

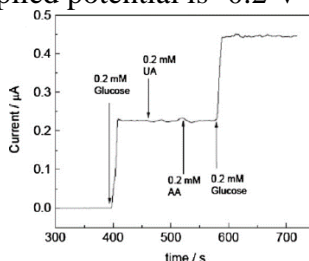
**BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE – PILANI, K. K. BIRLA GOA CAMPUS  
SECOND SEMESTER, 2022-23 CHEM F327, Electrochemistry: Fundamentals and Applications**

**Midsemester examination (Closed Book)**

**Date: 13-03-2023, Duration: 90 minutes, Max. Mark: 50**

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**Instructions: Answer all the questions. Do not use pencil.**  
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1. (a) Draw and explain how the charging current behaves when voltage pulse is applied. [3 marks]  
(b) What is the difference between electropolymerisation and drop-casting on electrode? [3 marks]  
(c) Write the main difference between fast polarography and staircase voltammetry. [3 marks]  
(d) With an example, explain the importance of the complex ferriin in electrochemistry. [3 marks]
2. (a) What is the significance of perturbing potential in impedance measurements? [3 marks]  
(b) What is the role of carbon nanotube in the detection of glucose (in the work discussed in the article titled “Enhanced electrochemical oxygen reduction-based -----“)? [3 marks]  
(c) Why generally electrophoresis is considered as an incomplete form of electrolysis? [3 marks]  
(d) Draw and explain the potential waveform for stripping voltammetry. [3 marks]
3. (a) Draw the Nyquist plot of (i) pure resistor and (ii) pure capacitor. [4 marks]  
(b) Explain the basic difference in carrying out anodic stripping voltammetry and adsorptive stripping voltammetry. [4 marks]  
(c) What is the difference between differential pulse voltammetry and square wave voltammetry in terms of potential-time diagram? [4 marks]  
(d) Explain the graph of  $\log(\text{current})$  vs  $\log(\text{scan rate})$  for surface-confined and diffusion controlled processes. [4 marks]
4. (a) What is meant by ideal nonpolarised electrode? [2 marks]  
(b) What is the role of ferrocene unit? (in the work discussed in the article titled “Target-induced structure-switching DNA hairpins for sensitive electrochemical monitoring of mercury(II)”) [2 marks]  
(c) Explain the significance of the result obtained from the following diagram in detail – an amperometry experiment output in the sensing of glucose by a glassy carbon electrode modified using a metalloorganic compound (applied potential is -0.2 V vs Ag/AgCl). [3 marks]



- (d) What is the advantage of RRDE over RDE? [3 marks]

**END**