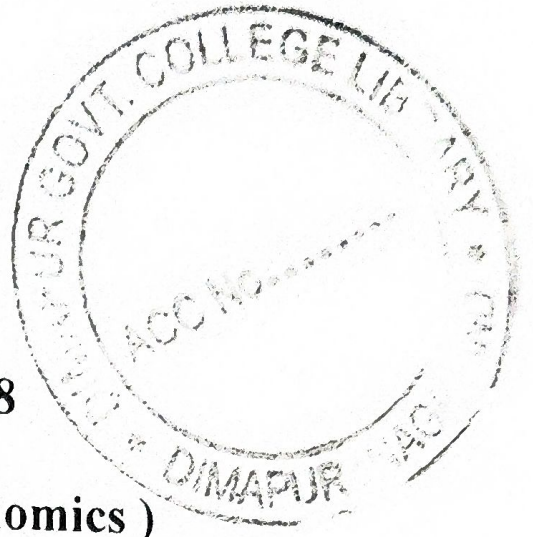


2025

(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:

$$\text{Quantity demanded: } Q_d = a - bP$$

$$\text{Quantity supplied: } Q_s = -c + dP$$

$$\text{And } Q_d = Q_s$$

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:

$$Y = C + I$$

$$C = 150 + 0.8Y$$

$$I = 800 - 0.3r$$

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

$$\text{Again, } M_d = M_s$$

$$M_d = 28 + 0.6Y - 6.5r$$

$$M_s = 250$$

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+9

UNIT - III

5. a) What do you mean by elasticity of demand? Prove that:

$$\text{Elasticity of Demand (Ed)} = \frac{AR}{AR - MR}$$

2+6

- 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

6. A monopolist has the Total Revenue (TR) function and Total Cost (TC) function as: 3x2

$$TR=46Q-3Q^2$$

$$TC=2Q^2-4Q+10; \text{ where } Q \text{ is quantity of output.}$$

An excise tax at the rate 't' is imposed per unit of output. Find-

- i) The rate of tax 't' which will maximise tax revenue
- ii) The profit maximising output and price after payment of tax.
- iii) 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:

$$A = \begin{bmatrix} 0.3 & 0.2 & 0.3 \\ 0.1 & 0.3 & 0.4 \\ 0.2 & 0.3 & 0 \end{bmatrix} \quad \text{and} \quad F = \begin{bmatrix} 500 \\ 700 \\ 600 \end{bmatrix}$$

Find the Sectoral output X_1 , X_2 and X_3

4+5

8. a) Distinguish between homogeneous and non-homogeneous difference equation.

- b) In a Cobweb Model

$$Q_{dt}=a-bP_t \quad ; \quad (a, b > 0)$$

$$Q_{st}=-c+dP_{t-1} \quad ; \quad (c, d > 0)$$

$$Q_{dt} = Q_{st}$$

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:

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 II				
Strategy of firm I	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