2018

M.A./M.Sc. 1st Seme. Examination

ECONOMICS

PAPER—ECO-103

Full Marks : 40

Time : 2 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.

Group-A

1. Answer any *two* questions :   2×2

   (a) Write a maximisation and a minimisation non-linear programming problem with n variables and m constraints.

   (b) What are boundary irregularities ?

(c) What is complementary slackness ?

(d) What are bijective functions ?

2. Answer any *two* questions :   2×4

(a) Distinguish between one-to-one and on-to functions.

(b) Consider the following non-linear programming problem and write the Kuhn-Tucker Condition for this problem

$$\text{Max } z = xy$$
$$\text{s.t } P_{xx} + P_{yy} \leq M$$
$$x \leq 40$$
$$\text{and } x_1, x_2 \geq 0.$$

(c) Derive the envelope theorem for an unconstrained optimisation problem.

(d) Give suitable examples and discuss the prevalence of non-linearity in economics ?

3. Answer any *one* question :   1×8

(a) Derive the Kuhn-Tucker condition for a non-linear programming problem of maximisation type.

(b) Discuss the Kuhn-Tucker sufficiency theorem and Arrow-Enthoven sufficiency theorem for a non-linear programming problem of minimisation type.

(Continued)

Group-B

4. Answer any *two* questions : 2×2

(a) Give one microeconomic example and one macroeconomic example of dynamic optimisation problem.

(b) Distinguish between function and functional.

(c) Explain static game with imperfect information.

(d) How can you find solution of a game using mixed strategy ?

5. Answer any *two* questions : 2×4

(a) Explain subgame perfect equilibrium.

(b) Explain, with a suitable example, the saddle path in dynamic optimisation through phase diagram stability analysis.

(c) Explain the different terminal points in dynamic optimisation problem.

(d) An industry consists of two firms producing an identical product. The market demand curve for the combined output of both the firms is

$$p = 8 - (Q_1 + Q_2)$$

The total cost function of each firm is

$$TC_i = 4Q_i, \quad i = 1, 2$$

Find the Nash equilibrium of the game and explain.

6. Answer any *one* question : 1×8

(a) Write the necessary conditions of dynamic optimisation using optimal control theory. Solve the following optimum control problem.

$$\text{Max} \int_0^1 \left(x - u^2\right) dt$$

s.t. $\dot{x} = u$

$x(0) = 2$ 4+4

(b) Explain Nash equilibrium. What are the problems of Nash equilibrium ? 3+5

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