

2025**(7th Semester)****ECONOMICS****Course Code : EC7.CC18****(Advanced Mathematical Economics)***Full Marks : 75**Time : 3 hours**The figures in the margin indicate full marks
for the questions**Answer any Five taking one from each unit.***UNIT – I**

1. a) Distinguish between simple interest and compound interest. Find the interest on `10200 for 7 years and 6 months at the rate 6% per annum. 4+5
- b) Find the compound interest on `16000 at 5% per annum at the end of 2 years if the interest is calculated half yearly. 6
2. a) What do you mean by annuity? What are the different types of annuities? Explain. 2+6
- b) What is present value of annuity? Find the amount of an annuity consisting of payment of `1000 at the end of every 3 months for 3 years at the rate of 8% compounded quarterly. 2+5

(Please turn over)

UNIT II

3. a) What do you mean by Goods Market and Labour Market? What is market equilibrium? 6
- b) In a market model:
Quantity demanded: $Q_d = a - bP$
Quantity supplied: $Q_s = -c + dP$
And $Q_d = Q_s$
- An indirect tax 't' per unit commodity is imposed by the government. Find the effect of tax on equilibrium price and quantity. 9
4. a) What do mean by Product Market (IS) and Money Market (LM) in IS-LM model? An economy with product market and money market has the following simultaneous equations:

$$\begin{aligned} Y &= C + I \\ C &= 150 + 0.8Y \\ I &= 800 - 0.3r \end{aligned}$$

Where, Y = Income, C = Consumption, I = Investment and r = Rate of interest

$$\begin{aligned} \text{Again, } M_d &= M_s \\ M_d &= 28 + 0.6Y - 6.5r \\ M_s &= 250 \end{aligned}$$

Where, M_d = Demand for money
 M_s = Supply of money

Find out the level of income (Y) and rate of interest (r) so that simultaneous equilibrium is achieved. 6+

UNIT - III

5. a) What do you mean by elasticity of demand? Prove that:
$$\text{Elasticity of Demand (Ed)} = \frac{AR}{AR - MR}$$
 2+
- b) If demand function of a commodity is given as:
$$Q = \frac{a}{P^2}$$
- Where, 'Q' is demand and 'P' is price and 'a' is constant. Obtain the price elasticity of demand. 7

(Please turn over)

6. A monopolist has the Total Revenue (TR) function and Total Cost (TC) function as:
$$TR = 46Q - 3Q^2$$
$$TC = 2Q^2 - 4Q + 10;$$
 where Q is quantity of output. 3x2
- An excise tax at the rate 't' is imposed per unit of output. Find-
- The rate of tax 't' which will maximise tax revenue
 - The profit maximising output and price after payment of tax.
 - The effect of imposition of tax on equilibrium price, output and profit.

UNIT - IV

7. a) Find equilibrium national income, consumption and tax by using Cramer's rule:
$$Y = C + 1000$$
$$C = 50 + 0.5(Y - T)$$
$$T = 0.2Y$$
 6
- b) What do mean by Input-Output Model? In a three sector economy, the input coefficient matrix and final demand vector are given as:
$$A = \begin{bmatrix} 0.3 & 0.2 & 0.3 \\ 0.1 & 0.3 & 0.4 \\ 0.2 & 0.3 & 0 \end{bmatrix}$$
 and $F = \begin{bmatrix} 500 \\ 700 \\ 600 \end{bmatrix}$ 4+5

Find the Sectoral output X_1 , X_2 and X_3

8. a) Distinguish between homogeneous and non-homogeneous difference equation. 6
- b) In a Cobweb Model
$$Q_{dt} = a - bP_t$$
 ; $(a, b > 0)$
$$Q_{st} = -c + dP_{t-1}$$
 ; $(c, d > 0)$
$$Q_{dt} = Q_{st}$$
- Obtain the time path of P_t and analyse the condition for its convergence. 6+9

(Please turn over)

UNIT-V

9. a) What is linear programming? Explain its basic assumptions, uses and limitations. 7

- b) Solve the following linear programming problems graphically:

$$\text{Maximise } \pi = 50x_1 + 30x_2$$

Subject to:

$$2x_1 + x_2 \leq 14$$

$$5x_1 + 5x_2 \leq 40$$

$$x_1 + 3x_2 \leq 18$$

$$x_1 \geq 0 \text{ and } x_2 \geq 0$$

10. a) What do you understand by 'zero-sum' and 'non zero-sum' games? What do you mean by 'strategy', 'payoff' and 'saddle point' in game? 2+3

- b) What are the basic rules of game theory? Find out the saddle point from the following payoff table: 6+4

Strategy of firm I	Strategy of firm II				
	0.10	0.20	0.15	0.30	0.25
	0.40	0.30	0.50	0.55	0.45
	0.35	0.25	0.20	0.40	0.50
	0.25	0.15	0.35	0.60	0.20

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