

B.Sc. Semester-III Examination, 2022-23**ECONOMICS [Honours]**

Course ID : 31613 Course Code : SH/ECO/303/C-7

Course Title : Mathematical Methods in Economics-II

Time : 2 Hours

Full Marks : 40

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.***UNIT-I**1. Answer any **five** of the following questions:

2×5=10

- Define difference equation with any one suitable example.
- Explain the meaning of order and degree of a differential equation with suitable examples.
- What is meant by a solution or integral of a differential equation?
- Give an example of non-zero sum game.
- What are different parts of a Linear Programming Problem?
- Write down two basic features of a 'two-persons-zero-sum' Game.

[Turn Over]

- What is meant by Saddle Point in a Game?
- If a_{ij} represents the minimum requirement of commodity i per unit of output of commodity j , then state Hawkins-Simon conditions for two industries — industry 1 and industry 2.

UNIT-II2. Answer any **four** of the following questions:

5×4=20

- Solve the following Linear Programming graphically mentioning the feasible region and basic solutions:
Minimize $C = 2x + 3y$
subject to : $5x+5y \geq 20$
and $5x+10y \geq 30$; $x, y \geq 0$
- State the relationships between Primal and Dual of a Linear Programming model. Write down the Dual of the problem given below:
Maximize $Z=4x+7y$
subject to: $2x+y \leq 4$
and $5x+3y \geq 7$; $x, y \geq 0$
- Write down the assumptions of Leontief's static open Input-Output model.

- d) Determine the saddle point of the following game by using maximin and minimax principle as well as by applying dominance principle:

	Player B			
Player A	(12	9	4
	7	5	3)
	6	1	3)

- e) Explain Hurwicz criterion of decision making with the help of the pay-off matrix given below, assuming the probability of occurrence of maximum 0.6 and probability of occurrence of minimum 0.4:

	State of Nature	
	N ₁	N ₂
S ₁	3	-2
Strategies S ₂	-6	5

- f) Write down the necessary and sufficient conditions for maximization of: $Y=(x_1, x_2)$

If the marginal cost function of a firm is : $MC=4+6x+30x^2$ find its total cost function given total fixed costs as Rs.200.

UNIT-III

3. Answer any **one** of the following questions:

10×1=10

- a) Find out the gross output levels of steel and coal in an economy when the technology matrix (A) and final demand vector (D) are given below:

	Steel	Coal	Final Demand
Steel	0.4	0.1	50
Coal	0.7	0.6	100
Labour	5	2	

Determine the gross output of the two sectors. Examine whether Hawkins-Simon condition is satisfied or not. Determine the amount of labour required in two sectors. 4+4+2

- b) (i) Find out the saddle point and value of the game for the following pay-off matrix:

		Player B			
		B ₁	B ₂	B ₃	B ₄
Player A	A ₁	1	7	3	4
	A ₂	5	6	4	5
	A ₃	7	2	0	3

- (ii) Explain the concepts of dominance and Nash Equilibrium. 5+5