



# ATAL INCUBATION CENTRE

## JYOTHY INSTITUTE OF TECHNOLOGY FOUNDATION

Sophisticated Instrumentation Facility at Incubation Centre

◆ C A T A L O G U E ◆

## ATAL INCUBATION CENTRE – JYOTHY INSTITUTE OF TECHNOLOGY FOUNDATION

### Sophisticated Instrumentation Facility at Incubation Centre

AIC-JITF-SIF is equipped with different sophisticated analytical equipments for meeting the needs of researchers in all areas of Science and Technology. Any individual researcher or group of researchers from any academic institutions or Industrial R&D or Industry can utilize the services of these analytical equipment facilities on nominal charges. AIC-JITF Instrument facility is open for all keeping in view the inability of small educational institution and industries to procure and maintain sophisticated analytical instruments. Some high end specialised instruments / facilities housed in the SIF would be charged as per usage prevailing rates and are subject to change at the discretion of the management. Details of the equipment housed in the SIF are detailed below:

- Hot Air Dryer
- Cooling Orbital Shaker Incubator
- MTS Exceed E43 Test System
- Automatic protein estimation system
- Automatic fat estimation system
- Automatic fiber estimation system
- Leica DMI8- Manual Fluorescent Microscope
- Scanning electron microscope (SEM-EDS)
- Powder X ray Diffractometer
- Thermal Analysis Systems
- Fourier Transform Infrared (FTIR)
- UV Visible Spectrophotometer
- Electrochemical analyzer/workstation
- Gas Chromatograph
- High Performance Preparative Liquid Chromatography (Prep-HPLC)
- Laboratory freeze dryer
- Fused Deposition Modeling (FDM)
- Brunauer–Emmett–Teller (BET)
- Battery Tester
- Elisa Plate Reader
- Gel Doc Imaging System
- Thermal cycler (PCR)
- 70 ton hydraulic press
- Environmental Test chamber (Conditioning chamber)
- Laminar air flow
- Centrifuge
- Autoclave
- Muffle furnace

## Hot Air Dryer

A hot air dryer is electrical operated equipment, used to dry heat sterilizer/ drying the samples at temperature between 30°C to 300°C, it is ideal for materials that are not heat sensitive and remain unaffected at high temperature. For heat sensitive materials, hot air drying is carried out at low temperature (i.e, till 60-70°C), where temperature is controlled by the help of attached electronic temperature controller.

### Specifications:

Make & Model	LEIDAS, HS8419
Minimum Temp	Room Temp.
Maximum Temp	250°C
Capacity	20Kg
No of Trays	20 Nos
Power Requirement	200-240V AC, 8KW

### Applications:

For drying of sample with following features:

- Uniform air circulation across chamber
- Digital PID based temperature controller.
- Excellent uniformity at temperature distribution.
- Stainless steel inner chamber and additional trays.
- Over temp. protection.
- Fume ventilation points on top side.

### Instructions:

Sample should be non-flammable, non-toxic and non-corrosive in nature.



## Cooling Orbital Shaker Incubator

The incubator shaker is a one of a kind of temperature controlled biochemical instrument combining incubator with cooling (4°C- 60°C) and shaking function it is widely used in cell culture, fermentation, hybridization, biochemistry, research of enzymes and cell tissue. It can dynamically and statically cultivate microbial cell and all kind of strains.

### Specification:

Rotational speed	50-180 RPM
Temp control range	4°C - 60°C
Temp stability	@ 37°C
Lighting	Yes
Working hours	24 Hrs
Voltage	230V
Sample capacity	16 Nos. Conical Flask of 250ml

### Application:

- Constant temperature incubation of sample
- The cultivation of microbial and cell culture.
- General mixing and fermentations



## MTS Exceed E43 Test System

### Specifications:

Model	MTS Exeed E43.504
Maximum rated force capacity	10KN
Force capacity options	100N-10KN
Frame type	Table top
Test zone	Single
Maximum test speed	508mm/min
Minimum test speed	0.001mm/min
Vertical test space (standard)	1000mm
Cross head travel (extended)	1300mm
Weight	325KG
Power requirement	200-240V AC, 1600W



### Applications:

- Mechanical testing such as Tensile/ elongation, Compression, Flexural/ bending tests can be performed in this universal testing machine (UTM)

### Instructions:

- **Tensile/Elongation Test:**
  1. For soft material/ thin film –rubber grip max. thickness-5.0 units max. width- 31, min. gauge length (longitudinal)-40 (preferably).
  2. For hard materials (HDPE, PU, Wood based composites) for rectangular / dog bone shaped specimens max. thickness-12, max. width-40, min. gauge length-50 units.
  3. For round specimens min. diameter-4 , max. diameter – 9, min. gauge length (longitudinal) – 50(preferably).
- **Flexural / Bending Test:** max. span length- 460, min. span length – 50, max. width – 60 (roller width).
- **Compression Test:** plate max. Diameter – 150, min. sample thickness – 3 units.

## Automatic Protein Estimation System

Protein is an important macronutrient, which is considered essential for human nutrition. The Kjeldahl method is a means of total protein content determination of organic substances like food. The entire protein estimation process is carried in three parts, namely Digestion, Distillation and Titration. Digestion and distillation is carried out with the help of Kjeldhal Turbotherm unit TTS 625, 2019. Titration is done with the help of electronic auto-titration unit. Automatic protein estimation system reduces chances of error in protein estimation and ensuring accuracy of the estimation.

### Specification:

Make & Model	Gerhardt Turbotherm unit TTS 625
Analysis	Kjeldhal analysis – Total protein estimation
Temperature	Short heating up and cooling down period
Samples capacity	Six sample digestion at a time, with precise temperature control
Power consumption	230 V AC, 50 Hz.

### Application:

- Total nitrogen/protein content determination in food, feed and other organic/inorganic samples.

### Instructions:

- Sample should be in dried powder form.
- Sample Quantity 1g per test.





## Automatic Fat Estimation System

A sample's fat content is generally determined quantitatively by means of extraction using a lipophilic solvent. The free fat is recorded by direct extraction, without prior digestion. The most commonly used extraction method is solid/liquid extraction. The prepared sample is extracted using the solvent. After extraction, the solvent is evaporated and the dried residue is weighed. The free fat content is calculated from the difference between the initial sample weight and the output weight.

### Specification:

Model	Southern unit SOX414
Estimation	Total lipid estimation
Capacity	Four sample digestion and filtration at a time
	Precise temperature control
	Minimum solvent loss during solvent recovery
	Solvent type variation
	Long life, compact design and easy inspection

### Application:

- Total per cent of lipid content determination in food, feed and other organic/inorganic samples.

### Instruction:

- Sample should be in dried powder form.
- Sample quantity 2g for test.



## Automatic Fiber Estimation System

C. Gerhardt's products for fiber analysis are designed with a particular focus on that have to determine fiber fractions in food / feed. To determine the individual fiber fractions, samples of the feedstuff are treated with different solvents. The undissolved residue is dried, weighed and then incinerated. The loss in mass during incineration corresponds to the crude fiber, ADF, NDF or ADL content in the sample.

### Specification:

Model	Fibertherm FT12
Sample estimation	Total crude fibre estimation
Capacity	12 sample digestion at a time
Temperature	Precise temperature control
Power	230 V AC, 50 Hz.
Pneumatic lift with air compressor arrangement	
Variable boiling time and filtration	
Reusable filtration arrangement	
Long life, compact design and easy inspection	

### Application:

- Total % of crude fiber content determination in food, feed and other organic/inorganic samples.

### Instructions:

- Sample should be in dried powder form.
- Sample quantity 2 g for test.





## Leica DMI8- Manual Fluorescent Microscope

**Instrument:** Leica DMI8 Fluorescent Microscope is an inverted microscope which operates manually and relies on fluorescence based principle to examine the structural organization and spatial distribution of biological samples. The samples are first labelled with fluorescent dyes/substance known as fluorophore and can be visualized either through normal transparent, fluorescence and phase contrast illumination. The samples can be placed in either microscopic slides or on culture dishes and images are acquired and analyzed using LASX software.

### Specifications:

Make	Leica Biosystems
Model no	Leica DMI8
Supply Voltage	100 – 240 VAC
Frequency	50/60 Hz
Power consumption	Max. 55VA
Ambient Temperature	15°- 35°
Relative Humidity	90% up to 30°C
Eye Piece	HC PLAN s 10×/22 Br. M
Objectives	HI PLAN 10×/0.25 PH1, HI PLAN I 40×/0.50 PH2, HC FL PLAN 100×/1.25 OIL
Fixed Stage	TR: 248×212
Side Port	Left 100/0, Manual
Filter Cube	DAPI, FITC, RHOD
Condenser	S40 / 0.45
Fuses	1.6 A, Breaking Capacity H, 250 VAC
Camera	Leica MC170 HD
Fluorescent Turret	6x manual
Desktop Specifications	Intel i5 processor, 8G, 24" LED, 1TB HDD, 500VA UPS



### Applications:

- To identify structure in fixed and live biological sample.
- Multi-channel fluorescence imaging
- Imaging of histological samples
- Identifying cells, sub-micro cellular components & live & dead cells
- Quantifying the physiological state of cells.
- Enumeration of bacteria, distinguishing live from dead, tracing viral particles & other biomolecules in cells by tagged with fluorescent dye.

### Instruction to the user:

- Always cover the microscope with the supplied dust cover when not in use.
- Unplug the power supply before performing cleaning and maintenance work.
- Protect electrical components from moisture.
- Thinners can harm the microscope & must not be used for cleaning coated parts.
- Never allow optics & mechanical parts to come into contact with acids & harsh chemicals.
- Remove light-colored spots on the stage by rubbing with paraffin oil or acid-free Vaseline.

## Scanning Electron Microscope (SEM-EDS)

Scanning electron microscope (SEM) is a versatile tool for observation and characterization of heterogeneous organic and inorganic materials on a nanometer to micrometer scale. It uses low energy secondary electrons (SE) or high energy back scattered electrons (BSE) from the specimen surface for image formation. In addition to variable pressure secondary electron detector, Hitachi S 3500 has the analytical capability of determination of elemental composition through energy dispersive X-ray spectrometry (EDS).

### Specifications:

Make and model	Hitachi SU 3500
Resolution	30 nm
Magnification	up to 3,00,000 X
Detector	SE, BSE, and EDS
Accelerating voltage	0.3 to 30 kV
Variable pressure range	6 to 650 Pa
Coating	Carbon and gold

### Applications:

- Surface morphological study (composites, ceramics, concrete, polymer, samples, etc.)
- Failure analysis
- Compositional analysis using EDS
- Dimension verification of thin films/coatings

### Instructions:

- Sample may be in the form of solid, powder or film/filament, but should be completely dry
- Sample quantity for powder is less than 2 mg. Solid specimen with a dimension of less than 10 mm X 10 mm X 10 mm is preferred. However, other sizes are also possible only after discussion. Smaller the height better is the measurement. The side of interest should be finely polished, while the opposite side should be flat to enable sample mounting
- All liquid samples should be dried over a glass slide
- The presence of user at the time of measurement is highly recommended. However, if not possible, user must provide the details with respect to expected features, magnification, sample preparation, conductivity of sample, etc.



## Powder X-Ray Diffractometer

X ray diffractometer is the most sought after, indispensable tool to any materials research lab. X ray diffraction is a modern non-destructive technique for materials investigation, characterization and quality control. Basically, X-rays interact with electrons surrounding the atoms of the target material and the resulting reflected signal gives information about the inner structure of the material. However, with the advent of high brilliance X-ray sources and substantial improvement in detector technology, new generation X-ray diffractometers provide tremendous information about the material under investigation. D8 ADVANCE ECO is one such all-purpose X-ray analyzer, which can be configured for all powder diffraction applications.

### Specifications:

Make and model	Bruker, D8 ADVANCE ECO
X-ray Source	1 kW Cu K $\alpha$ ( $\lambda = 1.54 \text{ \AA}$ )
Geometry	Bragg-Brentano ( $\theta$ - $\theta$ )
Angle Range ( $2\theta$ )	-110° to +168°
Sample holder	Regular as well as special Si Zero background sample holders
Sample stage	Rotating
Detector	SSD 160
Detector Software	DIFFRACT.EVA-Diffraction evaluation package
Database	PDF-2

### Applications:

- Phase identification
- Micro-structure and crystal structure analysis

### Instructions:

- Sample may be in the form of solid, powder or film
- Minimum quantity of powder sample required is around 2 g. The maximum dimension of solid specimen should be (Length x Width x thickness (height)) 10 mm x 10 mm x 3 mm only.



## Thermal Analysis Systems

Thermal analysis refers to the study of the relationship between a sample property and its temperature as the sample is heated or cooled in a controlled manner. DTG-60 of Shimadzu has been designed to perform both differential thermal and thermogravimetric measurements simultaneously on a single sample. Shimadzu's DSC-60 is a new system with numerous unique features, including high sensitivity, accuracy and ease of operation.

### TG-DTA Specifications:

Make and model	Shimadzu, DTG-60
Measured temp. range	Ambient to 950 °C
Balance type	Parallel guide differential top pan type
TG measurable range	± 500 mg
DTA Detector	PLATINEL (plug-in type)
DTA measurable range	± 1 to ±1000 µV
Heating rate	0.1 to 99.9 °C min <sup>-1</sup>
Atmosphere	Air and Nitrogen
Sample quantity	1g max.
in gross wt Sample pan	Al and Alumina

### DSC Specifications:

Make and model	Shimadzu,DTG-60
Measured temp. range	Ambient to 600 °C
Heat flow range	± 40 mW
Detector (thermocouple)	Type K for the sample section temperature; Type K for the furnace temperature; Type E for the heat flow (differential measurement)
Heating rate	Typically 1 to 50 °C min <sup>-1</sup>
Atmosphere	Air and Nitrogen
Env. Pressure	Atmospheric pressure
Sample pan	Standard aluminum pan (40 µl cap.)



### Instructions:

- Sample must be non toxic, non corrosive and non explosive
- Sample in the finely divided form is preferred
- Minimum quantity of sample required is about 10 mg for TG-DTA and 5 mg for DSC
- Sample resulting in toxic / obnoxious gases / fumes on heating cannot be undertaken for analysis.
- Halide compounds and glass shall not be taken up for analysis.
- User must ensure that sample does not react with the sample holder
- User must provide the details of operating conditions such as heating rate, temperature range, gas atmosphere, etc.

## Fourier Transform Infrared (FTIR)

Spectrometer FTIR spectroscopy is a workhorse technique for materials' characterization. It offers a vast array of analytical opportunities in different fields, including environment, food, forensics, pharmaceuticals, polymers, and academic research. Shimadzu's IRAffinity-1S with HATR (Horizontal Attenuated Total Reflectance) accessory allows quick analysis of liquids and solids with minimal sample preparation. It can allow the analysis of samples which are difficult to grind.

### Specifications:

Make and Model	Shimadzu IRAffinity-1S
Interferometer	Michelson interferometer (30° incident angle) Equipped with Dynamic Alignment system Sealed interferometer with auto dryer
Beam Splitter	Germanium-coated KBr
Light Source	High-energy ceramic light source
Detector	DLATGS detector equipped with temperature control mechanism Wavenumber
Range	4,000 to 400 $\text{cm}^{-1}$
Resolution	0.5, 1, 2, 4, 8, 16 $\text{cm}^{-1}$
Accessory	ATR with Diamond prism
Software	LabSolutions IR



### Instructions:

- Sample may be in the form powder, liquid or film
- Quantity of powder sample required is 1-2 mg



## UV Visible Spectrophotometer

UV- 2600 of Shimadzu is a cuvette-based high resolution UV-VIS Spectrophotometer with 1 nm spectral bandwidth over the entire wavelength range of 1100 nm – 190 nm. It offers a powerful performance and functionality in a compact design.

### Specifications:

Make and model	Shimadzu, UV-2600
Number of cuvette holders	02
Wavelength range	200 to 900 nm
Spectral bandwidth	1 nm
Photometric system	Double beam optics
Light source	20 W halogen lamp and deuterium lamp
Monochromator	Blazed holographic grating in Czerny-Turner mounting
Detector	Silicon photodiode

### Instructions:

- Samples shall be considered for analysis only after the discussion





## Electrochemical Analyzer / Workstation

Potentiostat and galvanostat are electrochemical instruments used in electrochemistry, battery and fuel cell testing, corrosion studies, voltammetry, biomedical research, surface imaging, and related applications. Potentiostat is used to keep the potential (voltage) between a working electrode and a reference electrode at a constant value. Galvanostat is used to maintain a constant flow of current through an electrolytic cell. Electrochemical analyzer/workstation is a computerized general purpose potentiostat / galvanostat. The 660E of CH Instruments is one such high-end complete electrochemical workstation, capable of a wide variety of electrochemical techniques. It is available with integrated simulation and fitting software functions for both impedance and cyclic voltammetry. These features provide powerful tools for both electrochemical mechanistic studies and trace analysis.

### Specifications:

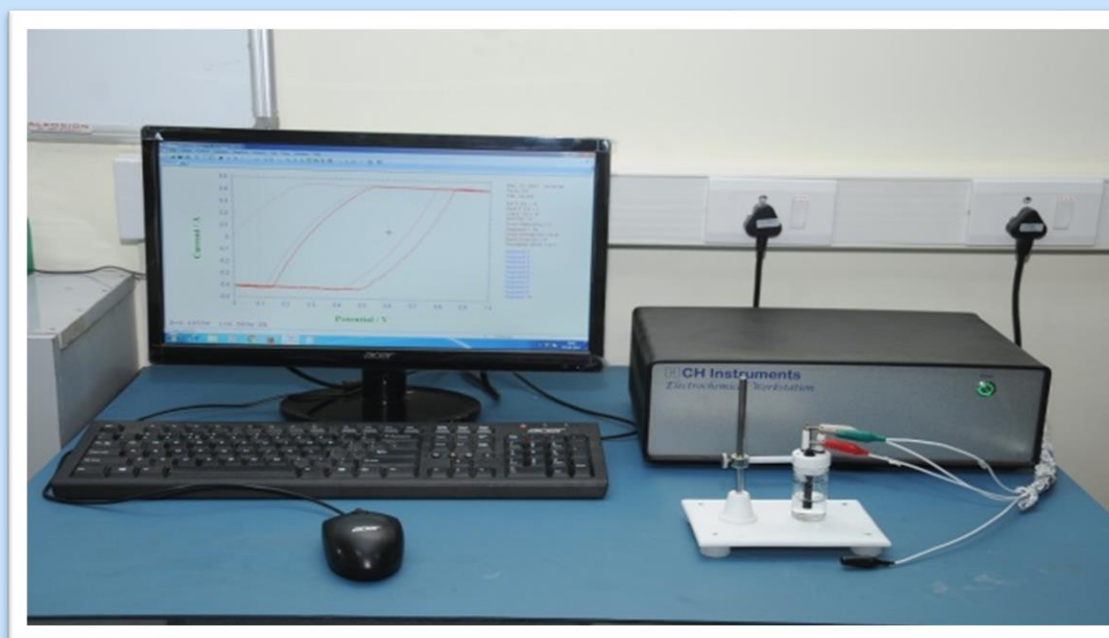
Make and model	CH Instruments, 660E
Potentiostat / Galvanostat	2- or 3- or 4-electrode configuration
Maximum potential	$\pm 10$ V
Maximum current	$\pm 250$ mA & $\pm 350$ mA peak
Compliance Voltage	$>\pm 13$ V
CV and LSV scan rate	0.000001 to 10,000 V/s 2 channels simultaneously
CA and CC pulse width	0.0001 to 1000 s
IMP frequency	0.00001 to 1MHz (for impedance 10-1000 ohm)
IMP amplitude	0.00001V to 0.7 V RMS

### Applications:

- Testing of batteries, supercapacitors, fuel cells, and dye sensitized solar cells
- Corrosion studies
- Investigation of coatings / thin film
- Biomedical and fundamental electrochemical research
- Trace Metal analysis

### Instructions:

- Samples shall be considered for analysis only after the discussion.



## Gas Chromatograph

Gas chromatography is one of the most important techniques in modern analytical chemistry for separating and analyzing chemical components in a mixture. It uses a gaseous mobile phase to transport sample components through either packed columns or hollow capillary columns containing a polymeric liquid stationary phase. It is widely used for quantitative and qualitative analysis of mixtures, for the purification of compounds, and for the determination of thermochemical constants such as heats of solution and vaporization, vapour pressure, and activity coefficients. Shimadzu's versatile GC-2014 gas chromatograph is ideal for routine analysis in the R&D lab, covering a wide range of applications from capillary to packed column analysis.

### Specifications:

Make and model	Shimadzu, GC-2014
Column oven temperature range	Up to 400 °C
Columns	Capillary and Packed
Sample injection	Syringe, split/splitless
Sample injection unit temperature range	Up to 400 °C
Detectors	Dual Flame Ionization Detector (FID)
Gas	Air, H <sub>2</sub> , and N <sub>2</sub>

### Applications:

- **Pharmaceutical:** analysis of residual solvents in both raw materials and finished products, screening of urine drug, ethylene oxide in sterilized products, etc.
- **Food/Flavors/Fragrances:** quality testing, solvents testing, and fingerprinting of fragrances for characterization, etc.
- **Petrochemical:** natural gas analysis, gasoline characterization and fraction quantification, aromatics in benzene, mapping of oil reserves, etc.
- **Chemical/Industrial:** determination of product content and purity, monitoring production processes, etc.
- **Environmental:** detection of pollutants and quality monitoring, analysis of stack and waste emissions, water discharges, etc.

### Instructions:

- Samples shall be considered for analysis only after the discussion.



## High Performance Preparative Liquid Chromatography

HPLC is an analytical technique widely used to separate, identify, and quantify each component in a mixture. It relies on pumps to pass a pressurized liquid solvent containing the sample mixture through a column filled with a solid adsorbent material. The individual component of the sample interacts differently with the adsorbent material used in the column, causing a difference in the rate at which they flow out leading to their separation.

### Specifications:

Make	Shimadzu
Pump	LC-20AP (2 modules) Preparative
Solvent delivery	Parallel-type double plunger system
Flow rate	150 mL/min
Detector	SPD M20A Photodiode Array Detector
Fraction Collector	FRC 10A
Software	LabSolutions, Shimadzu
Operating Temperature	4°C to 35°C

### Applications:

- HPLC finds widespread application in quality control, Analysis and R&D labs of the Biochemistry, Biotechnology, Food, pharmaceutical industry and many other Industries where there are high benchmarks for precision, sensitivity and reproducibility.



## Laboratory freeze dryer

Freeze drying, also known as lyophilization, is a method used for the gentle drying or preservation of thermally sensitive materials. It is based on the physical phenomenon of sublimation. The frozen products are dried under vacuum without thawing. It keeps the product temperature low enough during the process to avoid changes in the dried product appearance and characteristics. Gamma 2-16 LSCplus of Martin Christ is a compact tabletop unit for effective lyophilization of specimens with innovative wireless shelf technology. The simple and intuitive LSCplus controller supports manual and automatic process control for reproducible results.

### Specifications:

Make and model	Martin Christ, Gamma 2-16 LSC plus
Condenser capacity	16 kg
Condenser temperature	-85 °C
Sample holders	Trays and wide neck bottles
Sample types	Aqueous and organic solvent based sample
Pre-freezing	Required

### Applications:

- Preservation of the characteristics of the original substances such as pharmaceutical products, coffee, etc.
- Preservation of the original form of materials including animal preparations, biological strains, archaeological objects, flowers, and books
- Conditioning the material such as freeze-dried fruit in yoghurt
- Sample preparation for chemical or biochemical analysis (e.g. investigation of trace elements in foods, sludge or soil)

### Instructions:

- Samples should be in liquid form only, preferably with lower water content
- Aqueous and mild organic solvent based samples only. Acidic or basic solvent based samples are not allowed.
- Process duration depends on both quantity and solvent content of samples
- User can avail CIIRC's pre-freezing facility.



## Fused Deposition Modeling (FDM)

Fused deposition modeling (FDM) also known as fused filament fabrication (FFF) is an additive manufacturing technology that belongs to the material extrusion family. It is widely used for modeling, prototyping, and production applications. In FDM, a three-dimensional object is built directly from 3D CAD data. A temperature-controlled head extrudes thermoplastic material layer by layer and deposits the melted material in a pre-determined path. Stratasys F170 3D printer enables designers and engineers to work faster through design concept iterations and component verification to precise, functional prototypes.

### Specifications:

Make and model	Stratasys F170
Resolution	300 $\mu\text{m}$
Print Volume	254 x 254 x 254 mm
Build Materials	PLA, ABS-M30™ ASA, QSR support material
Stratasys F170 Material bay	2 material spool bays, 1 for model, 1 for support
Network Connectivity	Wired: TCP/IP protocols at 100 Mbps minimum 100 base T, Ethernet protocol, RJ45 connector Wireless: IEEE 802.11n, g, or b; Authentication: WPA2-PSK, 802.1x EAP; Encryption: CCMP, TKIP
Software	GrabCAD Print
Power Requirements	100–132V/15A or 200–240V/7A.50/60 Hz

### Applications:

- Rapid prototyping
- Concept modeling
- Functional prototypes
- Simulated overmolding
- Wind tunnel testing

### Instructions:

- Printable prototype should be in printer readable format (.stl)
- Sample size shall not be more than 254 x 254 x 254 mm.





## Brunauer–Emmett–Teller (BET)

Surface area analyzer BET surface area analysis is an important technique for powder materials that provides information on specific surface area, porosity, pore size and pore volume. In this method, multilayer adsorption of nitrogen is measured as a function of relative pressure using a fully automated analyzer. Nitrogen is the most commonly used adsorbate at its boiling temperature (i.e 77K) for adsorption studies. The BELSORP MAX is one such sophisticated instrument for surface area related analysis. BELMaster software is user friendly and has different methods of analyzing the samples for material surface properties.

### Specifications:

Make and model	MicrotracBEL , BELSORP MAX
Adsorptive gas	Nitrogen
Software	BELMaster
Specific Surface area	0.01 m <sup>2</sup> /g (N <sub>2</sub> /77K)
Pore size	0.32 – 500 nm
Pressure Transducer	0.1 to 1000 Torr
Adsorption measurement	p/po 10 <sup>-8</sup> to 0.997

### Applications:

- Specific surface area in m<sup>2</sup> /g from BET, Langmuir, t-plot,  $\alpha$ -plot
- Pore size distribution in nm from BJH, DH, INNES, CI (mesopore) and HK, MP, CY & SF (micropore)
- Pore volume and pore diameter BET, BJH

### Instructions:

- Only powder form of the sample has to be submitted (minimum quantity 100-150 mg).
- Samples details required – melting point, degassing temperature and degassing time
- Approximated BET surface area.





## Battery Tester

Bitrode's model LCV is a full-featured life cycle test system for development of automotive, industrial and consumer batteries. The LCV provides increased laboratory accuracy, flexibility and efficiency, making it an ideal solution for testing needs in designing consistently high quality batteries, verifying rigorous battery specifications and research and development of new battery materials. Deep Cycle Life Test system featuring computer control via the VisualCN software and flexible network system. The LCV is based on a linear current control design for development of primary and rechargeable batteries of multiple chemistries. A single processor individually controls up to 16 circuits allowing paralleled operation for higher current applications and the use of assignable data channels. All circuits share a common power supply, are controllable to zero current and volts with bipolar voltage capability and can be configured for multiple current ranges. Profiles of up to 2,000 steps can be programmed with data acquisition rates of 100 ms continuous. Software allows control of each circuit via cycles, current, voltage, amp hours, watt hours, temperature or time.

### Specifications:

Make and model	Bitrode Model LCV4-100/1-48
Number of Circuits	4
Cycles	1 to 32,000
Steps	1 to 2,000
Step Time	255HRS
59M	59.9, resolution 0.1 sec
Voltage (CHG/DCHG)	0 to 72.00, resolution 0.01 V
Circuit Current (High)	0 to 100.00, resolution 0.01 A
Circuit Current (Low)	0 to 100.00, resolution 0.0001 A
Maximum Current	0 to 400.00, resolution 0.01 A
Circuit Power	0 to 7200, resolution 1 W
Maximum Power	0 to 28800, resolution 1 W

### Applications:

- Life Cycle Testing: Perform charge/discharge cycling of batteries or modules to obtain charge and discharge capacity, energy and DC internal resistance.
- Automotive Battery testing

### Instructions:

- Test system will be taken up for analysis only after the discussion.



## Elisa Plate Reader

It is a high-quality monochromator-based UV/VIS spectrophotometer. It is used in fast spectral scanning, endpoint and kinetic measurements to measure absorbance in the 200– 1000 nm wavelength range. Appropriate 96- or 384-well plates with and without lids and various types of cuvettes, making it ideal for virtually any photometric research application including, DNA, RNA and protein analysis.

### Specification:

Make and Model	Thermofisher Scientific™ Multiskan™ GO
Wavelength selection	Monochromator
Incubation Range	2°C to 45°C
Wavelength range	200 to 1000 nm with 1nm steps
Accuracy @ 450 nm	1.0% + 0.003 Abs (0-2.0 Abs); 2% (2.0-2.5 Abs) at 450nm
Precision	SD < 0.003 Abs or CV < 0.5% (Precision mode) SD < 0.003 Abs or CV < 1.0% (Fast mode)
Measurement Time	6 seconds (96 wells) / 10 seconds (384 wells)
Light Source	Xenon flash lamp
Mains input	100-240 V (50/60Hz)



### Applications:

- Compatible with Thermo Scientific™  $\mu$ Drop™ Plate that is a quick and easy tool for DNA and RNA assays using sample volumes down to 2  $\mu$ L.
- Allows kinetic, spectral, and endpoint measurements for a variety of applications
- Wide variety of applications, including ELISAs, endotoxin assays, cytotoxicity assays, growth curves, nucleic acid and protein analysis.

### Instructions:

- Clean the plate carrier and cuvette port when necessary and ensure proper shutdown.
- Ensure that you select the correct plate type. An unsuitable plate may become jammed in the instrument. When you work in the UV range, use quartz or other UV-compatible microplates.
- The cuvette port cover must be closed during the start-up self-diagnostics tests
- Prevent any liquid from entering the instrument. Keep the instrument free of dust and other foreign matter.

## Gel Doc Imaging System

The ChemiDoc XRS+ System is based on CCD high-resolution, high-sensitivity detection technology and modular options to accommodate a wide range of samples and support multiple detection methods including fluorescence, colorimetry, densitometry, chemiluminescence, and chemifluorescence. The system is controlled by Image Lab software to optimize imager performance for fast, integrated, and automated image capture and analysis of various samples from large handcast polyacrylamide gels to small Ready Agarose Gels and various blots.

### Specification:

Make and Model	BIO-RAD ChemiDoc™ XRS+ System
Maximum sample size	up to 28 x 36 cm
Maximum image area	up to 26 x 35 cm
Excitation source	Epi-white light and trans-UV (302 nm)
Illumination control	5 modes (trans-UV, epi-white, and no illumination for chemiluminescence)
Detector	Supercooled CCD
Pixel size (H x V)	6.45 x 6.45 $\mu\text{m}$
Cooling system	Peltier
Camera cooling temperature	-30°C controlled
Dynamic range	>4.0 orders of magnitude
Pixel density	65,535
Dynamic flat fielding	Application specific, for all applications
Instrument size	36 x 60 x 96 cm
Operating voltage	110/115/230 V AC nominal
Operating temperature	10–28°C (21°C recommended)
Operating humidity	<70% noncondensing

### Applications:

- The system is an ideal accompaniment to PCR, purification, and electrophoresis systems enabling image analysis, quantitative analysis and documentation of restriction digests, amplified nucleic acids, genetic fingerprinting, RFLPs, and protein purification and characterization.



### Instructions:

- Clean the transilluminator sample area after use.
- Proper precautions must be taken to avoid eye and skin exposure to the UV radiation
- Switch off all the lights on the instrument immediately

## Thermal Cycler (PCR)

The polymerase chain reaction is used to make millions of copies of a target piece of DNA. It is an indispensable tool in modern molecular biology and has transformed scientific research, introduction and is now commonly used for a wide variety of applications including genotyping, cloning, mutation detection, sequencing, microarrays, forensics, and paternity testing.

### Specification:

Make	ThermoFisher Scientific
Model	Veriti 96- Well Thermal cycler
Block format features	0.2 ml alloy
Max block ramp rate	3.9°C/sec
Max sample ramp rate	3.35°C/sec
Temperature Accuracy	±0.25°C (35°C to 99.9°C)
Temperature Range	0°C to 100°C
Dimensions(H*W*D)	24.5× 23.7× 48.5cm (9.6× 9.3× 19.1 in)
PCR volume range	10-100µL
Instrument memory	USB and onboard memory; onboard capacity >500 protocols
Display Interface	6.5 in. VGA 32K Colour Touch Screen
Power	100-240 V, 50-60 Hz, max. 800VA
VeriFlex Blocks range	25°C (5°C zone to zone)
Cat. No.	4375786
Cat. No. for Dx option*	4452300
Weight	11.4 kg (25 lb)





## 70 Ton Hydraulic Press

### Specification:

Make	Om Shakthi Engineering
Platen size	28 inches x 28 inches
Temperature	upto 300 °C
Operation	Hydraulic
Cooling	Cold Water
Day Light	15 inches



## Environmental Test Chamber (Conditioning Chamber)

### Specification:

Volume	256L
Setting accuracy temperature	up to 99.9 °C: 0.1 / from 100 °C: 0.5
Temperature range	without humidity: from -42°C up to +190°C
Temperature range	with humidity from +10°C up to +95°C
Temperature distribution (spatial)	+/- 0.5 up to 2K
Humidity control	Active humidifying and de-humidifying adjustable from 10-98 % rh with digital display of relative humidity - resolution of display 0.5 %, setting accuracy 1 %
Temperature sensor	2 Pt100 sensors DIN Class A in 4-wire-circuit for mutual monitoring
Display	Resolution of display for setpoint values 0.1°C up to 99.9°C, 0.5°C from 100°C and for actual values 0.1°C (LED)





## Laminar Air Flow

A laminar flow cabinet is a carefully enclosed bench designed to prevent contamination of semiconductor wafers, biological samples, or any particle sensitive materials. Air is drawn through a HEPA filter and blown in a very smooth, laminar flow towards the user. Due to the direction of air flow, the sample is protected from the user but the user is not protected from the sample.

### Specification:

Cleanliness	Class 100
Velocity	90 FPM $\pm$ 20%
HepaFilter	99.999 % efficiency for particles $>0.3 \mu\text{m}$
Work Table	304 Stainless Steel (optional 316 grade)
Airflow Speed	Control Speed Controller
Light	High intensity, low wattage $>800 \text{ lux}$
Power Supply	220-230 V
Optional Accessories	U. V. Germicidal Tube in work area
Microprocessor LCD Controller	
Transparent Front Door	
Gauges Pressure	

### Applications:

The specific requirements of the laboratory and are also ideal for general lab work, especially in the medical, pharmaceutical, R & d Labs and industrial sectors.



## Centrifuge

A centrifuge is a device that uses centrifugal force to separate various components of a fluid. (High speed centrifuge, cooling centrifuge, thermal, etc.)



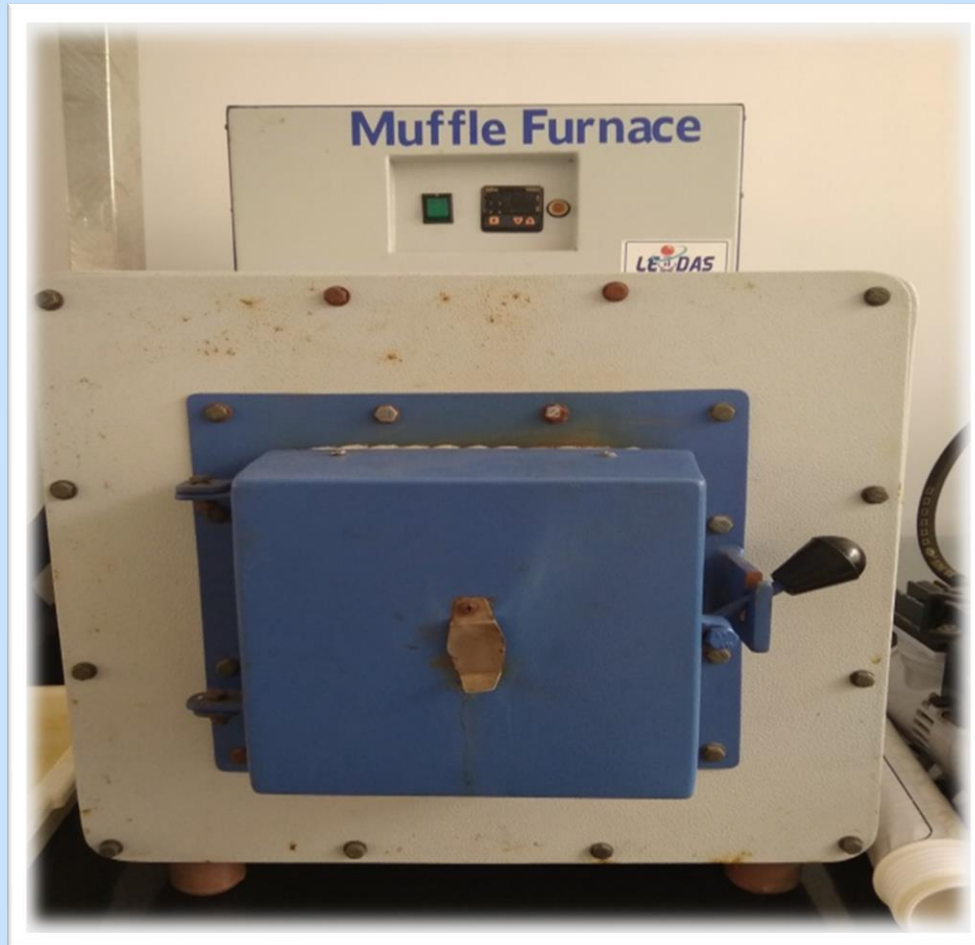
## Autoclave

An autoclave is a machine used to carry out industrial and scientific processes requiring elevated temperature and pressure, Sterilization autoclaves are widely used in microbiology, medicine, podiatry, tattooing, body piercing, veterinary medicine, mycology, funerary practice, dentistry, and prosthetics fabrication (temperature 121°C).



## Muffle Furnace

A muffle furnace is in which the subject material is isolated from the fuel and all of the products of combustion, including gases and flying ash, High temperature muffle-furnace maximum temperature is 1,473 K (1,200 °C; 2,192 °F).



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