2013

M.A. / M.Sc.

1st Semester Examination

PAPER—ECO-104

Full Marks : 40

Time : 2 Hours

The figures in the right-hand 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 of the following : 2×2

(a) Is non-linear programming technique an improvement over linear programming? Explain briefly.

(b) State the saddle point theorem in the context of non-linear programming problem.

(c) What is bijective function?

(d) State the envelope theorem in case of a constrained maximization problem.

2. Answer any *one* question of the following : 1×6

(a) Derive the Kuhn-Tucker condition for a maximization problem.

(b) What are the requirements of the constraint qualification in case of a non-linear programming problem ?

3. Answer any *one* question of the following : 1×10

(a) What are maximum and minimum value functions ? Show with the help of the duality theory that the ordinary or Marshallian demand function is the same as the Hicksian demand function under certain condition. 3+7

(b) If n(A) and n(B) denote the number of elements in the finite sets A and B respectively, then prove by Venn diagram :

$n(A) + n(B) = n(A \cup B) + n(A \cap B)$

Show that the map $f : Q \to Q$ defined by $f(x) = 3x + 2$ is one to one and onto, where Q is the set of rational numbers. 5+5

Group—B

4. Answer any *two* questions of the following : 2×2

(a) What is symmetric game ?

(b) Distinguish between perfect information and imperfect information in game with suitable examples.

(c) Write the solution equations to the linear differential equation if the roots are real and equal.

(d) What is current valued Hamiltonian ?

5. Answer any *one* question of the following : 1×6

(a) What do you mean by Nash equilibrium ? Explain the problems associated with it. 4+2

(b) Draw the phase diagram for the following linear differential equation system. Also find the saddle path : 6

$$\dot{y}_1 = y_2 - 4$$

$$\dot{y}_2 = \frac{y_1}{4} - \frac{1}{2}$$

6. Answer any *one* question of the following : 1×10

(a) (i) Explain with a suitable example why it is difficult to sustain cooperation in duopoly game. 6

(ii) Explain repeated games. 4

(b) (i) State the necessary conditions for dynamic optimisation using Hamiltonian function. 3

(ii) Solve the following dynamic problem : 7

Maximise $\int_0^T \left(K - bK^2 - I^2\right)dt$

Subject to $\dot{K} = I - \delta k$

$K(0) = 100$

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