

UG/3rd Sem/H/20(CBCS)

2020

ECONOMICS (Honours)

Paper : ECOH - DC-7

(Mathematical Methods in Economics-II)
(CBCS)

Full Marks : 32

Time : Two Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

Answer any *four* questions.

2×4=8

1. The production function is $Q = 36KL - 2K^2 - 3L^2$. What is the value of marginal physical product of Labour at $K = 2$ unit and $L = 10$ units ?
2. Suppose the rate of Capital formation is given by $I(t) = 3t^{1/3}$. Find the capital growth equation if the initial capital stock is given to be 25.
3. Inter industry flows are given in the following transaction matrix :

Production Sector	X	Y	Domestic Demand
X	30	40	50
Y	40	10	30

Determine the technology matrix.

4. Find the consumer surplus for a free good if its demand function is given by $P = 64 - x^2$.
5. A consumer's demand function is given by: $Q = k/P^n$, where k and n are positive constants. Show that price elasticity of demand is constant.
6. If $MRS_{x,y} = \alpha/\beta \cdot (y+b/x+a)$, show that one form of individual's utility function is $U = (x+a)^\alpha (y+b)^\beta$, where α, β, a, b are given constants.

Group - B

Answer any *four* questions.

4×4=16

7. Prove that diminishing marginal utility is neither necessary nor sufficient to ensure convexity of indifference curve.
8. If the Marginal Cost of a firm is $MC = 2e^{0.2Q}$, and Fixed Cost is $FC = 90$; Find the Total Cost function.
9. Let the demand and supply be
 $Q_d = \alpha - \beta P + \sigma dP/dt$; $Q_s = \delta P$ ($\alpha, \beta, \sigma, \delta$ are positive constants)
 Assuming that the rate of change of price over time is directly proportional to the Excess Demand, find the time path $P(t)$?
10. Solve the first order difference equation $y_{t+1} - 5y_t = 1$, where $y_0 = 7/4$
11. Given demand and supply for the Cobweb model as follows, find the intertemporal equilibrium price and determine whether the equilibrium is stable :
 $Q_{dt} = 18 - 3P_t$; $Q_{st} = -3 + 4P_{t-1}$;
12. Consider the production function $Q = AK^\alpha L^\beta$, where $\alpha + \beta = 1$ and the payments are made on the basis of marginal productivity of K & L .
 Assume $K = f(t)$; $L = g(t)$, where t denotes time. Show that relative rate of change of output is a linear combination of the relative rates of change of capital and labour.

13. Consider the following macroeconomic model :

$$C_t = 0.5Y_t + 0.4Y_{t-1} + 300,$$

$$I_t = 0.2Y_{t-1} + 200,$$

$$Y_0 = 6500$$

where notations have their usual meanings. Find the equilibrium national income.

14. Consider a three sector economy

$$C = 5 + 0.25(Y - T)$$

$$I = 85; T = 10, G = 15$$

Find the equilibrium level of income and calculate the change in equilibrium level of income if Government expenditure is increased by 10 units.

Group - C

Answer any *one* question.

8×1=8

15. What would be the limits of the ratio D_t/Y_t in Domar Model, as $t \rightarrow \infty$?

where, D_t = National Debt at time 't'

Y_t = National Income at time 't'

Domar Model

$$dY/dt = \beta \cdot Y_t$$

$$dD/dt = \alpha \cdot Y_t, \alpha > 0, \beta > 0$$

with initial conditions $D(0) = D_0$ and $Y(0) = Y_0$.

16. Given the following market Model, find the time path of Q and analyse the condition for it's convergence.

$$Q_{dt} = \alpha - \beta P_t$$

$$Q_{st} = -\gamma + \delta P_{t-1}$$

(while $\alpha, \beta, \gamma, \delta$ are positive constants)