Uva Wellassa University, Sri Lanka
End Semester Examination – June/July 2010
SCT 425-2 Biomass Conversion

Time: Two (02) hours

Total Five (05) Questions
Answer **only Four (04)** questions including the question **number One (01)**.

1.

(a) A certain food producing company fulfilled their energy requirement entirely by direct combustion of fossil fuel. The board of director of the company has recently decided to change their energy generation plan from fossil fuel to biomass energy generation through gasification process considering environmental issues. They have decided to appoint a selection committee to select a candidate plant as an energy crop for their energy generation. (Note: the plant should be a herbaceous crop)

i. Imagine that you are a member of that committee. Discuss the characters of the plant that you consider.
ii. Name two candidate plants that can be used to generate energy and state the advantages of that plants as energy crops.

(12marks)

(b) Describe the counter-current fixed bed gasification process.

(13marks)

2.

(a) Briefly explain the process "pyrolysis".

(8marks)

(b) What are the applications of pyrolysis?

(6marks)

(c) A group of scientists wanted to find out the weight of organic Carbon in 100cm^3 of *Albizia lebbeck* wood. They have estimated the total dry weight of that volume and it was 50g. The minimum amount of heat released during the combustion of 1g of the sample is 0.1MJ. The amount of heat required to convert 1Kg of a liquid into the vapor without a change in temperature is 2260KJ.
(Note: particle density of the material is 25gcm^{-3})

i. Calculate the amount of C in the sample.

(8marks)

ii. Calculate the porosity of that plant material.

(3marks)

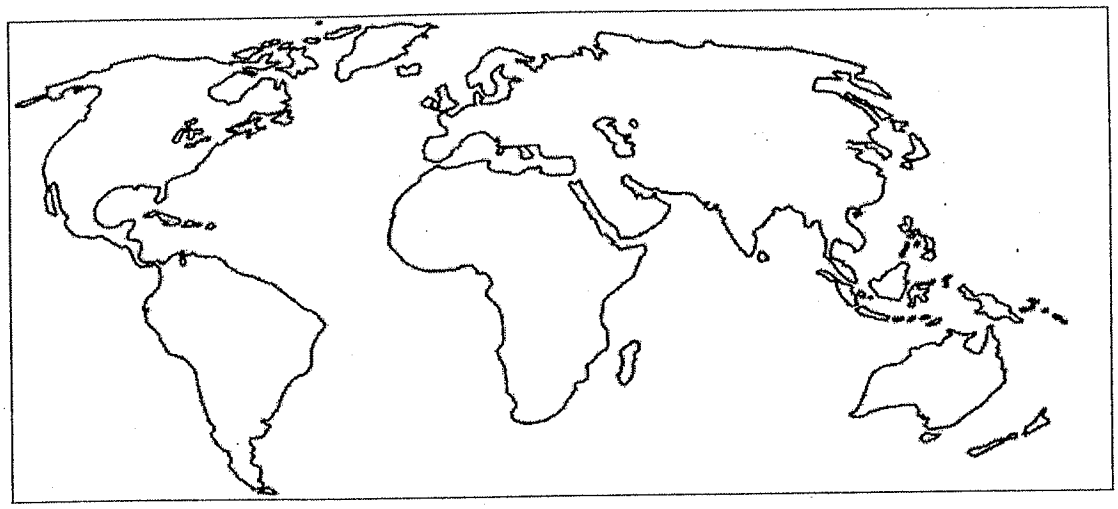
3.

(a) Mark by shading relevant area, the followings on the map given below.

i. Centre of origin of *Jatropha curcas* plant.

ii. Two leading countries, producing bio ethanol from corn and sugarcane respectively

iii. Two leading countries, producing bio diesel from rapeseed and soybean respectively



(5marks

(b) Name four advantages of biodiesel.

(4marks

(c) Explain the most widely used pure biodiesel production process from *Jatropha* seeds. You have to mention the by-products and their uses as well.

(16marks

4. Write short notes on followings.

(a) World biofuel production and the demand.

(9mark

(b) Importance of renewable energy resources.

(8mark

(c) The structure of a mini hydropower plant.

(8mark

5.

(a) "Sanitary toilet" concept is one of the major topics discussing in the world today. Briefl describe the importance of "sanitary toilet" concept to the countries like Sri Lanka.

(6mark

(b) Biogas production is said to be a sustainable process. Briefly explain this statement.

(6mark

(c) Describe the biogas production process.

(13 mark