Name of Facility or centre	Central Instrument Facility lab
Academic year of establishment	2018-19
School Name	School of Sciences
Incharge Name	Dr. Sadafara Pillai / Dr. Rajesh Jha

Introduction

The Central Lab serves as the cornerstone of our research and analytical capabilities, providing essential support to various scientific endeavors. Equipped with state-of-the-art instrumentation and staffed by expert scientists, our Central Lab ensures accurate analysis and interpretation of data across diverse disciplines. From conducting experiments to analyzing samples, our facility fosters innovation and collaboration, driving advancements in fields such as biotechnology, pharmaceuticals, and environmental science. With a commitment to excellence and precision, the Central Lab stands as a pivotal hub for scientific inquiry and discovery, facilitating ground-breaking research and driving progress towards a better tomorrow.

Vision and Impact

The central lab serves as the nucleus of scientific exploration, fostering innovation and collaboration. Its vision encompasses pioneering research and cutting-edge technology, driving advancements in various fields. Through interdisciplinary synergy, it propels transformative discoveries with far-reaching impact, addressing global challenges and enhancing quality of life. By providing state-of-the-art infrastructure and fostering a culture of excellence, the central lab cultivates a vibrant ecosystem for scientific inquiry and knowledge dissemination. Its impact extends beyond academia, influencing industry practices and shaping policies. As a beacon of discovery, the central lab catalyzes progress and inspires future generations of scientists, leaving an indelible mark on society.

➢ **Applications:**

➢ Laboratory Analysis: pH meters with magnetic stirrers are used in scientific research laboratories for accurate and precise pH measurements in chemical reactions, titrations, and biological assays.

➢ Industrial Processes: pH control is essential in various industrial processes such as food and beverage production, pharmaceutical manufacturing, and chemical processing to maintain product quality and optimize production efficiency.

Company Name: Equiptronics

Equipment Name: Digital auto ranging conductivity meter with magnetic stirrer

About

➢ The "Digital Auto Ranging Conductivity Meter with Magnetic Stirrer" is a device used to measure the conductivity of a solution, typically in laboratory or industrial settings.

➢ **Basic Principle:**

➢ Conductivity is a measure of a solution's ability to conduct electricity. It is influenced by the concentration of ions present in the solution. The conductivity meter measures the electrical conductivity of the solution by passing a small electric current through it and measuring the resulting voltage drop across two electrodes.

➢ The conductivity of the solution is directly proportional to the electrical conductivity of the solution.

➢ Auto ranging capability allows the meter to automatically adjust its measurement range based on the conductivity of the solution being measured.

- **Components:**

- Digital display: Displays the conductivity value in units such as Siemens per meter (S/m) or micro-Siemens per centimetre (µS/cm).
- Electrodes: These are typically made of a conductive material such as platinum and are immersed in the solution being measured.
- Magnetic stirrer: The magnetic stirrer ensures uniform mixing of the solution, which is important for accurate conductivity measurements.

- **Applications**:

- Water quality testing: Conductivity meters are commonly used to assess the purity and salinity of water in environmental monitoring, drinking water treatment, and wastewater treatment processes.
- Chemical process control: In chemical manufacturing processes, conductivity measurements can be used to monitor the concentration of dissolved solids or ions in solutions.
- Pharmaceutical industry: Conductivity meters are used to monitor the conductivity of solutions during the production of pharmaceuticals to ensure product quality and consistency.

Company Name: Equiptronics

Equipment Name: µController colorimeter with 10 inbuilt filters battery & charger

About

A "µCONTROLLER COLORIMETER WITH 10 INBUILT FILTERS BATTERY & CHARGER" is a device that integrates microcontroller technology with colorimetry principles to measure the concentration of substances in a solution based on the absorbance of light.

- **Colorimetry Principle:**
- Colorimetry is a technique used to determine the concentration of a substance in a solution by measuring the absorbance or transmission of light through that solution.
- It relies on the Beer-Lambert Law, which states that the absorbance of light is directly proportional to the concentration of the absorbing substance and the path length through which the light travels.

- **Microcontroller Integration:**
- The integration of a microcontroller allows for precise control of the measurement process and facilitates data processing and analysis.
- The microcontroller is responsible for controlling the light source, detecting the intensity of transmitted or reflected light, and converting these measurements into concentration values.

- **10 Inbuilt Filters:**
- Having 10 inbuilt filters allows the colorimeter to measure absorbance at different wavelengths of light.
- Each filter corresponds to a specific wavelength, enabling the colorimeter to analyze a wide range of substances with different absorption spectra.

- **Battery & Charger:**
- This feature enhances the versatility of the device, allowing it to be used in various settings, including fieldwork, laboratories, and educational environments.

- **Applications:**
- Environmental Monitoring: Colorimeters can be used to monitor water quality by measuring the concentration of pollutants, such as heavy metals, nitrates, and phosphates.
- Clinical Analysis: They are employed in medical laboratories to analyze blood samples, urine samples, and other biological fluids for the presence of specific substances.

Company Name: EQUIPTRONICS

Equipment Name: DISSOLVED OXYGEN METER WITH MAGNETIC STIRRER

About

- A dissolved oxygen meter with a magnetic stirrer is a laboratory instrument used to measure the concentration of dissolved oxygen (DO) in liquids, particularly in water samples.

➢ **Principle:**

➢ The dissolved oxygen meter measures the partial pressure of oxygen in the liquid sample using a polarographic sensor.

➢ The sensor consists of a cathode and an anode separated by an electrolyte solution. When exposed to the sample, oxygen diffuses through a permeable membrane on the cathode and is reduced at the electrode surface, generating a current proportional to the oxygen concentration.

➢ The meter then calculates the DO concentration based on this current.

➢ **Components**:

➢ Probe: Contains the polarographic sensor and a temperature sensor for temperature compensation.

➢ Meter/display unit: Displays the dissolved oxygen concentration in units such as mg/L or ppm (parts per million).

➢ Magnetic stirrer: Provides agitation to ensure uniform mixing of the sample and maintain consistent oxygen levels throughout the measurement process.

➢ Calibration solutions: Used to calibrate the meter to ensure accurate readings.

➢ Power source: Typically powered by batteries or AC power.

➢ **Applications:**

- Aquaculture: Monitoring dissolved oxygen levels in fish tanks, ponds, and aquaculture systems to ensure optimal conditions for fish and other aquatic organisms.
- Environmental monitoring: Assessing water quality in rivers, lakes, and oceans to monitor ecosystem health and detect pollution.
- Wastewater treatment: Optimizing aeration processes in wastewater treatment plants to promote microbial activity and facilitate the breakdown of organic matter.
- Industrial processes: Monitoring dissolved oxygen levels in industrial processes such as brewing, fermentation, and chemical manufacturing to optimize process efficiency and product quality.

Company Name: EQUIPTRONICS

Equipment Name: LED BAR GRAPH INDICATOR

About

- A LED bar graph indicator is a display device consisting of multiple Light Emitting Diodes (LEDs) arranged in a linear array or bar graph configuration.

➢ **Principle**:

➢ LED bar graph indicators work on the principle of converting an electrical signal into visible light.

➢ Each LED represents a specific level of the input signal, and its brightness is proportional to the amplitude of the signal.

➢ **Components**:

➢ LEDs: The main components of the indicator, arranged in a linear array or bar graph configuration. Each LED typically corresponds to a specific level or range of the input signal.

➢ Driver circuit: Provides the necessary current and voltage to drive the LEDs based on the input signal.

➢ Input interface: Connects the LED bar graph indicator to the source of the input signal, such as a sensor, microcontroller, or analogue circuit.

➢ Power supply: Provides electrical power to the LED indicator.

➢ **Principle of operation**:

➢ The input signal is received by the LED bar graph indicator.

➢ The driver circuit translates the amplitude of the input signal into corresponding levels of brightness for the LEDs.

➢ Each LED lights up to indicate the level of the input signal it represents. The brightness of the LED is directly proportional to the amplitude of the signal.

➢ **Applications**:

➢ Level indication: LED bar graph indicators are commonly used to display the level of various physical quantities, such as temperature, pressure, humidity, voltage, current, and audio levels.
➢ Battery charge indicators: LED bar graph indicators are used in battery-powered devices to display the remaining battery charge level.
➢ Signal strength indicators: In telecommunications and radio frequency applications, LED bar graph indicators are used to display the strength of received signals.
➢ Fault detection: They are used in industrial equipment and machinery to indicate the occurrence of faults or abnormal conditions.

Company Name: UNILAB®

Equipment Name: Microscope

About

- A microscope is an optical instrument used to magnify small objects or details of larger objects, allowing for detailed observation and analysis.

➢ **Principle**:
➢ Microscopes work on the principle of optical magnification, which involves bending light rays to magnify the image of an object.
➢ Each LED represents a specific level of the input signal, and its brightness is proportional to the amplitude of the signal.

➢ **Components**:
➢ Objective lens: The primary lens responsible for magnifying the specimen.
➢ Eyepiece (ocular): The lens at the top of the microscope that the viewer looks through to see the magnified image.
➢ Stage: The platform on which the specimen is placed for observation.
➢ Light source: Provides illumination to the specimen, typically located below the stage in light microscopes.

➢ Condenser: Focuses the light onto the specimen to improve contrast and resolution.
➢ Focus knobs: Adjust the position of the objective lens or stage to bring the specimen into sharp focus.
➢ Magnification changer: Allows for changing the magnification level by rotating different objective lenses into position.

➢ **Applications**:
➢ Biological research: Microscopes are used to study cells, tissues, and microorganisms in fields such as microbiology, cell biology, and histology.
➢ Material science: Microscopes are used to analyze the structure and properties of materials at the microscopic level, including metals, polymers, and ceramics.
➢ Forensics: Microscopes are used in forensic investigations to examine trace evidence such as hairs, fibers, and gunshot residue.
➢ Education: Microscopes are essential tools in classrooms and teaching laboratories for introducing students to the microscopic world and teaching concepts in biology, chemistry, and physics.

Company Name: EQUIPTRONICS

Equipment Name: REMI CM-101 centrifuge

About

- The REMI CM-101 Vortex Spinner is a laboratory instrument used primarily for mixing or agitating small volumes of liquids in test tubes or vials.

➢ The basic principle behind the Vortex Spinner is the creation of a vortex, which is a rotating flow of fluid that creates a whirlpool effect. This vortex helps to mix the contents of the test tube or vial thoroughly.

➢ **Here's how it typically works**:

- The Vortex Spinner consists of a motorized base with a rubber cup or platform on top.
- The test tube or vial containing the liquid to be mixed is placed securely into the rubber cup or platform.
- When the Vortex Spinner is turned on, the motor creates a rapid back-and-forth motion that causes the test tube or vial to shake vigorously.
- This shaking motion generates a vortex within the liquid, causing it to mix thoroughly.

- **Applications of the REMI CM-101 Vortex Spinner include:**

- Cell Culture: Mixing reagents, buffers, or cell suspensions in small volumes for cell culture experiments.
- Biochemistry: Homogenizing samples for protein extraction, DNA isolation, or enzyme assays.
- Microbiology: Agitating bacterial cultures or suspensions for growth or sample preparation.
- Chemistry: Mixing solutions for chemical reactions, such as polymerization or titrations, where thorough mixing is essential for accurate results.
- Molecular Biology: Mixing components for PCR (Polymerase Chain Reaction), DNA sequencing, or other molecular biology techniques.

Company Name:

Equipment Name: INCUBATOR

About

- An incubator is a device used to provide controlled environmental conditions for the growth and maintenance of microbiological cultures, cell cultures, and other biological samples.

➢ **Principle**: Incubators maintain a stable temperature, humidity, and sometimes CO2 or O2 levels to create an environment conducive to the growth and proliferation of microorganisms or cells. The key components include:

➢ Temperature control: Typically achieved using heating elements and a thermostat or digital temperature controller.

➢ Humidity control: Some incubators have built-in water reservoirs or humidity sensors to maintain a specific humidity level.

➢ Ventilation: Ensures adequate air circulation to prevent condensation and promote uniform temperature distribution.

➢ Optional gas control: Incubators used for cell culture may include gas regulators to control CO2 and O2 levels for maintaining physiological conditions.

➢ **Applications**:

➢ Microbiology: Incubators are essential for culturing and identifying bacteria, fungi, and other microorganisms in clinical, research, and industrial settings.

➢ Cell culture: Used for growing and maintaining mammalian cells, plant cells, and other eukaryotic cell types in research laboratories, biotechnology companies, and pharmaceutical industries.

➢ Molecular biology: Incubators are used for various molecular biology techniques such as PCR, DNA/RNA hybridization, and enzyme reactions that require precise temperature control.

➢ Food industry: Incubators are utilized for testing food samples for microbial contamination and studying food spoilage microorganisms.

➢ Environmental research: Incubators can simulate environmental conditions to study the effects of temperature, humidity, and gases on microbial growth and ecosystem dynamics.

Company Name: LABFIR™

Equipment Name: BOD INCUBATOR

About

- A BOD (Biochemical Oxygen Demand) incubator is a specialized type of incubator used to maintain specific environmental conditions for the incubation of biological samples to determine biochemical oxygen demand.

➢ **Principle**:

➢ BOD incubators provide a controlled environment with constant temperature and darkness to incubate samples containing aerobic microorganisms, such as bacteria and fungi, for a specific period.

➢ During incubation, microorganisms consume oxygen as they metabolize organic matter present in the sample.

➢ The rate at which oxygen is consumed over time reflects the biochemical oxygen demand, which is an indicator of the organic pollution level in water samples.

➢ **Components**:

➢ Temperature control: Maintains a stable temperature typically between 20°C to 25°C, which is the standard temperature for BOD measurements.

➢ Darkness: Prevents algal growth in the sample, ensuring accurate BOD measurements.
➢ Air circulation: Ensures uniform temperature distribution and adequate oxygen supply to the samples.
➢ Optional agitation: Some BOD incubators may include shakers or orbital platforms to promote mixing and oxygen diffusion in the sample.
➢ Monitoring and control system: Allows for monitoring temperature, setting incubation parameters, and ensuring environmental stability.

- Applications:

➢ Water quality assessment: BOD incubators are primarily used in environmental and wastewater treatment laboratories to measure the organic pollution level in water samples.
➢ This information helps assess the effectiveness of wastewater treatment processes and monitor water quality in natural ecosystems.

Company Name: PSI

Equipment Name: ORBITAL INCUBATOR SHAKER

About

- An orbital incubator shaker is a laboratory instrument that combines incubation with orbital shaking motion. Here are the basic principles and applications:

- **Principle**:

➢ Orbital incubator shakers maintain a controlled environment (temperature, humidity, and sometimes CO2 levels) for incubating biological samples while simultaneously providing gentle agitation through orbital shaking.

➢ This shaking motion ensures uniform mixing of samples and facilitates optimal growth conditions for cells, microorganisms, and other biological materials.

- **Components**:

➢ Temperature control: Maintains a constant temperature typically between ambient and 60°C, suitable for a wide range of biological applications.

➢ Shaking mechanism: Generates orbital motion, which can be adjusted in speed and amplitude to suit specific experimental requirements.

➢ Platform or tray: Holds sample containers such as flasks, tubes, or microplates securely during shaking.

➢ Optional CO2 control: Some models include CO2 regulation capabilities for cell culture applications requiring physiological conditions.

➢ Monitoring and control system: Allows users to set and monitor temperature, shaking speed, and other parameters.

- **Applications**:

➢ Cell culture: Orbital incubator shakers are commonly used in cell culture laboratoriesfor growing and maintaining adherent and suspension cells in culture flasks or dishes.

Company Name: LABFIR™

Equipment Name: LAMINAR AIR FLOW

About

- Laminar airflow is a controlled airflow technique used in various industries and scientific settings to maintain a clean and sterile working environment. Here are the basic principles and applications:
- **Principle**:

➢ Laminar airflow creates a unidirectional flow of air in a parallel stream, with minimal turbulence. This airflow is achieved by passing air through a HEPA (High Efficiency Particulate Air) filter, which removes particles and microorganisms, ensuring a clean and sterile environment.

- **Components**:

➢ HEPA filter: Removes particles and microorganisms from the air, typically with an efficiency of 99.97% for particles ≥0.3 micrometers.

➢ Blower or fan: Creates the airflow and pushes filtered air through the HEPA filter.

➢ Work area: The area where the clean airflow is directed, typically a laboratory bench, biological safety cabinet, or cleanroom workstation.

➢ Airflow control system: Allows users to adjust the airflow rate and direction to suit specific applications.

- **Applications**:

➢ Laminar airflow systems are commonly used in microbiology, tissue culture, and molecular biology laboratories to maintain a sterile environment for handling sensitive materials and performing experiments requiring strict contamination control.

Company Name:

Equipment Name: UV TRANSILLUMINATOR

About

- A UV transilluminator is a laboratory instrument used to visualize and analyze nucleic acids, such as DNA and RNA, after gel electrophoresis.

- **Principle:**

➢ A UV transilluminator emits ultraviolet (UV) light at specific wavelengths, typically 254 nm or 312 nm, which causes nucleic acids to fluoresce.

➢ The UV light penetrates through the gel, and the fluorescent bands of DNA or RNA become visible to the naked eye or can be captured using a camera or imaging system.

- **Components:**

➢ UV light source: Typically a mercury or UV LED lamp that emits UV light at specific wavelengths.

➢ Filter: Blocks unwanted wavelengths of light and only allows UV light to pass through.

➢ Translucent surface: A surface made of a material such as glass or acrylic, which allows the UV light to pass through and illuminate the gel placed on top.

➢ Safety features: Some UV transilluminators have built-in safety features such as UV-blocking shields or interlock systems to protect users from UV exposure.

- **Principle of operation:**

➢ After gel electrophoresis, the gel containing separated nucleic acids is placed on the translucent surface of the UV transilluminator.

➢ The UV light source is turned on, emitting UV light at the desired wavelength.

➢ The nucleic acids in the gel absorb the UV light and fluoresce, producing visible bands that correspond to the DNA or RNA fragments.

➢ The fluorescent bands can be visually inspected or captured using a camera or imaging system for further analysis.

- **Applications**:

➢ DNA/RNA visualization: UV transilluminators are primarily used for visualizing DNA and RNA fragments separated by gel electrophoresis. This is essential for applications such as DNA sequencing, PCR product analysis, restriction enzyme digestion, and gel extraction.

Company Name: EQUIPTRONICS

Equipment Name: MICRO CONTROLLER BASED DIGITAL pH METER WITH MAGNETIC STIRRER

About

- A microcontroller-based digital pH meter with a magnetic stirrer operates on the principles of pH measurement and agitation to ensure accurate and consistent readings of pH levels in aqueous solutions.

➢ **pH Measurement Principle**:

➢ pH is a measure of the acidity or alkalinity of a solution, determined by the concentration of hydrogen ions (H+) in the solution.

➢ pH meters typically consist of a pH probe (electrode) which generates a voltage proportional to the hydrogen ion concentration, and a reference electrode.

➢ The microcontroller reads the voltage generated by the pH probe and converts it into a pH value using calibration parameters and algorithms stored in its memory.

➢ **Magnetic Stirrer Principle**:

➢ The magnetic stirrer consists of a small magnetic bar placed within the solution and a rotating magnetic field generated by a motor underneath the container.

➢ The rotating magnetic field causes the magnetic bar to spin, providing consistent agitation and mixing of the solution.

➢ This agitation ensures uniform distribution of ions in the solution, leading to accurate pH measurements.

➢ **Microcontroller-Based Control:**

➢ The microcontroller serves as the brain of the pH meter, controlling the measurement process, data acquisition, display, and user interface.

➢ It receives input from the pH probe and processes the data to calculate the pH value.

➢ The microcontroller controls the magnetic stirrer motor, regulating the speed and duration of agitation to ensure optimal mixing for accurate readings.

➢ **Applications:**

➢ Laboratory Analysis: pH meters with magnetic stirrers are used in scientific research laboratories for accurate and precise pH measurements in chemical reactions, titrations, and biological assays.

Company Name: EQUIPTRONICS

Equipment Name: DIGITAL AUTO RANGING CONDUCTIVITY METER WITH MAGNETIC STIRRER

About

➢ The "Digital Auto Ranging Conductivity Meter with Magnetic Stirrer" is a device used to measure the conductivity of a solution, typically in laboratory or industrial settings.

➢ **Basic Principle:**

➢ Conductivity is a measure of a solution's ability to conduct electricity. It is influenced by the concentration of ions present in the solution. The conductivity meter measures the electrical conductivity of the solution by passing a small electric current through it and measuring the resulting voltage drop across two electrodes.

➢ The conductivity of the solution is directly proportional to the electrical conductivity of the solution.

➢ Auto ranging capability allows the meter to automatically adjust its measurement range based on the conductivity of the solution being measured.

➢ **Components:**

➢ Digital display: Displays the conductivity value in units such as Siemens per meter (S/m) or micro-Siemens per centimetre (µS/cm).

➢ Electrodes: These are typically made of a conductive material such as platinum and are immersed in the solution being measured.
➢ Magnetic stirrer: The magnetic stirrer ensures uniform mixing of the solution, which is important for accurate conductivity measurements.

➢ **Applications**:

➢ Water quality testing: Conductivity meters are commonly used to assess the purity and salinity of water in environmental monitoring, drinking water treatment, and wastewater treatment processes.
➢ Chemical process control: In chemical manufacturing processes, conductivity measurements can be used to monitor the concentration of dissolved solids or ions in solutions.
➢ Pharmaceutical industry: Conductivity meters are used to monitor the conductivity of solutions during the production of pharmaceuticals to ensure product quality and consistency.

Company Name: EQUIPTRONICS

Equipment Name: µCONTROLLER COLORIMETER WITH 10 INBUILT FILTERS BATTERY & CHARGER

About

A "µCONTROLLER COLORIMETER WITH 10 INBUILT FILTERS BATTERY & CHARGER" is a device that integrates microcontroller technology with colorimetry principles to measure the concentration of substances in a solution based on the absorbance of light.

➢ **Colorimetry Principle:**
➢ Colorimetry is a technique used to determine the concentration of a substance in a solution by measuring the absorbance or transmission of light through that solution.
➢ It relies on the Beer-Lambert Law, which states that the absorbance of light is directly proportional to the concentration of the absorbing substance and the path length through which the light travels.

➢ **Microcontroller Integration:**

- The integration of a microcontroller allows for precise control of the measurement process and facilitates data processing and analysis.
- The microcontroller is responsible for controlling the light source, detecting the intensity of transmitted or reflected light, and converting these measurements into concentration values.

- **10 Inbuilt Filters:**
- Having 10 inbuilt filters allows the colorimeter to measure absorbance at different wavelengths of light.
- Each filter corresponds to a specific wavelength, enabling the colorimeter to analyze a wide range of substances with different absorption spectra.

- **Battery & Charger:**
- This feature enhances the versatility of the device, allowing it to be used in various settings, including fieldwork, laboratories, and educational environments.

- **Applications:**
- Environmental Monitoring: Colorimeters can be used to monitor water quality by measuring the concentration of pollutants, such as heavy metals, nitrates, and phosphates.
- Clinical Analysis: They are employed in medical laboratories to analyze blood samples, urine samples, and other biological fluids for the presence of specific substances.

Company Name: EQUIPTRONICS

Equipment Name: DISSOLVED OXYGEN METER WITH MAGNETIC STIRRER

About

- A dissolved oxygen meter with a magnetic stirrer is a laboratory instrument used to measure the concentration of dissolved oxygen (DO) in liquids, particularly in water samples.

- **Principle:**
- The dissolved oxygen meter measures the partial pressure of oxygen in the liquid sample using a polarographic sensor.
- The sensor consists of a cathode and an anode separated by an electrolyte solution. When exposed to the sample, oxygen diffuses through a permeable membrane on the cathode and is reduced at the electrode surface, generating a current proportional to the oxygen concentration.
- The meter then calculates the DO concentration based on this current.

- **Components**:
- Probe: Contains the polarographic sensor and a temperature sensor for temperature compensation.
- Meter/display unit: Displays the dissolved oxygen concentration in units such as mg/L or ppm (parts per million).
- Magnetic stirrer: Provides agitation to ensure uniform mixing of the sample and maintain consistent oxygen levels throughout the measurement process.
- Calibration solutions: Used to calibrate the meter to ensure accurate readings.
- Power source: Typically powered by batteries or AC power.

- **Applications:**
- Aquaculture: Monitoring dissolved oxygen levels in fish tanks, ponds, and aquaculture systems to ensure optimal conditions for fish and other aquatic organisms.
- Environmental monitoring: Assessing water quality in rivers, lakes, and oceans to monitor ecosystem health and detect pollution.
- Wastewater treatment: Optimizing aeration processes in wastewater treatment plants to promote microbial activity and facilitate the breakdown of organic matter.
- Industrial processes: Monitoring dissolved oxygen levels in industrial processes such as brewing, fermentation, and chemical manufacturing to optimize process efficiency and product quality.

Company Name: EQUIPTRONICS

Equipment Name: LED BAR GRAPH INDICATOR

About

- A LED bar graph indicator is a display device consisting of multiple Light Emitting Diodes (LEDs) arranged in a linear array or bar graph configuration.

➢ **Principle**:

➢ LED bar graph indicators work on the principle of converting an electrical signal into visible light.

➢ Each LED represents a specific level of the input signal, and its brightness is proportional to the amplitude of the signal.

➢ **Components**:

➢ LEDs: The main components of the indicator, arranged in a linear array or bar graph configuration. Each LED typically corresponds to a specific level or range of the input signal.

➢ Driver circuit: Provides the necessary current and voltage to drive the LEDs based on the input signal.

➢ Input interface: Connects the LED bar graph indicator to the source of the input signal, such as a sensor, microcontroller, or analogue circuit.

➢ Power supply: Provides electrical power to the LED indicator.

➢ **Principle of operation**:

➢ The input signal is received by the LED bar graph indicator.

➢ The driver circuit translates the amplitude of the input signal into corresponding levels of brightness for the LEDs.

➢ Each LED lights up to indicate the level of the input signal it represents. The brightness of the LED is directly proportional to the amplitude of the signal.

➢ **Applications**:

➢ Level indication: LED bar graph indicators are commonly used to display the level of various physical quantities, such as temperature, pressure, humidity, voltage, current, and audio levels.

➢ Battery charge indicators: LED bar graph indicators are used in battery-powered devices to display the remaining battery charge level.
➢ Signal strength indicators: In telecommunications and radio frequency applications, LED bar graph indicators are used to display the strength of received signals.
➢ Fault detection: They are used in industrial equipment and machinery to indicate the occurrence of faults or abnormal conditions.

Company Name: UNILAB®

Instalment Date: 29/03/2019

About

• A icroscope is an optical instrument used to magnify small objects or details of larger objects, allowing for detailed observation and analysis.

➢ **Principle**:
➢ Microscopes work on the principle of optical magnification, which involves bending light rays to magnify the image of an object.
➢ Each LED represents a specific level of the input signal, and its brightness is proportional to the amplitude of the signal.

➢ **Components**:
➢ Objective lens: The primary lens responsible for magnifying the specimen.
➢ Eyepiece (ocular): The lens at the top of the microscope that the viewer looks through to see the magnified image.
➢ Stage: The platform on which the specimen is placed for observation.
➢ Light source: Provides illumination to the specimen, typically located below the stage in light microscopes.
➢ Condenser: Focuses the light onto the specimen to improve contrast and resolution.

➢ Focus knobs: Adjust the position of the objective lens or stage to bring the specimen into sharp focus.
➢ Magnification changer: Allows for changing the magnification level by rotating different objective lenses into position.

➢ **Applications**:
➢ Biological research: Microscopes are used to study cells, tissues, and microorganisms in fields such as microbiology, cell biology, and histology.
➢ Material science: Microscopes are used to analyze the structure and properties of materials at the microscopic level, including metals, polymers, and ceramics.
➢ Forensics: Microscopes are used in forensic investigations to examine trace evidence such as hairs, fibers, and gunshot residue.

Company Name: EQUIPTRONICS

Equipment Name: REMI CM-101 centrifuge

About

- The REMI CM-101 Vortex Spinner is a laboratory instrument used primarily for mixing or agitating small volumes of liquids in test tubes or vials.

➢ The basic principle behind the Vortex Spinner is the creation of a vortex, which is a rotating flow of fluid that creates a whirlpool effect. This vortex helps to mix the contents of the test tube or vial thoroughly.

➢ **Here's how it typically works**:

➢ The Vortex Spinner consists of a motorized base with a rubber cup or platform on top.
➢ The test tube or vial containing the liquid to be mixed is placed securely into the rubber cup or platform.

- When the Vortex Spinner is turned on, the motor creates a rapid back-and-forth motion that causes the test tube or vial to shake vigorously.
- This shaking motion generates a vortex within the liquid, causing it to mix thoroughly.

- **Applications of the REMI CM-101 Vortex Spinner include:**

- Cell Culture: Mixing reagents, buffers, or cell suspensions in small volumes for cell culture experiments.
- Biochemistry: Homogenizing samples for protein extraction, DNA isolation, or enzyme assays.
- Microbiology: Agitating bacterial cultures or suspensions for growth or sample preparation.
- Chemistry: Mixing solutions for chemical reactions, such as polymerization or titrations, where thorough mixing is essential for accurate results.
- Molecular Biology: Mixing components for PCR (Polymerase Chain Reaction), DNA sequencing, or other molecular biology techniques.

Company Name:

Equipment Name: INCUBATOR

About

- An incubator is a device used to provide controlled environmental conditions for the growth and maintenance of microbiological cultures, cell cultures, and other biological samples.

➢ **Principle**: Incubators maintain a stable temperature, humidity, and sometimes CO2 or O2 levels to create an environment conducive to the growth and proliferation of microorganisms or cells. The key components include:

➢ Temperature control: Typically achieved using heating elements and a thermostat or digital temperature controller.

➢ Humidity control: Some incubators have built-in water reservoirs or humidity sensors to maintain a specific humidity level.

➢ Ventilation: Ensures adequate air circulation to prevent condensation and promote uniform temperature distribution.

➢ Optional gas control: Incubators used for cell culture may include gas regulators to control CO2 and O2 levels for maintaining physiological conditions.

➢ **Applications**:

➢ Microbiology: Incubators are essential for culturing and identifying bacteria, fungi, and other microorganisms in clinical, research, and industrial settings.

➢ Cell culture: Used for growing and maintaining mammalian cells, plant cells, and other eukaryotic cell types in research laboratories, biotechnology companies, and pharmaceutical industries.

➢ Molecular biology: Incubators are used for various molecular biology techniques such as PCR, DNA/RNA hybridization, and enzyme reactions that require precise temperature control.

➢ Food industry: Incubators are utilized for testing food samples for microbial contamination and studying food spoilage microorganisms.

➢ Environmental research: Incubators can simulate environmental conditions to study the effects of temperature, humidity, and gases on microbial growth and ecosystem dynamics.

Company Name: LABFIR™

Equipment Name: BOD INCUBATOR

About

• A BOD (Biochemical Oxygen Demand) incubator is a specialized type of incubator used to maintain specific environmental conditions for the incubation of biological samples to determine biochemical oxygen demand.

➢ **Principle**:

➢ BOD incubators provide a controlled environment with constant temperature and darkness to incubate samples containing aerobic microorganisms, such as bacteria and fungi, for a specific period.

➢ During incubation, microorganisms consume oxygen as they metabolize organic matter present in the sample.

➢ The rate at which oxygen is consumed over time reflects the biochemical oxygen demand, which is an indicator of the organic pollution level in water samples.

➢ **Components**:

➢ Temperature control: Maintains a stable temperature typically between 20°C to 25°C, which is the standard temperature for BOD measurements.

➢ Darkness: Prevents algal growth in the sample, ensuring accurate BOD measurements.
➢ Air circulation: Ensures uniform temperature distribution and adequate oxygen supply to the samples.
➢ Optional agitation: Some BOD incubators may include shakers or orbital platforms to promote mixing and oxygen diffusion in the sample.
➢ Monitoring and control system: Allows for monitoring temperature, setting incubation parameters, and ensuring environmental stability.

- Applications:

➢ Water quality assessment: BOD incubators are primarily used in environmental and wastewater treatment laboratories to measure the organic pollution level in water samples.
➢ This information helps assess the effectiveness of wastewater treatment processes and monitor water quality in natural ecosystems.

Company Name: PSI

Equipment Name: ORBITAL INCUBATOR SHAKER

About

- An orbital incubator shaker is a laboratory instrument that combines incubation with orbital shaking motion. Here are the basic principles and applications:

- **Principle**:

➢ Orbital incubator shakers maintain a controlled environment (temperature, humidity, and sometimes CO2 levels) for incubating biological samples while simultaneously providing gentle agitation through orbital shaking.

➢ This shaking motion ensures uniform mixing of samples and facilitates optimal growth conditions for cells, microorganisms, and other biological materials.

- **Components**:

➢ Temperature control: Maintains a constant temperature typically between ambient and 60°C, suitable for a wide range of biological applications.

➢ Shaking mechanism: Generates orbital motion, which can be adjusted in speed and amplitude to suit specific experimental requirements.

➢ Platform or tray: Holds sample containers such as flasks, tubes, or microplates securely during shaking.

➢ Optional CO2 control: Some models include CO2 regulation capabilities for cell culture applications requiring physiological conditions.

➢ Monitoring and control system: Allows users to set and monitor temperature, shaking speed, and other parameters.

- **Applications**:

➢ Cell culture: Orbital incubator shakers are commonly used in cell culture laboratoriesfor growing and maintaining adherent and suspension cells in culture flasks or dishes.

Company Name: LABFIR™

Equipment Name: LAMINAR AIR FLOW

About

- Laminar airflow is a controlled airflow technique used in various industries and scientific settings to maintain a clean and sterile working environment. Here are the basic principles and applications:
- **Principle**:

➢ Laminar airflow creates a unidirectional flow of air in a parallel stream, with minimal turbulence. This airflow is achieved by passing air through a HEPA (High Efficiency Particulate Air) filter, which removes particles and microorganisms, ensuring a clean and sterile environment.

- **Components**:

➢ HEPA filter: Removes particles and microorganisms from the air, typically with an efficiency of 99.97% for particles ≥0.3 micrometers.
➢ Blower or fan: Creates the airflow and pushes filtered air through the HEPA filter.
➢ Work area: The area where the clean airflow is directed, typically a laboratory bench, biological safety cabinet, or cleanroom workstation.
➢ Airflow control system: Allows users to adjust the airflow rate and direction to suit specific applications.

- **Applications**:

➢ Laminar airflow systems are commonly used in microbiology, tissue culture, and molecular biology laboratories to maintain a sterile environment for handling sensitive materials and performing experiments requiring strict contamination control.

Company Name:

Equipment Name: UV TRANSILLUMINATOR

About

- A UV transilluminator is a laboratory instrument used to visualize and analyze nucleic acids, such as DNA and RNA, after gel electrophoresis.

- **Principle**:

➢ A UV transilluminator emits ultraviolet (UV) light at specific wavelengths, typically 254 nm or 312 nm, which causes nucleic acids to fluoresce.

➢ The UV light penetrates through the gel, and the fluorescent bands of DNA or RNA become visible to the naked eye or can be captured using a camera or imaging system.

- **Components**:

➢ UV light source: Typically a mercury or UV LED lamp that emits UV light at specific wavelengths.

➢ Filter: Blocks unwanted wavelengths of light and only allows UV light to pass through.

➢ Translucent surface: A surface made of a material such as glass or acrylic, which allows the UV light to pass through and illuminate the gel placed on top.

➢ Safety features: Some UV transilluminators have built-in safety features such as UV-blocking shields or interlock systems to protect users from UV exposure.

- **Principle of operation:**

➢ After gel electrophoresis, the gel containing separated nucleic acids is placed on the translucent surface of the UV transilluminator.

➢ The UV light source is turned on, emitting UV light at the desired wavelength.

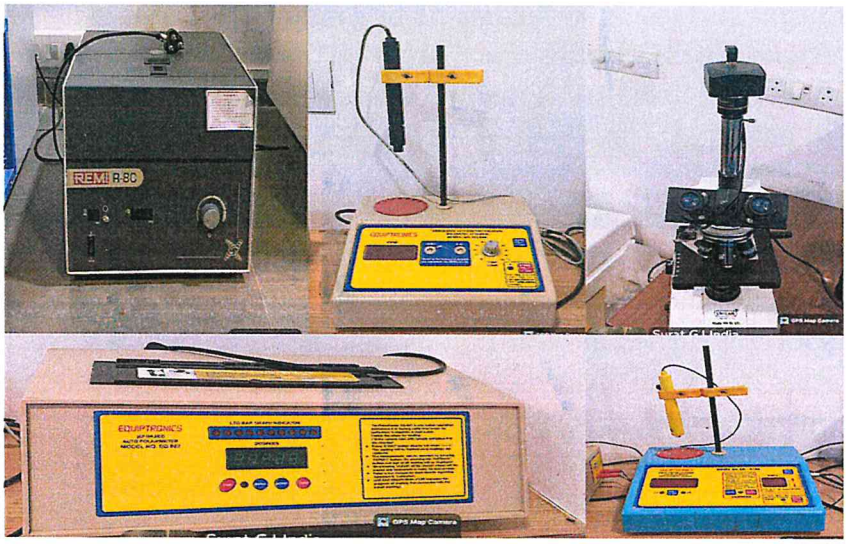
➢ The nucleic acids in the gel absorb the UV light and fluoresce, producing visible bands that correspond to the DNA or RNA fragments.

➢ The fluorescent bands can be visually inspected or captured using a camera or imaging system for further analysis.

- **Applications**:

➢ DNA/RNA visualization: UV transilluminators are primarily used for visualizing DNA and RNA fragments separated by gel electrophoresis. This is essential for applications such as DNA sequencing, PCR product analysis, restriction enzyme digestion, and gel extraction.

Photos with Label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Research and Development Focus

The Central Lab's Research and Development (R&D) focus revolves around pioneering breakthroughs in various fields, from biotechnology to materials science. Leveraging cutting-edge technologies, interdisciplinary collaboration, and innovative methodologies, the lab is committed to pushing the boundaries of knowledge. Key areas of interest include novel drug discovery, renewable energy solutions, advanced materials synthesis, and precision diagnostics. With a mission to address pressing global challenges, such as healthcare disparities and environmental sustainability, the R&D efforts aim to deliver transformative solutions that enhance human well-being and drive societal progress. Through rigorous experimentation and continuous exploration, the Central Lab strives to shape the future of science and innovation.

Collaborations and Applications

Central lab collaborations involve partnerships between different research institutions or organizations to share resources, expertise, and data in a centralized laboratory setting. These collaborations facilitate interdisciplinary research, enabling scientists to tackle complex problems more effectively. They enhance access to specialized equipment, methodologies, and personnel, fostering innovation and accelerating

scientific discoveries. Central labs play a crucial role in various fields such as biotechnology, pharmaceuticals, and environmental science, offering platforms for collaborative research projects and applications. Through centralized efforts, researchers can leverage collective knowledge and resources to address global challenges and drive advancements in technology and medicine.

Incharge **Principal** **Registrar**

Registrar
P P Savani University