

## Centre for Energy Studies

ESL-732 Bioconversion and Processing of Wastes

Time : 1 hr.

Minor-II (10.10.2009)

M.M. : 20

1. a) Describe with the help of a neat diagram a 'Flash Pyrolysis' process for pyrolysis of sawdust. (3)
  - b) Write down the conditions favourable for maximizing char yield in a pyrolysis process. (1)
  - c) Differentiate between the following :
    - i) Leavoglucosan and pyrolignous acid
    - ii) Updraft combustion and downdraft combustion
    - iii) A chain grate stoker and a travelling grate stoker for mass firing of solid waste
    - iv) Pyrolysis and combustion. (4)
  - d) Write down the various components of a continuous mass firing system for solid wastes clearly indicating the function of each component. (4)
2. i) The solid waste on analysis shows (% by weight) :  
C=68, N=1.9, S=0.3 and ash =14.7
  - ii) When the above solid is combusted, the % volumetric composition of the flue gas is as follows :  
 $\text{CO}_2 = 11.5$ ,  $\text{CO} = 1.5$ ,  $\text{O}_2 = 6.5$  and remaining  $\text{N}_2$ .
  - iii) The dry ash produced after combustion has a combustible content (by weight) of 40% carbon.  
Calculate:
    - i) Kmol of dry flue gas produced/100 kg of solid waste.
    - ii) Kmol of air supplied /100 kg of solid waste(Assume that C is burnt to  $\text{CO}_2$  and CO and S is burnt to  $\text{SO}_2$  and  $\text{SO}_2$  is incorporated into  $\text{CO}_2$ ) (8)