University Of Pune
Department Of Chemistry
P.G.B.Sc. (Applied) Analytical Techniques Syllabus Credit system
(One year Post Graduate Degree Course)

1) Title of the course: P.G.B.Sc.(Applied) Analytical Techniques
2) Preamble of the syllabus: This course is introduced to bridge the gap between academics and industry.. The number of conventional and modern analytical techniques along with their principle, instrumentation and applications are included in the course. Industrial visits and three week's in-plant training is the additional feature of this course.
3) Introduction : Pattern like Annual/Semester/Credit System etc. must be mentioned.: The course is annual with examination at the end of the year. Credit system is introduced for revised syllabus.
4) Eligibility: B.Sc. (Chemistry)
5) Examination: Internal and end of the year examination with a weightage of 40and 60 % respectively.
A) Pattern of examination: i) Internal and end of the year examination with a weightage of 40and 60 % respectively. There are three theory courses and two practical courses. Internal exam will consist of written test and orals. The student needs to write a project report of the work done during in-plant training.
ii) Pattern of the question paper. The annual exam paper will be of sixty marks and there will be number of internal tests equivalent to 40 marks per paper
B) Standard of Passing: 40 % passing separately in internal and external.
C) ATKT Rules: As per the University norms
D) Award of Class :As per the University guidelines
E) External Students: NA
F) Setting of Question paper / Pattern of Question paper: Exam paper will have theory questions as well as problem solving.
G) Verification / Revaluation: As per University guidelines

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The examination will be at the end of the year. The distribution of total marks will be External: 60 %, Internal : 40 %

Course No.	Title	No.of credits
PGB 1	Modern Analytical Techniques	5
PGB 1	Physicochemical and Biochemical Methods of Analysis	5
PGB 1	Spectro-analytical Methods	5
PGB 1	Practical	5
PGB 1	Industrial Training, Seminars and Advanced Techniques	5

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Theory courses

PGB 1 Modern Analytical Techniques. (5 credits)

Principle,Instrumentation and analytical applications of following techniques Atomic Absorption spectroscopy , Flame photometry, Inductively coupled plasma-Atomic Emission spectroscopy , Scanning Electron Microscopy (16)

Chromatography : Gas solid Chromatography , Gas liquid Chromatography, High performance liquid chromatography, ion exchange chromatography, paper chromatography, thin layer chromatography, column chromatography, gel permeation chromatography (20)

Radioanalytical methods : Neutron activation analysis, isotope dilution analysis, Radiometric titrations, particle induced X-ray Emission, Use of radioisotopes - in industry, agriculture and physicochemical studies (24)

PGB 2Physicochemical and Biochemical Methods of Analysis (5Credits)

Conductometry, Potentiometry Polarography, amperometry, PH metry, cyclic Voltammetry, Chronopotentiometry. (20)

Thermometric analysis :
Thermogravimetry , Differential Thermal analysis, Differential Scanning Calorimetry, Thermometric titrations (10)

Water analysis : Water quality assessment for biological and physiochemical parameters. (5)

Food analysis: Determination of moisture, ash content, fibres, protein,carbohydrates, and fat in different food items. (10)

Body Fluid analysis: Analysis of blood for hemoglobin,, biochemical properties of glucose and carbohydrates Protein,lipid and cholesterol analysis. Urine analysis: physical and chemical (15)

PGB 3 : Spectroscopic Techniques (5Credits)

U V Introduction to spectroscopy, Lambert Beer's law, Deviation from Lambert Beer s law, instrumentation and applications (6)

IR Introduction, basic principles, factors affecting IR group frequencies , Instrumentation and Applications (10)

NMR Basic principles, elementary ideas and instrumentation chemical shifts, spin-spin coupling, instrumentation and applications (10)

Mass Spectroscopy: Introduction, basic principles, applications and uses (8)

ESR: Principle, instrumentation and applications (8)

X-ray Spectroscopy: X-ray absorption, methods, diffraction methods (10)

Raman Spectroscopy : Principle instrumentation and applications (8)

Practical Courses

PGB 4 Practical course 1 (5 credits)

Practicals based on various techniques

Potentiometry

1. Halide Estimation
2. Solubility of sparingly soluble salts
3. Dissociation constant of acid

Conductometry :

1. Acid-Base titration

2. Effect of concentration on equivalent conductance of a given electrolyte

pH metry

1. Acid-Base titration

Polarography

1. Detennination of half-wave potential
2. Estimation of Zn2+ ions

Radioactivity

1. Detennination of half-life of a radioactive isotope

2. Measurement of thickness of the sample using radiation gauge

3. Elemental analysis of industrial alloys by neutron activation analysis

4. Counting errors

UV-visible spectroscopy

1. Determination of molar composition of complex
2. Determination of indicator constant of an indicator.

Water Analysis

1.Determination of physico-chemical parameters of water

Purification and separation techniques

1.Purification of aniline by distillation method

2.Crystallization of various compounds and their TLC study

3.Column chromatographic method for separation of compounds

Food and body fluid analysis

1. Estimation of free fatty acid in oil
2. Determination of serum cholesterol
3. Estimation of reducing sugar
4. Estimation of amino acid by Ninhydrin method
5. Estimation of protein by Lowry method

PGB 5 Practical Course 2 (5 credits)

Part A : Industrial visits and in plant training for 3 weeks

Part B : Demonstration practical based on following techniques

1. HPLC
2. GCMS
3. NMR
4. FTIR
5. XRD
6. TGA
7. AAS
8. SEM

Part C : Seminars

References

1. Instrumental methods of analysis H.H.Wilard,L.L.Merritt, J A Dean.
2 Instrumental Methods of Chemical analysis.
3 Analytical Chemistry G.D. Chritiain. Wiley
4 Introduction of instrumental analysis. R.P.Braun
5 Essentials of Nuclear Chemistry- H.J.Arnikar
6 A text book of quantitative Inorganic analysis A I Vogel.
7 Pharmo copie of India Britiesh Pharma copoeia
8 Standard methods of Chemical analysis A Series of Volutms Edited F.J.Welcher R.G. Krieger publ-Company.
9 Principles of Instrumental Analysis Fifth edition Skoog, Holler, Niemay.

10 Practical Bio-chemistry in Clinical Medicine .- R.L.Nath
Acad. Publ. Calcutta
11 Sectroscopic Identification of organic compounds, T.C. Morrilli, R.M. Silverstein and G.C. Bassler
12 Absorption Spectroscopy of organic molecules, V.M. Parikh
Stfectroscopic methods in Organic Chemistry, D..H. Williams and Ian-Fleming, 4 Edition.