**ST. JOSEPH’S UNIVERSITY, BENGALURU -27**

Registration Number:

Date & session:9-12-2022 (1pm)

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**B.Sc. (ECONOMICS) – I SEMESTER**

**SEMESTER EXAMINATION: OCTOBER 2022**

**(Examination conducted in December 2022)**

**ECS 1221 – MATHEMATICS FOR ECONOMICS**

**Time: 2 Hours Max Marks: 50**

**This paper contains 1 printed page and 3 parts**

**(calculators/scientific calculators are allowed)**

**PART A: Answer any FIVE of the following 3\*5 = 15**

1. The demand function is given by, P = 460 – 3Q. Find the consumer’s surplus when 92 units of the commodity are sold.
2. Check the homogeneity of the function: f(x, y, w) = x4 – 5yw3.
3. What do you mean by linear dependence of vectors? Give examples.
4. Given A = $\begin{matrix}0&4\\-1&3\end{matrix}$ , B = $\begin{matrix}3&-8\\0&1\end{matrix}$ ,

Find A-1 and B-1.

1. Differentiate between dependent and independent variables with examples.
2. Test whether the function is strictly convex: u = 9 – x2.

**PART B: Answer any FOUR of the following 5\*4 = 20**

1. Find the total derivative dz/dy, given, z = f(x,y) = 2x + xy – y2, where, x = g(y) = 3y2.
2. Solve the differential equation dy/dt = 5 + 6t when the initial condition is yo = 2.
3. The cost equation of the firm is C = 5x1 + 10x2, while the production function is given by q = x1x2. Find the minimum cost of producing 50 units of output.
4. The demand function for a commodity is given by:

X1 = 300 – 0.5p22 + 0.02p2 + 0.05y. Find the income elasticity of demand when p1 = 12, p2 = 10 and y = 200.

1. Find the first four derivatives of the function: y = x/(1 + x).

**PART C: Answer any ONE of the following 15\*1 = 15**

1. The equilibrium condition for three related markets is given by:

11p1 – p2 – p3 = 31

-p1 + 6p2 - 2p3 = 26

-p1 – 2p2 + 7p3 = 24

Using Cramer’s rule, find the equilibrium price for each market.

1. A monopolist firm produces two commodities x1 and x2 at constant average cost of Rs. 2.50 and Rs. 3.00 per item respectively. If P1 and P2 stand for the prices charged and the market demands are x1 = 5(P2 – P1) and x2 = 32 + 5P1 – 10P2, find the prices of the two commodities for maximum monopoly profit.