BACHELOR OF ARTS EXAMINATION, 2019

(1st Year, 2nd Semester, Old)

ECONOMICS (Honours)

MATHEMATICAL ECONOMICS I

(2016 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

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

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

i) $f = \dfrac{x^2y^2}{x^2+y^2} + 3$ 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 $y = Ax^3 + 6^2 - Bx$, 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
$2x + y \ge 8$
$x + y \ge 5$ 5
$x \ge 0$ $y \ge 0$