UNIVERSITY COLLEGE LONDON

EXAMINATION FOR INTERNAL STUDENTS

MODULE CODE	:	**ECON3015**
ASSESSMENT PATTERN	:	**ECON3015A**
MODULE NAME	:	**The Economics of Growth**
DATE	:	**09 May 2016**
TIME	:	**2:30 pm**
TIME ALLOWED	:	**2 hours**

This paper is suitable for candidates who attended classes for this module in the following academic year(s):

2015/16

TURN OVER

SUMMER TERM 2016

ECON3015: ECONOMICS OF GROWTH

TIME ALLOWANCE: 2 HOURS

Answer ALL questions from Part A and ONE from Part B

Part A accounts for 75 per cent of the total mark and Part B accounts for 25 per cent.

In cases where a student answers more questions than requested by the examination rubric, the policy of the Economics Department is that the student's first set of answers up to the required number will be the ones that count (not the best answers). All remaining answers will be ignored.

PART A

Answer ALL questions from this section.

1. (25 points) Assume that in the Solow model the aggregate production function takes the Cobb-Douglas form: $Y = AK^{\alpha}L^{1-\alpha}$, $0 < \alpha < 1$, where Y is output, A is a measure of productivity, K is capital and L is labour. Assume that the quantity of labour input, L, grows at the rate of n each period. The quantity of capital input, K, grows through investment but also decays due to wear and tear. Assume that a constant fraction of output is invested and denote this fraction γ. Also assume that a constant fraction of the capital stock depreciates each period. Denote this fraction δ. There is perfect competition in the markets for output and the inputs.

(a) What is the share of income paid to labour in terms of the parameters of the model? Please show all work.

(b) What are the steady state levels of capital per worker (k) and output per worker (y)? Please show all work.

(c) Consider two countries, Country 1 and Country 2. In Country 1 the growth rate of labour input is 0.1%, and in Country 2 it is 0.3%. In Country 1 the rate of investment is 20%. The two countries have the same levels of productivity, A. In both countries the rate of depreciation is equal to zero. The ratio of steady-state output per worker in Country 1 to steady-state output per worker in Country 2 is 1.5. Assuming that the value of α is 1/3, what is the rate of investment in Country 2? Please show all work.

2. (20 points) Consider the impact of population on economic growth.

(a) What two key mechanisms are at work in the Malthusian model? How do they lead to a steady-state level of population and income per capita?

(b) How will changing the level of productivity in an economy affect the steady-state income per capita in the Malthusian model?

(c) How will changing the level of productivity in an economy affect the steady-state income per capita in the Solow model?

3. (15 points) Consider the two-country model of Technology and Economic Growth, in which we analysed the interplay of two different means by which a country can acquire a new technology, innovation and imitation, respectively. Suppose that the cost-of-copying function is

$$\mu_c = \mu_i\left(\frac{A_1}{A_2}\right)^{-\beta},$$

where μ_i denotes the cost of invention, A_1 denotes the level of technology in the leading country (Country 1), A_2 denotes the level of technology in the follower country (Country 2), and $0 < \beta < 1$. Assume that the two countries have labour forces of equal size: $L_1 = L_2 = L$. Denote by $\gamma_{A,1}$ and $\gamma_{A,2}$ the fractions of the labour force that is doing R&D in the leading and the following countries, respectively.

Using this function, solve for the steady-state ratio of technology in the leading country to technology in the follower country (that is, A_1/A_2) as a function of the values of γ_A in the two countries. Show how this depends on the value of β, and provide the economic intuition behind the result. Please show all work.

4. (15 points) Consider a country in which there are two sectors, called Sector 1 and Sector 2. The production functions in the two sectors are:

$$Y_1 = 2L_1^{1/2}$$

$$Y_2 = L_2^{1/2}$$

where L_1 is the number of workers employed in Sector 1 and L_2 is the number of workers employed in Sector 2. The prices of goods produced in both Sector 1 and Sector 2 are equal to 1.

The total number of workers in the economy is $L = 1000$. In Sector 1 workers are paid their *marginal* products, while in Sector 2 they are paid their *average* products. Workers move freely between sectors so that the wages are equal.

(a) Calculate how many workers will work in each sector. Please show all work.

(b) How should the workers be allocated between the two sectors if wages in both sectors were set efficiently? What is the cost of misallocating workers between sectors (express the loss in output due to the misallocation as a percentage of the maximum possible output that can be produced in the economy)? Please show all work.

PART B

Answer ONE question from this section.

B1. (25 points) In explaining Europe's early rise to riches (before the Industrial Revolution), Voigtlander and Voth (2013) suggest the near-constant warfare in Europe between 1400 and 1700 as a possible explanation. What is the key mechanism underlying their hypothesis? Why did the initial income gains from the Black Death (1348-50) not fade, as would be suggested by Malthusian forces?

B2. (25 points) Poor countries have populations that are unhealthy in comparison to those of rich countries. Does this mean that public health interventions (e.g., malaria and hookworm eradication, antibiotics and clean water) that improve health in poor countries will also increase income per capita in these countries? Why or why not?

END OF PAPER