Uva Wellassa University, Sri Lanka
Faculty of Science and Technology
Science and Technology Degree program
2nd Semester Examination – September/ October 2013
SCT 425-2 Biomass Conversion

Uva Wellassa University

Answer any Four (04) questions
Number of questions: Five (05)
Time allocation: Two (02) hours
Total marks allocated: 100

1. a. What is meant by biomass conversion? (04 marks)

b. Discuss the importance of biomass conversion for the sustainable energy production. (05 marks)

c. Briefly explain the properties of biomass. (06 marks)

d. A group of scientists wanted to find out the weight of organic carbon in 100 cm^3 of *Albizia lebbeck* wood. They have estimated the total dry weight of that volume and it was 50 g. The total Carbon content of the biomass are 10 g and the amount of heat required to convert 1kg of water into the vapor without a change in temperature is 2260 kJ.
(Note: particle density of the material is 25 gcm^{-3})

i. Calculate the bulk density and porosity of the plant material. (05 marks)

ii. Find out the lower heating value of the sample. (05 marks)

2. a. i. Name two examples for short rotation woody crops and herbaceous energy crops each. (04 marks)

ii. List the advantages and disadvantages of herbaceous energy crops for the energy production.

b. Discuss the differences between pyrolysis and gasification processes. (06 marks)

c. i. Briefly explain the process of fluidized bed gasifier with suitable diagrams. (10 marks)

ii. Describe the importance of cyclone in fluidized bed gasifier. (05 marks)

3. a. What are the key elements that control the demand of biofuel production? (03 marks)

b. i. Name two countries popular for bio ethanol production. (02 marks)

ii. Discuss the advantages of bio ethanol production. (05 marks)

c. Asian Development Bank decided to grant Rs. 30 million to establish bioethanol production from sugar cane bagasse in Monaragala District. Imagine that you are a one of the coordinators of that project.

i. Propose the best method to produce bioethanol. (05 marks)

ii. Discuss the major steps involved in your proposed method. (10 marks)

4.

a. "Recycling is the best solution for the environmental problems due to landfills". Comment on this statement. (05 marks)

b. What is the difference between batch type digesters and continuous flow type digesters? (04 marks)

c. i. Briefly explain the process of biogas production. (10 marks)

ii. Discuss the socioeconomic and environmental benefits of biogas production. (06 marks)

5. Write short notes on followings.

a. Renewable energy sources.

b. Transestrification.

c. Direct and indirect liquefaction.

d. Counter current gasifier. (25 marks)