VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT.

PGDI Analytical Chemistry

COURSE STRUCTURE

The course shall have the weight age of 30 credits (750 marks), where 30% shall be for the internal evaluation and 70% will be for the University annual examinations.

The course will be taught throughout the year. The total teaching hours allocated for the completion of this course are 450 hours [30 Credits].

SUMMARY

Papers	CREDITS				MARKS		
	Internal	External	Total		Internal	External	Total
I	1.2	2.8	4	60	30	70	100
II	1.2	2.8	4	60	30	70	100
III	1.2	2.8	4	60	30	70	100
IV	1.2	2.8	4	60	30	70	100
V	1.2	2.8	4	60	30	70	100
Pract./ Project work	3	7	10	150	75	175	250
Total	09	21	30	450	225	525	750

PASSING STANDARDS

SYSTEM →	CREDITS	MARKS
TOTAL	30	750
I CLASS	18 AND ABOVE	450 AND ABOVE
II CLASS	15 AND ABOVE BUT < 18	375 AND ABOVE BUT < 450
PASS CLASS	12 AND ABOVE BUT < 15	300 AND ABOVE BUT < 375

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Paper- I

ADVANCED METHODS IN ANALYTICAL CHEMISTRY

[60 Hours][4Credits][100 Marks]

I. Separation Techniques (in Detail):

- Chromatography
High Performance Liquid Chromatography (HPLC): Principle -Instrumentation - Applications - Super Critical Fluid Chromatography

II. Spectrochemical Methods:

Infra red spectroscopy : Introduction, H-bonding, Group frequency, Applications of IR spectra.
NMR spectra: Introduction, Theory of magnetic resonance, chemical shift, coupling, spin – spin splitting.

III. Polarography & Voltametric Methods:

Introduction – Principle - Appratus - Halfwave potential - Derivation of a relation between halfwave potential & diffusion co-efficient - The Ilkovic equation - Evaluation Methods - Applications of polarography
-Brief Review of A.C.Polarography
- Pulse polarography - Squar wave polarography - Ampereometric titrations

IV. Coulometry & Electrogravimetry:

First law of faraday of electricity - Methods of Coulometry - Application of Coulometry - Coulometric titration - Advantages of Coulometric titrations

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Paper- II

PROBLEMS & CHEMICAL CALCULATIONS BASED ON VARIOUS ANALYTICAL TECHNIQUES

[60 Hours][4Credits][100 Marks]

(ALL THE TOPICS OF THIS PAPER ARE TO BE TAUGHT BY PROPER PROBLEMS ONLY.)

I. Structure elucidation by IR and NMR spectrocopy.

IR and NMR Spectroscopy

II. Acid-base neutralization :

Acidity, basicity and equivalent weights of some acids and bases.Total alkalinity and acidity, amount of individual acids in mixture of acids.

III. Redox calculations :

Calculation of oxidation number,and equivalent weights of some commonly used redox reagents, determination of amounts by redox titration.

IV. Methods of spectrophotometry:

Numericals based on calculation of molar absorption co-efficient, calculation of amount of substance based on standard addition method, ratio method.

V. Electrochemical methods:

Coulometry, Faraday's laws.

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Paper- III

INDUSTRIAL ANALYSIS

[60 Hours][4Credits][100 Marks]

I. Ores and Alloys:

Analysis of metals in ore & alloys, gravimetry & volumetric methods for Main constituent, instrumental methods for trace metals-With ref. to of brass& stainless steel

II. Pharmaceutical Analysis:

Sulfa-drugs, Antipyratics and Analgesics, Barbitarates and Antibiotics

III. Oil and Fat Analysis:

Acid value, R.M.Value, Saponification value, Iodine value, Detection of adulterants.

IV. Soap and Synthetic detergent Analysis:

Matter insoluble in alcohol, Free alkali, Free acid, combined alkali and total anhydrous soap, Total fatty matter (TFM) silica present as alkaline silicate, ISI Specification of detergents and it's analysis

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Paper- IV

LABORATORY MANAGEMENT AND GENERAL MANAGEMENT

[60 Hours][4Credits][100 Marks]

I. Introduction to laboratory management and importance:

General management : Introduction, nature, features and functions, Importance of management in laboratory, Role of manager in laboratory, General management of laboratory

II. Laboratory setup :

Laboratory setup with respect to building, surrounding and pollution aspects, Arrangement of instruments and reagents

III. Human Resource Managment :

Manpower planning, concept of recruitment and selection, sources of manpower supply, selection process, selection tests, advantages and disadvantages of selection tests.
Training and Development: Concept and comparison of T&D, training methods.
Performance Appraisal : Concept, objectives of PA, methods of PA
Concept of motivation: Maslow's theory of motivation, positive and negative motivation.

IV. Purchase Organisation :

Importance of good purchasing policy, Functions, methods of purchasing, purchase requisition form, purchase process, tenders and its types, notice inviting tenders, purchase orders, Inventory

V. Store Keeping and Record keeping :

Types of stores, purpose of store keeping, duties of store keeper, methods of storing and record keeping.

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Paper- V

INSTRUMENTATION

[60 Hours][4Credits][100 Marks]

SECTION I

Introduction to Instrumentation System, Functional Elements of an instrument, Input Output Configuration of Measuring Instrument. Difference between Digital and Analog Instruments.

Static Characteristics: Resolution, Threshold, Backlash, Hysterisis, Linearity, Sensitivity, Accuracy and Precession Errors, Types of Errors & Errors limiting techniques.

Introduction to Transducers, Types of Transducers , Study of some Simple Transducers (Temp., Pressure Flow, Displacement, Force, Strain etc…)

Block Diagram of a Simple Instrumentation System, Function of each Block of the System.

SECTION II

ANALYTICAL INSTRUMENTS:

PH Meter:-

Construction and working of pH Electrode, Characteristics of Amplifier used in pH Meter. Display System of a pH Meter.

Spectrophotometer:-

Principle of operation of Spectrophotometer Electron Microscope NMR Spectrometer.

Mass Spectrometer:-

Working principle of a Static and Dynamic Mass Spectrometer.

Conductivity meter:-

Working principle of a Conductivity meter.

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PRACTICALS

[150 Hours][10Credits][250 Marks]

GENERAL:

-Reporting in an industry
-Interactions of an industry with Government
-Installation of certificates for a company especially NOC from GPCB, ISO, FDA etc.

WATER CHEMISTRY:

-Ion Exchange w.r.t. water treatment
-Effect of pH on co-agulation & flocculation.

ANALYTICAL CHEMISTRY:

-Determination of optical activity of unknown compounds & if found optically active,specify by Polarimeter.
-Determination of surface tension of different liquids.
-Separate the
a. pigments used in coloured ink
b. Cu^{+2} and Fe^{+2} ions
c. sugar
chromatographically.
-Determine the solubility of KCL at diff. temperatures and draw the solubility
-General idea about IR spectroscopy & determining the structure. From it.
-General idea about NMR spectroscopy & determining the structure. From it.
DEMONSTRATION:
-Analysis of
(a) Cement (b) Sulpha drugs (c) Oils etc.

Seminar on Practicals in Analytical Chemistry with demonstrations.

- **PROJECT**

- **VIVA VOCE**

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REFERENCES

- Modern Methods of Chemical Analysis : Pecsok, Shield & Cairns(John Wiley), 2nd Ed.
- Standard Methods of Chemical Analysis :Vol. I & II(6th Ed). D. Van Mostrand Co. Inc (London)
- Fundamentals of Analytical Chemistry : Skoog, West, Holler & Crouch
- Qualitative Analysis : A Vogel
- Quantitative Analysis : A Vogel
- Analytical Chemistry : Gary Christian
- Instrumental Methods of Analysis : G W Erwing
- Senior Practical Physical Chemistry : B D Ghosla & Garg
- Practical Chemistry : Balwant Rai Salija
- A Handbook of Practical Chemistry : K R Mahadic & S H Bhosale
- Experimental Chemistry : Michell J Sienko, Robert A Plane & Stanley T Marcus
- Instrumental Methods of Analysis : Willard, Merrett, Dean & Settle
- Instrumental Methods of Analysis : B K Sharma, Goel Publi.
- Basic Concepts of Analytical Chem : II nd Ed S N Khopkar, New Age Int Ltd, Mumbai
- Problems and Exercises in Analytical Chemistry : A.A.Yaroslavtser, Mir Publications, Moscow
- Organic Spectroscopy : V.R.Dani, Tata Mc Graw Hill Pub.
- Problems in NMR spectroscopy : Mala Dutta, Sarup and Sons, Delhi
- Spectrometric identification of : Silverstein, Bassler and Morrill, (IV Ed)

Organic Compounds John Wiley and Sons

- Principles and Practice of Management : L M Prasad
- Essentials of Management : Koontz and Weihrich
- Personnel Management : Edwin Flippo
- Dynamic Personnel Administration : M.N.Rudrabaswaraf
- Personnel Management : Arun Monappa & Muza S Sai yadain
- Industrial Organisation and Engineering economics : T R Banga and S C Sharma
- Biomedical Instrumentation : R S Khandpur
- Practical Biochemistry : T.H. Ummer
- Electrical Measurement & Instrumentation : A K Sawhney