

EASTERN UNIVERSITY, SRI LANKA

FINAL YEAR FIRST SEMESTER EXAMINATION IN AGRICULTURE - 2004/2005

AEC 4107 : Advanced Production Economics

Answer All questions

Time : 02 hours.

01.

- (a) Define Production, Production Economics and Production Functions.
- (b) Discuss briefly the mathematical properties of a production function.
- (c) A single variable production function representing corn yield response to nitrogen fertilizer is given below:

$$Y = 4x^2 - x^3$$

Where Y = Corn Yield in Kg / hac.
 X = Nitrogen fertilizer in Kg.

- (i) Find out the input levels that form the boundaries of stage - II and III.
- (ii) Sketch TPP, APP & MPP on a common set axes & show the locations of stages of production.
- (iii) Check all the relevant second order conditions.

02.

- (a) Given the following Cobb-Douglas Production Function :

$$Y = AX_1^{b_1} X_2^{b_2}$$

Where Y = Output
 X_1 and X_2 = Factors of Production
 B_1 and B_2 = Coefficients
 A = Constant

Determine the following :

- (i) Marginal Product of Factors,
- (ii) Marginal Rate of Substitution,
- (iii) The Elasticity of Substitution,
- (iv) Equations for isoquant, isocline and expansion path.
(Assume Price of $X_1 = P_{X_1}$ and Price of $X_2 = P_{X_2}$)
- (v) The demand functions of X_1 and X_2

03.

- (a) Show mathematically that the function coefficient for the two-factor model is related to the partial elasticities of production.
- (b) Differentiate the production function that exhibit variable proportional returns from those exhibit constant proportional returns.
- (c) Define Homogeneous Production Functions (HPF).
Briefly discuss the properties of HPF.
- (d) Determine whether the following functions are homogenous.
If so what degree?

(i) $f(x, y, w) = \frac{x}{y} \frac{2w}{3x}$

(ii) $g(x, y, w) = \frac{x^2}{y} \frac{2w^2}{x}$

(iii) $h(x, y, w) = 2x^2 + 3yw - w^2$

(iv) $f(x, y, w) = \frac{xy^2}{w} + 2xw$

(v) $f(x, y) = 2x + Y + \sqrt{3xy}$

04. The following sample of printout information of Cobb-Dougllass production function was obtained in an analysis of a study conducted in Backialla, the least developed area in the Amparai District with the respect to the question of efficient use of inputs in paddy farms of different size.

The data for this application were collected by interview questionnaire of 430 farm households randomly selected from a random sample of 110 villages.

	Output (r)	Labour X ₁	Land X ₂	Plant Equipment X ₃	Capital X ₄
Partial Regression coefficients (b _i)		0.4446	0.1245	0.0818	0.2300
Standard Errors (S _{bi})		0.0593	0.0411	0.0163	0.0331
t - Rations		7.4938	3.0287	5.0126	6.9460
Beta coefficients		0.3743	0.1318	0.1644	0.2891
Table of correlation coefficient (zero order)	Y 1.0000	0.7336	0.6251	0.4434	0.6683
	X ₁ 0.7336	1.0000	0.7156	0.3964	0.6913
	X ₂ 0.6251	0.7156	1.0000	0.3799	0.5648
	X ₃ 0.4434	0.3964	0.3779	1.0000	0.2707
	X ₄ 0.6683	0.6913	0.5648	0.2797	1.0000
Partial correlation coefficients		0.3416	0.1454	0.2363	0.3193
Means (of logs)	3.9919	2.2461	1.0877	3.2335	3.8107
Standard Deviations (of logs)	0.4027	0.3390	0.4263	0.8093	0.5063
Geometric means (antilog)	9815.0	176.2	12.24	1712.0	6468.0
Number observation K	4.30	k-n-1 Degree of freedom			425
Interrupt	1.7169	F ratio			115.6826
Interrupt (antilog)	52.11				
Durbin - Test (d)	1.3418				
Std error of Estimate	0.2484	Std Error of Estimate adjusted			0.2507
Coefficient of Multiple Determination	0.6231	Adjusted coefficient of Determination R ²			0.6195

Interpret the above results.