



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: 5/02/21

TIME: 11-1 Pm

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