Dr. Rafiq Zakaria Campus
Maulana Azad Educational Trust's
Y. B. CHAVAN COLLEGE OF PHARMACY
(B. Pharm, M. Pharm & Research Centre)
ISO 21001:2018 & ISO 14001:2015 CERTIFIED | NIRF-2022 ALL INDIA RANK 65TH
NAAC ACCREDITATION "A" GRADE WITH 3.23 CGPA SCORE

COURSE MODULE

Program Title	B. Pharmacy
Department	Quality Assurance and Pharmaceutical Analysis
Course Title	Pharmaceutical Analysis-I

1. **NAME OF INSTITUTION** : Y. B. CHAVAN COLLEGE OF PHARMACY, AURANGABAD

2. **AFFILIATED UNIVERSITY** : DR. BABASAHEB AMBEDKAR MARATHWADA UNIVERSITY, AURANGABAD

3. **DEPARTMENT** **:** Quality Assurance and Pharmaceutical Analysis

4. **PROGRAM TITLE** : B. PHARM.

4.1. Program Outcomes (PO):

PO 01:Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioral, social, and administrative pharmacy sciences; and manufacturing practices.

PO 02:Planning Abilities: Demonstrate effective planning abilities including timemanagement, resource management, delegation skills and organizational skills. Develop and implementplans and organize work to meet deadlines.

PO 03:Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyze, evaluate and apply information systematically and shall make defensible decisions.

PO 04:Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.

PO 05:Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfillment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizensor leadership roles when appropriate to facilitate improvement in health and wellbeing.

PO 06: Professional Identity: Understand, analyze and communicate the value of their professional roles in society (e.g. health care professionals, promoters of health, educators,managers, employers, employees).

PO 07: Pharmaceutical Ethics: Honour personal values and apply ethical principles in professional and social contexts. Demonstrate behavior that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take responsibility for the outcomes associated with the decisions.

PO 08:Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effectivepresentations and documentation, and give and receive clear instructions.

PO 09:The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.

PO 10:Environment and sustainability: Understand the impact of the professional pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO 11:Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

5. COURSE SPECIFICATION :

5.1.Course Identification and General Information

a. Course Title:	Pharmaceutical Analysis-I	
b. Course Number/Code	BP102T BP108P	
c. Credit Hours	Theory	Practical
	45(3 Hrs/Week	60 (4Hrs. / Week)
d. Study level/semester at which this course is offered	B. Pharmacy I semester	
e. Pre-requisite	12 Standard Organic Chemistry	
f. Co-requisite	---	
g. Program in which the course is offered	B-Pharm	
h. Language of teaching the course	English	
i. Prepared by	Mr. Sarfaraz Khan and Dr. BarrawazAateka	
j. Approved by HOD	Dr. J. N. Sangshetti.	

5.2.Course Description:

Analytical chemistry deals with identification, separation, and quantitative assessment of different chemical substances may be natural or synthetic. Chemical analysis involves either identification of chemical species in matrix or alone (i.e. Qualitative analysis) or assessment of amount (i.e. Quantitative analysis) of one or more chemical substances simultaneously. In few cases separation of specific chemical species from matrix or mixture is necessary prior to its analysis.

Basically analytical methods are classified in to classical methods and instrumental methods. Classical methods of analyses alternatively referred to as wet chemistry methods, use separation techniques such as extraction, distillation and precipitation, color odour or melting point for qualitative reasons. The various volumetric methods will be studied in this course.

5.3.Course Objectives:

Upon completion of the course student shall be able to

- understand the principles of volumetric and electro chemical analysis
- carryout various volumetric and electrochemical titrations
- develop analytical skills

6.0.Course Outcomes (COs) : (Min. 4 and Max. 6)

Code	Course outcome
CO.01	Understand the qualitative and quantitative estimation of chemical compounds
CO.02	Preparation and standardization of various standard solutions at different concentrations.
CO.03	Calibration of various glasswares and equipments
CO.04	Quality check of various chemical compounds
CO.05	Knowledge of GLP and GMP in quality control lab.
CO.06	Understanding the methodology and principle of various types of titrations for estimation of drug content.

6.1. Knowledge and Understanding

(Alignment of POs to COs)

Course code (CO)	Program Outcome (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO.01	**3**	---	---	---	---	---	---	---	---	**2**	---
CO.02	**3**	---	---	**2**	---	---	---	---	---	---	---
CO.03	**3**	---	---	---	---	---	---	---	---	---	---
CO.04	**3**	---	**2**	---	---	**1**	---	---	---	---	---
CO.05	**1**	---	**2**	---	---	**1**	---	---	---	**2**	---
CO.06	**2**	---	**2**	**2**	---	---	---	---	---	---	---

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low);2: Moderate (Medium); 3: Substantial (High); If there is no correlation, put '-'

6.2.Teaching and Assessment Methods for achieving learning outcome:

Teaching Strategies(methods)/Tools used	Methods of Assessment
Lectures (Constructivist learning) **Collaborative learning (Discussion)** **Project based Learning** **Blended learning** **Inquiry based learning** **Flash cards** **Video** **Equipment models**	**Formative Assessment** **Case study** **Class test** **Multiple choice questions** **Assignments** **Seminar** **Viva Voce** **Synopsis** **Tutorials** **Summative Assessment**

6.3.Tools for the Teaching and learning

Theory subjects	Practical Subjects
• **PowerPoints presentation** • **Videos** • **Flash Card** • **Models** • **Software** • **Charts** • **Smart Boards** • **White boards** • **Online Platform**	• **White boards** • **Glassware** • **Chemicals** • **Instruments** • **Equipment** • **Software** • **Models** • **Plants/Crude Drugs** • **Animal**

6.4. COURSE CONTENT

6.1. Theoretical Aspect:

Order	Topic list/units	Subtopics list	Number of Weeks	Contact Hours
1	**Unit I**	**(a) Pharmaceutical analysis**- Definition and scope i) Different techniques of analysis ii) Methods of expressing concentration iii) Primary and secondary standards. iv) Preparation and standardization of various molar and normal solutions- Oxalic acid, sodium hydroxide, hydrochloric acid, sodium thiosulphate, sulphuric acid, potassium permanganate and ceric ammonium sulphate **(b)Errors:** Sources of errors, types of errors, methods of minimizing errors, accuracy, precision and significant figures. **(c)**Pharmacopiea, Sources of impurities in medicinal agents, limit tests.	**3 and Half week**	**10**
2	**Unit II**	**(a) Acid base titration**: Theories of acid base indicators, classification of acid base titrations and theory involved in titrations of strong, weak, and very weak acids and bases, neutralization curves **(b) Non aqueous titration**: Solvents, acidimetry and alkalimetry titration and estimation of Sodium benzoate and Ephedrine HCl	**3 and Half week**	**10**
3	**Unit III**	**(a) Precipitation titrations:** Mohr's method, Volhard's, Modified Volhard's, Fajans method, estimation of sodium chloride. **(b) Complexometric titration:** Classification, metal ion indicators, masking and demasking reagents, estimation of Magnesium sulphate, and calcium gluconate. **(c) Gravimetry**: Principle and steps involved in gravimetric analysis. Purity of the precipitate: co-precipitation and post precipitation, Estimation of barium sulphate. **(d)** Basic Principles, method and application of diazotization titration.	**3 and Half week**	**10**
4	**Unit IV**	**Redox titrations**: (a) Concepts of oxidation and reduction (b) Types of redox titrations (Principles and applications) Cerimetry, Iodimetry, Iodometry, Bromatometry, Dichrometry, Titration with potassium iodate	**2 and half week**	**8**

5	**Unit V**	**(a) Electrochemicalmethodsofanalysis** • **Conductometry**- Introduction, Conductivity cell, Conductometric titrations, applications. • **Potentiometry**: Electrochemical cell, construction and working of reference (Standard hydrogen, silver chloride electrode and calomel electrode) and indicator electrodes (metal electrodes and glass electrode), methods to determine end point of potentiometric titration and applications. • **Polarography** - Principle, Ilkovic equation, construction and working of dropping mercury electrode and rotating platinum electrode, applications	**2 and half week**	**7**
	TOTAL			**45**

6.2.Practical Aspects

Order	Name of Experiment	Number of Weeks
1.	Limit Test of Iron	**Each practical Per week**
2.	Limit Test of Chloride	
3.	Limit Test of Sulphate	
4.	Preparation and standardization of 0.1N Sodium hydroxide	
5.	Preparation and standardization of 0.1N Sulphuric acid	
6.	Preparation and standardization of 0.1N Sodium thiosulfate	
7.	Preparation and standardization of 0.1N Potassium permanganate	
8.	Preparation and standardization of 0.1N Ceric ammonium sulphate	
9.	Assay of the Ammonium chloride by acid base titration	
10.	Assay of the Ferrous sulphate by Cerimetry	
11.	Assay of the Copper sulphate by Iodometry	
12.	Assay of the Calcium gluconate by complexometry	
13.	Assay of the Hydrogen peroxide by Permanganometry	
14.	Assay of the Sodium benzoate by non-aqueous titration	
15.	Assay of the Sodium Chloride by precipitation titration	
16.	Conductometric titration of strong acid against strong base	
17.	Conductometric titration of strong acid and weak acid against strong base	
18.	Potentiometric titration of strong acid against strong base	

7.0. ASSESSMENT MECHANISM :

Sr. No.	Assessment Mechanism	Week due	Marks	Proportion of Final Assessment
1	Assignments, Exercises & Home works	2nd week of every month	10	6%
2	Sessional (Internal Theory exam)	As per scheduled examination	15	10%
3	Continuous Practical Assessment (Sessional Practical exam)	Weekly during practicals	15	10%
4	Final exam (theory)	As per University at end of course	75	50%
5	Final exam(practical)		35	24%
Total			150	**100%**

8.0.STUDENT SUPPORT:

Office hours/week	Other procedures
Two hours minimum	

9.0.TEACHER'S AVAILABILITY FOR STUDENT SUPPORT:

Days	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Time	**12:00-1:00**	**12:00-1:00**	**12:00-1:00**	**12:00-1:00**	**12:00-1:00**	**12:00-1:00**

10.0. LEARNING RESOURCES:

Sr.No.	Title of Learning Material	Details
1	Text books	Vogel's Text Book of Quantitative Chemical Analysis, 6th Edition, 2004
2	Essential references (as per syllabus)	1. K.A Connors : Text Book of Pharmaceutical Analysis, 3rd Edition, Wiley- inter Science Publication, 1999, New York **2.** Pharmacopoeia, 2011, the Controller of Publications Practical Pharmaceutical

		Chemistry, Part two, A. H. Beckett & J. B. Stenlake – 4th Edition
3	Reference material	1. Pharmaceutical analysis vol.-I A. V. Kasture, Nirali Prakashan **2.** Pharmaceutical analysis vol.-I P. C. Kamboj
4	E-materials and websites	----
5	Other learning material	----

11.0. FACILITIES REQUIRED:

Sr.No.	Particular of Facility Required
1	Lecture Rooms (capacity for 60 students)
2	Laboratory (capacity for 20 students)
3	Computing resources: PC with latest version and hardware/software and utilization of open source and licensed application software
4	Other resources: Appropriate laboratory tools, Chemicals, Glass ware, Apparatus, Instrumentation

12.0. COURSE IMPROVEMENT PROCESSES:

12.1. Strategies for obtaining student feedback on effectiveness of teaching:

Course delivery evaluation by students using: Questionnaire forms andonlinequestionnaires

12.2. Other strategies for evaluation of teaching by the instructor or by thedepartment:

Periodic review by Academic Planning & Monitoring Committee and departmental review committee, Observations and assistance of colleagues, External assessments by advisors/ examiners and auditors.

12.3. Process for improvement of teaching:

Use of ICT tools, teaching aids, Simultaneous practical orientation and theory classes (SPOT), Adoption of reflective teaching.

12.4.Describe the planning procedures for periodically reviewing of course effectivenessand planning for improvement:

Periodic review by departmental meeting, Review of course delivery and outcome through assessment and feedback from all stake holders.

12.5.Course development plans:

Provide inputs for course improvement and update to University Course development Committees (Board of Studies)

13. INFORMATION ABOUT FACULTY MEMBER RESPONSIBLE FOR THE COURSE:

Name	Mr. Sarfaraz A. Khan
Location	Quality Assurance Lab Cabin
Contact Detail (e-mail &cell no.)	9923803455, sarfrazkhan3648@gmail.com
Office Hours	10:00 AM to 5:00 PM

Name	Dr. BarrawazAateka Yahya
Location	Microbiology lab cabin
Contact Detail (e-mail & Cell No.)	9923350939, barrawazqa@gmail.com
Office Hours	10.00 AM to5.00 PM