

5/H-16 (vi) (Syllabus-2015)

2018

(October)

ECONOMICS

(Honours)

(**Mathematics for Economists**)

Marks : 75

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

Answer **five** questions, taking at least **one**
from each Unit

UNIT—I

1. (a) Find the equation of the straight line passing through the points (2, 2) and (4, 8). 2

- (b) Determine the equation of the line having intercept a on x -axis and intercept b on y -axis. 2

(2)

(c) What are the differences between an ordered pair (1, 2) and a set {1, 2}? 3

(d) Prove the distributive laws using Venn diagrams. 4+4=8

2. (a) Differentiate between explicit and implicit functions. 3

(b) Three daily newspapers are published in a city with a literate population of 4000. Following are the reading habits :

48% read A, 54% read B, 64% read C, 28% read A and B, 32% read B and C, 30% read C and A and 6% do not read any of the newspapers

Find the number of persons who read (i) all three newspapers and (ii) B and C not A. 4+4=8

(c) Briefly explain the methods of denoting a set. 4

(3)

UNIT—II

3. (a) Distinguish between a symmetric matrix and a skew-symmetric matrix. 4

(b) Prove that $(ABC)^T = B^T C^T A^T$. Given

$$A = \begin{bmatrix} 2 & 1 \\ 4 & 2 \end{bmatrix}, B = \begin{bmatrix} 3 & 0 \\ 1 & 5 \end{bmatrix}, C = \begin{bmatrix} 1 & 2 \\ 2 & 3 \end{bmatrix} \quad 7$$

(c) Prove that matrix multiplication is not commutative. 4

4. (a) Solve the following linear programming problem graphically : 5

$$\text{Maximize } Z = 45x + 80y$$

subject to

$$5x + 20y \leq 400$$

$$10x + 15y \leq 450$$

$$x \geq 0, y \geq 0$$

(b) A factory has 90, 80 and 50 running feet respectively of teak, pinewood and rosewood. Product A requires 2, 1 and 1 running feet and product B requires 1, 2 and 1 running feet of teak, pinewood and rosewood respectively.

(4)

If A could sell for ₹ 48 and B could sell for ₹ 40 per unit, how much of each should be produced and sold to maximize gross income out of his stock of wood? Give a mathematical formulation of this linear programming problem and solve by graphical method. 5+5=10

UNIT—III

5. (a) Given the demand and average cost functions of a monopolistic firm as $P = 32 - 3Q$, $AC = Q + 8 + \frac{5}{Q}$. What level of output will maximize total profit and what are the corresponding values of MC and MR? 6+2+2=10
- (b) Find the elasticity of demand (e) and MR at $p = 2$, if the demand function $q = 30 - 5p - p^2$. 5
6. (a) Explain an inflection point with suitable illustrations from economics. For the given function $y = x^3 - 3x^2 + 7$, find the point of inflection. 3+3=6

(5)

- (b) Find the total differential of the following : 3×3=9

(i) $Z = \frac{x^2 - y^2}{x^2 + y^2}$

(ii) $Z = (x^2 + y)(2x - y^2)$

(iii) $Z = \log(x^2 + y^2)$

UNIT—IV

7. (a) Use the substitution rule to find

$$\int \frac{4x^3 + 2}{(4x^4 + 8x)^5} dx \quad 3$$

- (b) Find the total revenue function and the demand function from the given marginal revenue function

$$MR = 3 - 2x - x^2 \quad 2+3=5$$

- (c) What is producer's surplus? If a producer's supply function is given by $Q = \sqrt{-4 + 4p}$ and the market price is 10, find the producer's surplus. 2+5=7

8. (a) The demand and supply functions are $P_d = (6 - q)^2$ and $P_s = 14 + q$ respectively. Find the consumer's surplus under perfect competition. 9

(b) Find the integrals of the following : $3 \times 2 = 6$

(i) $\int \frac{I_n(x)}{x} dx$

(ii) $\int \frac{8x}{(2x^2 + 1)} dx$
