W_1	2	2	2	1
W_2	10	8	5	4
W_3	7	6	6	8

Find the Initial Basic Feasible Solution by applying VAM and corresponding transportation cost

5. Jai Hind Industries is planning to set up a new plant. Following is the table showing alternative locations and respective costs for different objective factors.

Costs	Location	A	B	C
Transport, Rs /unit of Production		1.00	1.50	1.35
Power, Rs /unit of Production		1.25	0.65	1.05
Investment in Land*		50 lakh	35 lakh	40 lakh
Building Construction*		130 lakh	110 lakh	120 lakh
Equipment (Capital Cost), Rs /unit of Production volume		2.50	2.80	2.00
Locataion Taxes etc		10 lakh	8 lakh	12 lakh
Wages (average), Rs /unit of Production		0.90	1.00	1.40

*to be calculated at @ 15% per annum. Locations are also rated for some subjective factors as given below

Location	Industrial Relations Climate	Skill Availability	Transport Facility
City A	Excellent	OK	Bad
City B	Good	Good	Good
City C	Bad	Excellent	Excellent

Based on the management's judgment of the subjective factors, it has rated subjective factors on the scale 0 – 100 as follows:

Sl. No.	Subjective Factor	Rating
1	Industrial Relations Climate	35
2	Skill availability	30
3	Transport Facility	35

Management considers Industrial Climate factor a Critical Factor. Objective and Subjective Decision Weights have been taken as 0.65 and 0.35 respectively.

Keeping all the Objective, subjective and critical factors and other relevant parameters under consideration, answer under mentioned queries.

If the planned volume of production taken into consideration is 10, 00,000 units, what is the preferred location?

6. Demand for Quantum Corporation's action toy series follows a seasonal pattern --- growing through the fall months and culminating in December, with smaller peaks in January and July.

Months	Demand (cases)	Months	Demand (cases)
January	1000	July	500
February	400	August	500
March	400	September	1000
April	400	October	1500
May	400	November	2500
June	400	December	3000

Each worker can produce on average 100 cases of action toys each month. Overtime is limited to 300 cases, and subcontracting is unlimited. No action toys are currently in inventory. The wage rate is \$10 per case for regular production, \$15 for overtime production, and \$25 for subcontracting. No stock out are allowed. Holding cost is \$1 per case per month. Increasing the workforce costs approximately \$1000 per worker, decreasing the workforce costs \$500 per worker.

Management wishes to test the following scenarios for planning production:

- Level Production Strategy over the 12 months.
- Chase Demand Strategy each month.

7. a) Find the optimal assignment of four jobs and four machines when the cost of assignment is given by the following table:

	W_1	W_1	W_1	W_1
M_1	10	9	8	7
M_1	3	4	5	6
M_1	2	1	1	2
M_1	4	3	5	6

- b) Following is the pay off (annual profit million of Rs.) matrix for a decision making problem related to the choice of the size of a proposed factory:

States of Nature
(Market Share after 2 years of operations)

Factory (Size)	S ₁ (0 – 5%)	S ₂ (5% – 10%)	S ₃ (10% – 15%)
Action			
a₁ : Small	12	14	18
a₂ : Medium	10	28	32
a₃ : Large	8	24	40

What shall be the decision regarding the size of the factory, if the following strategies are adopted?

- i) Maximax ii) Maximin

8. Write short notes on any three of the following topics:

- i) Objective, subjective and critical factors. ii) Aggregate Planning
iii) Transportation and Assignment Problems iv) Decision Theory