FOURTH SEMESTER M.A. DEGREE EXAMINATION, APRIL 2024
(Regular/Improvement/Supplementary)
ECONOMICS
FECO4E03 - MATHEMATICAL ECONOMICS

Time: 3 Hours **Maximum Weightage: 30**

Part A: Multiple choice questions. Answer *all* questions. Each carries $^1/_5$ weightage.

1. In constrained utility maximization, the Lagrange multiplier λ can be interpreted as:
   (a) the marginal utility of income (b) the marginal utilities of commodities
   (c) the ratio of marginal utilities of commodities (d) marginal utility divided by price

2. What is meant by 'residual variability' in Slutsky equation?
   (a) the substitution effect (b) the income effect (c) direct effects (d) none of these

3. The indirect utility function:
   (a) gives the maximum utility as a function of normalized prices.
   (b) describes preferences independent of market phenomena.
   (c) gives the maximum utility as a function of quantities of commodities consumed.
   (d) all the above.

4. The isoquant of Cobb-Douglas production is ………
   (a) a downward sloping straight line (b) downward sloping and convex
   (c) L shaped (d) vertical

5. Which of the statement is true according to duality theorem?
   (a) a concave production function yields a cost function homogenous of degree one in input prices, given specified regularity conditions.
   (b) a cost function homogenous of degree one in input prices yields a concave production function, given specified regularity conditions.
   (c) the cost function derived from a particular production function will in turn yield that production function.
   (d) all the statements are true.

6. Neutral technological progress happens when the ratio of marginal physical products of labour and capital ($\frac{MP_L}{MP_K}$):
   (a) remains unchanged (b) increases (c) decreases (d) both (a) and (b)

7. Which of the statements is **not** true for monopolistic competitive market?
   (a) It is akin to perfect competition in that the number of sellers is sufficiently large so that the actions of an individual seller have no perceptible influence upon her competitors.
   (b) It is akin to monopoly in that each seller possesses a negatively sloped demand curve for her distinct product.
   (c) Firm reaches equilibrium at the point where MR = MC.
   (d) The second order condition requires that firm's MR increasing more rapidly than MC.

(P.T.O.)

8.   An equilibrium is stable if:
     (a) a disturbance results in a return to equilibrium.
     (b) a disturbance results in a divergence from equilibrium.
     (c) a price rise increases excess demand.
     (d) the supply curve is less steep than the demand curve.

9.   In monopoly, profit maximization requires that:
     (a) the marginal revenue product of each input equal to its price.
     (b) the value of marginal product of each input equal to its price.
     (c) the marginal physical product of each input equal to its price.
     (d) the marginal revenue product of each input equal to its marginal physical product.

10. In linear programming, any set of real numbers that satisfies constraints and non-negativity
     restriction is called ………
     (a) a boundary point   (b) a feasible solution   (c) an optimal solution   (d) a feasible solution

11. An input-output model which has endogenous final demand vector is known as ………
     (a) Open Input-Output Model   (b) Closed Input-Output Model
     (c) Static Input-Output Model   (d) Dynamic Input-Output Model

12. Which of the following is true for an optimum solution of a linear programming problem?
     (a) Number of non-zero valued slack variables is equal to the number of constraints.
     (b) Number of non-zero valued variables (including slack) is exactly equal to the number of
     constraints.
     (c) Number of non-zero valued slack variables is equal to the number of binding constraints.
     (d) Number of non-zero valued variables is equal to the number of non-binding constraints.

13. According to Game Theory, if increased advertising, raises costs more than revenues and the
     profits of both firms decline, we have a ………
     (a) Positive-sum game   (b) Non zero-sum game
     (c) Zero-sum game   (d) Negative-sum game

14. An individual for whom the marginal utility of money is constant; he or she is indifferent to a
     fair bet:
     (a) Risk averter   (b) Risk lover
     (c) Risk neutral   (d) None of these

15. Game in which actions are taken and payoffs received over and over again is ………
     (a) non-cooperative game   (b) cooperative game
     (c) repeated game   (d) positive-sum game

$(15 \times {}^1/_5 = 3 \text{ weightage})$

Part B: Answer any *five* questions. Each carries *one* weightage.

16. What is a homothetic utility function?

17. Define labour saving technological progress.

18. What is meant by linear expenditure system?

19. Distinguish between a single goal firm and a multiple goal firm.

20. State the Hawkin-Simon conditions for economic viability of a technology matrix.

21. Distinguish between pure strategy and mixed strategy.

22. What do you mean by risk?

23. Distinguish between dual and primal problems in Linear Programming.

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(5 × 1 = 5 weightage)

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Part C: Answer any *seven* questions. Each carries *two* weightage.

24. Prove that CES production function is linearly homogenous and it satisfies Euler's theorem.

25. Distinguish between direct utility function and indirect utility function.

26. Explain the derivation of cost function from production function with the help of Cobb-Douglas production function.

27. Find the profit maximizing output of the monopolist given the demand function $p = 60 - 2q$, and the cost function $C = 39q - 11q^2 + q^3 + 5$.

28. Explain the market equilibrium under monopolistic competition.

29. Distinguish between direct effects and cross effects in Slutsky equation.

30. Show how a linear programming problem can be solved graphically.

31. Define Leontief matrix and show how it is derived.

32. Discuss the use of game theory in economic decision making by firms.

33. What is saddle point? Determine the saddle point for the pay-off matrix
$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

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(7×2 = 14 weightage)

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Part D: Answer any *two* questions. Each carries *four* weightage.

34. Find the optimum commodity purchases for a consumer whose utility function and budget constraint are $u = x_1^{1.5}x_2$ and $3x_1 + 4x_2 = 100$ respectively.

35. State and prove the properties of Cobb-Douglas production function.

36. You are given the following input-output data:

Producing sectors	Receiving Sectors		Final Demand	Total Demand
	I	**II**		
I	5	2	3	10
II	8	9	3	20
Labour	7	9		

Find the technology matrix and levels of output if final demand is doubled for both the sectors I and II

37. Explain equilibrium of the firm and the market under perfect competition.

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(2 × 4 = 8 weightage)

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