

Bachelor of arts examination, 2022  
UG (Second Year, Fourth Semester)  
Economics (Honours)

Linear Programming and Input Output Analysis

Total Marks: 30

Time: 2 Hours

Answer any three questions from the following:

- 1) Write down the mathematical model of LPP from the given problem:  
For a firm producing two outputs A and B, the endowment of three limited resources labour hour, storage space and machine hour are given as 20 units, 15 units and 22 units respectively. All other necessary ingredients have no supply limitations. Output A needs 5 units of labour hour with 7 units of machine hour while the output B requires 7 units of labour hour, 10 units of storage space and 6 units of machine hour respectively along with other unlimited resources for the production of one unit output. According to the demand of the labour union, it is settled that at least 15 units of labour hour has to be utilised.
- What more information is necessary to write down the mathematical model.
  - Enter the information by yourself of your choice to complete the problem.
  - Write down the mathematical model of LPP for the model you have built.
  - For your model, find out how many corner points are there.
  - Find out the number of feasible corner points with the help of graph.

2+2+3+1+2

- 2) For the given LPP problem, find out the solution:

10

$$\text{Minimise } H=3X_1+4X_2+2X_3$$

$$\text{Subject to } X_1+X_2+X_3 \leq 10$$

$$X_1+2X_2+X_3 \geq 12$$

$$X_1+2X_2+5X_3 \geq 22$$

$$\text{and } X_1, X_2 \text{ and } X_3 \geq 0$$

- 3) Read the following input output table and answer the questions given below (where first three columns represent the input requirement of the three industries for producing one unit of output. Every entry in the table are measured in same monetary units)

Industries	Industry I	Industry II	Industry III	Consumption
Industry I	.2	.3	.1	20
Industry II	.5	.2	.3	25
Industry III	.2	.1	.4	22
Primary input	.1	.4	.2	

- Write down the Leontief matrix.
- If the industry II is producing 30 units of output, what will be the requirements of outputs of the three industries for that production.
- Write down the system of equation to solve for the equilibrium output of the model.

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- d) State the Hawkins Simon condition for the non-negative solution of any system of equation.
- e) Check whether the system will have non-trivial and non-negative solutions or not. 1+1.5+2+2+3.5
- 4) For a closed static input output model with 3 industries and 1 primary activity, write down how to find out the equilibrium output levels. 10
- 5) Answer any two of the following questions: 5X2
- a) Write short notes on the Social Account Matrix
- b) Write down the dual of the following problem stating the criteria you are utilising:
- Minimise  $H=3X_1+7X_2-2X_3$
- Subject to  $X_1+X_2+X_3\leq 15$
- $3X_1+2X_2+X_3=20$
- $X_1+2X_2+5X_3\geq 22$
- $2X_1-2X_2+3X_3\geq 19$
- $4X_1+X_2+3X_3\geq 30$
- and  $X_1, X_2$  and  $X_3\geq 0$
- c) Write short notes on dynamic input output model.