P. R. GOVERNMENT COLLEGE (A), KAKINADA

B. Sc. (Analytical Chemistry)

SEMESTER – II

Paper –II (ANALYTICALCHEMISTRY-2) **60 hrs.(4h/w)**

QUANTITATIVE METHODS OF ANALYSIS

UNIT–I **12hrs**

GRAVIMETRIC ANALYSIS:

A. Gravimetric methods introduction and types of gravimetric methods.

B. Volatilization methods – Principle, Applications of Volatilization methods - Determination of the sodium hydrogen carbonate content of antacid tablets

C. Precipitation methods – Principle, Various steps involved in Precipitation gravimetry

D. Properties of precipitates and precipitating reagents: Particle size, Filterability of Precipitates - Factors that determine particle size &formation of Precipitates (Mechanism of Precipitate and Relative supper saturation)

E. i). Colloidal Precipitates - coagulation of colloids, peptization of colloids, Treatment of colloidal precipitates

ii). Crystalline Precipitates (particle size and Filterability).

F. Co-precipitation& Types of Co –precipitation (surface adsorption, mixed-crystal formation, occlusion, and Mechanical entrapment) and co precipitation errors

G. Precipitation from Homogeneous Solution (The use of the technique of Homogeneous solutions to effect precipitation).

H. Drying and Ignition of precipitates

UNIT–II **12hrs**

VOLUMETRIC ANALYSIS

A. Volumetric titrimetry introduction

B. Definitions of the terms - Titrant, Titrand, The equivalence point, the endpoint and the Indicator

C. Classification of volumetric methods

i. Acid-base titrations
ii. Redox titrations
iii. Complexometric titrations
iv. Precipitation titrations

I. Indicator, Theories of indicators and Buffer solutions

J. Sigmoidal Titration Curves

K. Henderson –Hassel Balch equation for acids and bases.

UNIT–III **12hrs**

CENTRIFUGATION METHODS:

A. Introduction to Centrifugation methods
B. Types of centrifugation techniques
C. Sedimentation and relative centrifugal force
D. Different types of rotors. E. Density gradient

UNIT–IV **12hrs**

INTRODUCTION TO ENVIRONMENTAL ANALYSIS:

A. Sampling methods.
B. Environmentalpollutionfromindustrialeffluentsandradiochemicalwaste.
C. Introduction to water and waste analysis.

UNIT–V **12hrs**

Polarography

A. Basic principles of Polarography, residual current, migration current, diffusion current, half wave potential, the Ilkovic equation.
B. Instrumentation of Polarography technique -Dropping Mercury Electrode (DME) – Advantages and Disadvantages. Applications. Qualitative and quantitative analysis of inorganic ions: Determination of Copper and Zinc in Brass.

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SEMESTER –II

LABORATORYCOURSE -II **30** hrs. (2 h /w) Max.Marks: 50M

Practical-II Quantitative Analysis

(At the end of Semester-II)

1. Determination of HCl with Standard NaOH solution by using pH meter

2. Determination of Acetic acid with Standard NaOH by using pH meter

3. Determination of the strength of the given magnesium sulphate solution using EDTA and Eriochrome black –T as the indicator by Complexometric titration method.

4. Determination of the Nickel as its Dimethyl glyoxime by Precipitation Gravimetric method.

5. Analysis of soil:
i) Determination of pH of soil.
ii) Determination of total soluble salts.
iii) Determination of carbonate and bicarbonate.

Suggested Readings:

1. Analytical Chemistry-Methods of Separation (R.V. Dilts).
2. Laboratory Handbook of Chromatographic Methods (O. Mikes, R.A. Chalmers).
3. F.W. Fifield and D. Kealy: Analytical Chemistry.
4. Vogel's textbook of quantitative chemical analysis, 6thedition.
5. Vogel's textbook of quantitative chemical analysis, 7thedition.
6. Keith Wilson and John Walker: Practical Biochemistry.

SCHEME OF VALUATION

Max. Marks: 50

1. Procedure to be written in the first 15 minutes …. 10 Marks
2. Recording of data and reporting the value upto 2% error…… 20 Marks
3. Error up to 5% ……. 10 Marks

   Error greater than 5% …… 5 Marks
4. Viva – Voice …….. 10 Marks
5. Record …….. 10 Marks

P. R. GOVERNMENT COLLEGE, KAKINADA
MODEL QUESTION PAPER
SEMESTER – II
Paper - II (ANALYTICAL CHEMISTRY - 2)
QUANTITATIVE METHODS OF ANALYSIS

Duration: 2hrs. 30Min. **Max. Marks: 50**

SECTION – A

Answer any **THREE** questions. Each question carries **10** marks. 3 X 10 = 30M

1.Any Question from Unit –I

2. Any Question from Unit –II

3.Any Question from Unit –III

4.Any Question from Unit –IV

5.Any Question from Unit –V

6.Any Question from Unit –I

SECTION – B

Answer any **FOUR** questions. Each question carries **5** marks. 4 x 5 = 20M

7. Any Question from Unit - I
8. Any Question from Unit – II
9. Any Question from Unit – III
10. Any Question from Unit – IV
11. Any Question from Unit – V
12. Any Question from Unit – II
13. Any Question from Unit – V

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – II
Paper –II(ANALYTICAL CHEMISTRY - 2)
QUANTITATIVE METHODS OF ANALYSIS

Duration: 2hrs. 30Min. **Max. Marks: 60**

Blue print:

S. No.	Course Content	Essay Questions (10M)	Short Answer Questions (5M)	Total No. Of Questions from each Unit
1	**Unit -I**	**2**	**1**	**3**
2	**Unit –II**	1	2	3
3	**Unit –III**	1	1	2
4	**Unit –IV**	1	1	2
5	**Unit -V**	**1**	**2**	**3**
	TOTAL	**6**	**7**	**13**

Note: Questions should be given from Question bank

P. R. GOVERNMENT COLLEGE, KAKINADA
SEMESTER – II
Paper -II (ANALYTICAL CHEMISTRY)
QUANTITATIVE METHODS OF ANALYSIS
Duration: 2hrs. 30Min. Max. Marks: 60

QUESTION BANK

ESSAY QUESTIONS – 10 MARKS:

1. Explain the principles of Volatilization methods. How do you determine the Sodium Bi-carbonate ($NaHCO_3$) content of Antacid tablets by using volatilization method?
2. What are Precipitation methods? Explain the various steps involved in precipitation gravimetry.
3. Explain the properties of precipitates and precipitating reagents.
4. What is Co-precipitation? Explain the different types of Co-precipitation methods.
5. What is an Indicator? Explain the various theories of Indicators.
6. Derive Henderson – Hassel Balch equation for acids and bases.
7. Write about the classification of volumetric methods with examples.
8. Explain about the four types of titrations involved in volumetric analysis.
9. Explain about the sigmoidal titration curves.
10. Explain different types of centrifugation techniques.
11. Explain about Environmental pollution from industrial effluents and radiochemical waste.
12. Explain about different types of rotors.
13. Explain about the principle and instrumentation of Polarography technique
14. Write about the following,
    i). Ilkovic equation ii). Dropping mercury electrode (DME)
15. Describe the determination of Cu and Zn in brass by using Polarography technique.

QUESTION BANK

SHORT ANSWER QUESTIONS – 05 MARKS:

1. What are Gravimetric method and Explain briefly?
2. Explain about Colloidal precipitates
3. Write about Crystalline precipitates
4. What is Co-precipitation? Explain Co-precipitation errors
5. Explain briefly about Drying and ignition of precipitates
6. Explain the terms equivalence point end point and the Indictor
7. What is Indicator? Write the examples of indicators for various types of titrations.
8. What is Buffer? Explain briefly about Buffer solutions.
9. Explain briefly about Complexometric and Redox titrations with examples.
10. Explain briefly about centrifugation methods.
11. Write about sedimentation
12. Write briefly about Sampling methods
13. Explain briefly about Water analysis.
14. Explain about Diffusion current and half wave potentials
15. Explain about residual current and migration current
16. Write the advantages and disadvantages of DME
17. State and explain the Ilkovic equation
18. Write the principle and applications of Polarography technique.