

VPM's
DR VN BRIMS, Thane
Programme: PGDM (2017-19)
PGDM Trimester II Examination Dec. 2017

| Subject | Quantitative Techniques - II | | |
|----------------------------|------------------------------|----------|------------|
| Roll No. | | Marks | 60 Marks |
| Total No. of Questions | 7 | Duration | 3 Hours |
| Total No. of printed pages | 2 | Date | 29.12.2017 |

Note: Q1 is compulsory and solve any FOUR from the remaining SIX questions.

Q1) 20 Marks (Compulsory)

A manufacturer produces children bicycles and scooters each processes through Machine A and B. Machine A has a maximum of 120 hours available and machine B a maximum of 180 hours. Manufacturing a bicycle requires 6 hours on machine A and 4 hours on machine B. Scooter requires 3 hours on Machine A and 10 hours on machine B. If profit is Rs 45 on a bicycle and Rs. 55 on a scooter,

- I. Formulate a Linear Programming Problem (5 Marks)
- II. Determine the number of bicycles and scooters that should be produced in order to maximize profit using Simplex Method (15 Marks)

Attempt Any FOUR from the Remaining SIX Questions

Q2) Any two from (a) or (b) or (c) ————— (5x2) = 10 Marks

- a) A firm produces three products A, B, and C, each of which passes through three departments: Fabrication, Finishing and Packaging. Each unit of product A requires 3, 4 and 2; a unit of product B requires 5, 4 and 4, while each unit of product C requires 2, 4 and 5 hours respectively in the three departments. Everyday 60 hours are available in the fabrication department, 72 hours in the finishing department and 100 hours in the packaging department. The unit contribution of product A is Rs 5, or product B is Rs 10, and of product C is Rs 8.

Formulate the problem as an LPP.

- b) A company sells two types of fertilizers, one is liquid and the other is dry. The liquid fertilizer contains 2 units of chemical A and 4 units of chemical B per box and the dry fertilizer contain 3 units of each of the chemical A and B per box. The liquid fertilizer sells Rs. 3 box and the dry fertilizer sells for Rs. 4 per box. A farmer requires at-least 90 units of the chemicals A and at least 120 units of the chemical B for his farm.

Formulate the problem as an LPP

- c) What is linear programming problem? Discuss the scope and role of linear programming in solving management problem?

Q3) Any two from (a) or (b) or (c) ————— (5x2) = 10 Marks

- a) What steps are required in solving LPPs by graphic method? Discuss in brief

- b) Minimise $Z = 40X_1 + 24X_2$

Subject to

$$20X_1 + 50X_2 \geq 4800$$

$$80X_1 + 50X_2 \geq 7200$$

$$X_1, X_2 \geq 0$$

Solve the above minimisation Problem using Graphical Method

- c) Maximize $Z = 3X_1 + 5X_2$

Subject to

$$X_1 + 2X_2 \leq 2000$$

$$X_1 + X_2 \leq 1500$$

$$X_1, X_2 \geq 0$$

Solve the above maximization problem using Graphical Method

Q4) Any two from (a) or (b) or (c) ————— (5x2) = 10 Marks

In the context of the Linear Programming Problem write short notes on the followings

- Objective functions and constraints
- Slack Variable
- Surplus variable and Artificial variable

Q5) Any two from (a) or (b) or (c) ————— (5x2) = 10 Marks

A firm own facilities at seven places. It has manufacturing plants A, B and C with daily output of 500, 300 and 200 units of an item respectively. It has warehouse at places P, Q, R and S with daily requirements of 180, 150, 350 and 320 units respectively. Per unit shipping charges on different routes are given below

| | P | Q | R | S |
|--------|----|----|----|----|
| Firm A | 12 | 10 | 12 | 13 |
| Firm B | 7 | 11 | 8 | 14 |
| Firm C | 6 | 16 | 11 | 7 |

The firm wants to send the output from various plants to warehouse involving minimum transportation cost. Solve the above problem using

- North-West Corner Rule
- Least Cost Method
- Vogel's Approximation Method

Q6) Any two from (a) or (b) or (c) ————— (5x2) = 10 Marks

- Explain the applicability of sensitivity analysis in Linear Programming Problem.
- A production supervisor is considering how he should assign the four jobs that are to be performed, to four workers. He wants to assign the jobs to the workers such that the aggregate time to perform the job is least. Based on previous experience he has the information on the time taken by the four workers in performing these jobs are given below

| Worker | Job | | | |
|--------|-----|----|----|----|
| | A | B | C | D |
| 1 | 45 | 40 | 51 | 67 |
| 2 | 57 | 42 | 63 | 55 |
| 3 | 49 | 52 | 48 | 64 |
| 4 | 41 | 45 | 60 | 55 |

Solve the assignment problem using Hungarian Assignment Method (HAM)

C. What do you understand by an assignment problem? Give brief outline for solving it

Q7) Any two from (a) or (b) or (c) ————— (5x2) = 10 Marks

- Explain the transportation method of solving the Transportation problem.
- Discuss the importance of Quantitative techniques in the banking financial industry
- Explain the advantages and disadvantages of Graphical Method of Linear Problem over Simplex Method/