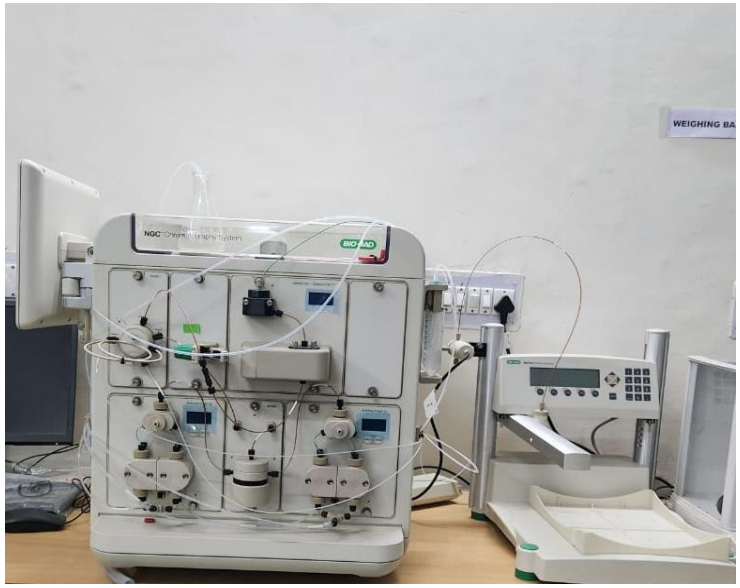
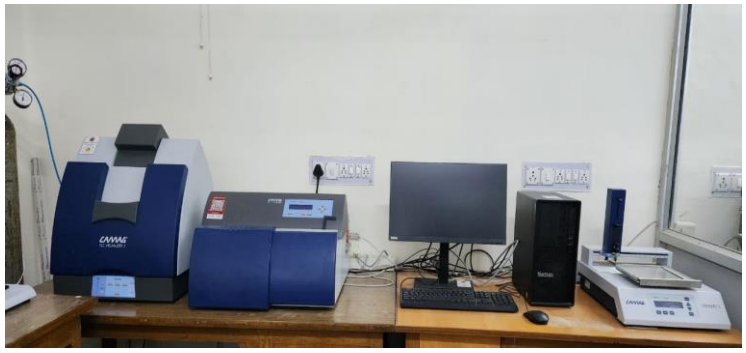
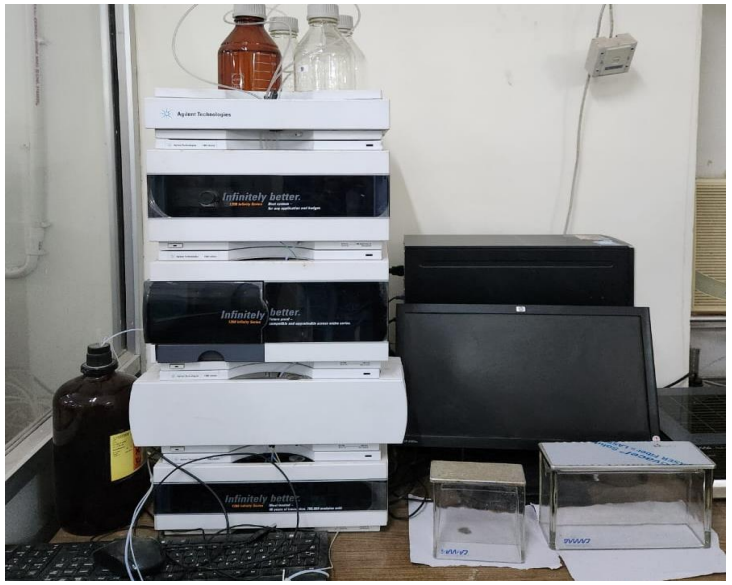
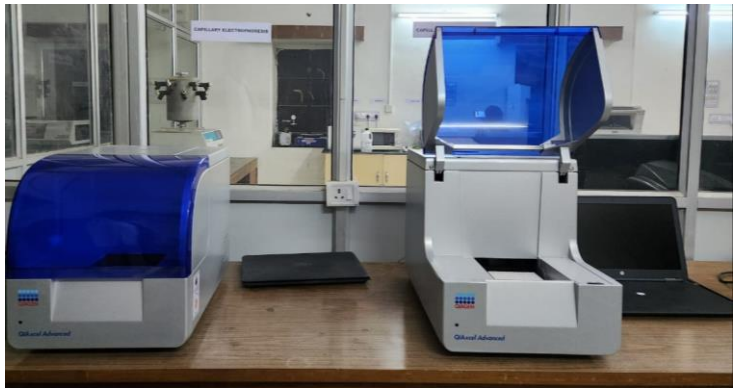
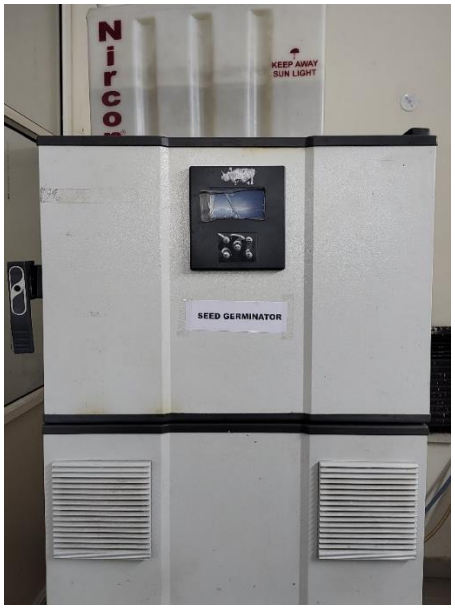
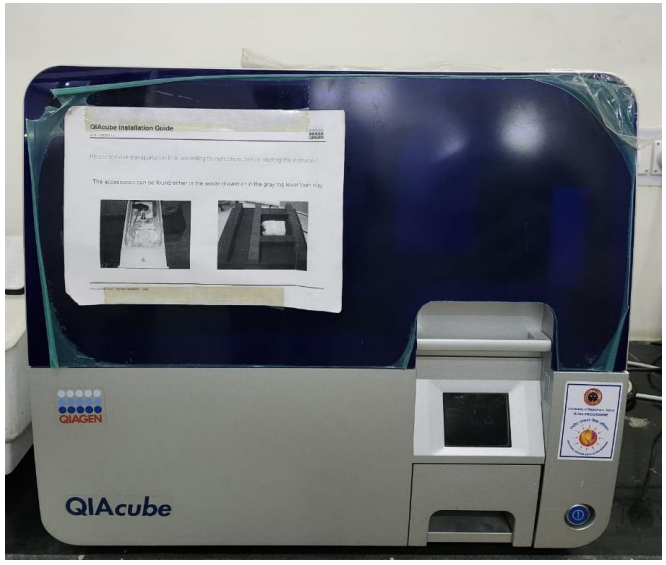
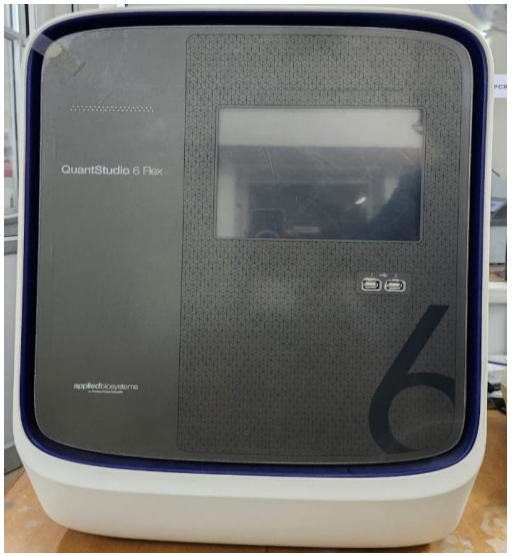
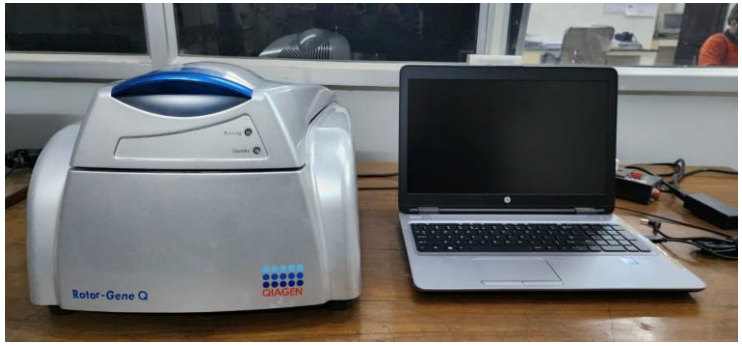
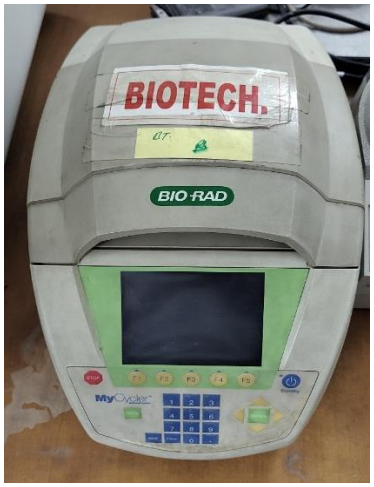
List of Major Instruments available in Central Facility and Analytical Lab of Botany Department

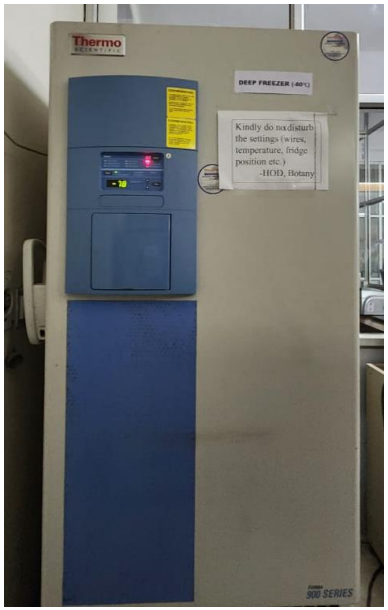
Name of Instruments	Brief Description of Instruments	Image of Instruments
Protein Purification System, BioRad NGC	**Introduction:** The BioRad NGC Protein Purification System is a versatile and automated chromatography platform. It is specifically designed for the purification of biomolecules such as proteins, peptides, and nucleic acids. With precise control over flow rates, gradients, and detection, the system ensures high reproducibility and efficiency in purification. **Applications:** This system is widely used in research and development, particularly in biotechnology, pharmaceuticals, and academia. It enables the purification of recombinant proteins, monoclonal antibodies, enzymes, and other bioactive molecules essential for structural and functional studies.	
HPTLC System, CAMAG	**Introduction:** The High-Performance Thin-Layer Chromatography (HPTLC) system by CAMAG is an advanced chromatographic technique that allows the analysis of complex mixtures with high resolution and precision. It includes automated sample application, development, and documentation. **Applications:** HPTLC is extensively used in the labs for quality control, in herbal product analysis for active ingredient quantification, and in food safety testing for detecting contaminants or adulterants.	

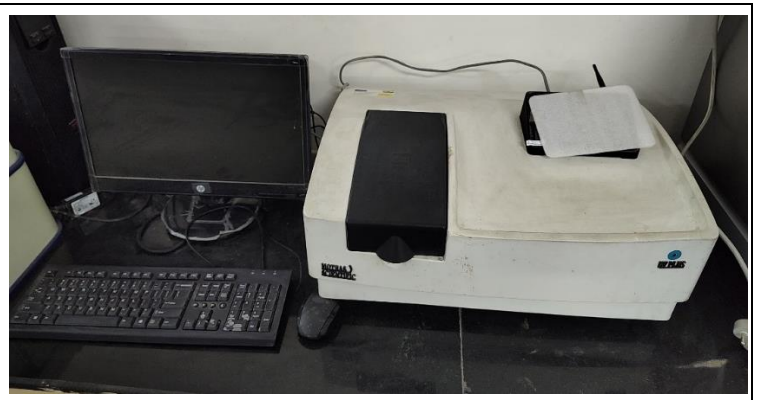
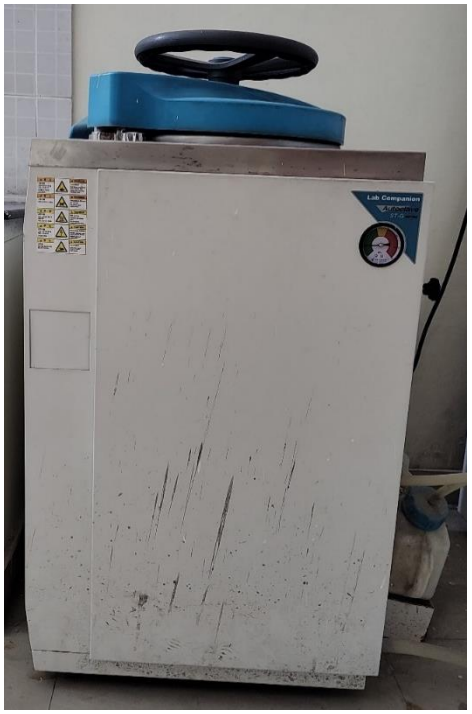
High-Pressure Liquid Chromatography (HPLC), Agilent Technologies G14311C	**Introduction:** Agilent Technologies' HPLC system offers high-resolution liquid chromatography for separating, identifying, and quantifying chemical components in a mixture. It features advanced detectors and software for accurate data acquisition and analysis. **Applications:** HPLC is a critical tool in drug development and quality control, environmental monitoring, and the analysis of food and beverages for contaminants, additives, or nutritional content.	
Capillary Electrophoresis, QIAGEN QIA Xcel	**Introduction**: The QIA Xcel Capillary Electrophoresis system by QIAGEN is a cutting-edge instrument designed for rapid and precise separation of biomolecules, such as nucleic acids and proteins, based on their charge and size. **Applications**: This system is widely used in genetic research, for DNA fragment analysis, genotyping, RNA quality assessment, and mutation detection in clinical and research settings.	

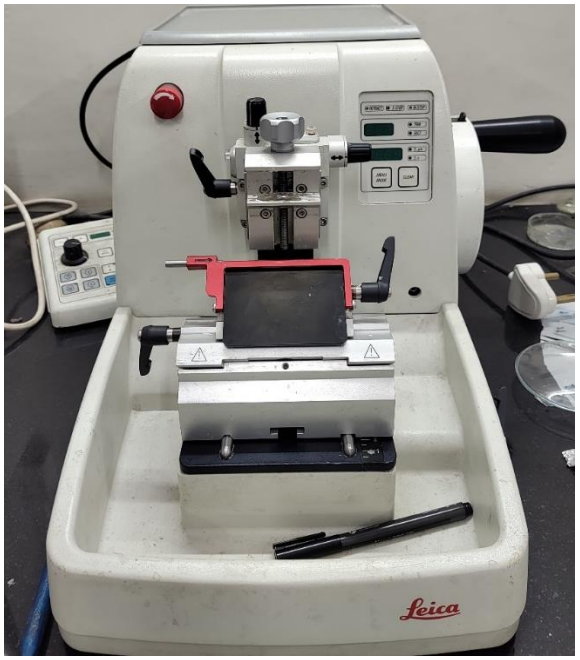
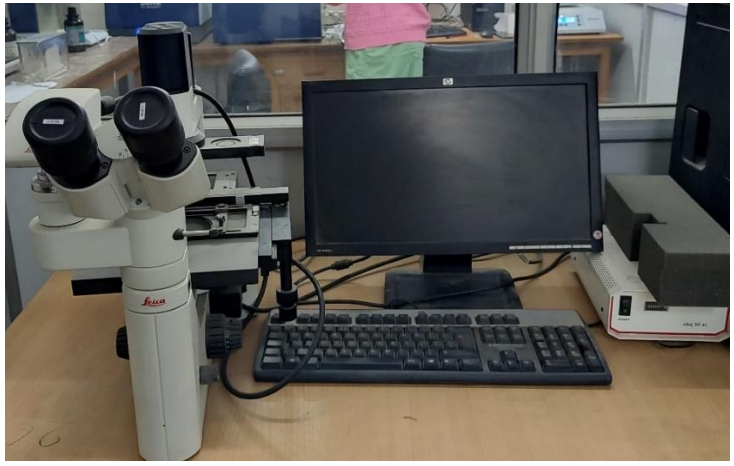
Automated Seed Germinator, REMI SG 6 Plus	**Introduction:** The REMI SG 6 Plus Automated Seed Germinator provides a controlled environment for seed germination and growth studies. It regulates parameters like temperature, humidity, and light to simulate natural conditions. **Applications:** This device is critical in agricultural research for evaluating seed viability, germination rates, and the effects of environmental conditions on seed development	
Automated DNA Extractor, QIAGEN	**Introduction:** QIAGEN's Automated DNA Extractor is a high-throughput system that streamlines the extraction of DNA and RNA from various biological samples. It eliminates manual steps, ensuring high purity and consistency. **Applications:** Widely used in molecular diagnostics, genetic research, and forensic science for obtaining high-quality nucleic acids for downstream applications like PCR, sequencing, and cloning.	

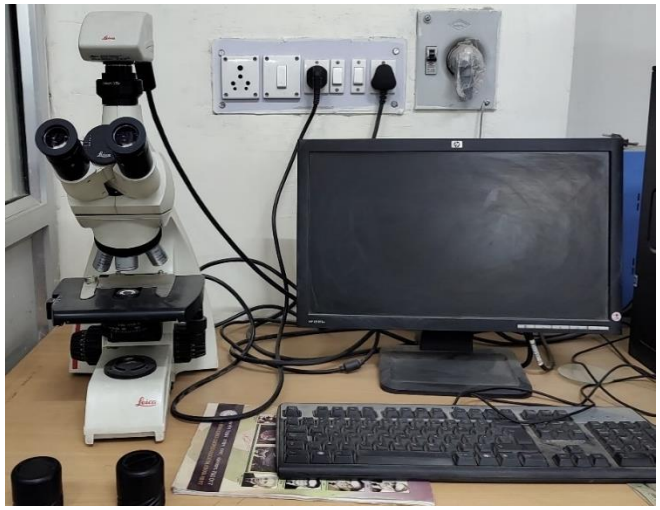
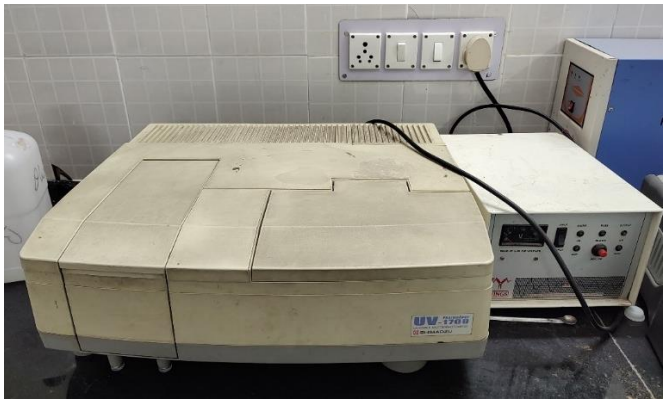
Real-Time PCR, Applied Biosystems, QuantStudio	**Introduction:** The QuantStudio Real-Time PCR system from Applied Biosystems is a robust and highly sensitive instrument for detecting and quantifying nucleic acids in real time. It offers advanced thermal cycling and fluorescence detection capabilities. **Applications:** It is extensively used in molecular labs for gene expression analysis, pathogen detection, and SNP genotyping.	
Real-Time PCR, Rotor-Gene Q, QIAGEN	**Introduction:** QIAGEN's Rotor-Gene Q is a unique rotary-based real-time PCR system that ensures uniform temperature across samples, improving the accuracy and reproducibility of results. **Applications:** Ideal for research in gene expression, mutation analysis, microbial detection, and quantification in both basic and applied molecular biology studies.	

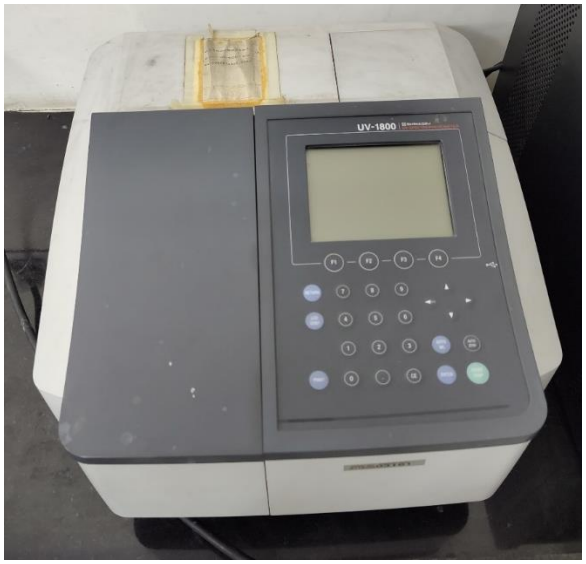
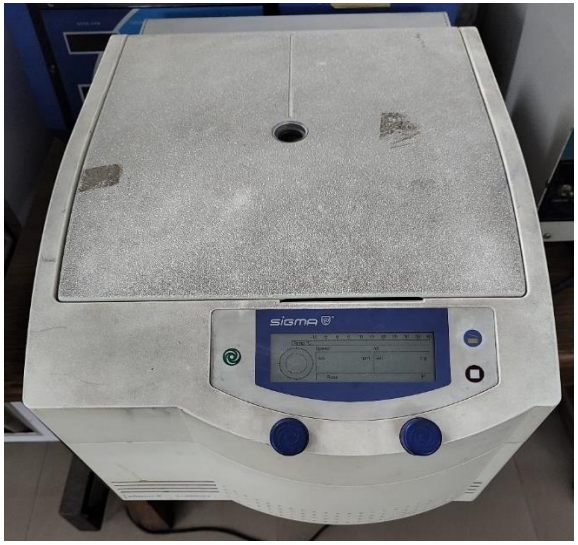
Gradient PCR, BioRad	**Introduction:** BioRad's Gradient PCR system provides the flexibility to optimize PCR conditions by testing multiple annealing temperatures simultaneously. **Applications:** This system is critical for optimizing DNA amplification protocols, cloning, mutation analysis, and studying gene expressions.	
Plant Growth Chamber, Smita Scientific	**Introduction:** The Plant Growth Chamber by Smita Scientific is designed to simulate controlled environmental conditions like light intensity, humidity, and temperature to study plant growth. **Applications:** Used in agricultural research, genetic studies, and environmental impact studies to understand the effects of environmental changes on plants.	

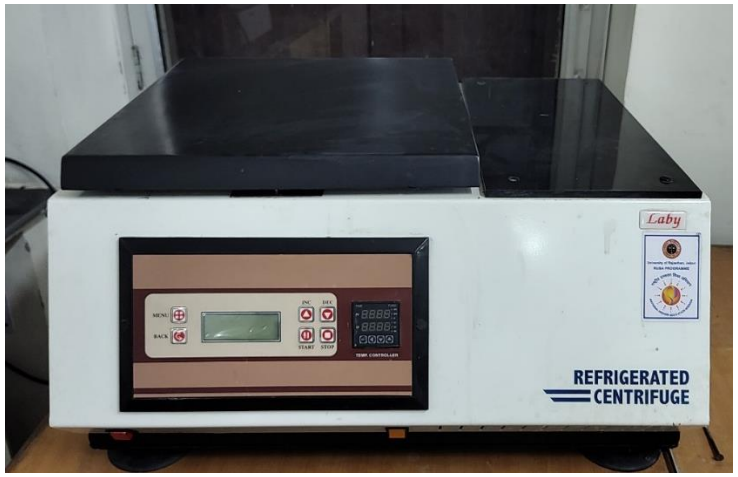
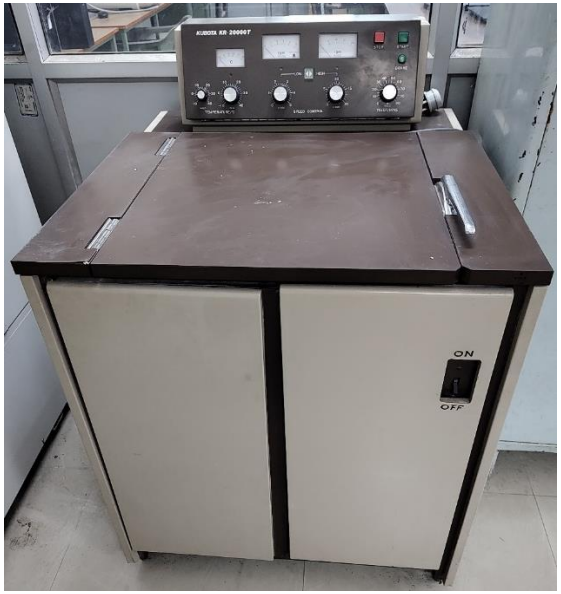
Deep Freezer (-80°C), Thermo Scientific 902	**Introduction:** The Thermo Scientific -80°C Deep Freezer is designed for the long-term preservation of temperature-sensitive biological and chemical samples under ultra-low temperatures. **Applications:** Essential in biomedical research for storing cell lines, proteins, DNA, and RNA, as well as in biobanks and pharmaceutical industries for sample preservation.	
Deep Freezer (-80°C), Whatman Technologies	**Introduction:** The -80°C Deep Freezer by Whatman Technologies provides ultra-low temperature storage for sensitive biological and chemical samples. Designed with advanced insulation and reliable temperature control, it ensures sample integrity over extended periods. **Applications:** Commonly used in research labs, for storing DNA, RNA, proteins, enzymes, and vaccines.	

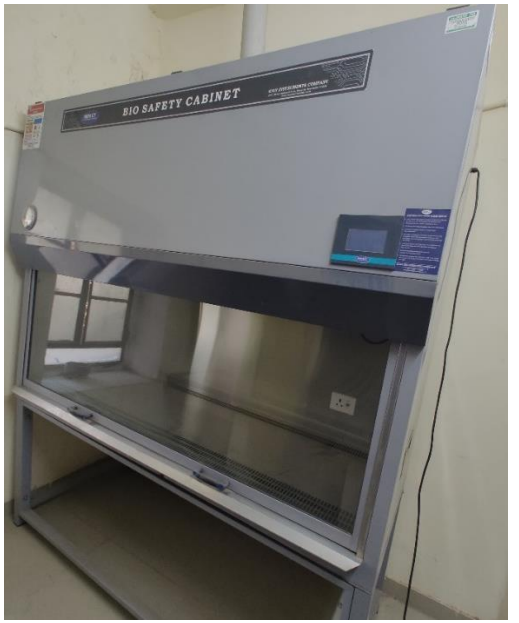
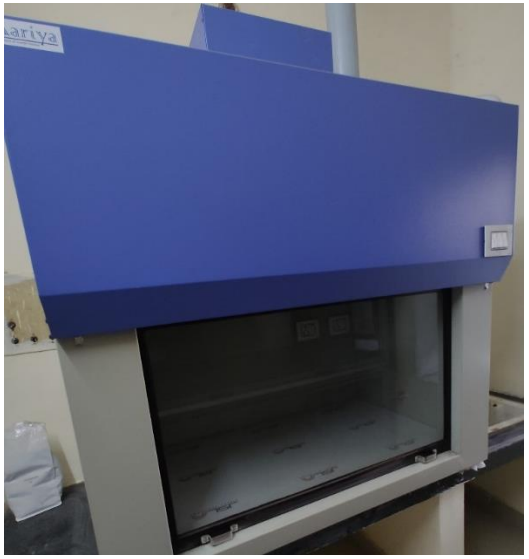
Spectrophotometer, Motrs Scientific	**Introduction:** The Spectrophotometer by Motrs Scientific is a versatile instrument that measures the absorbance and transmittance of light across a range of wavelengths. It offers accurate and reproducible results for analyzing chemical and biological samples. **Applications:** Used in research for analyzing concentration, purity, reaction kinetics, and quality control of pharmaceuticals, chemicals, and biological materials.	
Automatic Autoclave, Lab Companion	**Introduction:** The Lab Companion Automatic Autoclave is a sterilization system that uses high-pressure steam to sterilize equipment, media, and waste materials. The automatic features provide ease of use and consistent sterilization cycles. **Applications:** Essential in microbiology, clinical labs, and research institutions for sterilizing glassware, surgical instruments, culture media, and biological waste.	

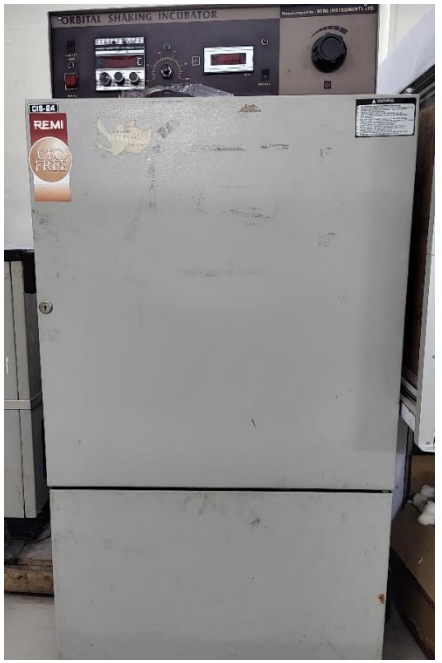
Microtome, Leica	**Introduction:** Leica's Microtome is a precision instrument designed to slice ultra-thin sections of biological tissues for microscopic analysis. It ensures uniform thickness and sharp sectioning for detailed imaging. **Applications:** Widely used in histology, pathology, and material science for preparing tissue samples for microscopy, including staining and imaging.	
Fluorescence Microscope, Leica	The Fluorescence Microscope by Leica is an advanced optical instrument that uses high-intensity light to excite fluorophores, enabling the visualization of specific cellular structures, biomolecules, and dynamic biological processes with high specificity and contrast. This microscope is widely used in molecular biology, microbiology, immunology, and medical diagnostics for applications such as live-cell imaging, protein localization, genetic studies, and cancer research. Its ability to provide detailed insights into cellular functions makes it indispensable in biomedical research and clinical laboratories.	

Light Microscope, Leica	The Light Microscope by Leica is a fundamental laboratory instrument that uses visible light and optical lenses to magnify specimens, enabling the observation of cells, tissues, and microorganisms with clarity. It is extensively used in histology, pathology, microbiology, and material sciences for applications like cell examination, bacterial identification, tissue analysis, and forensic investigations. Its versatility and ease of use make it essential for research, education, and routine laboratory work.	
UV-VIS Spectrophotometer 1700, Shimadzu	The UV-VIS Spectrophotometer 1700 by Shimadzu is a compact and efficient instrument for measuring the absorbance of liquids and solid samples in the ultraviolet (UV) and visible (VIS) spectrum. It is commonly used in pharmaceutical analysis, environmental monitoring, and biochemical research for applications such as drug quality control, water and soil contamination studies, and protein/DNA quantification. Its reliability and accuracy make it a valuable tool for routine laboratory analysis.	

UV-VIS Spectrophotometer 1800, Shimadzu	The UV-VIS Spectrophotometer 1800 by Shimadzu is a high-precision analytical instrument designed for enhanced optical performance and data accuracy. It is widely applied in pharmaceutical, food, environmental, and life sciences research for quantitative analysis of chemicals, detection of food adulterants, purity assessment of drugs, and protein/nucleic acid studies. Its superior resolution and user-friendly software make it ideal for both academic research and industrial applications.	
Cooling Micro Centrifuge, Sigma	**Introduction:** Sigma's Cooling Micro Centrifuge is a compact, refrigerated centrifuge designed for small-volume sample processing. It provides precise temperature control to preserve temperature-sensitive samples during high-speed centrifugation. **Applications:** Ideal for molecular biology applications, such as nucleic acid and protein isolation, cell fractionation, and enzymatic studies.	

Refrigerated Centrifuge, Laby	**Introduction:** The Laby Refrigerated Centrifuge is a high-capacity centrifuge designed for processing temperature-sensitive samples at controlled low temperatures. **Applications:** Used in clinical labs, biotechnology research, and blood banks for applications such as plasma separation, protein isolation, and sample preparation for downstream analysis.	
Refrigerated Centrifuge, Kubota KR-20000T	**Introduction:** The KR-20000T Refrigerated Centrifuge by Kubota offers high-speed, high-capacity sample processing with precise temperature control for sensitive applications. **Applications:** Commonly used in proteomics, genomics, and clinical diagnostics for tasks such as cell pelleting, protein precipitation, and DNA purification.	

Bio-Safety Cabinet (BSL 1), Icon Instruments Company	**Introduction:** The Bio-Safety Cabinet (BSL 1) by Icon Instruments provides a sterile, ventilated workspace designed to protect users, samples, and the environment from contamination during microbiological work. **Applications:** Used in laboratories handling non-harmful microorganisms for tasks such as cell culture, media preparation, and low-risk biological experiments.	
Fume Hood, Aariya	**Introduction:** The Fume Hood by Aariya is a ventilated enclosure designed to protect lab personnel by removing harmful fumes, vapors, and particulate matter generated during chemical experiments. **Applications:** Essential in chemical, pharmaceutical, and academic labs for handling hazardous chemicals, performing titrations, and synthesizing compounds.	

Orbital Shaking Incubator, Remi, CIS-24	**Introduction:** The Remi CIS-24 Orbital Shaking Incubator combines controlled incubation with an orbital shaker, ensuring uniform mixing and temperature stability for growing microbial and cell cultures. **Applications:** Widely used in microbiology, biochemistry, and molecular biology labs for fermentation studies, enzyme production, and bacterial culture growth.	
Lyophilizer, Heto Power Dry PL3000, Thermo Fisher Scientific	**Introduction:** The Heto Power Dry PL3000 Lyophilizer by Thermo Fisher Scientific is an advanced freeze-drying system for the preservation of biological and chemical samples. It removes moisture under vacuum while maintaining the structural integrity of sensitive compounds. **Applications:** Used in pharmaceuticals, biotechnology, and food industries for long-term storage of biologicals, vaccines, enzymes, and even food products like coffee or fruit powders.