'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

B.A./B.Sc. Honours 2nd Semester Examination, 2023

CC4-ECONOMICS (204)

MATHEMATICAL METHODS FOR ECONOMICS-II

Time Allotted: 2 Hours | Full Marks: 60

The figures in the margin indicate full marks.

GROUP-A

1. Answer any ***four*** questions from the following: 3×4 = 12

   (a) Solve the equation $\frac{dy}{dt} + 4y = 0$ with initial condition $y(0) = 1$.

   (b) Explain the concept of damped oscillation in respect of Cobweb model with supporting graph.

   (c) Explain the concept of 'degeneracy' in LPP.

   (d) Explain the concept of 'Fair game' with a supporting example.

   (e) Distinguish between 'mixed strategy' and 'pure strategy'.

   (f) Given the warranted rate of growth as s/v determine the Harrodian growth path of income.

GROUP-B

Answer any *four* questions from the following 6×4 =24

2. Analyze the following market model for stability of price 6

$$Q_d = 10 - 5P$$
$$Q_s = -10 + 5P$$

and $\frac{dP}{dt} = 3(Q_d - Q_s)$, where notations have their usual meanings.

3. In the multiplier-accelerator model of Samuelson it is given that $C_t = 0.8\ y_{t-1}$, $I_t = 0.2(y_{t-1} - y_{t-2})$. Show that the time path of income in this case will be converging (where the notations have their usual meanings). 6

4. Explain briefly the two-person zero-sum game. 6

5. Solve the following LPP using graphical method. 6

Maximize: $Z = 10x_1 + x_2$

Subject to : $2x_1 + x_2 \le 4$

$3x_1 + 2x_2 \le 6$

$x_1, x_2 \ge 0$

6. Solve the following problem using Dominance property: 6

Player B

Player A	B_1	B_2	B_3	B_4	B_5
A_1	1	2	3	4	5
A_2	1	2	3	7	4
A_3	3	4	1	5	6
A_4	6	5	7	6	5
A_5	2	6	6	3	1

7. Consider the pay-off 6

Player B

Player A	B_1	B_2	B_3	B_4
A_1	-6	-1	4	3
A_2	7	-2	5	7

Check if the above game bears a "saddle point".

GROUP-C

Answer any *two* questions from the following 12×2 = 24

8. For the Simple Cobweb model given below, determine the different stability conditions for the time path of price 12

$$Q_t^d = a + b\,P_t$$
$$Q_t^s = g + h\,P_{t-1}$$
$$Q_t^d = Q_t^s$$

where notations have their usual meanings.

9. Derive Domar's growth model and interpret the result. 8+4

10. Solve the following LPP using Simplex Method: 12

Maximize: $Z = 5x_1 + 3x_2$

Subject to : $x_1 + x_2 \le 10$

$3x_1 + 2x_2 \le 12$

$x_1 , x_2 \ge 0$

11. Given the payoff matrix 12

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$$

Find the value of the above game using mixed strategy.

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