2013

M.A/M.Sc.

2nd Semester Examination

ECONOMICS

PAPER—VII (ECO-203)

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 *five* questions : 2×5

(a) In what way nonlinear programming similar to classical optimization technique ?

(b) Write down the Kuhn-Tucker condition for a general n variable m constraint minimization problem.

(c) What are the requirements of Arrow-Enthoven Sufficiency Theorem for a non-linear programming problem of maximization type ?

(d) What do you mean by topology of the plane ?

(Turn Over)

(e) Solve the following pay-off matrix by using dominance principle :

$$\begin{array}{c} \\ A_1 \\ A_2 \end{array} \begin{array}{c} \begin{array}{ccc} B_1 & B_2 & B_3 \end{array} \\ \begin{bmatrix} 6 & 8 & 6 \\ 4 & 12 & 2 \end{bmatrix} \end{array}$$

(f) State the Saddle Point Theorem.

(g) What is decision graph ?

(h) What is mixed strategy ?

(i) What is tree ?

(j) What are the different types of variable terminal problems in dynamic optimisation ?

Group—B

Answer any *two* questions : 5×2

2. Check whether the Kunn-Tucker condition holds for the following problem : 2+3

Max $\pi = x_1$

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

and $x_1, x_2 \geq 0$

What happens if a new constraints $2x_1 + x_2 \leq 2$ is added to the problem ?

3. Explain the problems of Nash equilibrium.

4. Solve the following NLPP :

$$\text{Max } \pi = x_1^2 + (x_2 - 2)^2$$
$$\text{S.t. } 5x_1 + 3x_2 \leq 15$$
$$x_1, x_2 \geq 0$$

5. For the following differential equation system draw the phase diagram :

$$\dot{y}_1 = -3y_1 + 6$$
$$\dot{y}_2 = -2y_2 + 2$$

Group—C

6. Formulate a non-linear programming problem if the objective of the firm is to maximize revenue which is a function of output, Q subject to some minimum profit, π_0.

Solve the problem if the revenue and cost functions are $R = 3\alpha Q - Q^2$ and $C = Q^2 + 8Q + 4$ respectively and if minimum profit $\pi_0 = 18$.

7. What is the maximum principle in optimum control theory ? Derive the necessary conditions of this principle by using a suitable method. 4+6

8. Define Hamiltonian function in dynamic optimisation problem. Write the necessary conditions to obtain optimal solution path from it. Solve the following system using Hamiltonian :

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

$$\text{s.t. } \bar{x} = y$$

$$x(0) = 2$$

9. (a) Reduce the following game to an LPP : 5

	B_1	B_2	B_3
A_1	1	−3	2
A_2	3	6	−3
A_3	6	2	−2

(b) Explain subgame perfect equilibrium with a suitable example. 5

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