

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF
DOCTOR OF PHILOSOPHY IN CHEMISTRY**

CHEM 933: ADVANCES IN ELECTROCHEMISTRY

STREAMS: PHD (CHEM)

TIME: 2 HOURS

DAY/DATE: THURSDAY 23/04/2020

8.30 AM – 10.30 AM

INSTRUCTIONS:

ANSWER ALL QUESTIONS

QUESTION ONE (20 MARKS)

- a) Briefly explain corrosion briefly. (3marks)
- b) Differentiate between chemical and electrochemical reactions in corrosion. (3marks)
- c) Briefly discuss two Faraday's law. (4marks)
- d) i) Write short notes on coupled multi-electrode arrays (or assemblies). (3marks)
ii) Give three advantages of multi-Electrode arrays. (2marks)
- e) Write short notes on coupling of electrodes through potential fields (2.5 marks)
- f) Briefly discuss corrosion spreading on concrete (2.5 marks)

QUESTION TWO (20 MARKS)

- a) Discuss the uncoupled multi electrode array for corrosion studies. (3marks)
- b) Give two limitations of coupled electrode systems. (4marks)
- c) Discuss two methods for estimating and predicting corrosion failure rate distribution. (4marks)

- d) Give four ways in which modifying the surface of electrode important to electroanalytical chemistry. (3marks)
- e) Write short notes on three main strategies for producing high surface area electrodes. (6marks)

QUESTION THREE (20 MARKS)

- a) i) Discuss three advantages of carbon electrodes. (3marks)
- ii) Briefly discuss the diversity of carbon as an electrode material. (3marks)
- b) Write short notes on electronic properties of carbon electrode material. (3marks)
- c) Discuss the following carbon materials briefly i) Graphite (2marks) ii) Carbon nanotubes. (2marks)
- d) Briefly discuss the following terms in relation to the surface structure of carbon electrode material i) Termination ii) Surface oxides. (4marks)
- e) Discuss the use of sp^2 hybridized materials as adsorbents. (3marks)
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