Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December-22

Course: Mathematical Economics-I **Semester: III**
Program: BA, Economics (Hons.) **Course code: ECON2026**
Time: 03 Hours **Max. Marks: 100**

SECTION A

1. Each Question will carry 2 Marks
2. Instruction: Select the correct answer(s)

		CO
Q1	Find the domains of the functions defined by the following equations: a. $y = \sqrt{5-x}$ b. $y = \frac{2x-1}{x^2-x}$ c. $y = \sqrt{\frac{x-1}{(x-2)(x+3)}}$ d. $y = \frac{3x+6}{x-2}$ e. $y = \frac{3x+6}{x-2}$ f. $y = {}^{1}/_{x+3}$ g. $y = \sqrt{2x+4}$ h. $y = \sqrt{x}$ i. $y = 1-\sqrt{x+2}$ j. $y = \sqrt{5-x}$	**CO1**

SECTION B

1. Each question will carry 5 marks
2. Instruction: Write short / brief notes

Q11.	Find the equilibrium price and quantity for the following a. $D = 75-3P, S = -20+2P$ b. $D = 100-0.5P, S = -10+0.5P$	**CO2**
Q12.	Compute the following limits: a. $lim_{x\to 2}(x^2+3x-5)$ b. $lim_{y\to -3}({}^{1}/_{y+8})$	**CO2**
Q13.	Find the derivative of the following function $y = \sqrt{x+\sqrt{x+\sqrt{x}}}$	**CO2**
Q14.	Find $\frac{d^2y}{dx^2}$ when $y = x^a + x^{-a}$	**CO2**

SECTION-C

1. Each Question carries 10 Marks.
2. Instruction: Write long answer

Q 15.	For the following equations, find ${dy}/{dx}$ by implicit differentiation:	**CO3**

	a. $xy = 1$ b. $x - y + 3xy = 2$ c. $y^6 = x^5$ d. $2x^2 + 6xy + y^2 = 18$	
Q16.	Find the extreme value (s) of the following functions, and determine whether they are maxima or minima: a. $z = x^2 + xy + 2y^2 + 3$ b. $z = -x^2 - y^2 + 6x + 2y$	**CO3**
Q17.	Given $U = (X + 2).(y + 1)$ and $P_x = 4, P_y = 6\ and\ M = 130$: a. Write the Lagrangian function. b. Find the optimal levels of purchase x^* and y^*? c. Is the second-order sufficient condition for maximum satisfied?	**CO3**
SECTION-D 1. Each Question carries 15 Marks. 2. Instruction: Write long answer		
Q18	Solve the following system of equations using appropriate theorem of Matrix Inversion: a. $2x - 3y = 3, 3x - 4y = 5$ b. $2x - 3y = 8, 3x - 4y = 11$ c. $2x - 3y = 0, 3x - 4y = 0$	**CO4**
Q19	Let the IS equation be $Y = \frac{A}{1-b} - \frac{g}{1-b} i$ Where $1 - b$ is the marginal propensity to save, g is investment sensitivity to interest rates, and A is an aggregate of exogenous variables. Let the LM equation be $Y = \frac{M_0}{k} + \frac{l}{k} i$ Where k and l are income and interest sensitivity of money demand, respectively, and M_0 is the real money balances. If $b = 0.7, g = 100, A = 252, k = 0.25, l = 200, and\ M_0 = 176, then$ a. Write the $IS - LM$ system in matrix form. b. Solve for $Y\ and\ i$ by matrix inversion.	**CO4**