



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2016/2017

FIRST SEMESTER EXAMINATION FOR THE DEGREE OF MASTER OF
SCIENCE (RENEWABLE ENERGY TECHNOLOGY)

SET 803: ENERGY RESOURCES AND UTILIZATION

DATE: MONDAY 13TH DECEMBER 2016

TIME: 5.30 P.M. - 8.30 P.M.

INSTRUCTIONS:

There are FIVE questions in this paper.

Answer QUESTION ONE and ANY OTHER TWO questions from the remaining FOUR.

QUESTION ONE carries 30 Marks and all other FOUR questions carry 20 Marks EACH.

QUESTION ONE (COMPULSORY)

- a) "Acid Rain" is one of the environmental phenomena resulting from direct utilization of some fuels, with minimum control strategies.
- i) Discuss in details the scientific background of this phenomena, i.e., how it is formed; clearly indicating how energy is associated with it. (5 Marks)
 - ii) Clearly explain the environmental effects of acid rain outlining the potential control strategies that can be applied to minimize the problems. (5 Marks)
- b) The continued use of fossil fuels have increased the atmospheric concentration of greenhouse gases to an extent that we are committed to the future global warming (a climate change).
- i) Name the causal agents (greenhouse gases), highlighting the principle one, and show their sources. (4 Marks)
 - ii) Explain how greenhouse gases can cause global warming and show the environmental effects of the impact (global warming). (5 Marks)
- c) Photochemical Smog is another environmental phenomena resulting from some gaseous pollutants, products of some fuel utilizations. Coal extraction/mining and utilization is also of major concern environmentally.

- i) Name the gaseous pollutants involved (in photochemical smog) and the major source of them. (3 Marks)
- ii) Name and clearly explain the two environmental conditions for photochemical smog. (4 Marks)
- iii) Show all the chemical reactions occurring in formation of smog, and name the principle environmental effects of photochemical smog. (4 Marks)

QUESTION TWO

- a) There is no simple rule for allocation of natural resources can guarantee fairness under all circumstances. The ultimate decision depends heavily on exactly what needs to be distributed and the specific details of each situation. Explain four (4) major types of energy resource allocation criteria across uses and time (8 Marks)
- b) Renewable energy projects vary considerably in scale, capacity, energy resource characteristics, sale of output, status of technology and a host of other factors. As a consequence, financial strategies require innovation and flexibility to overcome a range of barriers specific to renewable energy projects. What are some major financing barriers restricting the uptake of renewable energy projects? (7 Marks)
- c) Fossil fuels have been and are still very important energy resources despite the facts that they are facing exhaustions together with the negative effects associated with their exploration and exploitation. Discuss why they are still very important energy resources (5 Marks)

QUESTION THREE

- a) Developing countries have certain distinct features that make it difficulties in analyzing their energy demand. Discuss some of these features. (5 Marks)
- b) Hydropower has been and still is a significant energy resource in Kenya, initially contributing to about 70% of the electric power generated in Kenya. However its percentage share has been in a constant decrease (currently accounting for about 49% and expected to account for 5% by the year 2030) due to investment in other energy resources. Briefly discuss its future in the Kenyan energy share. (10 Marks)

- c) For several decades now, governments, businesses, and civil society have accepted sustainable development as a guiding principle. Describe five factors that are paramount when deciding on Energy Policy development (5 Marks)

QUESTION FOUR

Kenya requires an elaborate energy policy to enable her achieve its industrialization dream. Given a chance as an Energy adviser to the Ministry of Energy & Petroleum and the Energy Regulatory Commission, outline your priority policy areas clearly stating the opportunities, challenges and options in the energy sector, the energy mix that will be appropriate and the role of stakeholders in the sector. (20 Marks)

QUESTION FIVE

A bigger share of Kenya's power is generated from renewable energy resources. Explain four different types of renewable energy resources currently being exploited in Kenya in relation to harnessing process and how the energy is used. Also give advantages and disadvantages of the resources (20 Marks)
