

D6BEC1802 (S2)

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Reg. No.....

Name:

SIXTH SEMESTER BA DEGREE EXAMINATION, APRIL 2023

(Supplementary-2018 Admission)

ECONOMICS

AECO6B12T: MATHEMATICAL ECONOMICS

Time: 3 Hours

Maximum Marks: 80

PART A: Answer *all* the questions. Each carries *half* marks.

Multiple Choices.

1. When TP curve is in its point of inflection, MP curve is.....
 - a. Rising
 - b. Falling
 - c. Maximum
 - d. Negative
2. The elasticity of a straight line supply curve passing through the origin will be.....
 - a. Less than one
 - b. Greater than one
 - c. Equal to one
 - d. Negative
3. The function $Y = 3X^2 + 8X + 10$ is.....
 - a. Concave
 - b. Convex
 - c. Point of inflection
 - d. Convex when $X < 0$
4. If the quantity demanded remains unchanged as its price change, the coefficient of price elasticity of demand is.....
 - a. Greater than one
 - b. Less than one
 - c. Equal to one
 - d. Equal to zero
5. Price discrimination will always lead to.....
 - a. Increase in output
 - b. Decrease in price
 - c. Decrease in output
 - d. Decrease in net revenue
6. If $P = 10$ at a point on the demand curve when $E_d = 0.5$, then MR is.....
 - a. 5
 - b. 0
 - c. 1
 - d. 10
7. If an input-output model includes exogenous sector along with the endogenous sectors in terms of 'n' producing sectors, the model is.....
 - a. Closed input output model
 - b. Open input output model
 - c. Static input output model
 - d. Dynamic input output model
8. When $U = f(X)$ is the utility function, diminishing marginal utility is implied by
 - a. $\frac{d^2U}{dX^2} \approx 0$
 - b. $\frac{d^2U}{dX^2} > 0$
 - c. $\frac{d^2U}{dX^2} \geq 0$
 - d. $\frac{d^2U}{dX^2} < 0$
9. In the production function $Q = AK^\alpha L^\beta$, the parameter β stands for.....
 - a. Input elasticity of labour
 - b. Efficiency parameter with respect to labour
 - b. Technology parameter with respect to capital
 - d. Output elasticity of labour

(PTO)

10. $MRPT_{lk}$ is given by the slope of:
- a. PPC b. Indifference curve c. Cost curve d. Isoquant
11. A function whose range consists of one specific value is.....
- a. Rational function b. Exponential function
c. Constant function d. Polynomial function
12. Discriminating monopolist will charge a higher price in the market where the demand for the product is
- a. More elastic b. Less elastic c. Unitary elastic d. Infinitely elastic

(12 × ½ = 6 Marks)

PART B: Answer any ten questions. Each carries two marks.

13. Examine the concept of endogenous and exogenous variables with a suitable example of an economic model.
14. Explain the relationship between marginal revenue and price elasticity of demand.
15. What is meant by elasticity of substitution?
16. A bag company makes 2 leather products vanity bags and travel bags. A vanity bag will give the company a profit margin of Rs 700 and a travel bag will give Rs 850. For making a vanity bag, it needs 15 minutes for cutting, 20 minutes for stitching and 10 minutes for packing whereas a travel bag requires 25 minutes for cutting, 30 minutes for stitching and 15 minutes for packing. The company has a maximum of 3 hours for cutting, 4 hours for stitching and 2 hours for packing. Mathematically formulate the above Linear programming Problem.
17. The demand function of a commodity is $Q = a - bP_1^2 + \sqrt{P_2}$. Where, P_1 and P_2 are price of the commodity and its related commodity respectively. Find price and cross elasticity of demand.
18. What is the meaning of Lagrangian multiplier? How can we interpret the value of Lagrangian multiplier?
19. Explain the relationship between degree of homogeneity and returns to scale, with an example.
20. Explain on income elasticity of an inferior good.
21. Find the duality.

$$\text{Maximise } Z = 250X + 500Y$$

Sub. to

$$3X + 6Y \leq 32$$

$$4X + Y \leq 28$$

$$X + 2Y \leq 19$$

$$X, Y \geq 0$$

22. Check the homogeneity of the function $Z = X^3 + 3X^2Y + 3XY^2 + Y^3$ and interpret the result
23. What are the major assumptions of Linear programming technique?
24. The following table gives inter-industry transaction table. Construct the technology co-efficient matrix showing the direct requirements

Industry	1	2	Final Demand
1	3400	1800	900
2	2800	4300	1100

(10 × 2 = 20 Marks)

PART C: Answer any six questions. Each carries five marks.

25. What is an Economic model? Explain how an economic modelling helps in mathematical economics
26. Mathematically prove the relation between Average cost and Marginal Cost.
27. What is Leontief model? Distinguish between open and closed input-output model.
28. Assume that both the perfectly competitive industry and the monopoly have the same market demand curve and market supply curve as shown below

$$\text{Market Demand: } P = 1000 - Q$$

$$\text{Market Supply: } P = Q$$

Compare the long-run equilibrium of perfectly competitive industry to a monopoly. Prove that the monopoly produces less output and charges a higher price than a perfectly competitive industry with the same market demand and market supply curves.

29. The total cost function is $C = 4q - q^2 + 2q^3$. Find the quantity produced for a minimum average cost.
30. Mathematically explain how a perfectly competitive firm reaches its equilibrium in the short-run.
31. Explain discriminating monopoly. When is price discrimination possible and Profitable?
32. Solve the following Linear programming problem by graphical method

$$\text{Minimise } Z = 4X + 6Y$$

Subject to

$$X + Y \geq 6$$

$$2X + Y \geq 7$$

$$X + 4Y \geq 2$$

and

$$X, Y \geq 0$$

(6 × 5 = 30 Marks)

(PTO)

PART D: Answer any two questions. Each carries twelve marks.

33. From the following input-output model, find the total output is to be produced by each industry so that the system is in equilibrium.

$$A = \begin{bmatrix} 0.1 & 0.2 & 0.4 \\ 0.3 & 0.2 & 0.1 \\ 0.2 & 0.4 & 0.3 \end{bmatrix} \text{ and } F = \begin{bmatrix} 40 \\ 50 \\ 80 \end{bmatrix}$$

34. Optimise the function $Z = 4X^2 - 3X + 5XY - 8Y + 2Y^2$ subject to $X = 2Y$. Also find the optimum value.

35. What is the relevance of Cobb Douglas production function in economics? State and prove its properties.

36. Given the demand function and the total cost function of the competitive firm as

$$P = 32 - Q \text{ and}$$

$$C = Q^2 + 8Q + 4$$

Where P = price per unit, Q = output and C = total cost

What level of output will maximize profit? Determine the level of profit at that level of output.

(2 × 12 = 24 Marks)