Reg. No. | | | | | | | | | |

BASECC 384

Choice Based Credit System VI Semester B.A. Degree Examination, September 2022
(2021-22 Batch)
ECONOMICS (Group – I)
Mathematical Economics (Optional)

Time : 3 Hours Max. Marks : 120

***Note** : A **single** answer booklet containing **40** pages will be issued. **No additional** sheet will be **issued**.*

SECTION – A

Answer **any two** of the following : **(20×2=40)**

1. a) What are the conditions necessary for linear demand and supply of a single commodity to represent a normal economic situation ?

   b) For the following pair of demand and supply equations determine the market equilibrium quantity and price algebraically and graphically
   $X = 16 - y^2$
   $X = 4 + y$. **(5+15)**

2. a) Mention some of the uses of differential calculus in economics.

   b) The average revenue function for a particular commodity is $Y = 24 - 7x$ and the Average Cost to the Monopolist is $\overline{Y}_c = 6 - x$.
   Determine the Maximum possible profit obtainable by a monopolist. **(5+15)**

3. a) Explain the usefulness of integral calculus in Economic analysis.

   b) If the Demand function is $Y = 14 - X^2$ and the Supply function is $Y = 2X^2 + 2$, where Y refers to price and X represents quantity. Find Consumer's Surplus and Producer's Surplus under Pure Competition. **(5+15)**

P.T.O.

4. Find the inverse of the matrix

$$A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 1 \\ 4 & 2 & 1 \end{bmatrix}.$$ **20**

SECTION – B

Answer **any five** of the following : **(10×5=50)**

5. Explain the various rules of differentiation.

6. The demand for a certain commodity found to be D = 100 – 2P.
   a) What is the demand if the price is Rs. 10 ?
   b) What should be the price if the seller wants to sell 80 units ?
   c) What is the largest quantity that one can sell ?
   d) What is the maximum price he can charge for the commodity ?
   e) Graph the demand curve.

7. The demand and supply curves of a commodity are given as
   D = 55 – P
   S = –5 + 4P
   Find the market equilibrium price and quantity algebraically and graphically.

8. Pareto's law of income distribution for a particular group is given by,

$$N = \frac{8 \times 10^8}{X^{3/2}}$$

   i) How many people have incomes exceeding Rs. 1,600 ?
   ii) How many people have incomes between Rs. 1,600 and Rs. 3,600 ?

9. If the average cost function is $\overline{Y}_c = 3x + 5 + \frac{6}{x}$
   a) What equation represents the total cost function ?
   b) What equation represents the marginal cost function ?
   c) At what quantity will average cost be minimum ?
   d) Prove that at that point marginal cost and average cost are equal.

10. For the following pair of demand functions, determine the four marginal demands and the nature of the relationship between the two commodities and the four partial elasticity of demand

    $x = 15 - 2p + q$

    $y = 16 + p - q$.

11. Obtain the optimum solution for the following Linear Programming Problem

    Maximize : $Z = 30x_1 + 15x_2$

    Subject to constraints : $60x_1 + 40x_2 \leq 24000$

    $2x_1 + 3x_2 \leq 1200$.

SECTION – C

Answer **any six** of the following : **(5×6=30)**

12. What are the different formulas for deriving the linear equations ?

13. When the price is Rs. 50, 50 purses of a fixed type are available for sale. When the price is Rs. 75, 100 purses are available.

    a) What is the supply function ?

    b) Graph the line.

14. Suppose the fixed cost of production for a commodity is Rs. 45,000. The variable cost is 60 percent of the selling price of Rs. 15 per unit. What is the break-even quantity ?

15. A company has the following Total revenue function

    $R = 24x - 3x^2$

    i) What equation represents the average revenue function ?

    ii) What equation represents the marginal revenue function ?

    iii) At what level of output the revenue of the company maximum ?

16. For the following total cost function, find marginal cost and determine the nature of marginal cost (increasing or decreasing)
    $Y = 220 – 55x – 2x^3 + x^4$.

17. If the production function is given by $Z = 4xy – x^2 – 3y^2$ obtain the marginal productivities of x and y.

18. If the marginal revenue function is $MR = 100 – 4x + 3x^2$. Find total revenue and average revenue functions.

19. Solve the following simultaneous equations using Cramer's rule.
    $3x_1 + 2x_2 = 12$
    $2x_1 + 5x_2 = 4$.
