GOVERNMENT OF TAMILNADU

## DIRECTORATE OF TECHNICAL EDUCATION

# DIPLOMA IN ENGINEERING
# I YEAR

## SEMESTER SYSTEM

## L - SCHEME

## 2011 - 2012

## I SEMESTER

# ENGINEERING CHEMISTRY – I PRACTICAL

## CURRICULUM DEVELOPMENT CENTER

**STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TAMILNADU**

**DIPLOMA IN ENGINEERING - SYLLABUS**

**L-SCHEME**

(Implements from the Academic Year 2011-2012 on wards)

Course Name : All Branches of Diploma in Engineering and Technology and Special Programmes except DMOP, HMCT and Film & TV

Subject Code : **21008**

Semester : I Semester

Subject Title : **ENGINEERING CHEMISTRY – I PRACTICAL**

## SCHEME OF INSTRUCTIONS AND EXAMINATION:

No. of Weeks per Semester: 16 Weeks

| Subject | Instructions | | Examination | | | |
|---|---|---|---|---|---|---|
| | Hours/ Week | Hours/ Semester | Internal assessment/ Record | Board Examination | Total | Duration |
| ENGINEERING CHEMISTRY- I PRACTICAL | 2 | 32 | 25 | 75 | 100 | 3 Hours |

## OBJECTIVES:

1. At the end of the program the student will have knowledge about volumetric analysis in acidimetric, Alkali metric and permanganametric titrations and their applications.
2. To give knowledge of estimation of total Hardness, temporary and permanent hardness in the hard water sample.
3. To get knowledge about measurement of pH and to calculate Hydrogen ion concentration in a solution.

1. **INTERNAL ASSESSMENT/ RECORD: 25 MARKS**
2. **BOARD EXAMINATION EVALUATION: 75 MARKS**

## VOLUMETRIC ANALYSIS / EDTA TITRATION

| | |
|---|---|
| Procedure | 5 Marks |
| Viva-Voce | 5 Marks |
| I-Titration | 25 Marks |
| II Titration | 25 Marks |
| Calculations | 3x5 = 15 Marks |
| Total | 75 Marks |

## DETERMINATION OF PH

| | |
|---|---|
| Answer for short Question on pH | 5 Marks |
| Viva-voce | 5 Marks |
| Determination of pH (5 Samples) | 40 Marks |
| Calculation of $H^+$ ion concentration | 25 Marks |
| Total | 75 Marks |

## ENGINEERING CHEMISTRY-I PRACTICAL

# CONTENTS

**Intellectual Skills:**

1. Titrations and Calculation of masses.
2. Knowing units for concentration of solutions

**Motor Skills:**

1. Measure the quantities accurately
2. Handling the apparatus carefully.

**Acidimetery and Alkalimetery:**

1. Estimation of Sulphuric acid, using a standard solution of oxalic acid and NaOH as Link solution - Phenolphthalein indicator.
   [Test solution should be made up to 100ml]
2. Estimation of sodium hydroxide using a standard solution of sodium carbonate Using sulphuric acid-as link solution -Methyl orange indicator.
   [Test solution should be made up to 100ml]

3. Comparison of strengths of two acid solutions using a link solution of NaOH- Phenolphthalein Indicator.
4. Comparison of strengths of two alkaline solutions using an acid (oxalic acid).- Phenolphthalein Indicator.

**Permanganametry:**

5. Estimation of Mohr's salt solution using a standard solution of ferrous sulphate and link solution of potassium permanganate
   [Test solution should be made up to 100ml]
6. Estimation of ferrous Sulphate using standard solution of Mohr's salt solution and link solution of potassium permanganate
   (Test solution should be made up to 100 ml).

**Water Analysis:**

7. Estimation of total hardness of a water sample using EDTA .
8. Determination of pH using a pH-meter [for five given samples] and to calculate the hydrogen ion concentration in the solutions.[This question may be given to any two students per batch].

## MODEL QUESTION PAPER

**MODEL: 1** **3 Hours**

1. Estimate the mass of Sulphuric acid Present in whole of the given solution. You are supplied with a standard solution of oxalic acid of strength 0.098N and an approximately decinormal solution of Sodium hydroxide.

**MODEL: 2** **3 Hours**

2. Calculate the total hardness of the given sample of water. You are given a standard Hard water Solution of 0.01M and an approximately 0.01M EDTA solution.

**MODEL: 3** **3 Hours**

3. Calculate pH of given five samples, using pH meter and calculate the $H^+$ ion Concentration of samples. (Any two Students only in a batch).

## SCHEME OF VALUATION

Short Procedure (Common to all titration). /
For pH determination question, any two PART A questions -in pH chapter may be asked. } – 5 marks

Viva Voce (common to all) - 5 Marks

### I. VOLUMETRIC ANALYSIS:-

Titration Value accuracy for I & II---------- ± 0.2 ml - 25x2=50

above ± 0.2 to 0.4 ml - 21 Marks

above ± 0.4 to 0.6 ml - 17 Marks

above ± 0.6 ml - 5 Marks

**Calculations:**

Titration I - 5 Marks

Titration II - 5 Marks

Result - 5 Marks

For Arithmetic errors, 25 % marks may be reduced

### II. DETERMINATION OF pH VALUES:

Determination of pH for 5 Samples - 5x8=40 Marks

If Accuracy ± 0.2 - 8 Marks

If Accuracy ± 0.2 to 0.4 - 6 Marks

If Accuracy ± 0.4 and above - 4 Marks

Calculation of $H^+$ ions concentration - 5x5 = 25 Marks

### III. EDTA TITRATION

Titration-I - 25 Marks

Titration-II - 25 Marks

Calculation - 15 Marks

For Arithmetic errors, 25 % marks may be reduced

Accuracy on par with ordinary titration (as above)

# FIRST YEAR ENGINEERING CHEMISTRY LABORATORY

## LIST OF EQUIPMENTS

List of equipments needed for a batch of 30 students in Chemistry Laboratory

**Non-Consumable Items:**

| | | |
|---|---|---|
| 1. | Indane gas Connection (DBC) | 1 no |
| 2. | Exhaust Fan (High capacity) | Sufficient Numbers |
| 3. | Fire Extinguisher | 1 no |
| 4. | First Aid Box (Full set) | 2 nos |
| 5. | Safety chart | 1 no |
| 6. | Chemical Balance | 1 no |
| 7. | Fractional weight box | 1 no |
| 8. | PH meters | 5 nos |
| 9. | Working Table with all accessories | 8 nos |

**Glassware and Other Items :**

| | | |
|---|---|---|
| 1. | Burette 50ml | 35 nos |
| 2. | Pipette 20ml (with safety bulb) | 35 nos |
| 3. | Conical Flask 250ml | 35 nos |
| 4. | Funnel 3” (Polythene) | 50 nos |
| 5. | Porcelain Tile 6x6” | 35 nos |
| 6. | Measuring Cylinder | |
| | a. 100ml | 5 nos |
| | b. 500 ml | 3 nos |
| 7. | Reagent Bottle (White) 250ml | 60nos |
| 8. | Reagent Bottle (White) 125ml | 100 nos |
| 9. | Reagent Bottle (Amber) 250ml | 80 nos |

10. Test tubes
    a. 15 x 1.5mm — 1000 nos
    b. 15 x 2.5mm — 500 nos
11. Test tube stand — 35 nos
12. Test tube holder — 35 nos
13. Test tube cleaning brush — 35 nos
14. Glass Trough — 5 nos
15. Beakers
    a. 1000 ml — 5 nos
    b. 500 ml — 5 nos
    c. 250 ml — 35 nos
    d. 100 ml — 5nos
16. Glass Rods 15cm — 100 nos
17. Watch Glass 3” — 35 nos
18. Wash Bottle (Polythene) 1000ml — 35 nos
19. Nickel Spatula — 10 nos
20. Kipps Apparatus — 1 no
21. Burner Nipple — 30 nos
22. Bunsen Burner for gas connection — 30 nos
23. Wire Gauge with asbestos center — 15 nos
24. Plastic Buckets (15 lts) — 10 nos
25. Tripod Stand (Iron) — 30 nos
26. Filter Paper Round sheets — 1000 nos
27. Burette stand — 35 nos
28. Standard flask 100 ml — 35 nos
29. Pipette 10ml — 5 nos

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**List of Apparatus to be supplied for each student in Chemistry lab during FIRST Semester Practical Class/Board Examination in addition to the required Solutions.**

1. Burette 50ml - 1
2. Pipette 20ml (with safety bulb) - 1
3. Conical Flask 250ml - 1
4. Funnel - 1
5. Porcelain Tile 6x6” - 1
6. Burette stand - 1
7. Standard flask 100 ml - 1
8. Beakers 250 ml - 1
9. Wash Bottle - 1

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