2017

M.A. / M.Sc.

1st Semester Examination

ECONOMICS

PAPER—ECO-103

Subject Code—04

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) Write the general forms of maximisation and minimisation problem in NLP.

(b) Write the Kuhn-Tucker Sufficiency theorem.

(c) What is envelope theorem ?

(d) Give an example of Cartesian product of sets.

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

(a) Prove with a suitable example that a local optimum in NLP is not necessarily global one when the feasible region is not convex.

(b) Distinguish between the one to one function and onto function.

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

(a) Write the Kuhn-Tucker necessary conditions in NLP. Show the nature of the optimum solution graphically and solve the following NLP : 2+2+6

Maximise $C = (x_1 - 4)^2 + (x_2 - 4)^2$

s.t. $2x_1 + 3x_2 \geq 6$

$-3x_1 - 2x_2 \geq -12$

$x_1, x_2 \geq 0.$

(b) Explain constraint qualification. Check whether the following problem satisfies constraint qualification.

Maximise $\pi = x_1$

s.t. $x_2 - (1-x_1)^3 \leq 0$

$x_1, x_2 \geq 0.$

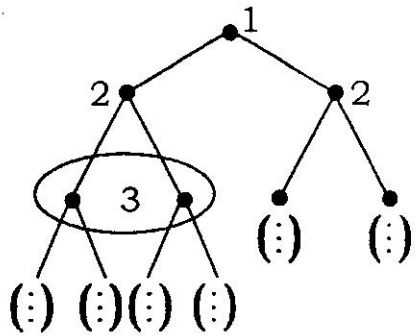
Group—B

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

(a) Give an economic example of optimal control problem.

(b) Prove that the steady state solution of a system of linear autonomous differential equations is asymptotically stable if and only if the characteristic roots are negative.

(c) Figure out the subgames of the following game :



(d) In a cournot duopoly, of the market price is given by $P(Q) = a - Q$, Where Q is the aggregate market output of the two firms and if both firms have constant marginal cost with zero fixed costs, find out the firms' strategy speces and pay off functions in a normal-form game.

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

(a) Draw the following with suitable examples :

$$\dot{y}_1 = y_2 - 2$$

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

(b) Define the following with suitable examples :

(i) Extensive form game.

(ii) Game of perfect Information and complete knowledge.

(iii) Stage game. 2+2+2

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

(a) Explain the maximum principle in the context of an optimal control problem. Solve the following optimum control problem : 3+7

Maximise $u = \int_0^T -\left(1 + x^2\right)^{\frac{1}{2}} dt$

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

and $y(o) = A$

$y(T)$ free (A, T given)

(b) (i) Find out the Nash equilibrium of the following game : 3

		Player–2		
		L	C	R
Player–1	T	0,4	4,0	5,3
	M	4,0	0,4	5,3
	B	3,5	3,5	6,6

(ii) Solve the following game by dominance principle: 3

		Player–2		
		L	M	R
Player–1	U	1,0	1,2	0,1
	D	0,3	0,1	2,0

(iii) Solve the following game using mixed strategy : 4

		Player–2	
		H	T
Player–1	H	–1,1	1, –1
	T	1, –1	–1,1