## First Semester FYUGP Mathematics Examination November 2024 (2024 Admission onwards) KU1DSCMAT114 (MATHEMATICAL ECONOMICS I) (EXAM DATE : 06-12-2024)

Time :  $120 \min$ 

Maximum Marks : 70

## Part A (Answer any 6 questions. Each carries 3 marks)

- 1. Use the rules of exponents to simplify the following expressions:
  - (a)  $\frac{x^3}{\sqrt{x}}$
  - (b)  $\frac{1}{x^3} \cdot \frac{1}{y^3}$ .

2. Define a rational function and give an example.	3
3. Define a power function and give an example.	3
4. Find $\lim_{x \to 6} x^2$ .	3
5. Find $\lim x$ .	3
$x \rightarrow b$	
6. Define critical points of a function?	3
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7. Define an increasing function?	3
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8. Explain the process of optimization using the first and second	derivatives of a
function	3
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Part B (Answer any 4 questions. Each carries 6 marks)	

- 9. Perform the indicated arithmetic operations.
  - (a) (34x 8y) + (13x + 12y)(b) (26x - 19y) - (17x - 50y)(c)  $(x + y)^2(x - y)$ .

6

3

- 10. Solve the following equations. (a) 5x + 6 = 9x - 10.
  - (b)  $5x^2 55x + 140 = 0.$  6

## 11. Graph the equation 2y - 6x = 12 and find the slope and intercepts. 6

12. Obtain the critical points of the function  $y = 2x^3 - 30x^2 + 126x + 126$ . 6

- 13. Obtain the marginal expenditure (ME) function associated with the supply function  $P = Q^2 + 2Q + 1$ . Evaluate it at Q = 10. 6
- 14. Determine the marginal and average functions at Q = 3 for the total cost function  $TC = 3Q^2 + 7Q + 12$ .

## Part C (Answer any 2 question(s). Each carries 14 marks)

- 15. Given C = 102+0.7Y, I = 150-100i,  $M_s = 300$ ,  $M_t = 0.25Y$  and  $M_z = 124-200i$ . (a)Find the equilibrium level of the income and equilibrium rate of interest. (b)Find the level of C, I,  $M_t$  and  $M_z$  when the economy is in equilibrium.
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- 16. Given Y = C + I, C = C<sub>0</sub> + bY<sub>d</sub>, I = I<sub>0</sub>, Y<sub>d</sub> = Y T, where C<sub>0</sub> = 100, b = 0.6, I<sub>0</sub> = 40, and T = 50.
  (a)Find reduced form
  (b)Find the numerical value of Y<sub>e</sub>
  (c)Find the effect on the multiplier when a lump-sum tax is added to the model and consumption becomes a function disposable income (Y<sub>d</sub>).
- 17. Use implicit differentiation to find the derivative  $\frac{dy}{dx}$  for the following functions (a) $x^4y^6 = 89$ . (b) $2x^3 + 7x + 8y^2 = 87$ . 14