Enrollment No.

Shree Manibhai Virani and Smt. Navalben Virani Science College (Autonomous), Rajkot Affiliated to Saurashtra University, Rajkot

SEMESTER END EXAMINATION NOVEMBER - 2017

M.Sc. Analytical Chemistry

16PCEAC02 - ELECTRO ANALYTICAL TECHNIQUES

Duration of Exam – 3 hrs

Semester – III

Max. Marks – 70

Part A (5*x*2= 10 *marks*)

Answer ALL questions

- 1. Enlist advantage and disadvantage of DME in voltametry.
- i) Write down cell representation of glass electrode. 2.
 - ii) Give equation for pH determination in glass electrode.
- 3. Explain the faraday's laws of electrolysis.
- 4. What is rheostat?
- 5. Define: Polarography, Polarogram.

Part B (5x5 = 25 marks)

Answer ALL questions

At 25 ⁰C temperature, Fe⁺² (0.1 M) is titrated against 0.1 M Ce⁺⁴. Both solutions are prepared in 6a. 1 M H₂SO₄. Calculate the concentration of reactant and product at equivalent point. (Formal potential is 0.68 V and 1.44 V)

OR

- Give the application of potentiometry in acid base titration. 6b.
- Discuss instrumentation of potentiostatic coulometry. 7a.

OR

- 7b. Enlist special features of coulometric methods.
- 8a. Explain polarography as a voltametric technique in brief.

OR

- 8b. Enlist the applications of voltametry.
- 9a. Explain working and instrumentation of polarography for CdCl₂.

OR

- 9b. Draw the schematic diagram and give brief details of polarographic cell.
- 10a. Differentiate ampherometry and polarography.

OR

Enlist advantage and disadvantage of ampherometric titration. 10b.

<u>Part C</u> (5X7 = 35 marks)

Answer \underline{ALL} questions

- 11a. Write a brief account of potentiometric titration in between $FeSO_4$ and $K_2Cr_2O_7$. **OR**
- 11b. At 25 ${}^{0}C$ calculate the equilibrium constant for following reaction, $Cr_2O_7^{-2} + Fe^{+2} + 14 H^+ \rightleftharpoons 6 Fe^{+3} + 2 Cr^{+3} + 7 H_2O$ $[H^+]= 1 M, E^0_{Fe+2, Fe+3} = 0.77 V, E^0_{Cr2O7-2, Cr+3} = 1.33 V$
- 12a. Give a brief note on coulometers used in coulometry (any three).

OR

- 12b. Discuss any seven application of potentiostatic coulometry in brief.
- 13a. Give a brief account of general theory related to voltametric techniques.

OR

- 13b. Explain pulse method in voltametry with necessary diagrams.
- 14a. Derive equation for half wave potential in polarography.

OR

- 14b. Discuss the factors affecting in current-voltage curve.
- 15a. Give the detail schematic diagram of DME for ampherometric titration.

OR

15b. Write a note on rotating platinum electrode with schematic diagram.