NATIONAL OPEN UNIVERSITY OF NIGERIA
14-16 AHMADU BELLO WAY, VICTORIA ISLAND LAGOS
SEPTEMBER/OCTOBER 2015 EXAMINATION

SCHOOL OF SCIENCE AND TECHNOLOGY

COURSE CODE: CHM409
COURSE TITLE: ELECTROCHEMISTRY
Duration: 2 hours
INSTRUCTION: Answer *question 1* and *any other three (3) questions*

Question 1

a) List the three major electrochemical interphases that you know and explain the order expected for diffusion of ions or other elementary particles in each of them. 13 ½ marks

b) State three factors that affect the conductivity of an electrolyte. 4 ½ marks

Question 2

a)Briefly describe the classical model on the existent of an electric double layer (Use suitable diagram to support your answer) 8 ½ mark

b). What are the parameters that affects the structure of an electric double layer? 5 marks

C)What are the basic applications of electric double layer in the industries? 4 mark

Question 3

a) Differentiate between polarizable and non polarizable electrode 5 marks

b) Describe the Significance of Tafel Plots 6 marks

c) List and explain the two main types of polarization in an electrochemical cell. 4 ½ mark

d) What is the difference between over voltage arising from cathodic and anodic polarization - respectively. **2 mark**

Question 4

a) State Fick's first law of diffusion (2 ½ marks)

b) Derive an expression that relates cathodic over potential to the cathodic current (i_C) and the limiting current (i_L). From the expression, state what will happened to the overpotential if $i_C < i_L$ and $_C = i_L$. 15 ½ marks

Question 5

a) ***Define the terms: i) ion transport and ii) Mobility 3 marks (1 ½ mark each)***

b) ***List and explain three principal ways by which ions are transferred in solution in the absence of fluid turbulence.*** 3 marks

c) ***Write a general equation to show how these three aspects are related to mass transport. 2 marks***

d) ***Describe the basic principles of polarography*** ***(9 ½ marks)***

Question 6

a) List and explain five (5) Factors affecting the half-wave Potentials. 10 marks

b) What is a transducer.? Give one example. 2 marks (1 mark each)

c) Define the following terms in respect to a transducer:
sensitivity and selectivity 3 marks (1 ½ marks each)

d) State any six (5) application of polarography 2 ½ marks