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#### MANICALAND STATE UNIVERSITY OF APPLIED SCIENCES

FACULTY OF ENGINEERING,APPLIED SCIENCES AND TECHNOLOGY

**DEPARTMENT: MINING AND MINERAL PROCESSING ENGINEERING**

**MODULE: CORROSION ENGINEERING**

**CODE: ENGM511**

### SESSIONAL EXAMINATIONS

**DECEMBER 2023**

**DURATION: 3 HOURS**

**EXAMINER: MISS T NYAMAZUNZO**

## INSTRUCTIONS

1. *This paper contains* ***One*** *section with* ***Five*** *questions.*
2. *Answer* ***Question one*** *and* ***Any other three questions****.*
3. *Start a new question on a fresh page.*
4. *Total marks 100.*

***Additional material(s):*** *Calculator*

**QUESTION ONE**

1. Discuss the different types of corrosion that we commonly come across.

 **[15marks]**

1. Discuss the use of inhibitors in corrosion control. **[7marks]**
2. Why does corrosion of a water-filled steel tank occur below the water line?

 **[3marks]**

**QUESTION TWO**

1. A sample of zinc corrodes uniformly with a current density of 4.2 ×10−6 A/cm2 in an aqueous solution.
2. What is the corrosion rate of zinc in mg/dm2/day? **[8marks]**
3. What is the corrosion rate of zinc in mm/year? **[12marks]**

 (Atomic weight, M=65.38g/mol; Density, Ꝭ=7.1g/cm3; n=2;

 f=96500coulombs/mole)

1. Explain what is meant by dissimilar metal corrosion. **[5marks]**

**QUESTION THREE**

1. Discuss the design rules applied in the manufacturing of structures to increase corrosion resistance. **[10marks]**
2. What do you understand by the terms anodic and cathodic protection?

 **[8marks]**

1. Corrosion can lead to losses. State and explain these losses. **[7marks]**

**QUESTION FOUR**

1. Explain the following terms:
2. Activation polarisation **[5marks]**
3. Concentration polarisation **[5marks]**
4. Resistance polarisation **[5marks]**
5. Describe high-temperature corrosion and its mechanism. **[10marks]**

**QUESTION FIVE**

1. With the aid of a diagram, discuss the three regions of the iron-water pourbaix diagram. **[10marks]**
2. What are the limitations of pourbaix diagrams? **[5marks]**
3. Give a brief description of the different classes of coatings used in preventing corrosion. **[10marks]**

**END OF EXAMINATION PAPER**