



Shree H N Shukla Group of Colleges Rajkot  
(Affiliated to Saurashtra University)  
Behind marketing yard, near lalpari lake,  
Between amargadh-bhichri Rajkot.  
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**JBG-003-1101004** Seat No. \_\_\_\_\_

**M. Sc. (Chemistry) (Sem. I) (CBCS) Examination**

**December – 2019**

**C-104 : Analytical Chemistry**

*(New Course)*

**Faculty Code : 003**

**Subject Code : 1101004**

Time :  $2\frac{1}{2}$  Hours]

[Total Marks : 70

Instruction :

- (1) All questions are compulsory.
- (2) All questions carry equal marks.

1 Answer the following (Any seven) 14

- (a) Define :
  - (i) Titration curve
  - (ii) Back titration
- (b) Give the setp-wise  $K_a$  values of EDTA.
- (c) Explain Bronsted-Lowry theory with suitable example and give the limitations of it.
- (d) What levelling effect in non-aqueous titration.
- (e) Give the principle of atomic absorption spectroscopy.
- (f) Give the advantages of atomic absorption spectroscopy over flame emission spectroscopy.
- (g) How will you determine vitamin  $B_1$  in food sample by fluorimetry ?
- (h) Write comparison of fluorimetry and phosphorimetry.
- (i) Discuss acetyl and hydroxyl value of oil and fat.
- (j) How will you determine cotton seed oil by Halphen's test ?



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- 2 Answer the following (any two) 14
- Draw the schematic diagram of AAS. Write main component of it and discuss detectors and amplifier in detail.
  - Discuss singlet and triplet state and factors affecting fluorescence and phosphorescence.
  - Discuss application of fluorimetry in detail.
- 3 Answer the following : 14
- What is neutralization titration ? Derive hypothetical titration curve for 20 ml 0.1 M HCl against 0.1 M NaOH at the 0, 25, 50, 100 & 150% addition of NaOH. Suggest the suitable indicator for this titration.
  - Explain the titration theory of weak base in non aqueous titration. How will you titrate Ephedrine in aprotic solvent ( $\text{CCl}_4$ ) against perchloric acid in dioxane ? Write the chemical reaction for this titration.
- OR**
- What are precipitation titration ? Derive titration curve for the titration of 50 ml 0.1 M NaCl against 0.1 M  $\text{AgNO}_3$  by calculating  $P_{\text{Cl}^-}$  at 0, 10, 25, 40 and 50 ml of 0.1 M  $\text{AgNO}_3$  added. [ $K_{\text{sp}}$  of  $\text{AgCl} = 1.78 \times 10^{-10}$ ]
  - Explain the titration theory of weak acid in non-aqueous titration. How will you titrate Benzoic acid as weak acid in n-butylamine solvent by sodium methoxide ? Write the chemical reaction for this titration.
- 4 Answer the following : 14
- Give the analytical profile of oil and fats. How will you determine its acid value ?
  - What is iodine value ? Give the principle and analytical importance. How will you determine iodine value of oil or fat ?
- 5 Answer the following : (any two) 14
- Discuss instrumentation of phosphorimetry in detail.
  - How will you determine lead in petrol by atomic absorption spectroscopy ?
  - Classify the solvents used in non-aqueous acid-base titration. Explain protophilic and protogenic solvents with suitable example.
  - Derive redox titration curve for 100 ml 0.1 M  $\text{Fe}^{2+}$  with 0.1 M  $\text{Ce}^{4+}$  in 1 M  $\text{HNO}_3$  by calculating the potential as a function of titrant volume at 10, 50, 100 & 200 ml of 0.1 M  $\text{Ce}^{4+}$  added.  
[ $E^\circ$  for  $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} = 0.771$  and  $E^\circ$  for  $\text{Ce}^{4+} \rightarrow \text{Ce}^{3+} = 1.61$ ]