

MA ECONOMICS
FIRST SEMESTER [SPECIAL REPEAT]
MATHEMATICAL METHODS FOR ECONOMICS
MEC – 104

**SET
A**

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

Time: 30 mins.

(Objective)

Marks: 20

Choose the correct answer from the following:

1 × 20 = 20

- In case what kind of strategy, do we get saddle point
 - Maximin strategy
 - Minimax strategy
 - Pure strategy
 - Mixed strategy
- The final demand in case of input-output analysis is a/an
 - $n \times 1$ vector
 - $n \times n$ matrix
 - $m \times n$ matrix
 - Identity matrix
- The determinant of the matrix $A = \begin{bmatrix} -1 & 2 \\ 8 & 4 \end{bmatrix}$ is
 - 20
 - 20
 - 12
 - 12
- What is an optimum solution?
 - Which maximizes a given problem
 - Which minimizes a given problem
 - Which maximizes or minimizes a given problem
 - Which both maximizes and minimizes a given problem
- We can get MR function from TR function by
 - Integrating
 - Differentiating
 - Product rule
 - Quotient rule
- Game theory is mostly applicable in which type of market?
 - Perfect Competition
 - Monopoly
 - Monopolistic Competition
 - Oligopoly
- The difference between the price which we are willing to pay and the price which we actually pay is
 - Consumer's surplus
 - Producer's surplus
 - Saving
 - None of these
- When is there no producer's surplus?
 - When demand is perfectly elastic
 - When demand is perfectly inelastic
 - When demand is unitary elastic
 - None of these
- Cobweb model is an application of
 - First order difference equation
 - First order differential equation
 - First time difference method
 - Particular solution

10. When the gain of one player is not equal to the loss of another player, the game is called a
- Zero sum game
 - Non zero sum game
 - Variable sum game
 - Draw
11. Prisoner's Dilemma is an example of
- Zero sum game
 - Non zero sum game
 - Cooperative Game
 - Non Cooperative Game
12. What is the TC function for $MC = 2Q + 3$?
- $Q^2 + 3Q + C$
 - $2Q^3 + 3 + C$
 - $2Q + 3 + C$
 - $Q^3 + 3Q + C$
13. What is the saddle point of the given game?

		Player A	
		A1	A2
Player B	B1	2	5
	B2	1	7

- 5
 - 1
 - 2
 - No saddle point
14. When is there disequilibrium in the Cobweb model?
- When slope of demand and supply curves are equal
 - When slope of supply curve is greater than the slope of demand curve
 - When slope of demand curve is greater than the slope of supply curve
 - There is never disequilibrium
15. What does investment depend upon in the Harrod's model?
- Accelerator
 - Income
 - Both accelerator and income
 - None of these
16. What is the TR function for $MR = 8Q^3 + 1$?
- 0
 - $8Q^4 + Q + C$
 - $Q^4 + Q^2$
 - $2Q^4 + Q + C$
17. What are corner points?
- The points bounding the feasible region
 - All points giving optimum solution
 - Some points giving optimum solution
 - The points at the origin
18. The coefficients of choice variables in the objective function of the primal program become what in the dual program?
- Constants of the objective function
 - Coefficients of the dual choice variables
 - Constants of the constraints
 - Inequality constraints
19. What is a feasible region?
- Region where all constraints are satisfied
 - Region where all feasible solutions lie
 - Region where feasible solution lie
 - All of the above

20. In case of Payoff matrix for Player Y with two players Y and Z, by whom is minimax strategy followed
- Y
 - Z
 - Both Y and Z
 - None

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(Descriptive)

Time : 2 Hr. 30 Mins.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. a) The input coefficient matrix and final demand vector in a three sector economy are given below: 4+6=10

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

Find out the input- output structure with the help of the given matrices.

- b) Find the sectoral output X_1 , X_2 and X_3 using Cramer's rule.
2. a) Explain the Harrod Domar Model of Growth in case of a simple national income model given below: 5+5=10
 $Y = C + I + A$
 Where Y= National income, C= Consumption, I = Investment, A = Autonomous Investment. Use appropriate assumptions for consumption and investment.
- b) Elaborate the importance of Autonomous Investment in the solution of the given Harrod Domar Model.
3. a) Obtain the producer's surplus with the given supply function and price $Q^s = -5 + 3P$ and price = $P = 10$. 5+5=10
 b) Obtain the consumer's surplus with the given demand function and price $Q^d = 50 - 2P$ and price = $P = 20$.
4. a) Explain the rules of dominance for the given Payoff table: 5+5=10

Player B

b) Solve the

	A1	A2	A3
B1	10	8	12
B2	7	6	11
B3	9	10	11

above game.

5. Discuss the situation of Prisoner's Dilemma in Game Theory with a suitable example. 10

6. a) Solve the following linear programming problem: 7+3=10
Maximize $\pi = 7x_1 + 21x_2$
Subject to
 $5x_1 + 2x_2 \leq 40$
 $3x_1 + 12x_2 \leq 60$
 $4x_1 + 8x_2 \leq 48$
 $x_1 \geq 0, x_2 \geq 0$

b) Show the general formulation of a transportation linear programming problem.

7. a) What are the conditions for the formulation of a dual linear programming problem? 5+5=10

b) Derive the dual linear programming problem for the given primal linear programming problem:

Minimize $\pi = 10y_1 + 4y_2 + 12y_3$

Subject to

$$4y_1 + y_2 \geq 56$$

$$2y_1 + 5y_3 \geq 10$$

$$y_1, y_2, y_3 \geq 0$$

8. a) The MR and MC functions of a firm are given as follows: 6+4=10
 $MR = 25 - 1/2Q$
 $MC = 0.2Q^2 - 1/3Q + 2$

And total fixed cost is 10. Find out the TR and TC functions of the firm.

b) Find out the profit of the firm if it sells 10 units of output.

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