



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF ENGINEERING AND TECHNOLOGY
UNIVERSITY EXAMINATIONS FOR THE DEGREE IN SCIENCE IN RENEWABLE
ENERGY TECHNOLOGY AND MANAGENT
3RD YEAR 1ST SEMESTER 2017/2018 ACADEMIC YEAR
CENTRE: MAIN CAMPUS

COURSE CODE: TET 3315

COURSE TITLE: FOSSIL FUEL POWER PLANT TECHNOLOGY

EXAM VENUE: WS

STREAM: BSc REN ENERGY TECH & MGT

DATE: 14/12/2017

EXAM SESSION: 2.00 – 4.00PM

DURATION: 2 HOURS

Instructions

- 1. Answer question 1 (Compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on question paper**
- 3. 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 deposits were discovered in Mui basin, Kitui County. Briefly discuss how the coal was formed (coalification). (7 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. The origin and composition of fossil fuels depend fundamentally on the origin and biochemical composition of life. Explain (2 marks)
- e. Petroleum discovered in the Northern part of Kenya consist of a mixture of hydrocarbon molecules. Briefly explain this statement. (5 marks)

QUESTION TWO

- a. World over, fossil fuels have distinct chemical and physical characteristics. For each of the following fossil fuels, state and explain their characteristics:
 - i. Coal (5 marks)
 - ii. Natural gas (5 marks)
- b. Prior to petroleum drilling, petroleum exploration is undertaken to ascertain the depositional environment. Clearly discuss this environment of deposition and what it entails. (10 marks)

QUESTION THREE

- a. Natural gas is formed in many ways. State and explain. (6 marks)
- b. Kenya as a country is planning to explore and exploit fossil fuels such as coal and petroleum/oil in Mui basin and Northern Kenya, respectively. 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. State and explain four types of mining Coal in China. (5 marks)
- c. Why is it hard to predict an exact date for peak oil (2 marks)
- d. The combustion chamber is the part where energy is inserted into the gas turbine. Describe the general layout of combustion chamber. (8 marks)