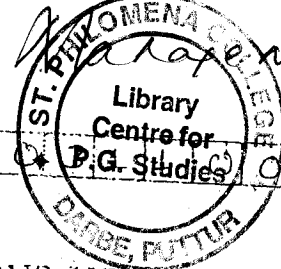


M.COM

Vidya

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FIRST SEMESTER M.COM. DEGREE EXAMINATIONS, NOVEMBER 2003

PAPER 1.3 : MANAGEMENT SCIENCE-I

Time: 3 Hours

Max. Marks: 80

SECTION - A (4x10=40)

Note: Answer any FOUR questions. Each question carries 10 marks.

- 1. What is Management Science? What are its characteristics?
- 2. A salesman has to visit four cities A, B, C and D. The distances (in hundred miles) between the four cities are as follows

		To			
		A	B	C	D
From	A	--	2	4	5
	B	3	--	2	4
	C	2	3	--	1
	D	5	3	2	--

The salesman does not want to visit any city twice before completing his tour of all the cities and wishes to return to the point of starting journey. If the salesman starts from city A and has to come back to City A, which route should he select so that total distance traveled is minimum? Use the branch and bound method to obtain the optimum solution.

- 3. What do you mean by Artificial Variables Technique? Describe the Big M method for solving the linear programming problems.

4. A person consumes two types of food A and B everyday to obtain 8 units of proteins, 12 units of carbohydrates and 9 units of fats which is his daily minimum requirements. 1 kilo of food A contains 2, 6 and 1 units of protein, carbohydrates and fats respectively. 1 kilo of food B contains 1, 1 and 3 units of protein, Carbohydrates and fats respectively. Food A costs Rs.8.50 per kilo, while B costs Rs.4 per kilo. Determine how many kilos of each food should he buy daily to minimize his cost of food and still meet the minimum requirements.

Minimisation: $8.50x_1 + 4x_2$

$$2x_1 + x_2 \geq 8$$

$$6x_1 + x_2 \geq 12$$

$$1x_1 + 3x_2 \geq 9$$

max. $Z = 8.50x_1 + 4x_2$

s.t. $2x_1 + x_2 \geq 8$

$$6x_1 + x_2 \geq 12$$

$$x_1 + 3x_2 \geq 9$$

5. Use two-phase simplex method to solve
- Maximize $Z = 5x_1 - 4x_2 + 3x_3$
- Subject to
- $$2x_1 + x_2 - 6x_3 = 20$$
- $$6x_1 + 5x_2 + 10x_3 \leq 76$$
- $$8x_1 - 3x_2 + 6x_3 \leq 51$$
- $$x_1, x_2, x_3 \geq 0$$
- Handwritten notes:*
 $0x_1 + 0x_2 + 0x_3 + 0s_1 + 0s_2 - A$
 $2x_1 + x_2 + 6x_3 + A = 20$
 $6x_1 + 5x_2 + 10x_3 + s_1 = 76$
 $8x_1 - 3x_2 + 6x_3 + s_2 = 51$

6. What is a sequencing problem? Explain the important terms in the context of sequencing problems.

7. Find the sequence, for the following eight jobs, that will minimize the total elapsed time for the completion of all the jobs. You may as well work out the total idle time on machine A, machine B and also on machine C. Each job is processed in the same order CAB. Entries give the time in hours on the machines.

Jobs	1	2	3	4	5	6	7	8
Times on A	4	6	7	4	5	3	6	2
Machines B	8	10	7	8	11	8	9	13
C	5	6	2	3	4	9	15	11

Handwritten sequence: 3 | 5 | 2 | 8 | 7 | 6

Handwritten note: Time in hours

SECTION - B (2x20=40)

Note: Answer any TWO questions. Each question carries 20 marks.

8. (a) "Systems approach is an important characteristic of management science". Comment.

(b) A company has one surplus truck in each of the cities A, B, C, D and E and one deficit truck in each of the cities 1, 2, 3, 4, 5 and 6. The distance between the cities in kilometers is shown in the matrix below. Find the assignment of trucks from cities in surplus to cities in deficit so that the total distance covered by vehicles is minimum.

	1	2	3	4	5	6
A	10	8	13	20	16	6
B	8	16	23	13	14	10
C	9	8	1	6	3	7
D	4	12	8	11	11	10
E	6	10	9	5	11	8

Handwritten note: Assignment problem

Determine:

- a. Expected task times and their variances.
 - b. The earliest and latest expected times to reach each event.
 - c. The critical path.
 - d. The probability of completing the project within 41.5 weeks
 - e. The duration of the project that will have 95% chance of being completed.
9. From the following inventory problem, calculate EOQ, Re-order level and total annual inventory cost. How much does the total inventory cost vary if the unit price is changed to Rs.6?

Annual Demand	:	2400 units
Unit price (Rs.)	:	2.40
Ordering Cost (Rs.)	:	Rs.4 per order
Storage Cost	:	2% P.A.
Interest Rate	:	10% P.A.
Lead Time	:	15 days [$\frac{1}{2}$ month]

10. Use dynamic programming and solve the following:

$$\text{Maximize } Z = Y_1^2 + Y_2^2 + Y_3^2$$

Subject to constraints

$$Y_1 + Y_2 + Y_3 \geq 15 \text{ and}$$

$$Y_1, Y_2, Y_3 \geq 0$$

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