



DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY
GEOHERMAL ENERGY TRAINING AND RESEARCH INSTITUTE
MSc IN GEOHERMAL ENERGY TECHNOLOGY

SPECIAL EXAMINATIONS

GET 4002: SCALING AND CORROSION

DATE:

TIME: 3 HOURS

INSTRUCTIONS

- 1) TIME ALLOCATED – 3 hours
- 2) There are THREE QUESTIONS in this paper
- 3) Attempt ALL THREE questions
- 4) All three questions have equal marks, 20 marks each
- 5) This Paper will count for 60% of the total score of GET 4002. The other 40% will be earned from CATS and assignments

Question 1 [20 marks] – This question is Compulsory

- (a) Define all explain the following terms or phrases [4 Marks]
 - i. Cathodic protection
 - ii. Scale inhibitors
 - iii. Rust
 - iv. Microbial corrosion
- (b) List four factors that affect crevice corrosion [2 Marks]
- (c) Explain why if steel rivets are fixed in a copper plate, the rivets are completely corroded after sometime. [2 Marks]
- (d) Explain how presence of impurities in the atmosphere influence corrosion [3 Marks]
- (e) Explain the best way to minimize corrosion of geothermal equipment during storage? [2 Marks]
- (f) Explain how does corrosion affect human health and safety? [4 Marks]
- (g) A sample of iron corrodes uniformly with a current density of 6.6×10^{-6} A/cm² in an aqueous solution. What is the corrosion rate of iron in mg/dm²/day? Given $M = 55.58$ g/mol, density, $\rho = 7.1$ g/cm³, 1 faraday 96000 C, [3 Marks]

Question 2 [20 marks] – This question is Compulsory

- (a) Discuss briefly how corrosion is controlled in boilers *[8 Marks]*
- (b) Describe with an example how corroded structures can lead to environmental pollution. *[8 Marks]*
- (c) Why are inhibitors needed to be injected in pipelines transporting oil and gas? *[4 Marks]*

Question 3 [20 marks] – This question is Compulsory

- (a) Discuss methods of cleaning scales from production wells *[8 Marks]*
- (b) Describe the various factors affecting the rate of corrosion *[8 Marks]*
- (c) Describe the electrochemical theory of corrosion *[4 Marks]*