KIBABII UNIVERSITY

2017/2018 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER

SPECIAL/SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN RENEWABLE ENERGY AND BIOFUELS TECHNOLOGY

COURSE CODE: IET 431

COURSE TITLE: Energy Generation from Biomass and Waste

DATE: 4/10/2018 **TIME:3-5PM**

INSTRUCTIONS TO CANDIDATES

Answer question ONE and any other two questions

This paper consists of 4 printed pages. Please Turn over

Question One

(a) Describe how electrical power can be generated from biomass fuel combustion. **[6 marks]**

(b) State the factors that affect the overall efficiency of combustion **[6 marks]**

(c) Briefly describe the production of biogas by anaerobic digestion **[6 marks]**

(d) Describe in detail the main features of the Kenya Ceramic Jiko (KCJ) and compare it with the traditional Jiko **[6 marks]**

(e) Explain in detail the importance of carrying out resource assessment before setting up an energy plant based on biomass **[6 marks]**

Question Two

a) Discuss and evaluate the barriers to the development of biomass energy schemes. 12 marks

b) Outline strategies and opportunities to mitigate the effects 8 marks

Question Three

(a) In the context of thermo-chemical conversion technology, describe with the aid of diagrams the different stages of the combustion process, giving information on the effects of the air/fuel ratio, moisture content, fuel grade and fuel density on the process. 10 marks

(b) What determines the efficiency of a steam engine or turbine? 3 marks

(c) Explain why Salix Sp is currently the favoured biomass crop 2 marks

(d) What are the main advantages and disadvantages of using wood as a fuel? 5 marks

Question Four

(a) Explain the combustion process **5 Marks**

(b) State factors that affect the overall efficiency of combustion **4 Marks**

(c) State which you consider to be the most important and Explain why **1 Marks**

(d) Describe how power can be generated from biomass fuel combustion **10 Marks**

Question Five

Describe the production of short rotation forestry from Populus sp.. 20 marks