

15



KIBABII UNIVERSITY

2019/2020 ACADEMIC YEAR

THIRD YEAR SECOND SEMESTER

SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE IN RENEWABLE ENERGY AND
BIOFUELS TECHNOLOGY

COURSE CODE: IET 313

COURSE TITLE: GEOTHERMAL ENERGY

DATE: 12/02/21

TIME: 11-1 Pm

INSTRUCTIONS TO CANDIDATES

Answer question ONE and any other two questions

This paper consists of 3 printed pages. Please Turn over

QUESTION ONE

- a. State three main factors that facilitates the formation of geothermal energy resource (3mks)
- b. State the three main sources of heat in the interior of the earth (3mks).
- c. Classify geothermal energy source based on:
 - I. Quality. (3mks)
- d. What do you understand by the following terms as used in geothermal resources classification:
 - I. Vapour dominated geothermal resource. (2mks)
 - II. Liquid dominated geothermal resource (2mks)
- e. With the aid of a well labelled diagram, describe geothermal energy generation using Binary Cycle (6mks)
- f. State THREE main reasons why geothermal energy can be classified as sustainable source of energy (3mks)
- g. List FOUR direct uses of geothermal heat (4mks)
- h. Give four main objectives of exploration process in geothermal energy resources study (4mks)

QUESTION TWO

- a. Describe the formation of the following geothermal resources formation using well labelled diagrams:
 - I. Hydro-Geothermal resource. (5mks)
 - II. Hot Dry Rock/Petro-Geothermal resource (5mks)
- b. List **FOUR** physical features that show the manifestation of geothermal energy resource beneath the ground. (4mks).
- c. State **SIX** surveys that must be carried out during geothermal exploration.

QUESTION THREE

- a. Using well labelled diagram, briefly describe the operation principle of vapour dominated single flash geothermal power plant (6mks).
- b. Give **FOUR** reasons why drilling fluid or mud is very important in geothermal drilling process (4mks).
- c. List any four negative impacts of geothermal exploration on environment (4mks).
- d. Describe the operating principles of a geothermal heat pump (GHP) (6mks)

QUESTION FOUR

- a. What is direct use geothermal resource utilization?(2mks)
- b. List any SIX ways Kenya is utilizing geothermal resource besides electricity generation (6mks).
- c. Name any FIVE Geothermal sites in Kenya (5mks)
- d. Describe space heating and cooling using geothermal heat pumps (7mks)

QUESTION FIVE

- a. State FIVE factors that determines the cost of Geothermal project (5mks)
- b. How do you compare geothermal power plant and coal power plant in terms of:
 - I. Capital cost. (2mks)
 - II. Operation and maintenance cost.(2mks)
 - III. Environmental sustainability (2mks)
- c. Briefly explain how the abundant geothermal energy Kenya can help in the realization of the government's big 4 agenda (7mks).
- d. Explain why exploration stage takes the largest share in total geothermal production cost. (2mks)