2012

ECONOMICS

Paper : 2.3

(Mathematical Methods)

Full Marks : 80

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following : 2×4=8

(a) Give the general formulation of a linear programming problem.

(b) What do you mean by the term 'players' in a game theory?

(c) Distinguish between difference and differential equation.

(d) What are the conditions of optimization?

2. Answer any *three* from the following : 8×3=24

(a) Maximize the utility function $u = q_1 q_2$ subject to $p_1 = 10$, $p_2 = 2$ and the budget is 240.

(b) Taking three commodities and two factors of production, formulate the production problem of linear programming.

(c) Explain the concept of prisoners' dilemma.

(d) A monopolist manufactures two goods X and Y with demand functions $x = 12 - P_x$ and $y = 18 - P_y$. The firm's cost function is $C = x^2 + y^2 + 2xy$. Find the maximum profit achievable and the quantities of two goods produced.

(e) Explain Harrod-Domar growth model when the autonomous investment is fixed.

3. Answer any *three* from the following : 16×3=48

(a) Can you consider a mixed strategy as linear programming of activities? Explain. 16

(b) Solve the following linear programming problem by simplex method :

$$\text{Maximize } \pi = 4x_1 + 3x_2$$

subject to $x_1 + x_2 \leq 4$

$$2x_1 + x_2 \leq 6$$

$$x_1, x_2 \geq 0$$

Also form the dual of the problem. 12+4

(c) (i) Explain the rules of dominance of game theory.

(ii) Two players A and B match coins. If the coins match, then A wins two units of value. If coins do not match, then B wins two units of value. Determine the value of the game and their respective probabilities. 16

(d) Analyse the market model for stability of the following : 16

$$Q_d = 14 - 3P$$

$$Q_s = -10 + 2P$$

$$\frac{dp}{dt} = 4(Q_d - Q_s)$$

(e) Given the demand and supply functions for Cobweb model :

$$Q_{dt} = 10 - 2P_t$$

$$Q_{st} = -5 + 3P_{t-1}$$

Find intertemporal equilibrium price and determine whether you will get stable equilibrium or not. 16

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