

QUESTION ONE (COMPULSORY) (30 Marks)

- a. Define the following terms:
 - i. Geothermal resource (1 Mark)
 - ii. Geothermal gradient (2 Marks)
- b. Examine the basis of geological and geophysical data in estimating a geothermal resource. (4 Marks)
- c. 60% of geothermal heat is derived from decay of long-lived radioactive isotopes. Using illustrations, explain this statement. (10 Marks)
- d. List three types of geophysical surveys as used in geothermal energy exploration. (3 Marks)
- e. The heat capacity of a geothermal source is a function of minerals that make up the rock, pore volume and whether it is fluid-filled. Examine this statement. (10 Marks).

QUESTION TWO (20 Marks)

- a. Examine the significance of understanding the chemistry of geothermal fluids. (5 Marks)
- b. Researchers have found that most reliable geothermometers for geothermal energy resource assessments are the silica, K–Mg, and Na–K–Ca geothermometers. Examine this statement. (5 Marks)
- c. Using illustrations, examine drilling for geothermal heat pump and direct-use applications. (10 Marks)

QUESTION THREE (20 Marks)

- a. Using illustrations, examine drilling for geothermal fluids for power generation. (10 Marks)
- b. Examine the uniqueness of geothermal power production compared to other power production methods. (5 Marks)
- c. State three types of geochemical surveys as used in geothermal energy exploration. (3 Marks)
- d. Examine the significance of geothermal resource assessment. (2 Marks)

QUESTION FOUR (20 Marks)

- a. Examine the flexibility and consistency of geothermal power generation. (5 Marks)
- b. Using neat pressure-entropy diagrams, examine the following.
 - i. Dry steam resources (5 Marks)
 - ii. Hydrothermal system (3 Marks)

- iii. Flashing (3 Marks)
- iv. Dual-flash systems (4 Marks)

QUESTION FIVE (20 Marks)

- a. Examine the types of geothermal systems as studied in geothermal energy technology. (10 Marks)
- b. Examine the economics of geothermal power in Kenya. (5 Marks)
- c. Examine environmental considerations while using geothermal resources in Kenya. (5 Marks)