



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

**UNIVERSITY EXAMINATIONS FOR THE DEGREE OF SCIENCE IN RENEWABLE
ENERGY TECHNOLOGY AND MANAGEMENT**

THIRD YEAR FIRST SEMESTER 2015/2016 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TET 3315

COURSE TITLE: FOSSIL FUEL POWER PLANT

EXAM VENUE: CR

STREAM: BSc RE TECH & MGT

DATE: 28/04/16

EXAM SESSION: 9.00- 11.00 AM

TIME: 2 HOURS

Instructions to candidates

The paper contains FIVE questions.

Answer question ONE and any other TWO questions

Candidates must hand in their answer booklets to the invigilator while in the examination room.

QUESTION ONE (COMPULSORY)

- a. What are fossil fuels? (1 mark)
- b. Coal, oil and natural gas deposits have been discovered in the Northern part of Kenya. As an upcoming energy expert, describe how you will mine or extract the deposits. (9 marks)
- c. Diesel power plants produce power from a diesel engine. From your knowledge on the general layout of diesel power plants, state and explain the major components of a diesel power plant. (15 marks)
- d. When we do the barrel of oil, we abbreviate BBL and not BL. Explain (2 marks)
- e. Based on current knowledge of fossil fuels formation, is coal being made now? (3 marks)

QUESTION TWO

- a. With respect to formation of fossil fuels, describe the chemical and physical properties of the following:
 - i. Coal (10 marks)
 - ii. Oil (3 marks)
 - iii. Natural gas (7 marks)

QUESTION THREE

- a. Natural gas is formed in many ways. Explain (6 marks)
- b. Kenya as a country is planning to explore and exploit fossil fuels such as coal in Mui basin, oil and natural gas in Northern part. Discuss the local, regional or global environmental impact of these fossil fuel exploration and exploitation. (10 marks)
- c. Free-piston engines are usually divided into three major categories based on the cylinder/piston configuration. Give a description of at least two of these categories of free-piston engines. (4 marks)

QUESTION FOUR

- a. The free-piston term is most commonly used to distinguish a linear engine from a rotating crankshaft engine. State and explain the unique features of a free-piston engine. (10 marks)
- b. State and explain the three types of gas turbines. (6 marks)
- c. A secondary school in Kisumu County is planning to install a stand-alone diesel power plant. Highlight at least five merits and three demerits of using this plant. (4 marks)

QUESTION FIVE

- a. A group of young investors have approached you as a renewable energy technologist with an interest to learn about gas turbine power plant and its theory of operation. Discuss (5 marks)
- b. Briefly describe the formation of fossil fuels (3 marks)
- c. Why is it hard to predict an exact date for peak oil (3 marks)
- d. The combustion chamber is the part where energy is inserted into the gas turbine. Describe the general layout of combustion chamber. (9 marks)