

BACHELOR OF ARTS EXAMINATION, 2019

(1st Year, 2nd Semester, Old)

ECONOMICS (Honours)**MATHEMATICAL ECONOMICS I****(2012 SYLLABUS)**

Time : Two hours

Full Marks : 30

Answer any two

1. a) Given the production function $Q = 2l^{1/3}k^{2/3}$ find optimum values of L and K that maximizes Q. Also check for second order condition. 4

b) Consider the following production function: Find the values of 'a' and 'b' for which it is continuous. Then draw the production function and hence find the optimum level of output. 2

$$f(x) = \begin{cases} x & \text{if } x < a \\ x^2 & \text{if } 1 \leq x \leq b \\ 8x^{1/2} & \text{if } x > 4 \end{cases}$$

c) Which of the following functions are homogenous or homothetic? Give reasons for your answer.

i) $f = \frac{x^2 y^2}{x^2 + y^2} + 3$ ii) $f = x_1^2 / (x_2^3 + 2)$ 4

d) Find the optimum commodity bundle that will minimize the consumer's expenditure when utility function is $u = x + \sqrt{y}$. and prices are p_x, p_y . Hence find the expenditure function. 5

2. a) Do detailed graphing for the following function: $f = x\sqrt{4-x}$ 6

c) Consider the cubic polynomial $y = Ax^3 + 6x^2 - Bx$, where A and B are unknown constants. If possible, determine the values of A and B so that the graph of y has a minimum value at $x = -1$ and an inflection point at $x = 1$. 4

d) State and prove Shephard's lemma 5

3. A consumer with utility function $U(q_1, q_2) = (q_1 - \lambda)q_2^\alpha$

and budget constraint $w = p_1q_1 + p_2q_2$

i) Solve for optimal commodity bundles.

ii) Check the second-order sufficient conditions.

iii) Derive the indirect utility function and show how it moves with w. 4+2+4

b) Solve the following LPP problem graphically:

minimize $4x + 3y$

subject to

$2x + y \geq 8$

$x + y \geq 5$ 5

$x \geq 0, y \geq 0$