D 110355 **(Pages : 3)** **Name.....**

Reg. No.....

FIFTH SEMESTER (CBCSS—UG) DEGREE EXAMINATION
NOVEMBER 2024

Economics

ECO 5B 10—MATHEMATICAL ECONOMICS

(2019 Admission onwards)

Time : Two Hours and a Half Maximum : 80 Marks

Section A (Short Answer Questions)

Maximum marks in this Section is 25.
Students can attempt **all** *questions.*
Each question carries a maximum of 2 *marks.*

1. What is $MRTS_{LK}$?
2. Define production function.
3. What do you mean by factor intensity ?
4. Define economic model.
5. Distinguish between primal and dual problem in linear programming.
6. Point out relationship between AC and MC.
7. Define market equilibrium.
8. Differentiate between autonomous and induced consumption.
9. What is optimal solution ?
10. Given a consumption function, C = 100 + 0.5 Y, find MPC and MPS.
11. Define feasible solution.
12. Find the Average Product for the production function $Q = 40\ K^{0.7}L^{0.1}$.
13. What is meant by input output table ?
14. Determine the shapes of AR and MR curves under monopoly
15. What are Giffen goods and their elasticity ?

Turn over

Section B (Short Essay/Paragraph Questions)

Maximum marks in this Section is 35.
Students can attempt **all** *questions.*
Each question carries a maximum of 5 *marks.*

16. What do you mean by Marginal Rate of Substitution ? Find MRSxy for the function $U = 12x + y$.

17. Define discriminating monopoly. What are the necessary conditions for price discrimination?

18. Distinguish between AR and MR. Illustrate the relationship between AR and MR with the help of a diagram

19. Define perfect competition. Assume that a perfectly competitive market faces P = Rs. 4 and $TC = X^3 - 7X^2 + 12X + 5$. Find the best level of output of the firm. Also find the profit of the firm at this level of output.

20. Maximize $Z = 3x_1 + 4x_2$
Subject to the constraints
$4x_1 + 2x_2 \leq 80$
$2x_1 + 5x_2 \leq 180$
$x_1, x_2 \geq 0$

21. Explain the meaning and applications of Lagrange multipliers.

22. Illustrate the input output matrix of technical co-efficients in $X = (I - A)^{-1} B$ format.

23. Explain the meaning and significance of production possibility curve.

Section C (Long Essay Questions)

Answer any **two** *questions.*
Each question carries a maximum of 10 *marks.*

24. Differentiate between optimization of single variable function and multivariable function. Describe the problem of constrained minimization of cost, $C = wL + rK$.

25. Discuss meaning and significance of Mathematical Economics. Derive the mathematical applications in economics using examples of Utility function and Profit function.

26. Explain linear homogeneous production function. State and prove any *four* properties of Cobb Douglas production function

27. Explain various degrees of price elasticity of demand.

    Given $Q1 = 100 - P1 + 0.75P2 - 0.25P3 + 0.0075Y$

    At $P1 = 10$, $P2 = 20$, $P3 = 40$ and $Y = 10{,}000$, find the different cross elasticities of demand.

(2 × 10 = 20 marks)

D 50803 **(Pages : 3)** **Name.....**

Reg. No.....

FIFTH SEMESTER (CBCSS–UG) DEGREE EXAMINATION, NOVEMBER 2023

Economics

ECO 5B 10—MATHEMATICAL ECONOMICS

(2019 Admission onwards)

Time : Two Hours and a Half Maximum : 80 Marks

Section A

Short Answer Questions.
Maximum marks in this section is 25.
Students can attempt **all** *questions.*
Each question carries a maximum of 2 *marks.*

1. Define linear programming.
2. What do you mean by objective function ?
3. Distinguish between dependent and independent variables.
4. Compare elasticity of luxury goods and inferior goods.
5. Define production function. Give example.
6. What is meant by elasticity of demand ?
7. State the meaning and features of an economic model.
8. What do you mean by MRS_{xy} ?
9. Point out the relationship between AC and MC.
10. What do you mean by optimization ?
11. State the relationship between primal and dual problem.
12. Write a note on Leontief matrix.
13. The total cost function is $TC = 60 - 12x + 2x^2$. Find the MC.
14. Explain discriminating monopoly.
15. Establish the relationship between MPC and MPS.

(25 marks)

Turn over

Section B

Short Essay / paragraph Questions.
Maximum marks in this section is 35.
Students can attempt all questions.
Each question carries a maximum of 5 marks.

16. Discuss the economic applications of optimization technique

17. Distinguish between maxima and minima points. Find the local maxima and minima of the function

$f(x) = 3x^4 + 4x^3 - 12x^2 + 15$.

18. Solve the following LPP graphically :

Maximize $Z = 3x_1 + 4x_2$

Subject to the constraints $4x_1 + 2x_2 \leq 80$
$2x_1 + 5x_2 \leq 180$
$x_1, x_2 \geq 0.$

19. Explain meaning and importance of Mathematical Economics

20. Distinguish between demand and supply functions. Assume that the demand and supply functions are $Qd = 20 - 2P$ and $Qs = -10 + 2P$ respectively. Determine equilibrium price and quantity.

21. Describe the features and equilibrium conditions of firm under monopoly

22. Define input output analysis. What are the features of input-output analysis?

23. What are the importance marginal concepts in economics ?

(35 marks)

Section C

Long Essay Questions.
Answer any **two** *questions.*
Each question carries a maximum of 10 *marks.*

24. Explain the conditions of equilibrium in the perfect competitive market. Assume that a perfectly competitive market faces P = Rs. 4 and $TC = X^3 - 7X^2 + 12X + 5$. Find the best level of output of the firm. Also find the profit of the firm at this level of output.

25. Define homogeneous production function. Explain Cobb Douglas production function. State and prove the properties of Cobb Douglas production function.

26. Explain the application of Lagrange multipliers in utility maximization. Assume that the utility function of the consumer is given by $u = x_1 x_2^{\,2} - 10x_1$ where x_1 and x_2 are quantities of two commodities consumed. Find the optimal utility value if his income is 116 and product prices are 2 and 8 respectively.

27. Explain elasticity of demand. What are the different types of elasticity and their methods of measurement ?

(2 × 10 = 20 marks)

D 30665 **(Pages : 2)** **Name.....**

Reg. No.....

FIFTH SEMESTER (CBCSS–UG) DEGREE EXAMINATION
NOVEMBER 2022

Economics

ECO 5B 10—MATHEMATICAL ECONOMICS

(2019 Admissions onwards)

Time : Two Hours and a Half Maximum : 80 Marks

Section A (Short Answer Questions)

Maximum marks in this section is 25.
Students can attempt all questions.
Each question carries a maximum of 2 *marks.*

1. What is the difference between APS and MPS ?
2. Define elasticity of substitution.
3. State linear demand equation mathematically.
4. Briefly explain Euler's theorem.
5. What is meant by Leontief matrix ?
6. Calculate consumption level for Y = Rs. 1,000 crores if consumption function is C = 200 + 0.5Y.
7. Explain producer's equilibrium.
8. Differentiate between homogeneous and non-homogeneous production function.
9. Point out the relationship between AC and MC.
10. Define and state saving function.
11. What is cross elasticity of demand ?
12. Differentiate between price maker and price taker.
13. Find the Average Product for the production function $Q = 20\ K^{0.7}L^{0.1}$.
14. What is a non-negativity constraint in linear programming ?
15. What is a multivariate function ?

Turn over

Section B (Short Essay/Paragraph Questions)

Maximum marks in this section is 35.
Students can attempt all questions.
Each question carries a maximum of 5 *marks.*

16. Maximize the utility function $U = 10X^{.6} + Y^{.4}$ subject to the constraint $20X + 30Y = 600$.
17. Prove that MPC + MPS is always equal to one. Explain the method of calculating MPC and MPS using an example.
18. What are the properties of Cobb Douglas production function ?
19. What is input output analysis ? Explain the uses of input output analysis.
20. Differentiate between total utility and marginal utility. Given the utility function $u = xy + 3x + 4y$, find the marginal utility of x and y.
21. Examine the meaning and significance of mathematical economics.
22. Differentiate between Marginal Rate of Substitution and Marginal Rate of Technical Substitution. Describe steps of calculating Marginal Rate of Technical Substitution.
23. Explain the meaning and features of perfect competition. State the equilibrium conditions of firm under perfect competition.

Section C (Long Essay Questions)

Answer any **two** *questions.*
Each question carries a maximum of 10 *marks.*

24. Explain the features of monopoly market. What are the different types of discriminating monopoly ? State the conditions of equilibrium under discriminating monopoly.
25. Explain degrees of elasticity. Differentiate between price elasticity, income elasticity and cross elasticity. Find the price elasticity of demand for the demand function $Q=1400 - P^2$ when $P = 10$.
26. Explain the fundamental assumptions of Linear Programming. Solve using the graphical method the following problem :

Maximize $Z = 3x + 2y$
subject to : $2x + y \leq 18$
$2x + 3y \leq 42$
$3x + y \leq 24$
$x \geq 0, y \geq 0.$

27. Explain the meaning and significance of Lagrange multipliers. Examine the economic applications of optimization technique

(2 × 10 = 20 marks)

D 10764 **(Pages : 2)** **Name.....**

Reg. No.....

FIFTH SEMESTER U.G. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS–UG)

Economics

ECO 5B 10—MATHEMATICAL ECONOMICS

(2019 Admissions)

Time : Two Hours and a Half Maximum : 80 Marks

Section A (Short Answer Questions)

Answer at least **ten** *questions.*
Each question carries 3 *marks.*
All questions can be attended.
Overall Ceiling 30.

1. Define production function
2. Given the utility function $u = xy + 4x + 5y$, find the marginal utility of x and y.
3. What is meant by elasticity of demand ?
4. Define Mathematical Economics.
5. What do you mean by factor intensity ?
6. Distinguish between homogenous products and heterogeneous products.
7. What is meant by economic model ?
8. Define Marginal Rate of Substitution.
9. Distinguish between primal and dual problem in linear programming.
10. Explain homogeneous production function.
11. What is meant by linear programming ?
12. State Euler's theorem.
13. What is optimal solution ?
14. What do you mean by a production possibility curve ?
15. Calculate MPC :

Income	Consumption
200	150
300	220

(10 × 3 = 30 marks)

Turn over

Section B (Short Essay/Paragraph Questions)

Answer at least **five** *questions.*
Each question carries 6 *marks.*
All questions can be attended.
Overall Ceiling 30.

16. What is meant by discriminating monopoly ? Briefly explain the necessary conditions for price discrimination.

17. Define AR and MR. Illustrate the relationship between AR and MR with the help of a diagram.

18. Explain utility function. Show the first and second order conditions for consumer equilibrium for a given utility function $U = f(Q_1, Q_2)$ and the budget constraint $M = P_1Q_1 + P_2Q_2$.

19. Explain the meaning and significance of Lagrange multipliers.

20. Solve the following linear programming problem using graphical method :

Maximize $z = x_1 + 1.5\,x_2$

subject to the constraint
$$2x_1 + 2x_2 \le 16$$
$$x_1 + 2x_2 \le 12$$
$$4x_1 + 2x_2 \le 28$$
$$x_1, x_2 \ge 0.$$

21. Discuss the economic applications of optimization technique.

22. The demand curve of a monopolist is given by $p = \frac{50 - x}{5}$. Find the marginal revenue for any output. What is marginal revenue when $x = 25$?

23. Explain input output analysis. What are the features of input-output analysis ?

(5 × 6 = 30 marks)

Section C (Essay Questions)

Answer any **two** *questions.*
Each question carries 10 *marks.*

24. Explain Cobb Douglas production function. State and prove the properties of Cobb Douglas production function.

25. Discuss the conditions for profit maximization. Consider $TC = Q^3 - 8Q^2 + 120Q + 420$, $TR = 1200Q - 5Q^2$. Find the profit maximizing output.

26. Explain the meaning and characteristics of perfect competition. Assume that a perfectly competitive firm faces a price of Rs. 9 and has a total cost function $C = 2Q^2 + 2Q + 15$. What quantity should the firm produce in the short run ?

27. Explain price elasticity of demand. What are the degrees of elasticity ? Suppose price increases from 40 to 45 and demand falls from 200 to 150. Calculate price elasticity of demand.

(2 × 10 = 20 marks)