



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

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

3RD YEAR 1ST SEMESTER 2024/2025 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TEB 1309

COURSE TITLE: FOSSIL FUEL POWER PLANT TECHNOLOGY

EXAM VENUE: STREAM: BSc. REN ENGY TEC & MGT

DATE: 9/1/2025 EXAM SESSION: 9-11.00 AM

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

- a) Enumerate **FIVE** major functions of a lubrication system in a diesel generator
[5 Marks]
- b) Enumerate **THREE** major parameters used to classify crude oil by the petroleum industry
[3 Marks]
- c) Using a well labelled diagram illustrate the components of and discuss the working principal of an open gas-turbine cycle.
[5 Marks]
- d) Define the following terms
[3 Marks]
1. Reserves.
 2. Recovery factor.
 3. Oil in place (OIP)
- e) State **FOUR** geological essentials that result in the subsurface accumulation of oil and gas
[4 Marks]
- f) List **THREE** main elements common to all gas turbine engines
[3 Marks]
- g) Discuss **TWO** different test methods measure octane number
[3 Marks].
- h) Explain briefly **FOUR** major activities involved when developing a natural gas resource
[4 Marks]

QUESTION TWO

- a) Using a well labelled diagram discuss a fuel supply system of a diesel generator
[5 Marks]
- b) Using a well labeled diagram discuss the four process of a Brayton cycle and illustrate both the isentropic and turbine efficiency.
[9 Marks]
- c) Discuss three basic types of hydrocarbon traps for formation, oil and gas. [6 Marks]

QUESTION THREE

- a) Discuss **SEVEN** fundamentals of a combustor
[7 Marks]
- b) Using a well labelled diagram illustrate the **FIVE** features that are integral to combustor design.
[5 Marks]
- c) Discuss **FOUR** emerging challenges for the petroleum industry
[8 Marks]

QUESTION FOUR

- a) Discuss the **FIVE** stages of the drilling process of oil. **[10 Marks]**
- b) Discuss three main types of unconventional natural gas resources **[6 Marks]**
- c) Discuss briefly two methods used to mine coal and give one example for each method. **[4 Marks]**

QUESTION FIVE

- a) Discuss five characteristics of crude oil **[10 Marks]**
- b) Discuss how heat recovery steam generator (HRSG) and gas turbine (GTG) work in a combined-cycle gas turbine (CCGT). **[6 Marks]**
- c) Discuss **FOUR** methods that natural gas energy can be transported to the consumers **[4 Marks]**