

## Criterion 2. Program Curriculum and Teaching-Learning Processes

### 2.2 Teaching-Learning Processes

#### 2.2.7. Quality of experiments

Every laboratory experiment is carried out methodically in compliance with the PCI & SPPU syllabus, which is detailed in the list of practicals in the B. Pharmacy syllabus.

The Institute is dedicated to keeping all of its labs equipped with calibrated, high-quality, and curriculum-relevant equipment. Each lab across all core domains- Pharmaceutics, Pharmaceutical Chemistry, Pharmacology and Pharmacognosy has equipment that meets both industrial and academic requirements.

- All laboratory equipments are procured from certified and standard manufacturers ensuring compliance with quality standards.
- All equipment are continuously upgraded in alignment with syllabus requirements.
- All analytical instruments are periodically calibrated as per standard operating procedures and manufacturer guidelines to maintain accuracy, consistency and to ensure functioning of equipment within acceptable limits.
- Sophisticated equipment set up is handled by expert well qualified lab technician. Laboratory staff is trained to operate equipment correctly using standard operating procedures (SOPs) to avoid misuse or damage.
- Adequate numbers of equipments are available in each laboratory for each experiment to ensure that every student receives ample hands-on experience. Equipment is regularly updated based on the current academic syllabus and practical requirements, ensuring relevance and effectiveness in student learning.
- Safety measures are in place in every laboratory. Equipment complies with all necessary safety standards, and emergency protocols are in place to ensure user safety.
- Standard Operating procedures (SOPs) are provided for each equipment. Practical are conducted as per standard procedures.
- During regular practicals students are also exposed to modern analytical instrumentation such as UV spectrophotometers, HPLC, FTIR, tablet dissolution testers, Brookfield's viscometer etc.

#### **Quality from the equipment set-up**

- Calibration of equipments is performed as per standard operating procedures (SOPs) and manufacturer guidelines to ensure accuracy and reliability.
- Equipments used frequently are calibrated monthly; equipments used occasionally are calibrated semi-annually.
- Maintenance of equipment is periodically carried out by Annual maintenance contract (AMC). A dedicated maintenance department ensures timely servicing and upkeep of laboratory instruments. Maintenance issues across departments are efficiently tracked and managed through JSPM's centralized Maintenance Management system, utilizing the UV desk Helpdesk software for streamlined ticketing and resolution.



## EXPERIMENTAL SETUP: Dissolution Test Apparatus

**Make:** Electrolab **Model:** TDT-08L

**Year Purchased:** 2012

### Brief Description

Dissolution Test Apparatus is a microcontroller-based, 8-station USP dissolution testing instrument designed for in-vitro drug release studies of solid oral dosage forms. It complies with USP, IP, Ph. Eur. and JP Pharmacopoeial standards and supports multiple USP apparatus types (Type I – Basket, Type II – Paddle, and intrinsic test methods). The system features precise temperature control, programmable protocols and sampling intervals, a motorised paddle/basket lift, and easy snap-fit shaft locking for wobble-free and accurate hydrodynamics essential for reproducible results.



### Courses Using the Setup

| Code    | Name                                          | Year | Sem |
|---------|-----------------------------------------------|------|-----|
| MPH102T | Drug Delivery System                          | I PG | I   |
| MPH103T | Modern Pharmaceutics                          | I PG | I   |
| MQA104T | Product Development and Technology Transfer   | I PG | I   |
| MQA103T | Quality Control and Quality Assurance         | I PG | I   |
| MPH201T | Molecular Pharmaceutics                       | I PG | II  |
| MPH202T | Advance Biopharmaceutics and Pharmacokinetics | I PG | II  |
| MPH204T | Cosmetic and Cosmeceuticals                   | I PG | II  |
| MQA202T | Pharmaceutical Validation                     | I PG | II  |

### Outcome:

The experiment enabled students to:

- Demonstrate understanding of USP dissolution testing principles
- Operate and calibrate advanced pharmaceutical equipment
- Apply analytical techniques for quantification of drug release
- Interpret dissolution data and compare with Pharmacopoeial specifications
- Evaluate formulation performance and batch consistency



**Vision: To be the premier institute in the field of pharmaceutical education, research and healthcare for the betterment of society.**

## EXPERIMENTAL SETUP: Tablet compression machine

**Make:** Karnawati **Model:** Mini Press-IIMT

**Year Purchased:** 2011

### Brief Description

Compact tablet compression machine designed primarily for pharmaceutical R&D, pilot runs and small batch tablet production. It is a single-sided rotary tablet press built on cGMP-oriented construction and suitable for laboratory and scale-up formulation applications. The machine incorporates a centrally driven turret with pre-compression, adjustable tablet thickness and weight controls, and is mounted on a stable table-top frame for ease of use. Typical models support a range of tooling (B, D, etc.) and are driven via an AC VFD (variable frequency drive) for precise speed control, with safety guards and interlocks for operator protection during operation.



### Courses Using the Setup

| Code    | Name                                           | Year  | Sem | Module        |
|---------|------------------------------------------------|-------|-----|---------------|
| BP506P  | Industrial Pharmacy-I - Practical              | III   | V   | Pharmaceutics |
| BP706PS | Practice school                                | Final | VII | Pharmaceutics |
| MPH102T | Drug Delivery System                           | I PG  | I   |               |
| MPH103T | Modern Pharmaceutics                           | I PG  | I   |               |
| MQA104T | Product Development and Technology Transfer    | I PG  | I   |               |
| MQA103T | Quality Control and Quality Assurance          | I PG  | I   |               |
| MPH201T | Molecular Pharmaceutics                        | I PG  | II  |               |
| MPH202T | Advanced Biopharmaceutics and Pharmacokinetics | I PG  | II  |               |
| MPH204T | Cosmetic and Cosmeceuticals                    | I PG  | II  |               |
| MQA202T | Pharmaceutical Validation                      | I PG  | II  |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a rotary tablet compression machine.
- Operate the tablet compression machine safely and set key compression parameters.
- Compress granules into tablets and evaluate them for quality and common defects



## EXPERIMENTAL SETUP: Photo stability chamber

**Make:** HMG **Model:** HMG-PS

**Year Purchased:** 2013

### Brief Description

Photo Stability Chamber is a controlled environmental testing unit designed to evaluate the photostability of pharmaceutical products as per ICH guidelines. It provides uniform illumination using UV and visible light sources along with controlled temperature conditions. The chamber is used to study the effect of light exposure on drug substances, drug products, and packaging materials to ensure product stability, safety, and quality during storage and use.



### Courses Using the Setup

| Code    | Name            | Year  | Sem | Module        |
|---------|-----------------|-------|-----|---------------|
| BP706PS | Practice school | Final | VII | Pharmaceutics |
| 304     | Research Work   | II PG | III |               |
| 402     | Research Work   | II PG | IV  |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a photo stability chamber.
- Operate the photo stability chamber as per ICH guidelines and safety practices.
- Evaluate the effect of light exposure on the stability of pharmaceutical products.



## EXPERIMENTAL SETUP: Stability Chamber

**Make:** Thermo lab **Model:** TS0000200S

**Year Purchased:** 2011

### Brief Description

Stability Chamber is a controlled environmental testing chamber used to study the stability of pharmaceutical products under defined temperature and humidity conditions. It is designed to comply with ICH stability testing guidelines and is used for real-time, accelerated, and intermediate stability studies to evaluate the effect of environmental conditions on the quality, safety, and shelf life of drug substances and drug products.



### Courses Using the Setup

| Code    | Name                                  | Year  | Sem | Module        |
|---------|---------------------------------------|-------|-----|---------------|
| BP407P  | Physical Pharmaceutics II – Practical | II    | IV  | Pharmaceutics |
| BP706PS | Practice school                       | Final | VII | Pharmaceutics |
| 304     | Research Work                         | II PG | III |               |
| 402     | Research Work                         | II PG | IV  |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a stability chamber.
- Operate the stability chamber by setting temperature and humidity conditions as per guidelines.
- Evaluate the stability of pharmaceutical products under controlled environmental conditions.



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## EXPERIMENTAL SETUP: R&D Coater

**Make:** Ideal cures **Model:** DELUX

**Year Purchased:** 2011

### Brief Description

R&D Coater is a laboratory-scale tablet coating machine used for research and development of film and functional coatings. It provides controlled parameters such as pan speed, inlet air temperature, spray rate, and airflow, enabling uniform coating of tablets. The equipment is widely used for formulation development, coating optimization, and scale-up studies in pharmaceutical R&D.



### Courses Using the Setup

| Code    | Name                              | Year  | Sem | Module        |
|---------|-----------------------------------|-------|-----|---------------|
| BP506P  | Industrial Pharmacy-I - Practical | III   | V   | Pharmaceutics |
| BP706PS | Practice school                   | Final | VII | Pharmaceutics |
| 304     | Research Work                     | II PG | III |               |
| 402     | Research Work                     | II PG | IV  |               |

### Outcome

The experiment enabled students to:

Understand the working principle and components of an R&D tablet coating machine.

- Operate the R&D coater by setting key coating parameters safely.
- Perform tablet coating and evaluate coating quality and uniformity.



## EXPERIMENTAL SETUP: Extruder Spheronizer

**Make:** Shakti Model: SP8

**Year Purchased:** 2013

### Brief Description

Extruder–Spheronizer is laboratory-scale equipment used for the production of pellets/spheroids from wet mass formulations. The extruder forms uniform cylindrical extrudates, which are then converted into spherical pellets in the spheronizer by centrifugal and frictional forces. It is widely used in pharmaceutical R&D for pelletization, controlled-release formulations, and multiparticulate drug delivery system development.



### Courses Using the Setup

| Code    | Name                              | Year  | Sem    | Module        |
|---------|-----------------------------------|-------|--------|---------------|
| BP506P  | Industrial Pharmacy-I - Practical | III   | V      | Pharmaceutics |
| BP706PS | Practice school                   | Final | VII    | Pharmaceutics |
| MPH201T | Molecular Pharmaceutics           | I PG  | II PG  |               |
| 304     | Research Work                     | II PG | III PG |               |
| 402     | Research Work                     | II PG | IV PG  |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of an extruder–spheronizer.
- Operate the equipment to produce uniform pellets safely.
- Evaluate pellets for size, shape, and quality attributes.



## EXPERIMENTAL SETUP: Microscope with software

**Make:** Metzer **Model:** Metzer-M

**Year Purchased:** 2019

### Brief Description

Microscope with Software is a digital optical microscopy system used for magnification, observation, measurement, and image analysis of pharmaceutical samples. Integrated software enables image capture, measurement of particle size and shape, documentation, and data analysis. The equipment is widely used in pharmaceutical R&D and quality control for microscopic evaluation of powders, granules, crystals, and dosage forms.



### Courses Using the Setup

| Code    | Name                                            | Year | Sem | Module        |
|---------|-------------------------------------------------|------|-----|---------------|
| BP508P  | Pharmacognosy and Phytochemistry II – Practical | III  | V   | Pharmacognosy |
| MPH102T | Drug Delivery System                            | I PG | I   |               |
| MPH103T | Modern Pharmaceutics                            | I PG | I   |               |
| MPH201T | Molecular Pharmaceutics                         | I PG | II  |               |
| MPH204T | Cosmetic and Cosmeceuticals                     | I PG | II  |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a microscope with image analysis software.
- Operate the microscope and software for sample observation and measurement.
- Analyze and interpret microscopic images for pharmaceutical evaluation.



## EXPERIMENTAL SETUP: Lab Spray Dryer

**Make:** Technosearch India **Model:** SPD-D-111

**Year Purchased:** 2017

### Brief Description

Lab Spray Dryer is a laboratory-scale unit used to convert liquid feed (solutions, suspensions, or emulsions) into dry powder by spray drying. The liquid is atomized into fine droplets and rapidly dried using a stream of hot air, resulting in uniform particles. The equipment is widely used in pharmaceutical R&D for particle size reduction, formulation development, taste masking, and preparation of amorphous or controlled-release powders.



### Courses Using the Setup

| Code | Name          | Year  | Sem |
|------|---------------|-------|-----|
| 304  | Research Work | II PG | III |
| 402  | Research Work | II PG | IV  |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a lab spray dryer.
- Operate the spray dryer by setting key process parameters safely.
- Prepare and evaluate spray-dried powders for yield and particle characteristics.



## EXPERIMENTAL SETUP: Freeze Dryer

**Make:** Martin Christ Alpha **Model:** 1-2 LD Plus

**Year Purchased:** 2018

### Brief Description

Freeze Dryer is a laboratory-scale lyophilization system used to remove water from heat-sensitive pharmaceutical and biological products through freezing followed by sublimation under vacuum. The equipment ensures product stability, extended shelf life, and preservation of structure and activity. It is widely used in pharmaceutical R&D for formulation development, stability studies, and drying of injectables, vaccines, and biological samples.



### Courses Using the Setup

| Code    | Name                    | Year  | Sem |
|---------|-------------------------|-------|-----|
| 304     | Research Work           | II PG | III |
| 402     | Research Work           | II PG | IV  |
| MPH201T | Molecular Pharmaceutics | I PG  | II  |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a freeze dryer (lyophilizer).
- Operate the freeze dryer by setting freezing, drying, and vacuum parameters safely.
- Perform lyophilization and evaluate dried products for quality and stability.



## EXPERIMENTAL SETUP: Tablet Disintegration Test Apparatus

**Make:** Electrolab **Model:** EDI-2

**Year Purchased:** 2018

### Brief Description

Tablet Disintegration Test Apparatus is used to determine the disintegration time of tablets and capsules in specified media under controlled temperature conditions, as per IP, BP, USP, and other pharmacopeial standards. The apparatus consists of a motor-driven basket-rack assembly that moves vertically in a thermostatically controlled water bath, simulating in-vivo conditions to assess the breakdown of solid oral dosage forms.



### Courses Using the Setup

| Code    | Name                                        | Year  | Sem | Module        |
|---------|---------------------------------------------|-------|-----|---------------|
| BP506P  | Industrial Pharmacy-I - Practical           | III   | V   | Pharmaceutics |
| BP706PS | Practice school                             | Final | VII | Pharmaceutics |
| MPH102T | Drug Delivery System                        | I PG  | I   |               |
| MPH103T | Modern Pharmaceutics                        | I PG  | I   |               |
| MQA104T | Product Development and Technology Transfer | I PG  | I   |               |
| MQA103T | Quality Control and Quality Assurance       | I PG  | I   |               |
| MPH201T | Molecular Pharmaceutics                     | I PG  | II  |               |
| MPH204T | Cosmetic and Cosmeceuticals                 | I PG  | II  |               |
| MQA202T | Pharmaceutical Validation                   | I PG  | II  |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a tablet disintegration test apparatus.
- Operate the apparatus as per pharmacopeial guidelines.
- Determine and interpret the disintegration time of tablets and capsules.



## EXPERIMENTAL SETUP: Probe Sonicator

**Make De Nova Tech Model: PS-10A**

**Year Purchased: 2020**

### Brief Description

Probe Sonicator is a laboratory-scale ultrasonic homogenization system used for particle size reduction, dispersion, emulsification, cell disruption, and degassing of liquids. It works on the principle of ultrasonic cavitation, where high-frequency sound waves generate microbubbles that collapse and produce intense shear forces. The equipment is widely used in pharmaceutical and nanotechnology research for formulation development and sample preparation.



### Courses Using the Setup

| Code    | Name                    | Year  | Sem | Module  |
|---------|-------------------------|-------|-----|---------|
| 304     | Research Work           | II PG | III | 304     |
| 402     | Research Work           | II PG | IV  | 402     |
| MPH201T | Molecular Pharmaceutics | I PG  | II  | MPH201T |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a probe sonicator.
- Operate the probe sonicator safely for homogenization and particle size reduction.
- Apply sonication for sample preparation and formulation development.



**EXPERIMENTAL SETUP:** All-purpose equipment with all accessories

**Make:** Orchid **Model:** AP01

**Year Purchased:** 2010

### Brief Description

The All-Purpose Equipment is a versatile laboratory unit designed to perform multiple pharmaceutical operations using interchangeable accessories. It can be used for mixing, stirring, granulation, emulsification, and other basic formulation processes, making it suitable for teaching, research, and small-scale R&D applications. The equipment offers flexible operation, ease of use, and adaptability for various pharmaceutical laboratory experiments.



### Courses Using the Setup

| Code    | Name                                     | Year | Sem | Module        |
|---------|------------------------------------------|------|-----|---------------|
| BP 308P | Pharmaceutical Engineering<br>–Practical | II   | III | Pharmaceutics |

### Outcome

The experiment enabled students to:

- Understand the working principle and applications of all-purpose pharmaceutical equipment.
- Operate the equipment with different accessories for various laboratory processes.
- Apply the equipment for basic formulation and R&D activities.



## EXPERIMENTAL SETUP: Brookfield Viscometer

**Make:** Brookfield **Model:** LVDV-E

**Year Purchased:** 2010

### Brief Description

Brookfield Viscometer is a digital rotational viscometer used to measure the viscosity of liquids and semi-solid materials such as solutions, suspensions, gels, creams, and ointments. It operates by measuring the torque required to rotate a spindle at a constant speed in the sample. The instrument provides accurate and reproducible viscosity readings and is widely used in pharmaceutical research, quality control, and formulation development.



### Courses Using the Setup

| Code    | Name                                          | Year  | Sem  | Module        |
|---------|-----------------------------------------------|-------|------|---------------|
| BP809ET | Cosmetic Science                              | Final | VIII | Pharmaceutics |
| BP407P  | Physical Pharmaceutics II – Practical         | II    | IV   | Pharmaceutics |
| MPH102T | Drug Delivery System                          | I PG  | I    |               |
| MPH103T | Modern Pharmaceutics                          | I PG  | I    |               |
| MPH201T | Molecular Pharmaceutics                       | I PG  | II   |               |
| MPH202T | Advance Biopharmaceutics and Pharmacokinetics | I PG  | II   |               |
| MPH204T | Cosmetic and Cosmeceuticals                   | I PG  | II   |               |
| MPH203T | Computer Aided Drug Development               | I PG  | II   |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a Brookfield viscometer.
- Operate the viscometer by selecting appropriate spindle and speed.
- Measure and interpret viscosity of pharmaceutical formulations.



## EXPERIMENTAL SETUP: Rotary Evaporator

**Make/ Model:** G K Bioscience

**Year Purchased:** 2013

### Brief Description

Evaporator is laboratory-scale equipment used for concentration and solvent removal from liquid samples by controlled evaporation. It operates by applying heat, reduced pressure, or airflow to efficiently remove volatile solvents without degrading heat-sensitive materials. The equipment is commonly used in pharmaceutical and research laboratories for sample preparation, extract concentration, and formulation development.



### Courses Using the Setup

| Code    | Name                    | Year  | Sem | Module  |
|---------|-------------------------|-------|-----|---------|
| MPH201T | Molecular Pharmaceutics | I PG  | II  | MPH201T |
| 304     | Research Work           | II PG | III |         |
| 402     | Research Work           | II PG | IV  |         |

### Outcome

The experiment enabled students to:

- Understand the working principle and applications of an evaporator.
- Operate the evaporator safely for solvent removal and concentration.
- Apply evaporation techniques in sample preparation and formulation work.



## EXPERIMENTAL SETUP: Planetary mixer

**Make:** Avon, Mumbai **Model:** Jainson

**Year Purchased:** 2012

### Brief Description

Planetary Mixer is laboratory-scale mixing equipment used for uniform blending of powders, granules, pastes, and semi-solid formulations. It operates on the planetary mixing principle, where the mixing blade rotates on its own axis while simultaneously revolving around the mixing bowl, ensuring efficient and homogeneous mixing. The equipment is widely used in pharmaceutical formulation development, especially for wet granulation, ointments, creams, and suspensions.



### Courses Using the Setup

| Code    | Name                                   | Year  | Sem | Module        |
|---------|----------------------------------------|-------|-----|---------------|
| BP706PS | Practice school                        | Final | VII | Pharmaceutics |
| BP 308P | Pharmaceutical Engineering – Practical | II    | III | Pharmaceutics |
| 304     | Research Work                          | II PG | III | 304           |
| 402     | Research Work                          | II PG | IV  | 402           |
| MPH102T | Drug Delivery System                   | I PG  | I   | MPH102T       |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a planetary mixer.
- Operate the planetary mixer for uniform mixing of pharmaceutical formulations.
- Apply mixing techniques in granulation and semi-solid formulation development.



## EXPERIMENTAL SETUP: Orbital Incubator Shaker

**Make:** Bio-Techniques India **Model:** BTI-39

**Year Purchased:** 2015

### Brief Description

Orbital Incubator Shaker is a laboratory instrument that combines controlled temperature incubation with orbital shaking. It is used for mixing, culturing, and aeration of biological and pharmaceutical samples under uniform and controlled conditions. The equipment allows precise control of temperature and shaking speed, making it suitable for microbial growth studies, fermentation, dissolution enhancement, and formulation research.



### Courses Using the Setup

| Code    | Name                    | Year  | Sem |
|---------|-------------------------|-------|-----|
| MPH102T | Drug Delivery System    | I PG  | I   |
| MPH201T | Molecular Pharmaceutics | I PG  | II  |
| 304     | Research Work           | II PG | III |
| 402     | Research Work           | II PG | IV  |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of an orbital incubator shaker.
- Operate the incubator shaker by setting temperature and shaking speed safely.
- Apply the equipment for incubation, mixing, and formulation or microbial studies.



## EXPERIMENTAL SETUP: Diffusion Cell Apparatus

**Make:** DBK **Model:** 40DCA01

**Year Purchased:** 2015

### Brief Description

Diffusion Cell Apparatus is a laboratory instrument used to study in-vitro drug diffusion and permeation through membranes. It is commonly used for evaluating topical, transdermal, and semi-solid formulations. The apparatus consists of donor and receptor compartments maintained at controlled temperature with continuous stirring, allowing measurement of drug release and permeation kinetics under simulated physiological conditions.



### Courses Using the Setup

| Code    | Name                                          | Year  | Sem |
|---------|-----------------------------------------------|-------|-----|
| MPH102T | Drug Delivery System                          | I PG  | I   |
| MPH103T | Modern Pharmaceutics                          | I PG  | I   |
| MPH201T | Molecular Pharmaceutics                       | I PG  | II  |
| MPH202T | Advance Biopharmaceutics and Pharmacokinetics | I PG  | II  |
| MPH204T | Cosmetic and Cosmeceuticals                   | I PG  | II  |
| 304     | Research Work                                 | II PG | III |
| 402     | Research Work                                 | II PG | IV  |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a diffusion cell apparatus.
- Operate the diffusion cell for in-vitro drug release and permeation studies.
- Analyze and interpret diffusion and permeation data of pharmaceutical formulations.



## EXPERIMENTAL SETUP: Tap Density Apparatus

**Make:** Electrolab **Model:** ETD-1020

**Year Purchased:** 2006

### Brief Description

Tap Density Apparatus is used to determine the tap density of powders and granules by subjecting a measuring cylinder to a fixed number of taps under standardized conditions, as per pharmacopeial guidelines. It helps evaluate powder flow properties and compressibility, which are critical parameters in tablet and capsule formulation development.



### Courses Using the Setup

| Code    | Name                                          | Year  | Sem | Module        |
|---------|-----------------------------------------------|-------|-----|---------------|
| BP109P  | Pharmaceutics I – Practical                   | I     | I   | Pharmaceutics |
| BP407P  | Physical Pharmaceutics II – Practical         | II    | IV  | Pharmaceutics |
| BP506P  | Industrial Pharmacy-I - Practical             | III   | V   | Pharmaceutics |
| BP706PS | Practice school                               | Final | VII | Pharmaceutics |
| MPH102T | Drug Delivery System                          | I PG  | I   |               |
| MPH103T | Modern Pharmaceutics                          | I PG  | I   |               |
| MPH201T | Molecular Pharmaceutics                       | I PG  | II  |               |
| MPH202T | Advance Biopharmaceutics and Pharmacokinetics | I PG  | II  |               |
| MPH204T | Cosmetic and Cosmeceuticals                   | I PG  | II  |               |
| 304     | Research Work                                 | II PG | III |               |
| 402     | Research Work                                 | II PG | IV  |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a tap density apparatus.
- Operate the apparatus as per pharmacopeial guidelines.
- Determine and interpret tap density and powder flow properties.



## EXPERIMENTAL SETUP: Hydraulic press

**Make:** Kimaya **Model:** TYPE KP

**Year Purchased:** 2012

### Brief Description

Hydraulic Press is laboratory-scale compression equipment that uses hydraulic pressure to compact powders and materials into tablets, pellets, or compacts. It provides controlled and uniform pressure, making it suitable for sample preparation, pre-compression studies, and material characterization in pharmaceutical and research laboratories.



### Courses Using the Setup

| Code    | Name                              | Year  | Sem | Module        |
|---------|-----------------------------------|-------|-----|---------------|
| BP506P  | Industrial Pharmacy-I - Practical | III   | V   | Pharmaceutics |
| BP706PS | Practice school                   | Final | VII | Pharmaceutics |
| 304     | Research Work                     | II PG | III |               |
| 402     | Research Work                     | II PG | IV  |               |
| MPH102T | Drug Delivery System              | I PG  | I   |               |
| MPH103T | Modern Pharmaceutics              | I PG  | I   |               |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of a hydraulic press.
- Operate the hydraulic press safely for powder compaction.
- Prepare tablets or compacts for formulation and evaluation studies.



## EXPERIMENTAL SETUP: Emulsifier

**Make:** Remi **Model:** RQ140D/E

**Year Purchased:** 2013

### Brief Description

Emulsifier is a high-speed laboratory homogenizer used for the preparation of emulsions, suspensions, and dispersions. It works by generating high shear forces that reduce droplet size and ensure uniform mixing of immiscible phases. The equipment is widely used in pharmaceutical formulation development for creams, lotions, emulsions, and other semi-solid dosage forms.



### Courses Using the Setup

| Code    | Name                 | Year  | Sem |
|---------|----------------------|-------|-----|
| 304     | Research Work        | II PG | III |
| 402     | Research Work        | II PG | IV  |
| MPH102T | Drug Delivery System | I PG  | I   |
| MPH103T | Modern Pharmaceutics | I PG  | I   |

### Outcome

The experiment enabled students to:

- Understand the working principle and components of an emulsifier.
- Operate the emulsifier to prepare uniform emulsions and dispersions.
- Evaluate emulsions for stability and quality characteristics.



## EXPERIMENTAL SETUP: Digital Tablet Hardness Tester

**Make:** Orchid **Model:** HTF-50

**Year Purchased:** 2018

### Brief Description

The Digital Tablet Hardness Tester is a laboratory instrument used in pharmaceutical quality control to measure how much force is needed to break a tablet. It helps assess the mechanical strength of tablets, which is essential for ensuring they survive handling, packaging, and transport without breaking prematurely.



### Courses Using the Setup

| Code    | Name                                          | Year  | Sem | Module        |
|---------|-----------------------------------------------|-------|-----|---------------|
| BP506P  | Industrial Pharmacy-I - Practical             | III   | V   | Pharmaceutics |
| BP706PS | Practice school                               | Final | VII | Pharmaceutics |
| MPH102T | Drug Delivery System                          | I PG  | I   |               |
| MPH103T | Modern Pharmaceutics                          | I PG  | I   |               |
| MQA104T | Product Development and Technology Transfer   | I PG  | I   |               |
| MQA103T | Quality Control and Quality Assurance         | I PG  | I   |               |
| MPH201T | Molecular Pharmaceutics                       | I PG  | II  |               |
| MPH202T | Advance Biopharmaceutics and Pharmacokinetics | I PG  | II  |               |
| MPH204T | Cosmetic and Cosmeceuticals                   | I PG  | II  |               |
| MQA202T | Pharmaceutical Validation                     | I PG  | II  |               |

### Outcome

The experiment enabled students to:

- Explain the principle and importance of tablet hardness testing in quality control.
- Operate the instrument correctly to measure tablet crushing strength.
- Interpret hardness data in relation to tablet formulation and processing variables.
- Apply pharmacopoeial standards to evaluate tablet quality.



## EXPERIMENTAL SETUP: HPLC

**Make /Model:** Jasco

**Year Purchased:** 2010

### Brief Description

HPLC (High-Performance Liquid Chromatography) is primarily used for identifying, quantifying, and purifying compounds in complex mixtures of pharmaceuticals. Its high resolution allows analysis of everything from small molecules to large biomolecules like proteins, ensuring product quality, safety, and aiding scientific research.



### Courses Using the Setup

| Code              | Name                                                  | Year  | Sem     |
|-------------------|-------------------------------------------------------|-------|---------|
| BP705P            | Instrumental Methods of Analysis (Practical)          | Final | VII     |
| PG PQA<br>MQA105P | Modern Pharmaceutical Analytical<br>Techniques (MPAT) | I PG  | I       |
| PG PQA            | Research                                              | II PG | III, IV |
| 304               | Research Work                                         | II PG | III     |
| 402               | Research Work                                         | II PG | IV      |

### Outcome

The experiment enabled students to:

- Explain the principle and components of High-Performance Liquid Chromatography.
- Operate the HPLC system for separation, identification, and quantification of drugs.
- Analyze and interpret chromatograms for assay, purity, and related substances.
- Apply pharmacopoeial and regulatory guidelines in pharmaceutical analysis.

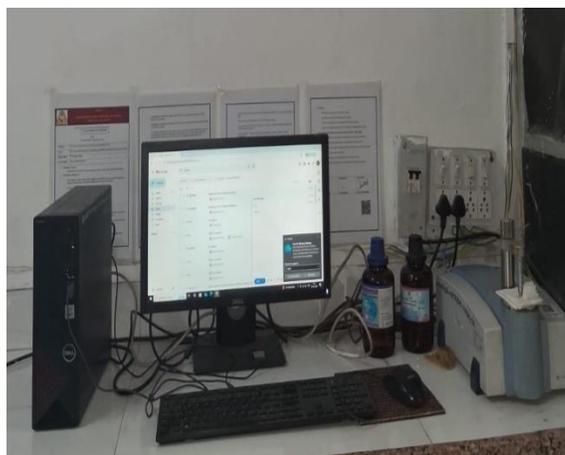


## EXPERIMENTAL SETUP: FT- IR

**Make /Model:** Bruker

**Year Purchased:** 2015

FTIR (Fourier-Transform Infrared Spectroscopy) is used across many fields for identifying substances, quality control, and analyzing materials like polymers, pharmaceuticals, food, and biological samples by detecting how molecules absorb infrared light, revealing their unique chemical fingerprint for structure, composition, contamination, and reaction Monitoring.



### Courses Using the Setup

| Code              | Name                                                  | Year  | Sem     |
|-------------------|-------------------------------------------------------|-------|---------|
| BP705P            | Instrumental Methods of Analysis (Practical)          | Final | VII     |
| PG PQA<br>MQA105P | Modern Pharmaceutical Analytical<br>Techniques (MPAT) | I PG  | I       |
| PG PH             | Research                                              | II PG | III, IV |
| PG PQA            | Research                                              | II PG | III, IV |
| 304               | Research Work                                         | II PG | III     |
| 402               | Research Work                                         | II PG | IV      |

### Outcome

The experiment enabled students to:

- Explain the principle of FT-IR spectroscopy and its role in drug analysis.
- Operate the Bruker FT-IR instrument for sample preparation and spectral acquisition.
- Interpret FT-IR spectra for functional group identification and drug characterization.
- Apply FT-IR data for quality control and compatibility studies.



## EXPERIMENTAL SETUP: Texture Analyzer- CT3

**Make /Model:** Brookfield

**Year Purchased:** 2013

### Brief Description

The Texture Analyzer CT3 is a versatile instrument used to measure the mechanical and textural properties of pharmaceutical solids and semi-solids such as tablets, capsules, gels, creams, and powders. It applies controlled force to a sample and records its response (e.g., deformation, hardness, adhesiveness, springiness). In pharmacy, it helps assess tablet hardness & friability, gel strength, mucoadhesion, and texture characteristics that influence product performance and patient experience.



### Courses Using the Setup

| Code    | Name                        | Year  | Sem |
|---------|-----------------------------|-------|-----|
| 304     | Research Work               | II PG | III |
| 402     | Research Work               | II PG | IV  |
| MPH102T | Drug Delivery System        | I PG  | I   |
| MPH103T | Modern Pharmaceutics        | I PG  | I   |
| MPH201T | Molecular Pharmaceutics     | I PG  | II  |
| MPH204T | Cosmetic and Cosmeceuticals | I PG  | II  |

### Outcome

The experiment enabled students to:

- Describe the principle and applications of texture analysis in pharmaceutical product evaluation.
- Perform experiments using the Brookfield CT3 to measure texture and mechanical properties of dosage forms.
- Interpret and analyze data obtained from texture profiles to assess quality attributes like hardness and consistency.
- Relate texture analysis results to formulation performance and product quality.



## EXPERIMENTAL SETUP: UV Visible Spectrophotometer

**Make /Model:** Shimadzu 1800

**Year Purchased:** 2012

### Brief Description

A UV/VIS spectrophotometer is a scientific instrument used to measure the absorbance or transmittance of light across a specific range of wavelengths in the UV and VIS regions. UV/VIS spectrophotometry enables quantitative analysis by determining the concentration of a compound in a sample.



### Courses Using the Setup

| Code              | Name                                               | Year  | Sem |
|-------------------|----------------------------------------------------|-------|-----|
| BP705P            | Instrumental Methods of Analysis (Practical)       | Final | VII |
| PG PQA<br>MQA105P | Modern Pharmaceutical Analytical Techniques (MPAT) | I PG  | I   |
| MPH102T           | Drug Delivery System                               | I PG  | I   |
| MPH103T           | Modern Pharmaceutics                               | I PG  | I   |
| MQA104T           | Product Development and Technology Transfer        | I PG  | I   |
| MQA103T           | Quality Control and Quality Assurance              | I PG  | I   |
| MPH201T           | Molecular Pharmaceutics                            | I PG  | II  |
| MPH202T           | Advance Biopharmaceutics and Pharmacokinetics      | I PG  | II  |
| MPH204T           | Cosmetic and Cosmeceuticals                        | I PG  | II  |
| MQA202T           | Pharmaceutical Validation                          | I PG  | II  |
| MQA204T           | Pharmaceutical Manufacturing Technology            | I PG  | II  |
| 304               | Research Work                                      | II PG | III |
| 402               | Research Work                                      | II PG | IV  |

### Outcome

The experiment enabled students to:

- Explain the principle of UV–Visible spectrophotometry and Beer–Lambert’s law.
- Operate the Shimadzu 1800 instrument for qualitative and quantitative drug analysis.
- Analyze absorption spectra and calibration curves for estimation of pharmaceutical compounds.
- Apply UV–Visible analysis for assay, dissolution, and quality control studies.



## EXPERIMENTAL SETUP: Fluorimeter

**Make Model:** Systronics

**Year Purchased:** 2008

### Brief Description

Fluorimeter is used to quantify substances in biochemistry (proteins, DNA), medicine (drug analysis, diagnostics), environmental monitoring (pollutants, ions), detecting analytes like vitamins, steroids, and drugs at trace levels by measuring emitted light from excited molecules, making it ideal for analyzing naturally fluorescent compounds and detecting non-fluorescent ones indirectly.



### Courses Using the Setup

| Code              | Name                                               | Year  | Sem |
|-------------------|----------------------------------------------------|-------|-----|
| BP705P            | Instrumental Methods of Analysis (Practical)       | Final | VII |
| PG PQA<br>MQA105P | Modern Pharmaceutical Analytical Techniques (MPAT) | I PG  | I   |

### Outcome

The experiment enabled students to:

- Explain the principle of fluorescence spectroscopy and its application in pharmaceutical analysis.
- Operate the Systronics Fluorimeter for sensitive qualitative and quantitative estimation of drugs.
- Interpret fluorescence spectra for identification and concentration determination of pharmaceutical compounds.
- Apply fluorimetric analysis in impurity profiling, bioanalysis, and quality control studies.



## EXPERIMENTAL SETUP: Flame Photometer

**Make /Model:** Systronics

**Year Purchased:** 2009

### Brief Description

The Flame Photometer is an analytical instrument used to measure the concentration of certain metal ions (like  $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Li}^+$ ) in solution. It works by aspirating the sample into a flame, where the metal ions emit light at characteristic wavelengths. The intensity of this emitted light is measured and correlated to ion concentration. In pharmaceutical labs, flame photometry is used for inorganic analysis, formulation studies, and quality control of electrolytes in solutions.



### Courses Using the Setup

| Code              | Name                                               | Year  | Sem | Module                   |
|-------------------|----------------------------------------------------|-------|-----|--------------------------|
| BP705P            | Instrumental Methods of Analysis (Practical)       | Final | VII | Pharmaceutical Chemistry |
| PG PQA<br>MQA105P | Modern Pharmaceutical Analytical Techniques (MPAT) | I PG  | I   |                          |
| 304               | Research Work                                      | II PG | III |                          |
| 402               | Research Work                                      | II PG | IV  |                          |

### Outcome

The experiment enabled students to:

- Explain the principle of flame photometry and its role in elemental analysis.
- Operate the Systronics Flame Photometer for determination of metal ion concentrations.
- Prepare calibration standards and samples accurately for quantitative analysis.
- Interpret results and apply them to pharmaceutical quality control and formulation evaluations.



## EXPERIMENTAL SETUP: Colorimeter

**Make /Model:** Equiptronics

**Year Purchased:** 2008

### Brief Description

Colorimeter is an analytical instrument used to measure the absorbance and transmittance of light by a solution at specific wavelengths to determine the concentration of coloured compounds. It operates based on the Beer–Lambert law, which correlates light absorbance with the concentration of the solute in a solution. In pharmaceutical laboratories, colorimeters are used for quantitative analysis, formulation testing, and quality control of drugs and excipients by comparing sample absorbance against standards.



### Courses Using the Setup

| Code   | Name         | Year        | Sem | Module                      |
|--------|--------------|-------------|-----|-----------------------------|
| BP209P | Biochemistry | F Y B Pharm | II  | Applied Pharmacy & Research |

### Outcome

The experiment enabled students to:

- Explain the principle of colorimetry and the Beer–Lambert law for quantitative analysis.
- Operate the Equiptronics Colorimeter for determination of absorbance and transmittance of solutions.
- Prepare calibration standards and samples accurately for concentration measurements.
- Interpret absorbance data to estimate drug or compound concentration for quality control studies.



## EXPERIMENTAL SETUP: Conductivity meter

**Make /Model:** Chemline

**Year Purchased:** 2017

### Brief Description

Conductivity meters measure a liquid's ability to conduct electricity, indicating its ion concentration, purity, and total dissolved solids (TDS), with uses in water quality (drinking, wastewater, pools, industries like pharma/food for quality control, essentially checking ionic content in liquids for purity and process control.

Also used to perform Conductometric titrations.



### Courses Using the Setup

| Code   | Name                    | Year        | Sem | Module                   |
|--------|-------------------------|-------------|-----|--------------------------|
| BP108P | Pharmaceutical analysis | F Y B Pharm | I   | Pharmaceutical Chemistry |

### Outcome

The experiment enabled students to:

- Explain the principle of conductivity measurement and its relevance in pharmaceutical analysis.
- Operate the Chemline Conductivity Meter for determination of ionic concentration in solutions.
- Prepare and measure samples accurately for conductivity and total dissolved solids (TDS).
- Apply conductivity data in water quality testing, formulation studies, and quality control.



## EXPERIMENTAL SETUP: Potentiometer

**Make /Model:** EI Product

**Year Purchased:** 2009

### Brief Description

Potentiometers and potentiometric titration are critical in the pharmaceutical field for high-precision analysis, including assaying Active Pharmaceutical Ingredients (APIs), raw materials, and finished products. They are extensively used to determine drug purity, concentration, and stability, as well as for non-aqueous titrations (e.g., weak acids/bases) and pH measurements, ensuring compliance with quality control standards.



### Courses Using the Setup

| Code   | Name                    | Year        | Sem | Module                   |
|--------|-------------------------|-------------|-----|--------------------------|
| BP108P | Pharmaceutical analysis | F Y B Pharm | I   | Pharmaceutical Chemistry |

### Outcome

The experiment enabled students to:

- Explain the principle of potentiometric analysis and its applications in pharmaceutical analysis.
- Operate the EI Product Potentiometer for accurate measurement of pH and electrode potential.
- Perform potentiometric titrations and analyze end points objectively.
- Apply potentiometric methods in assay, formulation analysis, and quality control studies.



## EXPERIMENTAL SETUP: Abbe's Refractometer

**Make /Model:** Doubler Ambala

**Year Purchased:** 2007

### Brief Description

Abbe's refractometer is a laboratory instrument used for rapid, high-precision measurement of the refractive index and concentration of liquids and semi-solids. It ensures quality control by verifying the purity, identity, and concentration of active pharmaceutical ingredients (APIs), solvents, and chemical reagents. It works on the principle of total internal reflection and is commonly used in pharmaceutical laboratories to determine purity, concentration, and identity of raw materials, solutions, oils, and formulations.



### Courses Using the Setup

| Code   | Name                    | Year        | Sem | Module                   |
|--------|-------------------------|-------------|-----|--------------------------|
| BP108P | Pharmaceutical analysis | F Y B Pharm | I   | Pharmaceutical Chemistry |

### Outcome

The experiment enabled students to:

- Explain the principle of refractometry and refractive index measurement.
- Operate the Abbe's Refractometer to determine refractive index of pharmaceutical samples.
- Interpret refractive index values for purity and concentration assessment.
- Apply refractometric analysis in quality control and formulation studies.



## EXPERIMENTAL SETUP: Polarimeter

**Make /Model:** Rolex

**Year Purchased:** 2006

### Brief Description

Polarimeter is an analytical instrument used to measure the specific optical rotation of chiral molecules, ensuring the purity, identity, and concentration of Active Pharmaceutical Ingredients (APIs) and raw materials. It works on the principle that plane-polarized light is rotated when it passes through chiral molecules. In pharmaceutical analysis they are critical for differentiating enantiomers,



### Courses Using the Setup

| Code   | Name                    | Year        | Sem | Module                   |
|--------|-------------------------|-------------|-----|--------------------------|
| BP108P | Pharmaceutical analysis | F Y B Pharm | I   | Pharmaceutical Chemistry |

### Outcome

The experiment enabled students to:

- Explain the principle of polarimetry and optical activity.
- Operate the Rolex Polarimeter for measurement of optical rotation.
- Calculate specific rotation and assess sample purity or concentration.
- Apply polarimetric analysis in quality control and pharmaceutical analysis.



## EXPERIMENTAL SETUP: pH Meter

**Make /Model:** Equiptronics

**Year Purchased:** 2020

### Brief Description

A pH Meter is a laboratory instrument used to measure the acidity or alkalinity of solutions, by simply and accurately measuring pH of a solution, ensuring product quality, safety, and regulatory compliance.

It consists of a pH electrode and a digital display unit that gives a precise numerical value of acidity or alkalinity. In pharmaceutical labs, pH measurement is critical for quality control, formulation development, and ensuring stability and compatibility of drug products and excipients.



### Courses Using the Setup

| Code    | Name                                          | Year        | Sem | Module                   |
|---------|-----------------------------------------------|-------------|-----|--------------------------|
| BP108P  | Pharmaceutical analysis                       | F Y B Pharm | I   | Pharmaceutical Chemistry |
| MPH102T | Drug Delivery System                          | I PG        | I   |                          |
| MPH103T | Modern Pharmaceutics                          | I PG        | I   |                          |
| MQA104T | Product Development and Technology Transfer   | I PG        | I   |                          |
| MQA103T | Quality Control and Quality Assurance         | I PG        | I   |                          |
| MPH201T | Molecular Pharmaceutics                       | I PG        | II  |                          |
| MPH202T | Advance Biopharmaceutics and Pharmacokinetics | I PG        | II  |                          |
| MPH204T | Cosmetic and Cosmeceuticals                   | I PG        | II  |                          |
| MQA202T | Pharmaceutical Validation                     | I PG        | II  |                          |
| 304     | Research Work                                 | II PG       | III |                          |
| 402     | Research Work                                 | II PG       | IV  |                          |

### Outcome

The experiment enabled students to:

- Explain the principle of pH measurement and the functioning of pH electrodes.
- Operate the Equiptronics pH Meter for accurate pH determination of pharmaceutical solutions.
- Calibrate the instrument using standard buffer solutions before measurements.
- Interpret pH values and apply the results in formulation evaluation and quality control.