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63/2 (SEM-2) ECO 2.3

2022

ECONOMICS

(Theory Paper)

Paper Code : ECO 2.3

(Mathematical Economics-II)

Full Marks – 80

Time – Three hours

**The figures in the margin indicate full marks
for the questions.**

1. Answer the following questions : 2×4=8

- (a) What is ordinary differential equation ?**
- (b) Explain the meaning of constraint optimization.**
- (c) What is a fair game ?**
- (d) In solving zero sum game why the smallest element is preferred in a row and vice versa ?**

2. Answer the following questions : 5×4=20

- (a) Explain the procedure of solving first order difference equation.**

[Turn over

(b) Discuss the steps involved in building Lagrangean function.

(c) Shortly explain the rules to determine saddle point using minimax and maximin principle.

(d) Find the range of X for the following payoff matrix :

		Player B		
		B1	B2	B3
Player A	A1	X	6	2
	A2	-1	X	-7
	A3	-2	4	X

3. Answer any two of the following questions :

10×2=20

(a) An editor has been allotted Rs. 60,000 to spend on the development and promotion of a new book. It is estimated that if x thousand rupees is spent on development and y thousand on promotion, approximately $f(x,y) = 20x^{3/2}y$ copies of the book will be sold. How much money should the editor allocate on development and how much to promotion in order to maximize sales ?

(b) Given the utility function $U = Q_1^2 Q_2^2$ and budget constraint $96 = 4Q_1 + 8Q_2$ respectively, find the optimum commodity purchased by the consumer.

(c) Explain Nash equilibrium with respect to battle of sexes.

(d) Explain the situation of duopolistic firms for profit maximization in relation to prisoners' dilemma.

4. Answer the following questions : 16×2=32

(a) Market model is given by

$$D_t = a - bP_t \quad (a, b > 0)$$

$$S_t = -c + dp_{t-1}, \quad (c, d > 0)$$

Obtain the time path of price and analyze its stability. 10+6=16

Or

What are the rules of dominance principles ? Find the optimal strategies and value of the game for the given payoff matrix. 4+12=16

		Player B			
		I	II	III	IV
Player A	I	3	2	4	0
	II	3	4	2	4
	III	4	2	4	0
	IV	0	4	0	8

- (b) Explain the steps involved in solving first order differential equation. Given the demand and supply function.

$$Q_d = a - bP + \delta(dp/dt) \quad (a, b > 0)$$

$$Q_s = -c + dP \quad (c, d > 0)$$

Obtain the time path of price P_t assuming that the rate of change of price overtime is directly proportional to excess demand. Also indicate the restriction on the value of δ to ensure dynamic stability.

16

Or

Two ecommerce giants Flipkart and Amazon has planned for big sales. They adopt different platforms to advertise their discount offers. Their gains in profits are given in payoff matrix below. Find out what would be the best strategies for them and also the value of the game.

16

		Flipkart		
		Google	Facebook	Instagram
Amazon	Google	30	40	-80
	Facebook	0	15	-20
	Instagram	90	20	50