MAY 2022 **U/ID 32506/URM2A**

Time : Three hours Maximum : 75 marks

PART A — ($10 \times 2 = 20$ marks)

Answer any TEN questions.

1. Mention any two importance of mathematical economics.

2. What is the condition a function is said to be convex?

3. What is market equilibrium condition?

4. Why is the price elasticity of demand negative?

5. Mention two methods of computing national income.

6. Find the simple interest of Rs. 6000 for 5 years at 5% per annum.

7. What is the feasible solution of linear programming problem?

8. Calculate $\begin{pmatrix} 1 & -2 & -3 \end{pmatrix} \begin{pmatrix} 3 \\ 2 \\ 4 \end{pmatrix}$.

9. If $y = (1 + 2x)^2$ find the derivative of $\frac{dy}{dx}$.

10. Define maxima and minima of the function.

11. Evaluate the definite integral $\int_0^{50} (100 - 2x)\, dx$.

12. Define producer surplus.

PART B — (5 × 5 = 25 marks)

Answer any FIVE questions.

13. Find the horizontal and vertical intercepts of the line $y = 1 + 3x$.

14. Explain the concept of market equilibrium in economics.

15. Find the sum of the first 10 terms of the series 1/2, 1/4, 1/8, 1/16,… What limiting values does this sum approach as the number of terms goes to infinity?

16. I paid Rs. 35,000 for my house 20 years ago. Now its worth is Rs. 3,50,000. What was the annual growth rate of its value?

17. Find the total revenue and marginal revenue functions for the demand function $q = -2p + 160$.

18. If $3^x = |9|$, find x.

19. If the marginal cost function is $3q + 5$, find the total cost function.

PART C — ($3 \times 10 = 30$ marks)

Answer any THREE questions.

20. Plot the graph of $y = 3x - 4$ between $x = -2$ and $x = 4$.

21. Supply and demand functions for a particular market are given by the equations $P_S = Q^2 + 6Q + 9$ and $P_d = Q^2 - 10Q + 25$.

(a) Sketch the graph of each function over the interval $Q = 0$ to $Q = 5$.

(b) Find the equilibrium price and quantity graphically and algebraically.

22. (a) Use the method of elementary row operations to find the inverse of $B = \begin{pmatrix} 3 & 2 & -1 \\ 1 & 7 & 5 \\ -1 & 0 & 1 \end{pmatrix}$.

(b) Write down the solution of the system $Bx = C$ for a general three vector C.

23. Find the stationary point of $z = x^2 + y^2$ when x and y are subject to the constraint $y = 10 - x$.

24. Find the producer surplus of the supply functions $P = 15 + e^{0.05Q}$ at $Q = 20$.