(b) Solve the game :

$$A = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 3 & -1 \\ -3 & 1 & 2 \end{bmatrix}$$

8. (a) Distinguish between pure and mixed strategies.

(b) Solve the following game when it is played under mixed strategies :

$$A = \begin{bmatrix} 8 & 5 \\ 2 & 0 \end{bmatrix}$$

9. (a) Explain the structure of a linear programming problem.

(b) Solve the following linear programming problem graphically :

Maximize $\pi = 2X_1 + 5X_2$

Subject to $X_1 \leq 4$

$X_2 \leq 3$

$X_1 + 2X_2 \leq 8$

and $X_1, X_2 \geq 0$

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SX/S-6/UG(A)—Eco (XVA)

2017

Time : 3 hours

Full Marks : 70

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

The questions are of equal value.

*Answer any **five** questions.*

1. The demand functions of two competitive commodities are given to be :

$$x = 11 - 2p_1 - 2p_2 \text{ and } y = 16 - 2p_1 - 3p_2$$

The average cost of production of the commodities are constants 3 and 1 respectively. Determine prices and quantities that maximise the profit of the monopolist.

2. A monopolist firm produces two types of chocolate X_1 and X_2 at constant average costs of Rs. 2.50 and Rs. 3.00 per kg respectively. If p_1

and p_2 are prices charged (per kg) and the market demands are given by :

$$x_1 = 5(p_2 - p_1),\ x_2 = 32 + 5p_1 - 10p_2$$

Obtain the levels at which prices will be fixed for the two types of chocolates for maximum joint monopoly revenue.

3. (a) Explain equilibrium of discriminating monopoly.

(b) Under discriminating monopoly the demand curve of monopolist is made up of two parts.

$$p_1 = 140 - 7p_1 \text{ and } p_2 = 90 - {}^{q_2}\!/_{2}.$$

Total cost curve is given, $c = 20 + 2q + 3q^2$, $(q = q_1+q_2)$ for maximum profit determine the prices of two markets.

4. (a) Explain the equilibrium of a duopoly market.

(b) Suppose there are only two firms in an industry producing a homogeneous product. Market demand function is $P = 140 - 0.6\ Q$ and the cost functions of the duopolists are,

$C_1 = 7Q_1$ and $C_2 = 0.6Q_2^2$. Obtain the equilibrium output of each duopolist ignoring their interdependence.

5. An economy has three activities producing phosphorous (X_1), tourism (X_2) and construction (X_3). Its technology matrix and final demand have been found to be :

$$A = \begin{bmatrix} 0.05 & 0.02 & 0.04 \\ 0.10 & 0.70 & 0.25 \\ 0.05 & 0.10 & 0.10 \end{bmatrix},\ F = \begin{bmatrix} 15 \\ 3 \\ 2 \end{bmatrix}$$

Find the outputs in the three activities under these conditions.

6. Solve by the simplex method :

Maximize $Z = x_1 + 2x_2 + 3x_3 - x_4$

Subject to : $x_1 + 2x_2 + 3x_3 = 15$

$$2x_1 + x_2 + 5x_3 = 20$$

$$x_1 + 2x_2 + x_3 + x_4 = 10$$

and $x_j \geq 0\ (j = 1, 2, 3, 4)$

7. (a) State and prove the minimise theorem.