32. Given the demand curve of a monopolist as X = 50 – 0.5P, and the cost function C = 50 + 40*x*, find the profit maximising level of output.

(6 × 5 = 30 Marks)

Part D: Short Essay

Answer any ***two*** questions. Each question carries 12 marks.

33. What is linear programming? Explain the components of a Linear Programming Problem.
34. Derive the equilibrium for a firm under perfect competition.
35. A producer has the possibility to discriminate between the national and international markets for a product due to the difference in price elasticity in the two markets. His demand functions are as follows. $x_1 = 21 - 0.1P_1$ in national market $x_2 = 50 - 0.4P_2$ in the international market. Total cost of the firm is TC = 2000 + 10x where $x = x_1 + x_2$. What price will the producer charge (a) with discrimination between markets (b) without discrimination?
36. Determine the total demand x for industries 1, 2 and 3, given the matrix of technical coefficients A and the final demand vector B.

$$A = \begin{bmatrix} 0.4 & 0.3 & 0.1 \\ 0.2 & 0.2 & 0.3 \\ 0.2 & 0.4 & 0.2 \end{bmatrix} \qquad B = \begin{bmatrix} 140 \\ 220 \\ 180 \end{bmatrix}$$

(2 × 12 = 24 Marks)

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18U640 (Pages: 4) Name: …………..……….

Reg. No……….………

SIXTH SEMESTER B.A. DEGREE EXAMINATION, APRIL 2021

(CUCBCSS-UG)

(Regular/Supplementary/Improvement)

CC15U ECO6 B12 - MATHEMATICAL ECONOMICS

(Economics – Core Course)

(2015 Admission onwards)

Time: Three Hours Maximum: 80 Marks

Part A

Answer ***all*** questions. Each question carries ½ mark.

1. _________ is a simplified description of reality, designed to yield hypotheses about economic behaviour that can be tested
   (a) An economic model (b) An assumption
   (c) A hypothesis (d) None of these
2. The given function *f* (x) = $ax^2 + bx + c$, is an example of _________ function
   (a) quadratic (b) polynomial (c) linear (d) rational
3. A _________ function provides an abstract mathematical representation of the relation between the production of a good or service and the inputs used.
   (a) consumption (b) production (c) revenue (d) technology
4. $\frac{AR}{AR - MR}$ gives the
   (a) Elasticity of demand (b) elasticity of cost
   (c) iso revenue live (d) elasticity of supply
5. When elasticity of demand is 2, the demand will be
   (a) Perfectly elastic (b) Perfectly inelastic
   (c) Relatively elastic (d) Unit elastic
6. If the demand curve for a monopolist is P = 100 -20Q, then the marginal revenue of that firm is given by the equation
   (a) MR = 200 − 20Q (b) MR = 50 − 40Q
   (c) MR = 100 − 20Q (d) MR = 100 − 40Q
7. The value of Lagrange multiplier λ gives the approximate change in the objective function caused by a small change in the _________
   (a) constant of the constraint (b) objective function
   (c) variables in the constraint (d) any of these

8. If $MRTS_{LK} = 2$, then $\frac{MP_k}{MP_L}$ is

(a) 2 (b) 1 (c) ½ (d) 4

9. MR is

(a) the second order derivative of TR (b) the first order derivative of TC

(c) the first order derivative of TR (d) the first order derivative of TR

10. Where $\alpha = {}^3/_4$ and $\beta = {}^1/_4$, the returns to scale for the Cob Douglas Productions functions is

(a) Increasing (b) Decreasing

(c) constant (d) cannot say without additional data

11. Linear Programming deals with

(a) Constraints (b) Inequalities

(c) Objective functions (d) All the above

12. The best or optimum level of output for a perfectly competitive firm is given by the point

(a) MR = AC (b) MR = MC

(c) MR exceeds MC by the greater amount (d) MR = MC and MC is rising

(12 × ½ = 6 Marks)

Part B (Very Short Answer Questions)

Answer any ***ten*** questions. Each question carries 2 marks.

13. Given a production function $Q = x^2 + 2xy + y^2$ for a firm which uses two inputs x and y in the production process, find marginal product of the two inputs.

14. Given the total cost function $TC = x^3 - 9xy - 3y^3$, of a firm producing two goods x and y, find the marginal cost of x and y.

15. What is feasible region in linear programming?

16. Explain transportation problem.

17. What is a matrix of technical coefficients?

18. What is a Leontief matrix?

19. If the demand functions and supply functions are $D = 50 - 10p$ and $S = 5 + 5P$, find equilibrium level of price and output.

20. Given a production function $Q = 6x^2 + 3xy + 2y^2$, find $MRTS_{xy}$ when y = 4.

21. Find MRS_{xy} for the function $U = 3x + y$.

22. If the price of a commodity is Rs. 3 and price elasticity of demand is −3, find the MR.

23. The demand function for a particular commodity is $y = 26 - 2x - 4x^2$ and the average cost to the monopolist of producing and marketing the commodity is $y = x + 8$. Determine the maximum profit obtainable by the monopolist.

24. State the conditions for equilibrium of a monopolist.

(10 × 2 = 20 Marks)

Part C (Short Essay)

Answer any ***six*** questions. Each question carries 5 marks.

25. State and prove any three properties of C- D function.

26. Distinguish between homogenous and non-homogenous functions.

27. Given the total cost function, $TC = 5q^2 + 5q + 2000$, prove that MC curve cuts the AC curve at the minimum of AC.

28. Given $Q_1 = 100 - P_1 + 0.75P_2 - 0.25P_3 + 0.0075Y$. At $P_1 = 10$, $P_2 = 20$, $P_3 = 40$ and $Y = 10{,}000$, (a) find the price elasticity of demand (b) find the different cross elasticities of demand.

29. Find the dual of the following

Minimize $C = 20x_1 + 30x_2 + 16x_3$

Subject to

$$2.5x_1 + 3x_2 + x_3 \geq 3$$
$$x_1 + 3x_2 + 2x_3 \geq 4$$
$$x_1, x_2, x_3 \geq 0$$

30. Solve Graphically

Maximize $Z = 80x_1 + 120x_2$

Subject to the constraints

$$x_1 + x_2 \leq 9$$
$$x_1 \geq 2$$
$$x_2 \geq 3$$
$$20x_1 + 50x_2 \leq 360$$
$$x_1, x_2 \geq 0$$

31. Solve graphically

Minimize $C = 3y_1 + 4y_2$

Subject to $2y_1 + 3y_2 \geq 36$

$$2y_1 + 2y_2 \geq 28$$
$$8y_1 + 2y_2 \geq 32$$
$$y_1, y_2 \geq 0$$