

## **Facilities to Support Research**

- 1. Animal House Central Instrumentation**
- 2. Central Instrumentation Laboratory**
- 3. Museum**
- 4. Green House & Herbal garden**
- 5. Business Lab**
- 6. Research Statistics Databases**
- 7. Media Laboratory Studio**
- 8. Theatre**
- 9. Any other facility to support research**

# Animal House Facility

## **Shree S K Patel College of Pharmaceutical Education and Research Animal House Facility**

Shree S K Patel College of Pharmaceutical Education and Research has established a well-equipped animal house facility with the vision to support research and training on animals. The facility was approved by the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, based on the inspection carried out by the CPCSEA Nominee on 01<sup>st</sup> June 2000. The types of animals housed in the facility include rats, and mice, Optimized housing conditions based on the CPCSEA guidelines are being maintained, including a temperature of 25°C (maintained with air conditioners), humidity of 60%, pest control management, power backup, a noise-free environment, separate experimental area and washroom, and a separate storage area. The facility is equipped with equipment such as an incinerator, Automated Hematology 3part Analyzer, Rotary Microtome and Trinocular Microscope with camera. The animals are cared for by a fully dedicated animal caretaker.

## CODE OF ETHICS FOR ANIMAL HOUSE

The Shree S K Patel College of Pharmaceutical Education and Research adheres to the Code of Ethics for Animal House as per the guidelines set by CPCSEA (Committee for the Purpose of Control and Supervision of Experiments on Animals) and IAEC (Institutional Animal Ethics Committee), the following Code of Ethics for the Animal House is to be adhered to:

**Respect for Animal Welfare:** The highest standards of animal welfare must be maintained, ensuring that animals are treated with care, compassion, and respect throughout their stay in the facility.

**Compliance with Regulations:** All activities within the Animal House must comply with the regulations and guidelines provided by the CPCSEA and IAEC to ensure the ethical treatment and use of animals in research and training.

**Appropriate Housing Conditions:** Animals should be provided with appropriate housing conditions that meet their physiological and behavioral needs. This includes maintaining optimal temperature, humidity, lighting, ventilation, and cleanliness.

**Veterinary Care:** The Animal House must have qualified veterinary personnel available to provide necessary medical care, monitor animal health, and ensure prompt treatment in case of illness or injury.

**Ethical Handling and Experimentation:** Animals should be handled with care and subjected to experiments only after due consideration of their welfare and scientific necessity. The principles of the 3Rs (Replacement, Reduction, and Refinement) should be followed to minimize animal usage and optimize experimental procedures.

**Training and Competence:** All personnel involved in animal care and experimentation should receive appropriate training to ensure their competence in handling animals and conducting experiments in an ethical manner.

**Record Keeping and Reporting:** Accurate and detailed records must be maintained for each animal, including their source, housing conditions, health status, experimental procedures, and outcomes. Any adverse events or unexpected outcomes should be promptly reported to the relevant authorities.

**Ethical Review:** All research and training protocols involving animals must undergo ethical review by the IAEC, ensuring that the potential benefits justify the use of animals and that alternatives have been explored.

By adhering to this Code of Ethics, the Shree S K Patel College of Pharmaceutical Education and Research ensures responsible and ethical treatment of animals within its Animal House facility.

## Animal House Facility

### List of equipments

<b>Sr No.</b>	<b>Name of the equipment</b>	<b>Make</b>	<b>Unit Cost (Rs.)</b>	<b>Quantity</b>
1	Incinerator (HSN No.85141000)	Axiva Sichem Biotech Bor German Glassware C/o-Divya Scientific & Chemicals	1,40,700	01
2	Polypropylene Cages (HSN No.84198990)	National Scientific & Surgical Traders	26,125	50
3	Refrigerator (HSN No.8418)	Samsung	18,400	01
4	Agappe Automated Hematology 3part Analyzer BC3000 HSN No.: 90278090	Care Enterprise, Ahmedabad	2,90,000	01
5	Precision Rotary Microtome with Disposable Blade Holder HSN Code: 90279091	Fibretec, Uttaranchal	21,210	01
6	Trinocular Microscope with camera 1.3 MP HSN Code: 90121090	Axiva Sichem Biotech Bor German Glassware C/o-Divya Scientific & Chemicals	72,510	01
<b>Total</b>			<b>5,68,945/-</b>	

**Shree S K Patel College of Pharmaceutical Education and Research  
Animal House Facility**

College of Pharmaceutical Education & Research, Mehsana.  
Inward No. 883 Dt. 8-6-2000

No.25/199-AWD  
Government of India  
Ministry of Social Justice and Empowerment  
(Committee for the Purpose of Control and Supervision of Experiments on Animals)  
\*\*\*\*\*

Shastri Bhavan, New Delhi-110001.  
Dated the 1<sup>st</sup> June, 2000

To  
The Principal,  
Shree S.K.Patil College of  
Pharmaceutical Education and Research,  
Nagalpur Road, State Highway,  
Mehsana, Gujarat-384 002.

**Subject : Registration of Establishments/ Breeders under Rule 5(a) of the "Breeding of and Experiments on Animals (Control and Supervision) Rules 1998".**

Sir,

With reference to your application on the above-mentioned subject, this is to inform that your Establishment is hereby registered for "Research and Teaching on Animals". Your Registration Number is 197/CPCSEA. Mr. Rajesh Bhavsar will be the nominee of the Institutional Animal Ethics Committee of the Establishment.

2. You are requested to quote the above Registration Number in all your future correspondence with the Committee.
3. For further correspondence you are requested to contact Office of CPCSEA at Chennai, at the address given below:

Office of the CPCSEA,  
Ministry of Social Justice and Empowerment,  
C/o Secretary, Animal Welfare Board of India,  
No.11, Venkataraman Street, Srinivasa Avenue,  
R. A Puram, Chennai-600028.

Yours faithfully,




**(DILIP SINGH)**  
**MEMBER SECRETARY(CPCSEA)**  
Tel. No.338759  
Fax No.3384918

Copy to:-1. Mr. Rajesh Bhavsar, 60, Kunj Society, Alkapuri, Vadodara, Gujarat-390 005.

2. Ms. Prema Veeraraghavan, Expert Consultant(CPCSEA), No.11, Venkataraman Street, Srinivasa Avenue, R.A. Puram, Chennai-600028.

Fig Establishment Approval 01<sup>st</sup> June 2000

 **Ganpat University**  
Shree S.K. Patel College of Pharmaceutical Education and Research  
25 years of Cultivating Next-Gen Pharma Profession through Research & Innovations

**Minutes of 26 IAEC Meeting**

(Minutes of IAEC meeting should be uploaded on the website of CCSEA within 15 days after conducting the meeting)

**Name and address of establishment:** Shree S.K. Patel College of Pharmaceutical Education & Research

**Registration number of establishment:** 197/PO/Ere/S/2000/CCSEA Dt.1<sup>st</sup> June 2000

**Date and Time of the IAEC Meeting:** 18/02/2023

**Venue:** SKPCPER conference Room

**(1) To confirm the minutes of the 25<sup>th</sup> meeting of the IAEC held on 16 July 2022 and To approve the animals for experimental usage.**  
*Minutes of the twenty fifth meeting of the IAEC held on 16 July 2022 was read, confirmed by all the members and action taken report was noted and approved.*

**(2) To approve the animals for experimental usage.**  
*No proposals (form-B) were received.*

**(3) Discussions about replacement of IAEC members**  
*Mr. Arijit Chaudhary (Member secretary of IAEC SKPCPER) resigned and left college which was informed to committee and committee suggested the name of Ms. Heli Amin, Assistant Professor (M. Pharm Pharmacology).*  
*Ms. Heli Amin, also kindly consented to shoulder the responsibility as member secretary.*  
*(One page biodata and consent letter attached as Annexure-I).*

**(4) Any other matters with permission of Chairman.**  
Members noted the change in name of CPCSEA to CCSEA.  
The meeting ended with vote of thanks to all the members for sparing valuable time and their suggestions.

Page No 01 of 02

Ganpat Vidyanagar - 384 012, Mehsana-Gandhinagar Highway, District: Mehsana, Gujarat, INDIA  
Phone: +91 2762-226002 | Toll Free No.: 1800 233 12345  
Email: info.skpcper@guni.ac.in | Website: www.skpcper.ac.in

**INSTITUTIONAL ANIMAL ETHICS COMMITTEE (IAEC) MEETING**

**Animal House Registration No. 197/PO/ERe/S/2000/CPCSEA**  
The Twenty sixth meeting of institutional Animal Ethics Committee (IAEC) of Shree S.K. Patel College of Pharmaceutical Education & Research, Ganpat University holds on Saturday 18<sup>th</sup> February, 2023(10:30 A.M.) at office of Principal SKPCPER, Ganpat University, Kherva.  
Following members are present in the meeting:

Sr. No.	Name	Designation	Signature
1.	Dr. S.S Pancholi	Chairman cum Scientist from different discipline	
2.	Dr. Deepak Ratwani	Main Nominee	
3.	Dr. D. Sivaraman	Link Nominee	
4.	Dr. Samir C Patel	Scientist from outside the Institute	
5.	Prof. Dr. Jigna Shah	Socially aware Member	
6.	Dr. Bhupendra Prajapati	Biological Scientist	
7.	Dr. Nilesh J. Patel	Scientist from different discipline	
8.	Dr. Ganesh D Patel	Veterinarian	
9.	Ms. Heli Amin	Incharge of Animal House Facility	

**Fig Most recent Approval of IAEC Approval (2023-01)**



**Fig Animal House Facility Area**

# Central Instrumentation Laboratory

## Central Instrumentation Laboratory

### About:

Central Instrumentation Laboratory of Shree S K Patel College of Pharmaceutical education and research was established in the year 2000 to support experimental research for various departments of the institutes by providing sophisticated instruments. It is equipped with various instruments necessary to carry out research work. The faculty and students engage in various research works leading to dissertation, publication, industry support and IPR using the instruments available in the central instrument room.

### Objectives:

The main objectives of the instrumentation laboratories are to

- Carry out the research work in the different areas and strengthen the research performance of the institute.
- Train students and faculty in instrument operation
- Organizing training programmes to enhance the technical skills of scientific community

### Outcomes:

- Skillful students/faculty

<b>Major Equipments</b>	
1.	HPLC System Shimadzu prominence
2.	UV Visible Spectrophotometer model UV 1601, 1700, 1800 Shimadzu
3.	F.B.D. machine oil free compressor perestatic pump Extra change part
4.	Brookfield Viscometer Model LVDV2P230 with brookfield small sample adeptor 18/13R
5.	HPTLC instrument Win CATS Planar Chromatography

6.	Fourier transform Infra-red Spectrophotometer Model: FTIR - 8400s Shimadzu
7.	Gas Chromatograph Model: DC 14BPTF Shimadzu
8.	Spectro Fluorophotometer Model: 1501 Shimadzu
9.	Differential Scanning Calorimeter with Software and Part Shimadzu, DSC - 230VAC with All parts
10.	Advanced Lab Spray drier main unit LU 222 & Air Compressor and Software
11.	Dissolution Test Apt Model 8Ltr Electro lab
12.	Tablet Hardness Tester Model PTB 3111
13.	Benchtop 4K ZL Laboratory Freeze Dryer 220/50HZ with Leybold 2.5E Vacuum Pump - 65 LPM 2 Stage and other Accessories
14.	HPLC System with PDA Detector Shimadzu LC - 2010 CHT High Throughput
15.	Dissolution Tester 8 Station Electro lab Model EDT 08 Lx Std Access.
16.	Avastin Inc. Canada Model Emulsifier c5 High Pressure Homogenizer Pressure Adjustable by pneumatic Control
17.	Diffusion Cell Apparatus Model EDC-07
18.	HPLC, LC -2030C Plus L21445782531
19.	Texture Analyzer 50kg Load With Software
20.	Rotary Tablet Machine 12 Station with D tooling
<b>Other Equipments</b>	
1.	Flame Photometer
2.	Potentiometer
3.	pH Meter
4.	Conductometer
5.	Incubator Co2, AJAUTO Co2 6.2CF 230VCE
6.	Cell Analyzer
7.	Mini Press II (MT) With Enlp Turret With 24 sets of P&D any size & shape 10 Dummy die
8.	Horizontal Main Drive HND/002/99/81 universal creating, wet granulator, cub mixer, pelletizer, shive shaker
9.	Digital balance SARTORIUS MODEL: CP-225/D CAP: 220gm

Testing services and analytical work offered in Instrument lab:

- Sample analysis by DSC, FTIR, HPLC, HPTL.
- Analytical method development on different instruments
- Support for industrial projects.

## Gallery and highlights of the major equipments:

### Texture analyzer

A texture analyzer is a device used to measure and analyze the physical properties of food and pharmaceutical products related to their texture. It provides objective data on attributes such as hardness, chewiness, stickiness, crispness, and many other textural characteristics. In the food industry, texture analyzers are widely used during the product development process to ensure consistent quality and optimize the sensory experience of food products. They help manufacturers understand how ingredients, processing techniques, and storage conditions affect the texture of their products. For example, a texture analyzer can measure the tenderness of meat, the crunchiness of snacks, or the viscosity of sauces.

In the pharmaceutical industry, texture analyzers play a crucial role in quality control and formulation development. They are used to evaluate the texture and consistency of various pharmaceutical products such as tablets, gels, creams, and ointments. This information is essential for ensuring the proper dosage form, ease of administration, and patient acceptance.



### UV visible spectrophotometer

A UV-visible spectrophotometer is a scientific instrument used to measure the absorption or transmission of light by a sample in the ultraviolet (UV) and visible (visible light) regions of the electromagnetic spectrum. It is a versatile tool employed in various fields such as chemistry, biochemistry, pharmaceuticals, environmental analysis, and materials science.



### High performance Liquid Chromatography

High-performance liquid chromatography (HPLC) is a powerful analytical technique used to separate, identify, and quantify components in a mixture. It is widely employed in various fields such as pharmaceuticals, environmental analysis, food and beverage, forensic science, and many others. HPLC is based on the principle of chromatography, which involves the separation of components in a sample based on their differential interactions with a stationary phase and a mobile phase.



### High performance thin layer chromatography

High-performance thin-layer chromatography (HPTLC) is a variation of thin-layer chromatography (TLC) that utilizes advanced techniques and specialized equipment to improve the separation and analysis of components in a mixture. It is a widely used analytical technique in various industries, including pharmaceuticals, forensics, food and beverage, and environmental analysis.



## Gas Chromatography



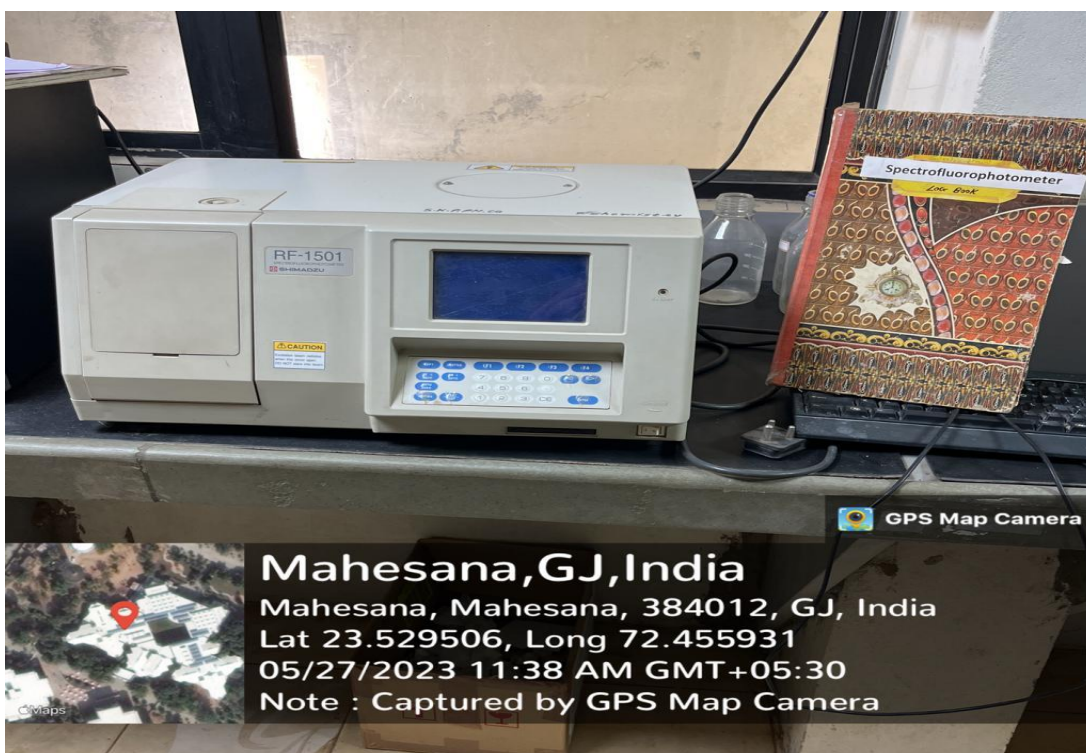
## FT-IR Spectrophotometer

FT-IR (Fourier Transform Infrared) spectrophotometer is an analytical instrument used to measure the absorption, transmission, and reflection of infrared radiation by a sample. It is a powerful technique employed in various fields, including chemistry, materials science, pharmaceuticals, forensic science, and environmental analysis.



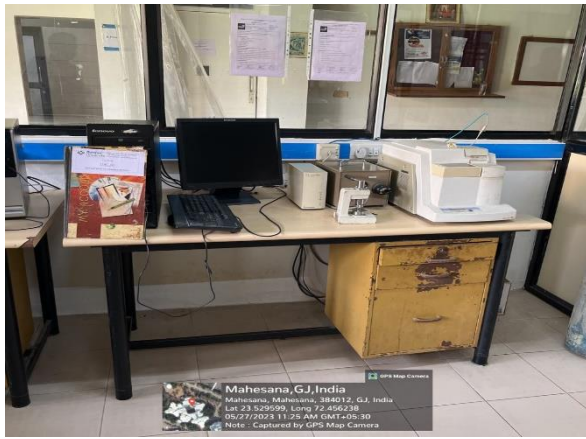
## Spectrofluorometer

A spectrofluorometer is an analytical instrument used to measure the fluorescence properties of a sample. It is widely utilized in various scientific fields, including chemistry, biochemistry, pharmaceuticals, materials science, and environmental analysis. Spectrofluorometry provides valuable information about the structure, composition, and behavior of fluorescent molecules in a sample.



## Differential scanning calorimetry (DSC)

Differential scanning calorimetry (DSC) is a technique used to measure thermodynamics of solid or liquid phase transitions that produce or absorb heat. DSC is commonly applied in the biopharmaceutical setting for the characterization and engineering of manufacturable drug products.



## Lyophilizer

A lyophilizer is a device to freeze-dry a substance that means the removal of ice or other frozen solvents from a material by avoiding the liquid state through sublimation, i.e., direct conversion from ice to vapor. Freeze drying is the gentlest process for drying products.



## High speed Homogenizer

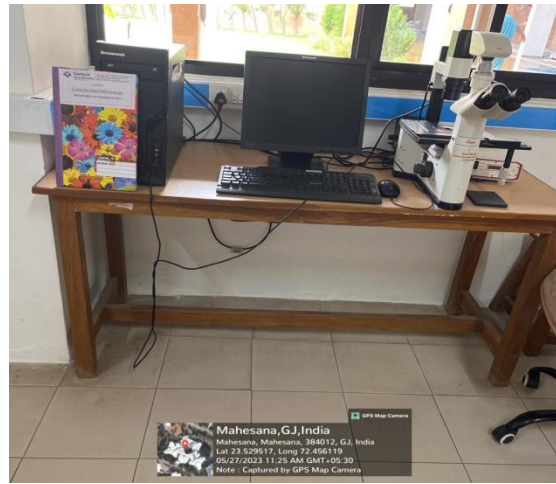
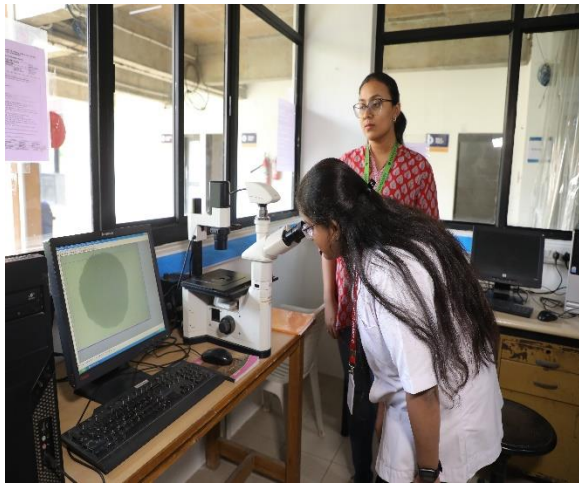
A high-speed homogenizer, also known as a high-shear mixer or an emulsifier, is a device used in various industries for the mixing, blending, emulsifying, and dispersing of substances. It is commonly employed in the pharmaceutical, food, cosmetic, and chemical industries.

The high-speed homogenizer works by applying mechanical shear forces and turbulence to the substance being processed. It consists of a motor-driven rotor that rotates at high speeds, typically ranging from several thousand to tens of thousands of revolutions per minute (RPM). The rotor is equipped with blades or a stator that creates a shearing action as the substance passes through the narrow gap between the rotor and stator.



### **Lieca Inverted Microscope**

An inverted microscope differs from a conventional upright microscope in terms of its optical path. In an inverted microscope, the light source and condenser are positioned above the specimen stage, while the objective lens and imaging system are located below the stage. This configuration allows for the examination of samples in containers such as petri dishes, well plates, or culture flasks.



### Brookfield Viscometer

A Brookfield viscometer is a type of viscometer, which is an instrument used to measure the viscosity or resistance to flow of fluids. Brookfield viscometers operate based on the principle of rotational viscometry. They measure the torque required to rotate a spindle or bob immersed in the sample fluid at a constant speed. The resistance encountered by the spindle is directly related to the viscosity of the fluid.

### Tablet testing apparatus

The PTB 311E „3-in-1“ tablet hardness testing instrument is doubtless one of the most popular instruments for measuring thickness up to 15mm, diameter (or Length) up to 40mm (optional 70 mm), and hardness up to 300N (optional up to 500N). The PTB 311E is designed in compliance with the USP and EP monographs. The actual design includes the possibility to enter a product code and a date and time stamp onto each protocol.



# MUSEUM

Department of Pharmacognosy deals with the study of crude drugs obtained from natural sources such as Plants, Animals and minerals. Shree S. K. Patel College of Pharmaceutical Education & Research has Pharmacognosy museum at first floor (Department of Pharmacognosy) Room No. 112, established in the year 2000. The museum displays dried crude drugs samples preserved in glass jar along with their pharmacognostic details.

To study the morphology of crude drug such as Cardamom, Liquorice, Fennel, Nutmeg, Ajowan, Black Catechu, Garlic, Amla, Kurchi, Coriander, Sandalwood, Rhubarb, Sarsaparilla, Senna, gentian, Quassia, Saffron, Shatavari, Punarnava etc, more than 130 species of crude drugs are displayed in museum.

Apart from the drugs, various models, permanent slides, herbarium sheets and Charts are also displayed in the museum.

Sr. No.	Name of Plant	Sr. No.	Name of Plant	Sr. No.	Name of Plant
1	Agar	24	Clearing nut	47	Kalmegh
2	Aconite	25	Cinchona Bark	48	Jatamansi
3	Ashwagandha	26	Dioscorea	49	Kurchi
4	Arjuna	27	Colocynth	50	Liquorice
5	Black catechu	28	Cumin	51	Nutmeg
6	Bael	29	Ephedra	52	Nuxvomica
7	Baheda	30	Digitalis	53	Vasaca
8	Anise	31	Colchicum	54	Kutki
9	Amla	32	Fennel	55	Pale catechu
10	Chhota gokhru	33	Ergot	56	Salai guggul
11	Bara gokhru	34	European diil	57	Shatavari
12	Barberis Root	35	Benzoin	58	Shellac
13	Bavchi	36	Aloe	59	Sandal wood
14	Black pepper	37	Indian gum	60	Pyrethrum
15	Brahmi	38	Guar gum	61	Rhubarb
16	Cassia	39	Harde	62	Senega
17	Clove	40	Hycoscyamus	63	Vidang
18	Cardamom	41	Pipali	64	Senna
19	Coca butter	42	Ipecac	65	Stramonium
20	Chirata	43	Lobelia	66	Turmeric
21	Tamalpatra	44	Asafoetida	67	Shankpushpi
22	Myrrh	45	Wool	68	Squill
23	Opium	46	Rasna	69	Jalap

<b>Sr. No.</b>	<b>Name of Plant</b>	<b>Sr. No.</b>	<b>Name of Plant</b>
70	Quassia	104	Kalijiri
71	Guggul	105	
72	Ghoda vaj	106	Picrorhiza
73	Bhang	107	Valerian
74	Silk	108	Brahmi
75	Turpeth	109	Hyoscyamus
76	Aloe vera	110	Indian podophyllum
77	Chakramadu seed	111	wild cherry
78	Jati phal	112	Indrajav
79	Linseed	113	Methi
80	Bhilama	114	Vata twak
81	Pinus species	115	Safed musli
82	Punarnava	116	Guduchi
83	Kino (vijaysar)	117	Ativisha
84	Gudmar	118	Castor seed
85	Ashopalav	119	Katphala
86	Turpethum	120	karkat shring
87	Bada tagra	121	Chameli
88	Darudi	122	Pippali root
89	Kaolin	123	Jyotismati seed
90	Rauwolfia	124	Mamejavo
91	Ashoka Bark	125	Viadarikand
92	Dhamaso	126	Kustha
93	Dhatakipuspa	127	Pushkaramula
94	Colophony	128	Kali musali
95	Nagarmoth	129	Pashanbheda
96	Gentian	130	Palash seed
97	Isabgol	131	Chanothi
98	Talispatra	132	Jivanti
99	Chitrak	133	khadirtwak
100	Maize starch	134	Kakoli
101	Palash	135	Karen seed
102	Kantakari	136	Akkalkara
103	Epherda		



# GREENHOUSE

A greenhouse is not just a tool for the home gardener to extend the growing season, it can be an incredibly valuable educational tool, too! Growing plants in a greenhouse is not only good for mental and physical wellbeing, but it can teach students responsibility, plant biology, entrepreneurship, and more.

A greenhouse is a structure which allows people to regulate climatic conditions, such as temperature and humidity. There are many different designs of greenhouses, however in general these buildings include large areas of transparent material to capture the light and heat of the sun.

Ganpat University has established greenhouse near the Krishi Vigyan Kendra which demonstrates the structure and benefits of greenhouse to students.



23.529913; 72.455750 NW 0  
GJ SH 73, Gujarat 384001, India






**KRISHI VIGYAN KENDRA, MEHSANA**  
 (Karnataka Council of Agricultural Research, Mysore)  
 વૃદ્ધિ વિજ્ઞાન કેન્દ્ર, મેહસાણા (ગુજરાત), મહેસાણા

**ગોળાકાર**

ગોળાકાર મહત્વના વાણિજ્યિક પાકોમાં કે. વાણિજ્યિક સમસ્યાઓ સંબંધિત સલાહકારી સેવાઓ આપવા માટે સ્થાપિત કરવામાં આવેલ છે. આ સેવાઓને વધુ સુવ્યવસ્થિત અને સુવ્યવસ્થિત બનાવવા માટે આ કેન્દ્રની સેવાઓ આપવામાં આવે છે.

**સેવાઓ:**

- કૃષિ સમસ્યાઓ સંબંધિત સલાહકારી સેવાઓ આપવામાં આવે છે.
- કૃષિ સમસ્યાઓ સંબંધિત સલાહકારી સેવાઓ આપવામાં આવે છે.
- કૃષિ સમસ્યાઓ સંબંધિત સલાહકારી સેવાઓ આપવામાં આવે છે.
- કૃષિ સમસ્યાઓ સંબંધિત સલાહકારી સેવાઓ આપવામાં આવે છે.
- કૃષિ સમસ્યાઓ સંબંધિત સલાહકારી સેવાઓ આપવામાં આવે છે.
- કૃષિ સમસ્યાઓ સંબંધિત સલાહકારી સેવાઓ આપવામાં આવે છે.

 **GPS Map Camera**



**મેહસાણા, ગુજરાત, ભારત**  
**GFF5+3GJ, મેહસાણા, ગુજરાત 384001, ભારત**  
**Lat 23.522689°**  
**Long 72.458767°**  
**17/03/23 09:06 AM GMT +05:30**

1	Arjuna <i>Terminalia arjuna</i> Combretaceae	26	Indrajav / འོ-རྒྱལ་བ་ <i>Holarrhena pubescens</i> Apocynaceae
2	Indrajav Mitho <i>Wrightia tinctoria</i> Apocynaceae	27	Palash/Kesudo <i>Butea monosperma</i> Fabaceae
3	Kevado <i>Pandanus odoratissimus</i> Pandanaceae	28	Guggulu <i>Commiphora wightii</i> Burseraceae
4	Hadjhod <i>Cissus quadrangularis</i> Vitaceae	29	Chanothi <i>Abrus precatorius</i> Fabaceae
5	Shatavari <i>Asparagus racemosus</i> Liliaceae	30	Chitrak <i>Plumbago zeylanica</i> Plumbaginaceae
6	Dumvel <i>Tylophora indica</i> Apocynaceae	31	Bakuchi <i>Psoralea corilyfolia</i> Fabaceae
7	Bahera <i>Terminalia balerica</i> Combretaceae	32	Gotukola/Brahmi <i>Centella asiatica</i> Apeaceae
8	Pennywort <i>Bacopa monnieri</i> Scrophulareaceae	33	Bhringaraj/ <i>Eclipta alba</i> Asteraceae
9	Malkangani <i>Celastrus peniculatus</i> Celastraceae	34	Guduchi <i>Tinospora cordifolia</i> Menispermaceae
10	Mamejao <i>Enicostigma littorale Blume.</i> Gentianaceae	35	Kari patta <i>Murraya koenigii</i> Rutaceae
11	Long pepper <i>Pipper longum</i> Piperaceae	36	Karanj <i>Pongamia pinnata,</i> Fabaceae
12	Madhunashini <i>Gymnema Sylvester</i> Apocynaceae	37	Sarpaghandha <i>Rawolfia serpentina</i> Apocynaceae
13	Lemongrass <i>Cymbopogon flexuosus</i> Poaceae	38	Pamarosa <i>Cymbopogon martini</i> Poaceae
14	Mogara <i>Jasminum sambac</i> Oleaceae	39	Lasan vel <i>Mansoa alliacea,</i> Bignoniaceae
15	Porcupine flower <i>Barleria prionitis</i> Acanthaceae	40	Ajmapan <i>Trachyspermum roxgughianum</i> Apiaceae
16	Khas <i>Chrysopogon zizanioides</i> Poaceae	41	Sindur <i>Bixa orellana,</i> Bixaceae
17	Aprajita <i>Clitoria ternatea</i>	42	Vasaka <i>Adhatoda vasika</i>

	Fabaceae		Apocynaceae
18	Saragavo/drumstick <i>Moringa oleifera</i> Moringaceae	43	Tulsi <i>Ocimum sanctum</i> Lamiaceae
19	Aritha <i>Sapindus mukorossi</i> Sapindaceae	44	Garmalo <i>Cassia fistula</i> leguminoceae
20	Parnphuti <i>Bryophyllum pinnatum</i> Crassulaceae	45	Tamarind <i>Tamarindus indica</i> Fabaceae
21	Borasalli <i>Mimusops elengi</i> Sapotaceae	46	Saptparni <i>Alstonia scholaris</i> Apocynaceae
22	Kanchanar <i>Bauhinia variegata</i> Fabaceae	47	Ashok <i>Saraca asoca</i> Caesalpinioideae
23	Puarnava <i>Boerhavia diffusa</i> Nyctagenaceae	48	Chota gokharu <i>Tribulus terrestris</i> Zygophylaceae
24	Apamargh/Aghedo <i>Achyranthus aspera</i> Amaranthaceae	49	Neem <i>Azadirachta indica</i> Meliaceae
25	Siris <i>Albizzia lebeck</i> Fabaceae	50	Paras pippalo <i>Thespesia populnea</i> Malvaceae





કાચનાર  
Botanical Name - *Bauhinia variegata*  
Family - Fabaceae  
Common Name -  
Hindi : Kachanara

GPS Map Camera



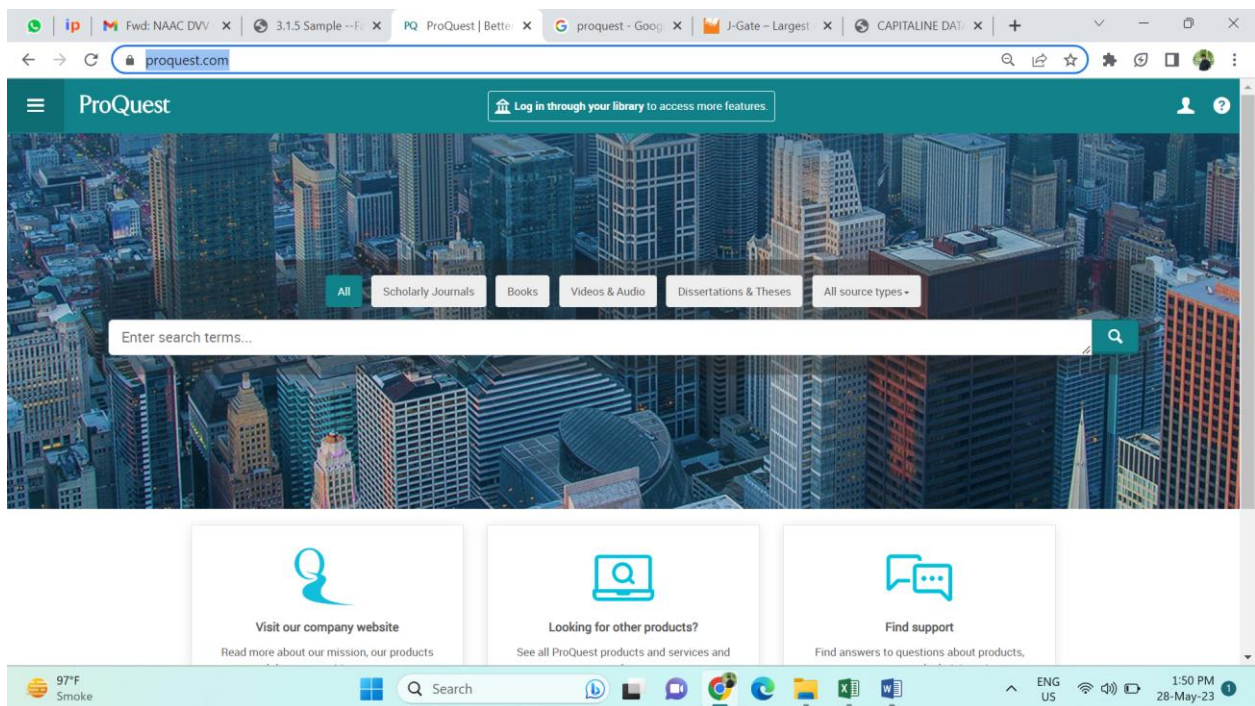
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GFH4+QHM, Mehsana, Gujarat 384001, India  
Lat 23.529533°  
Long 72.456497°  
27/05/23 01:02 PM GMT +05:30

Google

# Journal & Databases:

## Proquest:

S.No	Name of the Database	Content accessible	URL of Website
1	Proquest	(For Journal, Research Article) Ongoing	<a href="https://www.proquest.com/">https://www.proquest.com/</a>
2	Capitaline	(For Financial Databases) Ongoing	<a href="https://www.capitaline.com/index.aspx">https://www.capitaline.com/index.aspx</a>
3	JGate	For Journal, Research Article Discontinued 2018	<a href="https://jgateplus.com/home/">https://jgateplus.com/home/</a>



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**Live News**  
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27-May (07:47)  
The Phosphate Company consolidated net profit rises 570.00% in the March 2023 quarter

**Heat Map**  
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**Dr. Balaram Bora**  
Associate Professor & HOD, Department of Management Studies, IITM, Tiruvarur

**Ganpat University – Shree S. K. Patel College of Pharmaceutical Education  
& Research**

**Department Expertise**

**Department of Pharmaceutics & Technology**

Novel and conventional drug delivery systems

- Nano and micro particulate Drug Delivery systems
- Gastro Retentive Drug Delivery systems
- Transdermal Drug Delivery systems
- Colon Targeted Drug Delivery systems

In situ Drug Delivery systems

- Lipid Base Drug Delivery systems
- Self Emulsifying Drug Delivery systems
- Solid Dispersion and Complexation
- Bioavailability Enhancement

**Pharmaceutical Chemistry & Quality Assurance**

- Analytical method development and validation
- Bioanalytical method development and Validation
- Impurity Profiling
- Standardization and analysis of herbal formulation
- Stability indicating assay method development for bulk and dosage form
- Dissolution studies
- Stability studies of active pharmaceutical ingredients and dosage forms as per ICH guidelines
- Forced degradation studies (Stress conditions) and accelerated stability testing of API and dosage forms
- Drug Design & Computational chemistry
- Synthesis of heterocyclic molecules

**Pharmacognosy**

- Development of quality control parameters for the herbals
- Development and evaluation of novel drug delivery for the classical herbs and ayurvedic formulations
- Phytopharmacological investigations of the herbal drugs
- Development and validation of Chromatographic Analytical Methods for the polyherbal formulations.
- Cytotoxic Assay's and Pharmacological Evaluation of Herbals.

# Pharmacology

## In-vitro studies:

- Aldose Reductase inhibition using rats lens, PPAR-gamma agonistic assay, Anti-Stroke using PC12 cell line, Antidiabetic activity, Cytotoxicity studies, Antioxidant activity, Enzyme inhibitory activity, Chromosomal aberration assay, Ames test, Micronucleus assay, Hepatoprotective activity, Antiobesity activity etc.

## In-vivo studies:

- Inflammation disease models: - General models of inflammation - Allergic asthma in vivo model - Arthritis in-vivo inflammation models - Inflammatory Bowel Disease (IBD) in-vivo models.
- CNS models: - Cognition enhancer - Antidepressant - Anti-anxiety - Sedative/hypnotics - Anti convulsant - Anti psychotics.
- Pain models: - Nociception pain models using hot plate and tail flick models - Neuropathic pain model- diabetic neuropathy - Inflammatory pain model- carrageenan and formaldehyde.
- Ischemia reperfusion injury model: - stroke and Myocardial Ischemia.
- Endocrine disease model: - single dose of STZ treated Type-I diabetes model - STZ+ HFD model for Type-II diabetes - HFD model for obesity.
- CVS models: -Coronary artery ligation model for myocardial infarction - DOCA-salt induced hypertension in rats - Fructose induced hypertension in rats - Two Kidney One Clip model for hypertension.
- Toxicity studies: - Single, repeated dose toxicity study - Dermal Irritation toxicity study - Biocompatibility study - Mutagenicity - Genotoxicity Preclinical Contract Research Organization (CRO)
- Pre-clinical in vitro and in vivo assays
- Preparation of protocol for clinical studies viz. Bioavailability and Bioequivalence studies and Drug Master File/Dossier for excipients and/or drug substance according to different regulatory agencies.

# List of Sophisticated Instruments with Description

## Pharmaceutics

Sr. No	Instrument name	Description of instrument Make model and application (50-100 words)
01	Benchtop Laboratory Freeze Dryer	SP Industries, Benchtop 4K ZL For the Freeze drying of unstable or heat-sensitive drugs and biologicals
02	High Pressure Homogenizer	Avestin Inc. Canada Model Emulsiflex c5 It helps to disrupt the cell, reduce the particle size and to make emulsions
03	Advanced Lab Spray dryer	Labultima LU222, Multiple applications such as spray dry Excipient production, drying of nanosuspension, encapsulation, dry powder inhaler ect.,
04	Tablet Compression Machine	Karnavati Engineering ltd, Mini Press II (MT) With Enlp Turret With 24 sets of P&D, It used in compress pharmaceutical powder formulations into the form of tablets
05	High Speed Homogenizer	Kinematica AG Dispersing and Mixing technology Homogenizer Machine ( Polytron syst. Pt2500e, 230 V/EU To reduce the particle size, homogenization of tissue and emulsion
06	Fluid bed dryer	Cronimach Machinery Use for the drying and coating of granules
07	Diffusion cell Apparatus	Janki Impex PVT ltd, Diffusion cell Apparatus Model EDC-07, Testing release of drugs from ointments or creams and other semi solid dosage forms.
08	DSC	Shimadzu asia Pacific, It is used for the study of phase transitions such as melting, exothermic decompositions, and glass transitions.
09	Viscometer	Brookfield Viscometer Model LVDV2P230 with brookfield small sample adeptor 18/13R, Measurement of viscosity at given shear stress
10	Dissolution tester 8 Station	Electrolab Model EDT 08 Lx Std Access. Dissolution testing of capsule, tablets and suspension dosage forms
11	UV - Vis Spectrophotometer	Shimadzu Model UV - 1800, Quantitative measurement of drug substances and measurement of percentage transmission

12	Leica Microscope	Leica DM IL Fluo 3Pl. Microscope, For the measure the particle and globule size, study of aggregation, surface morphology evaluation ect.,
13	Stability Chamber	Labtronic, model CIC 63 Size 20"x18"x32" Cintex Make, To perform the stability of various dosage forms

### Pharmaceutical Analysis/Chemistry

Sr. No	Instrument name	Description of instrument
01	HPTLC	CAMAG High Performance Thin Layer Chromatograph system (Switzerland) with Linomat 5 semiautomatic sample applicator, Camag TLC Scanner 3, Camag flat bottom and twin-trough developing chamber, dual wavelength UV cabinet, Camag win-CATS software. HPTLC is one of the most widely applied methods for the qualitative as well as quantitative analysis of pharmaceutical drugs and products. Advantages includes photo documentation, simplicity, low costs, parallel analysis of samples, high sample capacity, rapidly obtained results, and possibility of multiple detection.
02	HPLC	HPLC System with PDA Detector Shimadzu LC - 2010 CHT High Throughput Shimadzu (Asia Pacific) with auto sampler. HPLC is used for the quantification of drug substances and drug products. It is used for identification, quantification, impurity checking, stability testing, multicomponent analysis, degradation studies, dissolution study etc.
03	Ion Chromatograph (IC)	Metrohm 930 Compact Ion Chromatograph. It is used for the determination of cations, anions and polar substances.
04	Infrared Spectrophotometer (IR)	Fourier Transform Infrared Spectrophotometer Model: FTIR - 8400s Shimadzu-206-72400- 38. It is used for the qualitative analysis of simple organic compounds.
05	Gas Chromatograph (GC)	Model : DC 14BPTF Shimadzu 221- 41675- 39: GC. It is used for the qualitative as well as quantitative analysis of so many organic and pharmaceutical drugs having volatility characteristics.
06	Spectrofluorimeter	Spectro Fluorophotometer Model : 1501 Shimadzu. It is used for the measurement of fluorescence intensity of many compounds having native fluorescence property or fluorescence property after suitable chemical treatment.
07	UV Visible Spectrophotometer	Shimadzu 1601 Double beam UV Visible Spectrophotometer with UV Probe 2.0. It is used for the quantitative estimation of many compounds by measurement of wavelength and absorbance.
08	UV Visible	Shimadzu 1700 Double beam UV Visible Spectrophotometer with

	Spectrophotometer	UV Probe 2.0. It is used for the quantitative estimation of many compounds by measurement of wavelength and absorbance.
09	UV Visible Spectrophotometer	Shimadzu 1800 Double beam UV Visible Spectrophotometer with UV Probe 2.0. It is used for the quantitative estimation of many compounds by measurement of wavelength and absorbance.
10	HPLC	Prominence I series HPLC, LC-2030C Plus. HPLC is used for the quantification of drug substances and drug products. It is used for identification, quantification, impurity checking, stability testing, multicomponent analysis, degradation studies, dissolution study etc.
11	HPLC	Shimadzu Prominence system. HPLC is used for the quantification of drug substances and drug products. It is used for identification, quantification, impurity checking, stability testing, multicomponent analysis, degradation studies, dissolution study etc.
12	Analytical Balance	Sartorius make Electronic Analytical Balance model: CP 224 S cap: 220 gm Accuracy : 0.1 mg, It is used for the weighing of powder with high accuracy
13	Water Purification System	TKA water Purification System. It is used for removal of salts and other elements from the water.
14	Microwave Synthesis Instrument	Catalyst System make Scientific Microwave Synthesis Model: CATA R Capacity 31 Liters ( 1.1 Cubic Ft ). It is used for the microscale synthesis of organic compounds with green chemistry concept.
15	Rotary Evaporator	Eriction and Instrumentation Engineers make Rotary Evaporator with all necessary Accessories. It is used for removal of solvent from the sample.

## Pharmacognosy

<b>Sr. No</b>	<b>Instrument name</b>	<b>Description of instrument</b>
01	Rotary Evaporator	Rotary Evaporator with all necessary Accessories. It is used for removal of solvent from the extract.
02	Trinocular Microscope with Camera	Divya Scientific & Chem. Qualitative and Quantitative microscopical evaluation of powder formulation can be done with high resolution Photograph

# MUIS

## Instruments

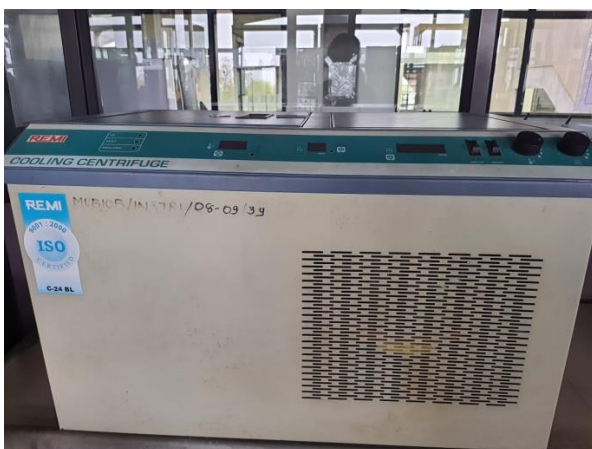
(MB/BT/BOTANY/PGDMLT-Student Laboratory)



*Figure 1 Hot Air Oven*



*Figure 2 Refrigerator*



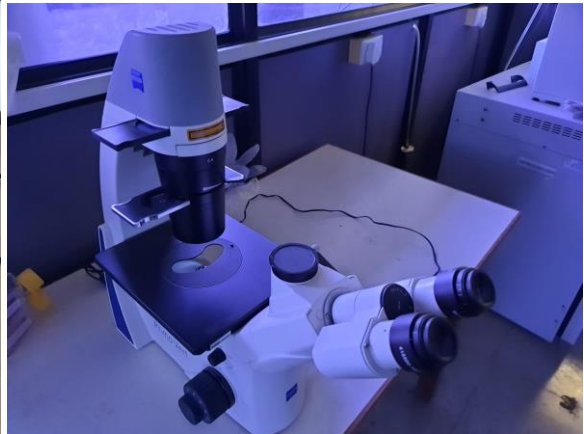
*Figure 3 centrifuge*



*Figure 4 Microscope*



*Figure 5 weigh balance*



*Figure 6 Inverted Microscope*



*Figure 7 Centrifuge*



*Figure 8 Incubator Shaker*



*Figure 9 BOD Incubator*



**Figure 10 PCR(Thermocycler)**



**Figure 11 Vertical Autoclave**



**Figure 12 LAF(Laminar Air flow)**



**Figure 13 pH Meter**



*Figure 14 pH Meter*



*Figure 15 Water Bath*



*Figure 65 Distillation Unit*



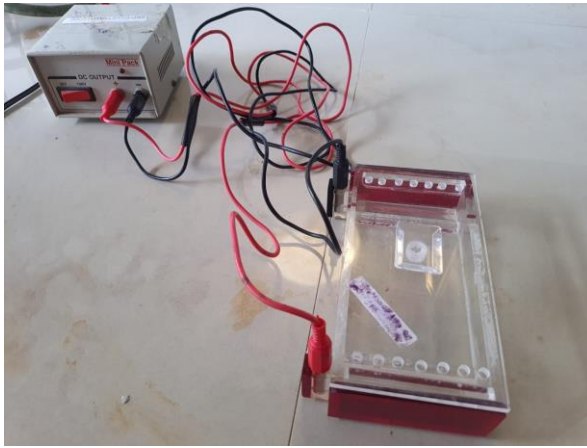
*Figure 17 Deep freeze*



*Figure 18 Rotary Shaker*



*Figure 19 Spectrophotometer*



*Figure 20 Electrophoresis Assembly(Horizontal)*



*Figure 21 Electrophoresis Assembly(Vertical)*



*Figure 22 Microwave Oven*



**Figure 23** Microscopes

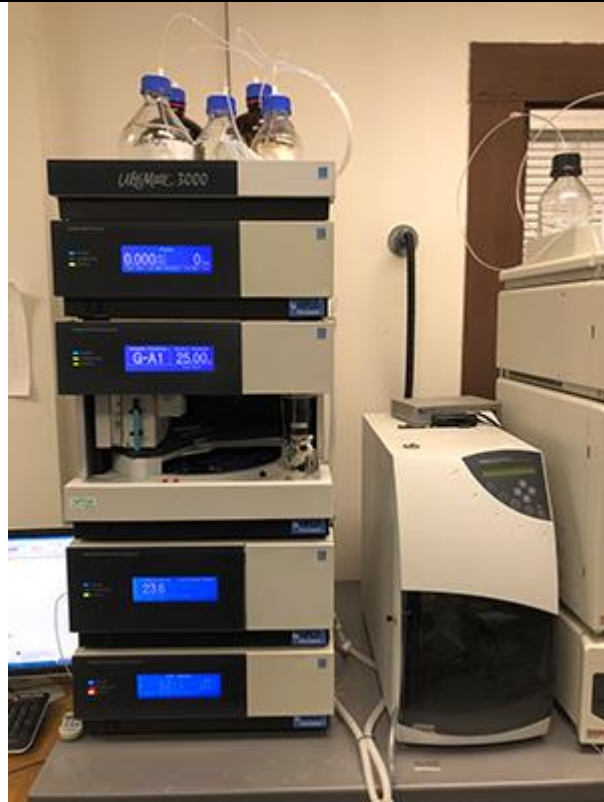


*Figure 24 Binocular Microscope*



***Fig 25: Colling Centrifuge***

**HPLC**



**Rota Evaporator**



**FTIR**



**Muffle furnace**

**Fume Cupboard**



**Microwave Synthesizer**



**UV-VIS Spectrophotometer**

**Hot air ovens**



**Spectrometers**



**Cooling Centrifuges**



**Ultra Sonicator**



**pH Meter**



**Conductometer**



**Potentiometer**



**Polarimeter**



**Refractometer**



## CO<sub>2</sub> Incubator



Inside a CO<sub>2</sub> incubator, also known as a gassed incubator, an atmosphere is created that is as natural as possible to develop cell and tissue cultures. This way of cultivating living organisms is called *in vitro* and is the main application for CO<sub>2</sub> incubators.

The process can take several weeks, during which sample growth and safety are always the top priority. To guarantee both these aspects, the temperature, humidity, and CO<sub>2</sub> content must match the cell culture requirements as precisely as possible.

### Structure

A CO<sub>2</sub> incubator has an interior which is completely sealed off from the environment to ensure the atmosphere inside the unit cannot be affected by external factors. To enable laboratory technicians to still view the samples during the growth phase, most CO<sub>2</sub> incubators feature a glass door as well as the regular door, which provides additional protection against contamination.

The interior is made of rust-resistant materials such as stainless steel and should have as few sharp edges and grooves as possible to avoid any places where contamination could be hidden. In the sensitive field of cell cultivation in particular, just one single germ can ruin weeks of work.

The air coming in flows through a sterile filter and must be distributed evenly throughout the whole interior, as the samples are usually positioned on shelves at different heights. The challenge lies in creating homogeneity through the entire interior, to ensure a uniform supply of CO<sub>2</sub> for all samples at constant climate and humidity conditions.

## The following parameters are crucial for cell cultivation:

- CO<sub>2</sub> level
- Temperature
- Humidity

## Application

CO<sub>2</sub> incubators are most frequently used in medical research and the pharmaceutical industry. However, they also provide sterile conditions for cultivation in other fields where cells must grow in a completely germ-free environment.

## Digital colorimeter



A Colorimeter involves the measurement of Color and is the widely used method for finding the concentration of biochemical compounds. It Measures absorbance and wavelength between 400 to 700 nm (nanometer) i.e. from the visible spectrum of light of the electromagnetic spectrum.

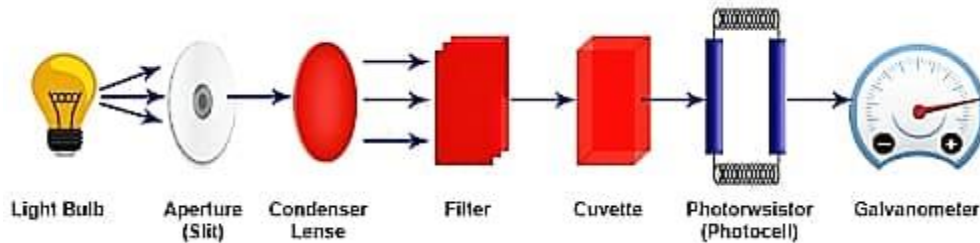
⇒ **Absorption of light** – Light falling on a colored solution is either absorbed or transmitted. A colored solution absorbs all the colors of white light and selectively transmits only one color. This is its own color.

- **PARTS OF COLORIMETER**

- There are 5 essential parts in a colorimeter.....

⇒ **Light Source** – The most common source of light used in colorimeter is a tungsten filament.

⇒ **Monochromator** – To select the particular wavelength filter or monochromators are used to split the light from the light source.



⇒ **Sample holder** – Test tube or Cuvettes are used to hold the color solutions they are made up of Glass at the visible wavelength.

⇒ **Photo Detector System** – when light falls on the detector system, an electric current is generated, this reflects the Galvanometer reading.

⇒ **Measuring device** – The current from the detector is fed to the measuring device, the Galvanometer, shows the meter reading that is directly proportional to the intensity of light.

- **WORKING OF THE COLORIMETER**

⇒ When using a colorimeter, it requires being calibrated first which is done by using the standard solutions of the known concentration of the solute that has to be determined in the test solution. For this, the standard solutions are filled in the cuvettes and placed in the cuvette holder in the colorimeter.

⇒ There is a ray of light with a certain wavelength that is specific for the assay is directed towards the solution. Before reaching the solution the ray of light passes through a series of different filters and lenses. These lenses are used for navigation of the colored light in the colorimeter and the filter splits the beam of light into different wavelengths and allows the required wavelength to pass through it and reaches the cuvette containing the standard or test solutions. It analyzes the reflected light and compares it with a predetermined standard solution.

⇒ When the monochromatic light (light of one wavelength) reaches the cuvette some of the light is reflected, some part of the light is absorbed by the solution and the remaining part is transmitted through the solution which falls on the photodetector system. The photodetector system measures the intensity of transmitted light and converts it into the electrical signals that are sent to the galvanometer.

⇒ The galvanometer measures the electrical signals and displays them in the digital form. That digital representation of the electrical signals is the absorbance or optical density of the solution analyzed.

⇒ If the absorption of the solution is higher than there will be more light absorbed by the solution and if the absorption of the solution is low then more lights will be transmitted through the solution which affects the galvanometer reading and corresponds to the concentration of the solute in the solution. By putting all the values in the formula given in the below section one can easily determine the concentration of the solution.

- **APPLICATIONS OF THE COLORIMETER**

⇒ The colorimeter is commonly used for the determination of the concentration of a colored compound by measuring the optical density or its absorbance.

⇒ It can also be used for the determination of the course of the reaction by measuring the rate of formation and disappearance of the light-absorbing compound in the range of the visible spectrum of light.

- By colorimeter, a compound can be identified by determining the absorption spectrum in the visible region of the light spectrum.

## Refrigerator



Laboratory refrigerators are used to cool samples or specimens for preservation. They include refrigeration units for storing blood plasma and other blood products, as well as vaccines and other medical or pharmaceutical supplies. They differ from standard refrigerators used in homes or restaurant because they need to be totally hygienic and completely reliable.

Laboratory refrigerators need to maintain a consistent temperature in order to minimize the risk of bacterial contamination and explosions of volatile materials. To achieve a high degree of accuracy the refrigerator needs air to circulate and a fan to maintain an even temperature at all times. The fan turns off when the door is open to prevent cold air from blowing out of the unit. Laboratory refrigerators feature separate compartments to prevent cross contamination and can hold specific medical supplies, such as blood or vaccines.

## ELISA plate reader



### Purpose of an ELISA reader

ELISA readers were designed for measuring antibody tests. They worked so well, the machine has been adapted to other purposes. Researchers use them for protein and enzyme assays. They are also used for HIV detection and quantitation of nucleic acids.

## Gel doc

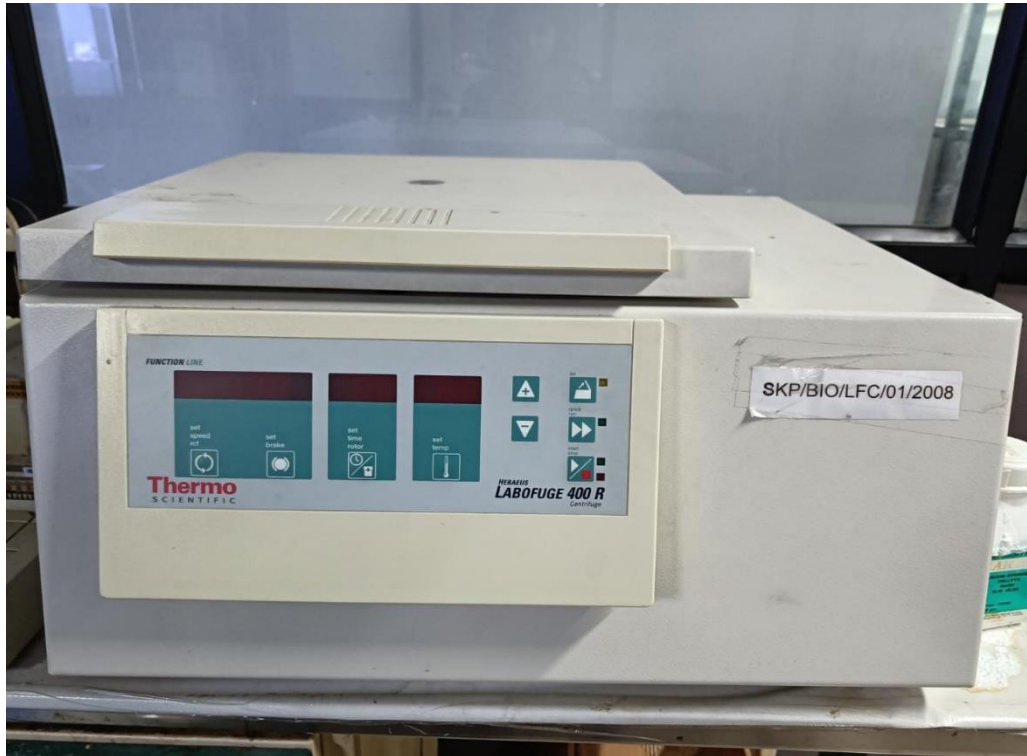


### Imaging DNA and protein gels

For analysing DNA and RNA routinely in your lab, having a great gel doc (gel documentation) system is critical. DNA/RNA stained with ethidium bromide is often visualised using UV. When you need to re-use that DNA, for example, you can choose safer dyes such as SYBR<sup>®</sup> Safe, SYBR<sup>®</sup> Gold, SYBR<sup>®</sup> and GelGreen<sup>®</sup> which can be imaged with blue light.

If you're looking for proteins on gels, you can easily visualise bands stained with Coomassie blue or silver stain.

## Labofuge centrifuge



- Centrifugation is a technique of separating substances which involves the application of centrifugal force.
- The particles are separated from a solution according to their size, shape, density, the viscosity of the medium and rotor speed.
- The centrifuge works using the sedimentation principle, where the centripetal acceleration causes denser substances and particles to move outward in the radial direction.
- At the same time, objects that are less dense are displaced and move to the center.

### Applications of Centrifugation

- To separate two miscible substances
- To analyze the hydrodynamic properties of macromolecules
- Purification of mammalian cells
- Fractionation of subcellular organelles (including membranes/membrane fractions) Fractionation of membrane vesicles
- Separating chalk powder from water
- Removing fat from milk to produce skimmed milk
- Separating particles from an air-flow using cyclonic separation
- The clarification and stabilization of wine
- Separation of urine components and blood components in forensic and research laboratories
- Aids in the separation of proteins using purification techniques such as salting out, e.g. ammonium sulfate precipitation.

## Dry bath



The dynamic dry baths are used to heat samples. The term dry bath intends to differentiate from other techniques of heating by means of a liquid medium. The laboratory dry bath is generally utilized to thaw, boil, incubate and warm specimen for utilizing in molecular biology, microbiology, assay preparation, tissue/cell culture, biochemistry, genetic studies, and proteomics.

Also known as dry block heaters, these devices utilize a small amount of space and are extremely reliable. There are two major categories of dry baths including digital dry baths and analog dry baths. The digital dry baths are set apart from analog dry baths as they incorporate a microchip into the model. This enables the user to control the temperature of the bath by means of the digital interface whereas analog dry baths are not equipped with microchip technology. While the use of microprocessors and a digital display in the contemporary dry baths makes it easier to select and validate temperatures, however, it may not provide precision. For obtaining exact precision, it is advisable to use a temperature probe or external thermometer given that the digital display only shows the temperature within the block and not the sample being heated.

### Mode of Operation

The innovative dry baths with heat blocks have become a necessary part of labs today. Dry baths are available with a wide range of blocks to fit various sized tubes to suit the particular needs of a researcher. It is possible to obtain different blocks with the dry bath apparatus in order to broaden and extend the uses for one unit. This will enable the researcher to take full advantage of the device.

Primarily, the digital dry baths aim to heat samples in the absence of a liquid medium. To ensure that the device performs its task efficiently, set the device on a durable, horizontal surface in a safe, dry area, at a distance from laboratory traffic. Next, plug the power switch into a grounded outlet of suitable voltage. The next step is to choose a metal block according to the sample requirements and place the block along with the samples inside the unit. Turn the power switch on.

To adjust the device according to the required temperature, utilize the up or down keys. Now, to begin the heating process, push the start key. If the need to alter the temperature during the heating process arises, push the start button again to deactivate and change the temperature. Push the start button again to activate heating. If setting the time for heating is necessary, enter the time setting mode. The time display window will show the previously set time value. Then, press the up or down button to alter the time according to requirements. The dry bath will now 'auto-stop' once the time is over.

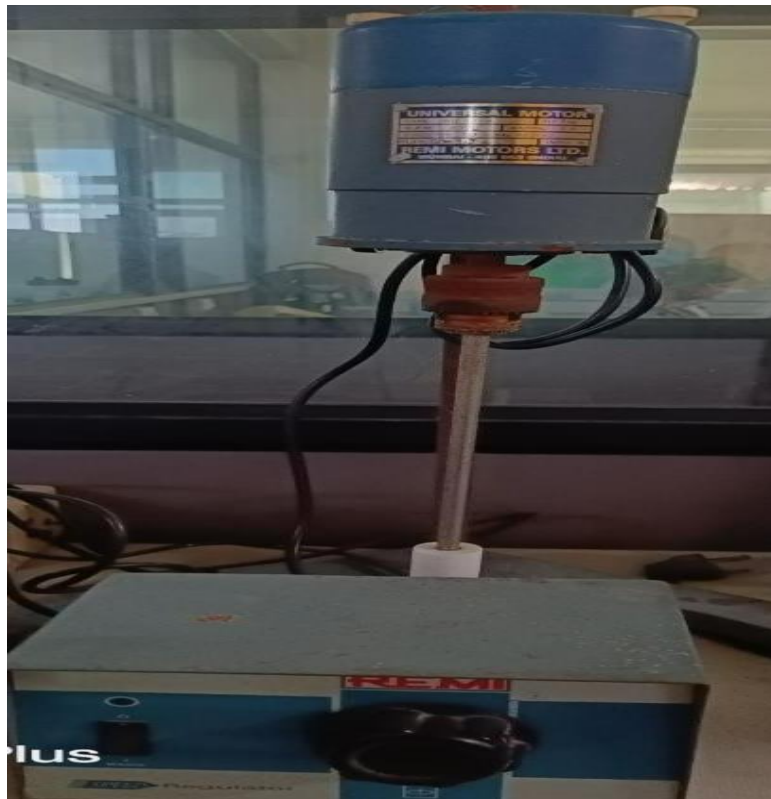
### **Applications**

- Dry baths are essential laboratory instruments used for heating samples.
- The applications of the device extend to fields such as molecular biology, microbiology histology, genetic applications, biochemistry, and clinical, environmental and industrial settings.
- The instrument consists of a stainless-steel chamber, aluminum blocks, microprocessors, and a digital display with timer and temperature control.
- A key benefit of the dry bath is the superior hygiene of the instrument with less probability of sample contamination.

# Agitator

## Functions

- It should have a provision to control environment for optimum biomass or product yield.
- It should provide an aseptic fermentation condition for more reliability.
- It should provide the adequate or proper mixing and aeration for the growth and production without damaging of the microorganisms or cells.
- It should have a system temperature control.
- It should have a system to monitor and regulate pH of the fermentation broth.
- Facility for sampling should be provided.
- It should have required minimum of labour in maintenance, cleaning, operating and harvesting operation.



## Hot air oven

### Working Principle of Hot air oven

Sterilization by dry heat is performed by conduction. The temperature is consumed by the surface of the objects, then moves towards the core of the object, coating by coating. The whole object will ultimately attain the temperature needed for sterilization to take place.

Dry heat causes most of the injury by oxidizing particles. The primary cell components are damaged and the organism dies. The temperature is kept for about an hour to eliminate the most ambitious of the resistant spores.



### Hot air oven Application

- It is used to dry glassware, sterilize N95 masks, general instruments, and packaging items in life science, microbiology laboratory.
- It is also used in chemical and pharmaceutical industries, food and beverage industries, textile industries.
- It helps in the elimination of moisture from the material thus it is used in curing, drying, baking, and annealing.
- It is also used for the Measurement of mixed liquor suspended solids (MLSS).
- In certain laboratories and hospitals, it is used to store materials at a constant temperature.

# Incubator

## Incubator definition

An incubator is an insulated and enclosed device used in biological laboratories. It creates an optimum environment which is required for the growth of microorganisms by providing optimum temperature, humidity, and other environmental conditions such as the CO<sub>2</sub> and oxygen content inside's atmosphere.

In laboratories, it is used to grow and maintain microbiological cultures or cell cultures. Both bacterial and eukaryotic cell organisms are cultivated by using an incubator.



## Application of Incubator

In laboratories incubator is used for different purpose such as;

1. Used to maintain the growth of different microbial cultures or cell cultures, which we can use in later.
2. Sometimes they are used to enhance the growth rate of organisms.
3. Some advanced incubators are used for the reproduction of microbial colonies and subsequent determination of biochemical oxygen demand.
4. In zoology, they are also used for the breeding of insects and hatching of eggs.
5. It also used to store different medical samples.

## UV illuminator

An ultra-violet (UV) transilluminator is a standard piece of equipment used in life science laboratories for visualization of target DNAs and proteins. The UV transilluminator works by emitting high levels of UV radiation through the viewing surface. The key application for a UV transilluminator is for visualization of DNA and protein agarose and polyacrylamide gels after electrophoresis. Gels can be directly placed onto the UV transilluminator; wavelength will vary on your particular application.



## **vortex mixer**

The vortex mixer is a vital piece of equipment commonly found in research laboratories to mix small samples of liquids rapidly. The device was first developed in the 1960s by the Kraft Brothers while being employed by the Scientific Industries. The combination of a small footprint and a high rpm together make the vortex mixer an absolute necessity in any laboratory.

In general, the vortex mixer is a relatively straightforward gadget, utilized in various fields of bioscience, microbiology, and biochemical research settings. It is also used in analytical research centers to blend small vials of fluids using a rapidly oscillating circular movement. At the point when the movement of the rubber cup holder on the mixer is transmitted to the fluid sample, a vortex is produced. With the device accessible in changeable speeds and the choice of constant and on-demand function, the vortex mixer becomes an unquestionable appliance for any research facility.

Vortex mixers are frequently utilized as a part of scientific laboratories to mix small volumes of liquid for cell disruption or homogenization. These machines whether analog or digital are capable of regulating the speed at which they operate along with the time taken to achieve reproducible outcomes. The device is also equipped to test single or multiple liquid samples simultaneously. The vortex mixers can process test tubes, vials, cylinders, or at times even microplates. The instrument is capable of enduring heavy regular use as it is produced from strong, corrosion-free materials.



### **Summary**

- The vortex mixer is a vital piece of equipment used to mix small samples of liquids in various research settings rapidly.
- Vortex mixers are frequently utilized for cell disruption or homogenization.
- The device can operate at a speed of 250 – 2,500 rpm and weighs around 6lbs.
- The vortex mixer requires a minimum amount of space and power to function.

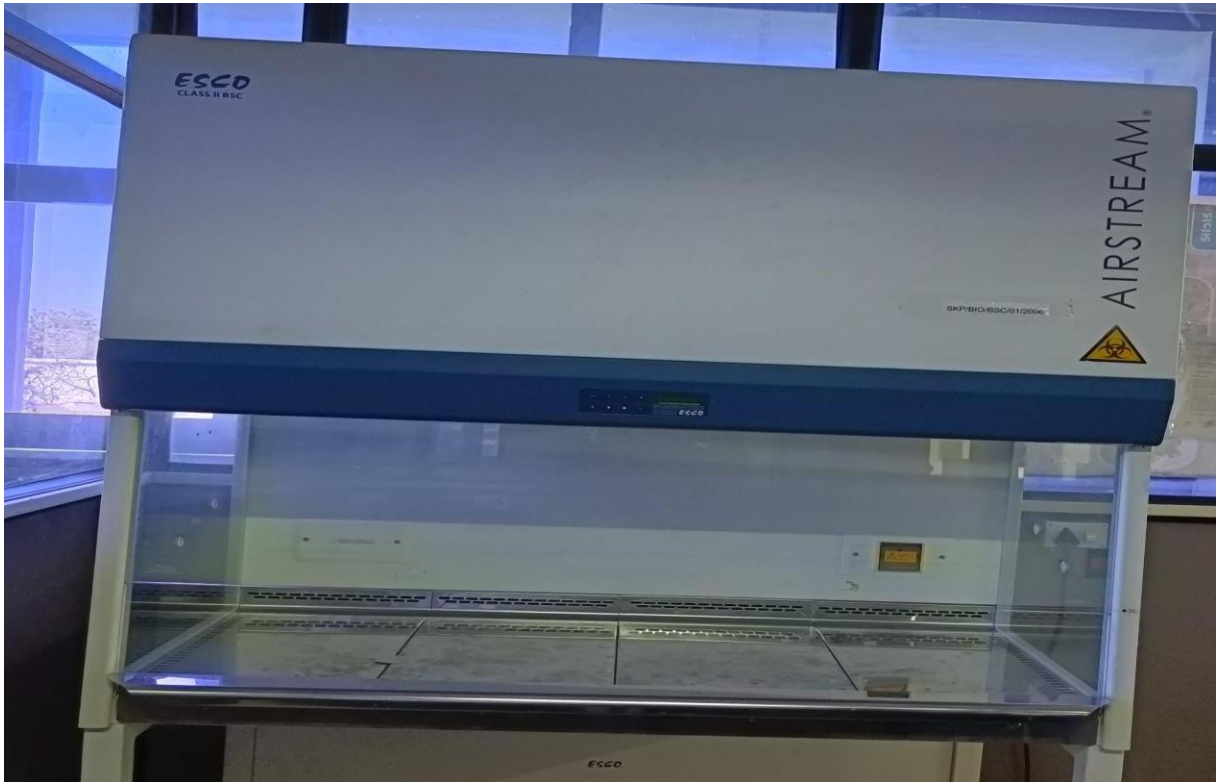
## Water bath

### Optimized temperature control

Our microprocessor-controlled Thermo Scientific water baths provide superior temperature uniformity for your specific applications and offer unique features such as a seamless-stainless steel interior chamber and epoxy-coated exterior which make them resistant to corrosion and chemical damage.



**Biosafety cabinet**



**Baby autoclave**



**Microplate washer**



**Incubator**



**Inverted microscope**



**Autoclave**



**Magnetic stirrer**



**Biosafety cabinet**



**Gel rocker**



**Master thermocycler**



**Microplate luminometer**



**Deep freezer**



**Dessicator**



**CO<sub>2</sub> incubator**



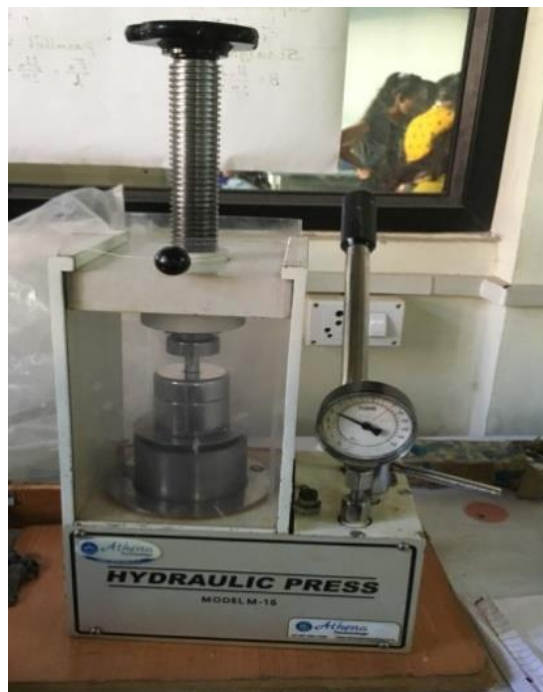
## Weigh balance



# Physics Instruments



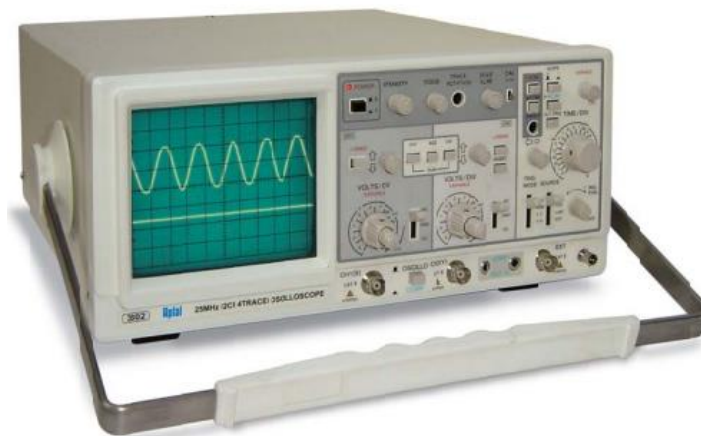
**Image 1: Weighing Balance**



**Image 2: Hydraulic Press (15bTon)**



**Image 3: High temperature muffle furnace (up to 1500°C)**



**Image 4 : CRO**



**Image 5: G.M. Counter**



**Image 6: Spectrometer**



**Image 7 : Ultrasonic Interferometer**




**Image 8: Audio Frequency Function Generator**

# Ganpat University

U.V.Patel College of Engineering

Department of Biomedical Engineering

**a) Sophisticated Equipments:**

Name of Equipment	Image
DIGITAL SPIROMETER	 A photograph of a digital spirometer workstation. It consists of a computer monitor displaying a software interface, a keyboard, and a mouse, all mounted on a white mobile cart with four wheels. A black tower PC case is positioned on the lower shelf of the cart. The workstation is situated in a room with a white wall and a grey floor.

**STRESS TEST  
SYSTEM**



**FLUROSCOPY  
MACHINE**



b) small equipments

Name of Equipment	Image
GM COUNTER	 A blue rectangular device with two white handles on the sides. The front panel features a digital display at the top, a control panel with buttons labeled 'STORE', 'SHIFT', 'PLUG', and 'STOP', and a red power switch on the right. Text on the device includes 'G.M. COUNTING SYSTEM (AT)', 'NUCLEONIX', 'DIT (01/0099)', and 'GC802A'.
CO <sub>2</sub> LASER	 A white and blue machine with a black articulated arm extending upwards. The machine is positioned in front of a wall with electrical outlets. The blue part of the machine has a curved, wave-like design.
BIOMECHANICS MODEL	 Four anatomical models of joints are displayed on a wooden table. From left to right, they represent a shoulder joint, an elbow joint, a wrist joint, and a hand joint. Each model is mounted on a small black stand.

## **Research strengths in terms of experimental techniques**

Department of Biomedical Engineering-Ganpat University is well equipped with 5 main laboratories with each of them divided into sub-parts. The new laboratory instruments are bought every year in order to cope up with the new technology and as per the new academic curriculum.

Students of Biomedical Engineering can learn and can develop technical expertise by proper use of laboratory Equipments.

Some of the Equipments are listed here which can be used for understanding basics of it as well as increasing research strength by understanding different experimental techniques.

### **a) Sophisticated Equipments**

#### **1. DIGITAL SPIROMETER**

##### **Description:**

Spirometry is used to diagnose asthma, chronic obstructive pulmonary disease (COPD) and other conditions that affect breathing. Spirometry may also be used periodically to monitor your lung condition and check whether a treatment for a chronic lung condition is helping you breathe better.

##### **Spirometer test:**

- A clip will be placed on your nose to keep your nostrils closed.
- You will take a deep breath and breathe out as hard as you can for several seconds into the tube. It's important that your lips create a seal around the tube, so that no air leaks out.
- You will need to do the test at least three times to make sure your results are relatively consistent. If there is too much variation among the three outcomes, you may need to repeat the test again. The highest value among three close test results is used as the result.
- The entire process usually takes less than 15 minutes.

##### **Applications:**

- Asthma
- COPD
- Chronic bronchitis

#### **2. STRESS TEST SYSTEM:**

##### **Description:**

TMT is the abbreviation for Treadmill Test. The TMT Testing takes into account, the measurement of the blood circulation inside the body (blood pressure) when a patient walks/runs on a treadmill. TMT Testing helps to determine the impact, which a physical stress can have on your heart. The test is conducted to find out how efficiently your heart responds when you are made to exercise in a cloistered environment. The test is performed on OPD basis and requires no hospitalization.

**Function:**

To identify a congenital heart problem like Coronary Artery Disease (CAD) wherein blood vessels/arteries get clogged, diseased or damaged

To determine the functioning of your heart post a heart-attack or angioplasty

To detect repressed heart conditions like shallow breathing, dizziness, chest discomfort and abrupt bodily weaknesses

To monitor the efficacy of medications applied to cure diseases such as angina and ischemia

To discern any abnormal heartbeat rate because of exertion caused by exercise

**Application:**

- Dizziness
- Severe panting
- High or low blood pressure
- Arrhythmia
- Chest pain
- Abnormal changes detected by the ECG device.

**3. FLUROSCOPY MACHINE:**

An X-ray fluoroscopy machine is any machine that involves X-rays. It may consist of an X-ray generator and an X-ray detector.

**Procedure:**

X-rays can be performed at a doctor's office, dentist's office, hospital, or other medical facility.

The procedure can take anywhere from a few minutes to more than an hour, depending on the type of image your doctor or dentist needs.

A technician will position human body and the X-ray machine.

Human will need to remain still and may have to hold breath during the X-ray. Movement can cause blurry images.

The machine will capture images of body as position for eg. Sitting standing. The process is painless.

If a contrast medium is needed for X-ray, it will be received by an intravenous injection or enema ahead of time.

## b) Small Equipments

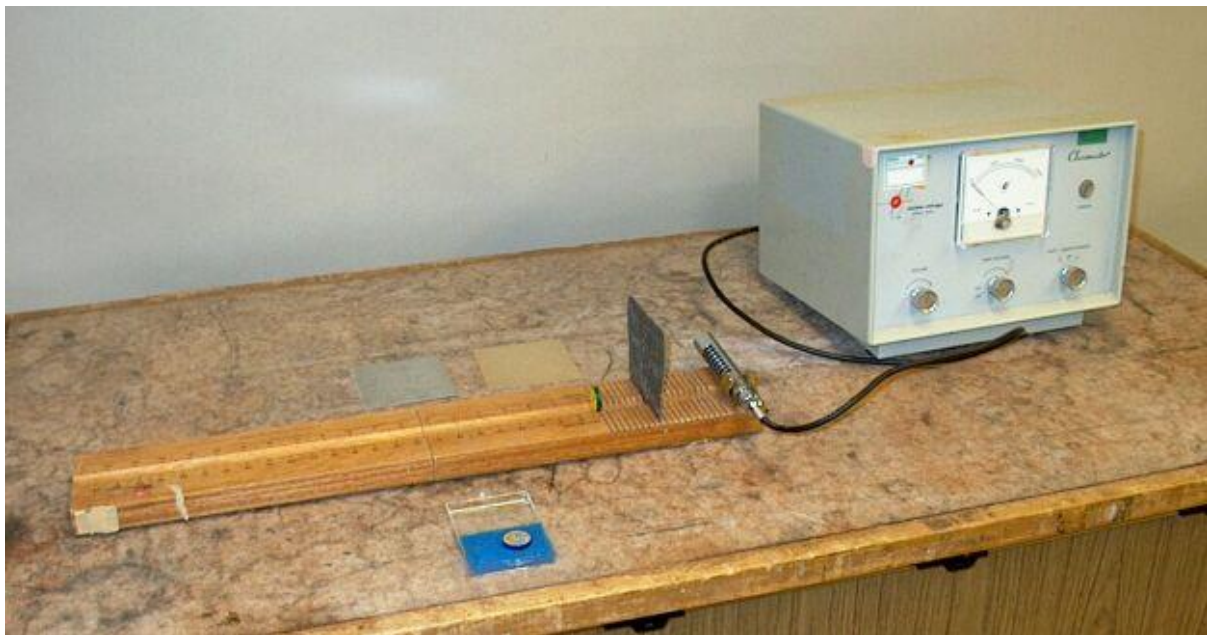
### 4. GM COUNTER:

#### PRINCIPLE:

The ionizing particle passing through the tube ionizes the gas and electrons so produced move towards Anode. The velocity is quite high and they later produce secondary electrons after repeated collisions with the particles of the gas. These secondary electrons further produce more electrons in Geometric progression.

Due to this large multiplication action, a large ionization current is produced.

#### Experimental Set-up:



### 1. CO<sub>2</sub> LASER:

#### Introduction:

The CO<sub>2</sub> laser is one of the oldest lasers which are still successfully running. It is a kind of gas laser. The device of a CO<sub>2</sub> laser produces light when electricity runs through a gas-filled tube. Furthermore, mirrors are at the end of the tube. One of the mirrors is fully reflective and the other allows some light through it. The gas mixture is usually composed of carbon dioxide, hydrogen, nitrogen, and helium.

#### Functioning of CO<sub>2</sub> Laser

The nitrogen molecules which exist in the gas mixture gain energy after stimulating through an electric current. In other words, you can say that the nitrogen molecules get excited. We use nitrogen in this process as it can hold this state of excitement for a longer time. Moreover, during this state, nitrogen does not discharge the energy in form of light or photons.

Furthermore, nitrogen produces high-energy vibrations which thus excite the carbon dioxide molecules. A state called the population inversion is achieved by the laser at this stage. This stage is one where the system consists of more excited particles than non-excited ones.

Therefore, the atoms of nitrogen have to lose their state of excitement through the release of energy in the form of photons so that they can produce a beam of light. This happens when the atoms of nitrogen which are in the state of excitement get in touch with the extremely cold atoms of helium, causing the nitrogen to produce light.

## **GENERAL INSTRUCTIONS FOR THE OPERATION OF LASER**

Hold the hand piece perpendicular to the lesion and press the foot pedal to fire the laser. Vaporize the lesion in coiled, whorled, centrifugal, vertical or horizontal fashion. Vaporize the flat lesions from the top.

Pedunculated lesions can be excised by lasing from the base of the lesion. Hold the lesion with toothed forceps on the top, pull it to the side on the top of the wet gauze (to prevent charring of the normal skin). Always use wet gauze as dry gauze can catch fire.

Wipe the vaporized lesions with wet gauze. Always make sure to dry the area or wipe the water with dry gauze. Look for the raw areas. Coagulate the bleeding spots if any by defocusing the laser beam.

## **2. MODELS OF BIO-MECHANICS:**

### **Introduction:**

Scientific models reduce things to their essentials and establish a basis, not only for understanding how things work, but also for predicting how they will behave and, ultimately, for influencing them to behave in ways we want.

**Application:** BIOMECHANICS models can be used for study of different Corrective exercise which enables allied health and fitness professionals to identify **musculoskeletal imbalances** and apply appropriate corrective exercises to eliminate pain and improve physical function.

**Department of Civil Engineering  
Laboratory Equipment Detail**

Sr. No.	Name of the Department	Name of the Lab	Name of Equipment	Total Cost (In Rs.)	Make/Supplier	Date of Purchase	Whether in working Condition
1.	Civil Engineering	Engineering Mechanics	9001 Universal Force Table	5900.00	SHREE KRISHNA SALES CORPO.	19/11/1997	Yes
2.	Civil Engineering	Engineering Mechanics	9006 Wheel Differential Axle	2400.00	SHREE KRISHNA SALES CORPO.	19/11/1997	Yes
3.	Civil Engineering	Engineering Mechanics	Compression testing machine	33040.00	VINDIS ASSOCIATE	12/1/1997	Yes
4.	Civil Engineering	Engineering Mechanics	Combined inclined plane and friction	1900.00	VINDIS ASSOCIATE	24/02/98	Yes
5.	Civil Engineering	Engineering Mechanics	Moment of inertia of flying wheel	1150.00	VINDIS ASSOCIATE	24/02/98	Yes
6.	Civil Engineering	Engineering Mechanics	Single purchase winch crab	4500.00	VINDIS ASSOCIATE	24/02/98	Yes
7.	Civil Engineering	Engineering Mechanics	Parallel force apparatus	650.00	VINDIS ASSOCIATE	2/3/1998	Yes
8.	Civil Engineering	Engineering Mechanics	Fitting of counter to engg. Models	3500.00	VINDIS ASSOCIATE	29/06/98	Yes
9.	Civil Engineering	Engineering Mechanics	Wooden weight box- 2 gms to 500 gms	950.00	SHREE KRISHNA SALES CORPO.	24/2/98	Yes
10.	Civil Engineering	Engineering Mechanics	COMBINE COIL & BELL FRICTION	6030.00	HARIDARSHAN ENTERPRISE	14/12/09	Yes
11.	Civil Engineering	Engineering Mechanics	SYSTEM OF PULLY SINGLE	3330.00	HARIDARSHAN ENTERPRISE	14/12/09	Yes
12.	Civil Engineering	Engineering Mechanics	UNI FORCE TABLE	11012.00	HARIDARSHAN ENT	5/9/2013	Yes
13.	Civil Engineering	Engineering Mechanics	WINCH CURB SINGLE PURCHASE	9990.00	HARIDARSHAN ENT	5/9/2013	Yes
14.	Civil Engineering	Engineering Mechanics	WINCH CURB SOUBLE PURCHASE	10822.50	HARIDARSHAN ENT	5/9/2013	Yes
15.	Civil Engineering	Engineering Mechanics	WHELL AND DIFF AXLE	6660.00	HARIDARSHAN ENT	5/9/2013	Yes
16.	Civil Engineering	Engineering Mechanics	COMBINE INCLIND PLANES AND FRICTION SLIDE APP	7492.50	HARIDARSHAN ENT	5/9/2013	Yes
17.	Civil Engineering	Engineering Mechanics	WEIGHT SCALE 10 KG (FOR Parallel force apparatus)	2900.00	EM LAB	31/1/2014	Yes
18.	Civil Engineering	ECE/Survey	Optical square with prism	660.00	SHREE KRISHNA SALES CORPO.	10/11/1997	Yes

19.	Civil Engineering	ECE/Survey	prismatic compass	3125.00	SHREE KRISHNA SALES CORPO.	10/11/1997	Yes
20.	Civil Engineering	ECE/Survey	Planimeter	630.00	SHREE KRISHNA SALES CORPO.	10/11/1997	Yes
21.	Civil Engineering	ECE/Survey	Line ranger	2250.00	SHREE KRISHNA SALES CORPO. & EIE	8/12/1997	Yes
22.	Civil Engineering	ECE/Survey	Surveyor's compass	3500.00	SHREE KRISHNA SALES CORPO.	8/12/1997	Yes
23.	Civil Engineering	ECE/Survey	chain 30 mtr	1410.00	SHREE KRISHNA SALES CORPO.	10/11/1997	Yes
24.	Civil Engineering	ECE/Survey	chain 20 mtr	1320.00	SHREE KRISHNA SALES CORPO.	10/11/1997	Yes
25.	Civil Engineering	ECE/Survey	Fibre glass tape 30 mtr	2070.00	SHREE KRISHNA SALES CORPO.	10/11/1997	Yes
26.	Civil Engineering	ECE/Survey	Metallic Tape of 15 mtr	1215.00	SHREE KRISHNA SALES CORPO.	10/11/1997	Yes
27.	Civil Engineering	ECE/Survey	stop watch	2700.00	SHREE KRISHNA SALES CORPO.	10/11/1997	Yes
28.	Civil Engineering	ECE/Survey	Ranging rod of 2 mtr	4140.00	SHREE KRISHNA SALES CORPO.	8/12/1997	Yes
29.	Civil Engineering	ECE/Survey	Ranging rod of 3 mtr	2700.00	SHREE KRISHNA SALES CORPO.	8/12/1997	Yes
30.	Civil Engineering	ECE/Survey	Hammer	640.00	PATEL BHARATBHAI K.	8/12/1997	Yes
31.	Civil Engineering	ECE/Survey	Iron peg	1650.00	VINDIS ASSOCIATE	11/12/1997	Yes
32.	Civil Engineering	ECE/Survey	Plume bob	75.00	GAYATRI MACHIONARY STORE	16/01/98	Yes
33.	Civil Engineering	ECE/Survey	Plane table	2830.00	VINDIS ASSOCIATE	24/02/98	Yes
34.	Civil Engineering	ECE/Survey	Prism square	1200.00	EIE	30/11/04	Yes
35.	Civil Engineering	ECE/Survey	Wooden cross staff	900.00	EIE	30/11/04	Yes
36.	Civil Engineering	ECE/Survey	Open cross staff	840.00	EIE	30/11/04	Yes
37.	Civil Engineering	ECE/Survey	Plane table	3330.00	EIE	30/11/04	Yes
38.	Civil Engineering	ECE/Survey	METALIC WIRE TAPE	2439.00	EIE	30/11/04	Yes
39.	Civil Engineering	ECE/Survey	PULLY BLOCK	2880.00	EIE	22/12/04	Yes
40.	Civil Engineering	ECE/Survey	Cube mould ( 7.06 x7.06x7.06)	975.00	EIE	30/11/04	Yes

41.	Civil Engineering	ECE/Survey	Cube mould (15 x 15 x 15)	1650.00	EIE	30/11/04	Yes
42.	Civil Engineering	ECE/Survey	Tikam, kodali, paavda and ghamela	317.00	GAYATRI MACHIONARY STORE	11/1/2005	Yes
43.	Civil Engineering	ECE/Survey	Iron Pag	428.60	EIE Instrument	3/4/2010	Yes
44.	Civil Engineering	ECE/Survey	LEVELING STAFF 4mt.	5952.30	EIE Instrument	3/4/2010	Yes
45.	Civil Engineering	ECE/Survey	LEVELING STAFF 6mt.	8809.50	EIE Instrument	3/4/2010	Yes
46.	Civil Engineering	ECE/Survey	MEASURING CHAIN 20MT	2700.00	BHARAT EMPORIUM	28/4/2009	Yes
47.	Civil Engineering	ECE/Survey	MEASURING CHAIN 30MT	3450.00	BHARAT EMPORIUM	28/4/2009	Yes
48.	Civil Engineering	ECE/Survey	MEASURING TAPE	690.00	BHARAT EMPORIUM	28/4/2009	Yes
49.	Civil Engineering	ECE/Survey	RANGING ROAD	3350.00	BHARAT EMPORIUM	28/4/2009	Yes
50.	Civil Engineering	ECE/Survey	ARROW PIN	100.00	BHARAT EMPORIUM	28/4/2009	Yes
51.	Civil Engineering	ECE/Survey	ELECTRONIC THEODOLITE WITH STAND	48600.00	BHARAT EMPORIUM	28/4/2009	Yes
52.	Civil Engineering	ECE/Survey	AUTO LEVEL	29000.00	BHARAT EMPORIUM	28/4/2009	Yes
53.	Civil Engineering	ECE/Survey	TRIPOD STAND FOR THEODOLITE	6300.00	BHARAT EMPORIUM	28/4/2009	Yes
54.	Civil Engineering	ECE/Survey	STOP WATCH	4325.00	BHARAT EMPORIUM	28/4/2009	Yes
55.	Civil Engineering	ECE/Survey	MEASURE TAPE	603.00	INSTRUMENT AGENCY	29/5/2009	Yes
56.	Civil Engineering	ECE/Survey	FIBRE GLASS	430.00	INSTRUMENT AGENCY	29/5/2009	Yes
57.	Civil Engineering	ECE/Survey	PLANIMETER	550.00	INSTRUMENT AGENCY	29/5/2009	Yes
58.	Civil Engineering	ECE/Survey	ELECTRONIC THEODOLITE	80000.00	INSTRUMENT AGENCY	29/5/2009	Yes
59.	Civil Engineering	ECE/Survey	PLANE TABLE	2600.00	INSTRUMENT AGENCY	29/5/2009	Yes
60.	Civil Engineering	ECE/Survey	WT CI	1350.00	INSTRUMENT AGENCY	29/5/2009	Yes
61.	Civil Engineering	ECE/Survey	ACCESSARIES FOR PT SET	1600.00	INSTRUMENT AGENCY	8/6/2009.	Yes
62.	Civil Engineering	ECE/Survey	TELTING LEVEL WITH AL- STAND	10080.00	HARIDARSHAN ENTERPRISE	14/12/09	Yes

63.	Civil Engineering	ECE/Survey	PLUMBOB	450.00	HARIDARSHAN ENTERPRISE	14/12/09	Yes
64.	Civil Engineering	ECE/Survey	PRISMATIC COMPASS	7200.00	INSTRUMENT AGENCY	12/12/2009	Yes
65.	Civil Engineering	ECE/Survey	SURVEYING COMPASS	8400.00	INSTRUMENT AGENCY	12/12/2009	Yes
66.	Civil Engineering	ECE/Survey	LINE RANGER	1100.00	INSTRUMENT AGENCY	12/12/2009	Yes
67.	Civil Engineering	ECE/Survey	OPTICAL SQUARE	300.00	INSTRUMENT AGENCY	12/12/2009	Yes
68.	Civil Engineering	ECE/Survey	PRISMATIC SQUARE	620.00	INSTRUMENT AGENCY	12/12/2009	Yes
69.	Civil Engineering	ECE/Survey	OPEN CROSS STAFF	490.00	INSTRUMENT AGENCY	12/12/2009	Yes
70.	Civil Engineering	ECE/Survey	DIGITAL PLANIMETER	73600.00	INSTRUMENT AGENCY	12/12/2009	Yes
71.	Civil Engineering	ECE/Survey	TRANSIT VERNIER THEODOLITE	22000.00	INSTRUMENT AGENCY	12/12/2009	Yes
72.	Civil Engineering	ECE/Survey	DUMPLY LEVEL	8400.00	INSTRUMENT AGENCY	12/12/2009	Yes
73.	Civil Engineering	ECE/Survey	BOX SEXTANT	450.00	INSTRUMENT AGENCY	12/12/2009	Yes
74.	Civil Engineering	ECE/Survey	WEIGHT 2KG	450.00	INSTRUMENT AGENCY	12/12/2009	Yes
75.	Civil Engineering	ECE/Survey	TOTAL STATION (GOWIN)	200000.00	K K SAKES	8/12/2011	Yes
76.	Civil Engineering	ECE/Survey	GPS	14500.00	K K SAKES	8/12/2011	Yes
77.	Civil Engineering	ECE/Survey	MATRIC CHAIN	6615.00	HARIDARSHAN ENT	6/8/2013	Yes
78.	Civil Engineering	Strength of Material	Universal testing machine	442000.00	BLUE STAR LTD	27/10/2000	Yes
79.	Civil Engineering	Strength of Material	Torsion test M/c	124633.00	EIE	18/12/2000	Yes
80.	Civil Engineering	Strength of Material	Izod Impact test M/c	48696.00	EIE	18/12/2000	Yes
81.	Civil Engineering	Strength of Material	Compression test M/C	97918.00	EIE	18/12/2000	Yes
82.	Civil Engineering	Strength of Material	Hardness test M/c	24338.00	EIE	18/12/2000	Yes
83.	Civil Engineering	Strength of Material	Fatigue test M/c	65656.00	EIE	18/12/2000	Yes
84.	Civil Engineering	Strength of Material	MICROMETER SCREW	2350.00	BHARAT EMPORIUM	28/4/2009	Yes
85.	Civil Engineering	Strength of Material	DEFLECTION OF BEAM	1900.00	INSTRUMENT AGENCY	29/5/2009	Yes

86.	Civil Engineering	Strength of Material	SIMPLE SCREW JACK	1600.00	INSTRUMENT AGENCY	29/5/2009	Yes
87.	Civil Engineering	Strength of Material	YOUNG MODULUS	1000.00	INSTRUMENT AGENCY	29/5/2009	Yes
88.	Civil Engineering	Strength of Material	VERNIER CALIPER	1400.00	INSTRUMENT AGENCY	29/5/2009	Yes
89.	Civil Engineering	Strength of Material	SINGLE CANTILEVER	31000.00	INSTRUMENT AGENCY	12/12/2009	Yes
90.	Civil Engineering	Strength of Material	BENDING BEAM APPARATUS	2600.00	INSTRUMENT AGENCY	12/12/2009	Yes
91.	Civil Engineering	Transportation	PANSKY MARTENEFLASH POINT	6190.49	EIE Instrument	3/4/2010	Yes
92.	Civil Engineering	Transportation	BITUMEN CLEANING REAGENT	61.90	EIE Instrument	3/4/2010	Yes
93.	Civil Engineering	Transportation	FILTER PAPER 10 CM FOR MARSHAL SHEET	428.55	EIE Instrument	3/4/2010	Yes
94.	Civil Engineering	Transportation	ENEMAL TRAY	1714.26	EIE Instrument	3/4/2010	Yes
95.	Civil Engineering	Transportation	SPECIFIC GRAVITY BOTTLE 50ML	157.14	EIE Instrument	3/4/2010	Yes
96.	Civil Engineering	Transportation	SPECIFIC GRAVITY BOTTLE 100ML	214.28	EIE Instrument	3/4/2010	Yes
97.	Civil Engineering	Transportation	BOROSILICATE GLASS	345.72	EIE Instrument	3/4/2010	Yes
98.	Civil Engineering	Transportation	LOS ANGELES ABBRATION	48000.00	BHARAT EMPORIUM	28/4/2009	Yes
99.	Civil Engineering	Transportation	FINE SEIVE	20320.00	BHARAT EMPORIUM	28/4/2009	Yes
100.	Civil Engineering	Transportation	COURSE SEIVE	27400.00	BHARAT EMPORIUM	28/4/2009	Yes
101.	Civil Engineering	Transportation	AGGREATE IMPACT TESTER	4400.00	BHARAT EMPORIUM	28/4/2009	Yes
102.	Civil Engineering	Transportation	CYLINDEER MEATER	3250.00	BHARAT EMPORIUM	28/4/2009	Yes
103.	Civil Engineering	Transportation	MARSHAL STABILITY	42600.00	BHARAT EMPORIUM	28/4/2009	Yes
104.	Civil Engineering	Transportation	WATER BATH ELECTRICITY	2800.00	BHARAT EMPORIUM	28/4/2009	Yes
105.	Civil Engineering	Transportation	ASBESTOS HAND GLOVES	400.00	BHARAT EMPORIUM	28/4/2009	Yes
106.	Civil Engineering	Transportation	STOVE	350.00	BHARAT EMPORIUM	28/4/2009	Yes
107.	Civil Engineering	Transportation	FILTER PAPER	36.00	BHARAT EMPORIUM	28/4/2009	Yes

108.	Civil Engineering	Transportation	DENSITY BUCKET	375.00	BHARAT EMPORIUM	28/4/2009	Yes
109.	Civil Engineering	Transportation	CBR APPARATUS	45000.00	HARIDARSHAN	28/4/2009	Yes
110.	Civil Engineering	Transportation	FILTER PAPER	540.00	HARIDARSHAN	28/4/2009	Yes
111.	Civil Engineering	Transportation	G.I. TRAY	8100.00	HARIDARSHAN	28/4/2009	Yes
112.	Civil Engineering	Transportation	BANKLE BEAM	15300.00	HARIDARSHAN	12/5/2009	Yes
113.	Civil Engineering	Transportation	ATHMOSPHERIC THEROMETER	180.00	HARIDARSHAN	12/5/2009	Yes
114.	Civil Engineering	Transportation	ELECTRONIC BALANCE	10000.00	INSTRUMENT AGENCY	29/5/2009	Yes
115.	Civil Engineering	Transportation	AGGREATE CRUSHING VALUE APP	3400.00	INSTRUMENT AGENCY	29/5/2009	Yes
116.	Civil Engineering	Transportation	THICKNESS GUAGE	260.00	INSTRUMENT AGENCY	29/5/2009	Yes
117.	Civil Engineering	Transportation	LENGTH GUAGE	260.00	INSTRUMENT AGENCY	29/5/2009	Yes
118.	Civil Engineering	Transportation	METAL MEASURE	4000.00	INSTRUMENT AGENCY	29/5/2009	Yes
119.	Civil Engineering	Transportation	PYCNOMETER BOTTLE	900.00	INSTRUMENT AGENCY	29/5/2009	Yes
120.	Civil Engineering	Transportation	STANDARD PENITROMETER	3480.00	INSTRUMENT AGENCY	29/5/2009	Yes
121.	Civil Engineering	Transportation	DUCTILITY TESTING MACHINE	34500.00	INSTRUMENT AGENCY	29/5/2009	Yes
122.	Civil Engineering	Transportation	BITUMEN EXTRACTOR	10500.00	INSTRUMENT AGENCY	29/5/2009	Yes
123.	Civil Engineering	Transportation	GENERAL HANDY TOOLS	600.00	INSTRUMENT AGENCY	29/5/2009	Yes
124.	Civil Engineering	Transportation	MECHANICAL MIXTURE	29500.00	INSTRUMENT AGENCY	29/5/2009	Yes
125.	Civil Engineering	Transportation	TAR VISCO METER APPARATRS	5040.00	HARIDARSHAN ENTERPRISE	14/12/09	Yes
126.	Civil Engineering	Transportation	FLOW CAP	1350.00	HARIDARSHAN ENTERPRISE	14/12/09	Yes
127.	Civil Engineering	Transportation	FILM STRIPPING DEVICE	25200.00	HARIDARSHAN ENTERPRISE	14/12/09	Yes
128.	Civil Engineering	Transportation	OVEN DIGITAL 24*24*24	20700.00	HARIDARSHAN ENTERPRISE	14/12/09	Yes
129.	Civil Engineering	Transportation	DEVEL ABARTION TEST M/C	33000.00	INSTRUMENT AGENCY	12/12/2009	Yes
130.	Civil Engineering	Transportation	DOUBLE WHEEL BARROW	5200.00	INSTRUMENT AGENCY	12/12/2009	Yes

131.	Civil Engineering	Transportation	Radar gun speedometer	85500.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
132.	Civil Engineering	Transportation	Tally for vehicular counts	68400.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
133.	Civil Engineering	Transportation	MARSHAL MOULD	3000.00	EIE	10/2/2013	Yes
134.	Civil Engineering	Transportation	ELASTIC RECOVERY MOULD	4950.00	EIE	10/2/2013	Yes
135.	Civil Engineering	Transportation	CBR MOULD	5000.00	EIE	10/2/2013	Yes
136.	Civil Engineering	Transportation	CHEMICAL	364.00	EIE	10/2/2013	Yes
137.	Civil Engineering	Transportation	BUMP INTEGRATOR	485000.00	EIE	1/3/2013.	Yes
138.	Civil Engineering	Mechanics of Structure	COMBINED COMPRESSION	4050.00	HARIDARSHAN ENT.	12/5/2009	Yes
139.	Civil Engineering	Mechanics of Structure	ELECTIC FLEXURE APP	1260.00	HARIDARSHAN ENT.	12/5/2009	Yes
140.	Civil Engineering	Mechanics of Structure	BENDING MEASURE APP	2430.00	HARIDARSHAN ENT.	12/5/2009	Yes
141.	Civil Engineering	Mechanics of Structure	STRESS BEAM APP	2430.00	HARIDARSHAN ENT.	12/5/2009	Yes
142.	Civil Engineering	Mechanics of Structure	SHEAR FORCE APPRATRS	2250.00	HARIDARSHAN ENT.	14/12/2009	Yes
143.	Civil Engineering	CMEG Lab.	SET OF ROCK CASED BASED SHOW CASE	2070.00	HARIDARSHAN	12/5/2009	Yes
144.	Civil Engineering	CMEG Lab.	SET OF MINERAL	3735.00	HARIDARSHAN	12/5/2009	Yes
145.	Civil Engineering	CMEG Lab.	SET OF EARTH MINERAL	315.00	HARIDARSHAN	12/5/2009	Yes
146.	Civil Engineering	CMEG Lab.	SET OF ALLOYS	432.00	HARIDARSHAN	12/5/2009	Yes
147.	Civil Engineering	CMEG Lab.	SET OF METAL & ALLOYS	513.00	HARIDARSHAN	12/5/2009	Yes
148.	Civil Engineering	CMEG Lab.	SET OF METAL	207.00	HARIDARSHAN	12/5/2009	Yes
149.	Civil Engineering	CMEG Lab.	SET OF ROCK & MINERAL	2160.00	HARIDARSHAN	12/5/2009	Yes
150.	Civil Engineering	CMEG Lab.	ZINC GRANULAR	450.00	HARIDARSHAN	12/5/2009	Yes
151.	Civil Engineering	CMEG Lab.	ZINC ROADS	3141.00	HARIDARSHAN	12/5/2009	Yes
152.	Civil Engineering	CMEG Lab.	ZINC WIRE	180.00	HARIDARSHAN	12/5/2009	Yes
153.	Civil Engineering	CMEG Lab.	ZINC METAL POWDER	360.00	HARIDARSHAN	12/5/2009	Yes

154.	Civil Engineering	CMEG Lab.	ZINC PIECES	360.00	HARIDARSHAN	12/5/2009	Yes
155.	Civil Engineering	CMEG Lab.	ZINC PLATE	810.00	HARIDARSHAN	12/5/2009	Yes
156.	Civil Engineering	CMEG Lab.	COPPER PLATE	990.00	HARIDARSHAN	12/5/2009	Yes
157.	Civil Engineering	CMEG Lab.	COPPER TURNING	450.00	HARIDARSHAN	12/5/2009	Yes
158.	Civil Engineering	CMEG Lab.	HEAD ROAD	1260.00	HARIDARSHAN	12/5/2009	Yes
159.	Civil Engineering	CMEG Lab.	COPPER ROAD	198.00	HARIDARSHAN	12/5/2009	Yes
160.	Civil Engineering	CMEG Lab.	SITE EXPLANATION CHART	9000.00	HARIDARSHAN	12/5/2009	Yes
161.	Civil Engineering	CMEG Lab.	SHALLOW WALL FOUNDATION	3600.00	HARIDARSHAN	12/5/2009	Yes
162.	Civil Engineering	CMEG Lab.	MASONARY DRAWING CHART	21600.00	HARIDARSHAN	12/5/2009	Yes
163.	Civil Engineering	CMEG Lab.	CAVITY AND PARATION CHART	4500.00	HARIDARSHAN	12/5/2009	Yes
164.	Civil Engineering	CMEG Lab.	LINTLE AND ARROW DRAWING	7200.00	HARIDARSHAN	12/5/2009	Yes
165.	Civil Engineering	CMEG Lab.	DOOR WINDOWS CHART	7200.00	HARIDARSHAN	12/5/2009	Yes
166.	Civil Engineering	CMEG Lab.	STAIR BUILDING	900.00	HARIDARSHAN	12/5/2009	Yes
167.	Civil Engineering	CMEG Lab.	FLOORS DRAWING	4500.00	HARIDARSHAN	12/5/2009	Yes
168.	Civil Engineering	CMEG Lab.	ROOF DRAWING	3600.00	HARIDARSHAN	12/5/2009	Yes
169.	Civil Engineering	CMEG Lab.	TEMPERORY CONSTRUCTION DRAWING	4500.00	HARIDARSHAN	12/5/2009	Yes
170.	Civil Engineering	Concrete Lab.	ENAMAAL TRAY	1285.00	EIE	3/8/2009	Yes
171.	Civil Engineering	Concrete Lab.	VEE BEE COSITOMETER	13333.330	EIE	3/8/2009	Yes
172.	Civil Engineering	Concrete Lab.	CUBE MOULD	5571.360	EIE.	19/8/09	Yes
173.	Civil Engineering	Concrete Lab.	TAPARIA PAKKAD	150.000	PATEL BHARATKUMAR K	8/7/2009	Yes
174.	Civil Engineering	Concrete Lab.	SLUMP TEST APPRATUS	1260.000	HARIDARSHAN ENTERPRISE	17/8/09	Yes
175.	Civil Engineering	Concrete Lab.	TRAY CIRCULAR 250 DIA-	270.000	HARIDARSHAN ENTERPRISE	17/8/09	Yes
176.	Civil Engineering	Concrete Lab.	NIDDLE VIBRATOR	9000.000	HARIDARSHAN ENTERPRISE	17/8/09	Yes

177.	Civil Engineering	Concrete Lab.	BLAINS APPRATUS	1800.000	HARIDARSHAN ENTERPRISE	17/8/09	Yes
178.	Civil Engineering	Concrete Lab.	MORTAR MIXTURE	25000.00	SHRI KRISHNA SELS	23/9/09	Yes
179.	Civil Engineering	Concrete Lab.	CYLLANDER CUBE MOULD	13050.00	SHRI KRISHNA SELS	23/9/09	Yes
180.	Civil Engineering	Concrete Lab.	COMPACTION FACTOR APPRATUS	8200.00	SHRI KRISHNA SELS	23/9/09	Yes
181.	Civil Engineering	Concrete Lab.	CEMENT AUTO CLAVE	40000.00	SHRI KRISHNA SELS	23/9/09	Yes
182.	Civil Engineering	Concrete Lab.	CUBE MOULD	3600.00	ASSOCIATE AGENCY	29/10/09	Yes
183.	Civil Engineering	Concrete Lab.	VIBRATING TABLE	30000.00	ASSOCIATE AGENCY	29/10/09	Yes
184.	Civil Engineering	Concrete Lab.	TRAY 600X450X50	1650.00	ASSOCIATE AGENCY	29/10/09	Yes
185.	Civil Engineering	Concrete Lab.	VICAT APPRATUS	1800.00	ASSOCIATE AGENCY	29/10/09	Yes
186.	Civil Engineering	Concrete Lab.	LE CHEATER MOULD	250.00	ASSOCIATE AGENCY	29/10/09	Yes
187.	Civil Engineering	Concrete Lab.	LE CHEATER BATH	4000.00	ASSOCIATE AGENCY	29/10/09	Yes
188.	Civil Engineering	Concrete Lab.	PYCNO METER	600.00	ASSOCIATE AGENCY	29/10/09	Yes
189.	Civil Engineering	Concrete Lab.	SHIEVE SHEKER	18428.97	EIE	8/2/2010	Yes
190.	Civil Engineering	Concrete Lab.	CONTENAR	357.14	EIE	8/2/2010	Yes
191.	Civil Engineering	Concrete Lab.	MOISTURE CANE	1028.00	EIE	8/2/2010	Yes
192.	Civil Engineering	Concrete Lab.	WASH BOTTLE	60.00	EIE	8/2/2010	Yes
193.	Civil Engineering	Concrete Lab.	EVEPORATING DISH.	1234.20	EIE	8/2/2010	Yes
194.	Civil Engineering	Concrete Lab.	CYLINDRICAL MOULD	25200.00	SHRI KRISHNA SELS	18/2/2010	Yes
195.	Civil Engineering	Concrete Lab.	V FUNNEL TEST APP-	5785.00	EIE INSTRUMENTS.	11/9/2011	Yes
196.	Civil Engineering	Concrete Lab.	L BOX FOR SELF COMPACTING	4806.00	EIE INSTRUMENTS.	11/9/2011	Yes
197.	Civil Engineering	Concrete Lab.	U BOX FOR SELF COMP-	7565.00	EIE INSTRUMENTS.	11/9/2011	Yes
198.	Civil Engineering	Concrete Lab.	CUBE MOULD 7.06 CM	3608.00	EIE INSTRUMENTS.	11/9/2011	Yes
199.	Civil Engineering	Concrete Lab.	CUBE MOULD 15 CM	24045.00	EIE INSTRUMENTS.	11/9/2011	Yes

200.	Civil Engineering	Concrete Lab.	CYLINDRICAL MOULD	19936.00	EIE INSTRUMENTS.	11/9/2011	Yes
201.	Civil Engineering	Concrete Lab.	BEAM MOULD 150X100X500	12015.00	EIE INSTRUMENTS.	11/9/2011	Yes
202.	Civil Engineering	Concrete Lab.	BEAM MOULD 150X150X700	27234.00	EIE INSTRUMENTS.	11/9/2011	Yes
203.	Civil Engineering	Concrete Lab.	J RING LAB APP-	5785.00	EIE INSTRUMENTS.	3/10/2011	Yes
204.	Civil Engineering	Concrete Lab.	CYLINDRICAL MOULD 150X300HIGHT.	31328.00	EIE INSTRUMENTS.	3/10/2011	Yes
205.	Civil Engineering	Concrete Lab.	CYLINDRICAL MOULD 100X200HIGHT.	19344.00	EIE INSTRUMENTS.	19/10/2011	Yes
206.	Civil Engineering	Concrete Lab.	Digitalization of CTM	42840.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
207.	Civil Engineering	Concrete Lab.	FLEXURE TESTING MACHINE(DIGITAL)	97014.00	TECH MECH	3/12/2011	Yes
208.	Civil Engineering	Concrete Lab.	ULTRASONIC PULSE VELOCITY.	160000.00	K K SAKES	29/12/2011	Yes
209.	Civil Engineering	Concrete Lab.	DEGITAL TEST CONCRETE HAMMER	153000.00	TIRTH ENTERPRISE.	10/1/2011	Yes
210.	Civil Engineering	Concrete Lab.	FLOW TABLE FOR CONCRETE	37500.00	EIE INSTRUMENTS.	12/2/2012	Yes
211.	Civil Engineering	Concrete Lab.	CONCRETE PERMEABILITY TEST APPRATUS	94500.00	EIE INSTRUMENTS.	12/2/2012	Yes
212.	Civil Engineering	Concrete Lab.	CELEBRATION OF UTM & SHIFTING	20000.00	EIE INSTRUMENTS.	1/8/2012	Yes
213.	Civil Engineering	Concrete Lab.	Drill Machine	2500.00	Jai Bharat Elect CO.Mehsana	4/8/21012	Yes
214.	Civil Engineering	Concrete Lab.	Marsh Cone	3600.00	HARIDARSHAN ENTERPRISE.	16/5/2012	Yes
215.	Civil Engineering	Concrete Lab.	Jaw Crusher (4"x6")	70560.00	Eie instruments	4/12/2012	Yes
216.	Civil Engineering	Concrete Lab.	Digital weight 100kg	8190.00	MARUTI SAGAR ENGG.	18/1/2013	Yes
217.	Civil Engineering	Concrete Lab.	Manual weight scale 20kg	2599.00	MARUTI SAGAR ENGG.	18/1/2013	Yes
218.	Civil Engineering	Concrete Lab.	Mortar mixture 10 lit	31920.00	MARUTI SAGAR ENGG.	18/1/2013	Yes
219.	Civil Engineering	Concrete Lab.	HUMIDITY CONTROL ASEMBALY AND AIR CON	605000.00	SIDDHI SERVICES	14/8/2013	Yes

220.	Civil Engineering	Concrete Lab.	CELEBRATION OF CTM AND FTM M/C	12921.40	MAP LAB	21/12/2013	Yes
221.	Civil Engineering	Concrete Lab.	LI CHETLIER FLASK	1785.00	EIE	23/1/2014	Yes
222.	Civil Engineering	Concrete Lab.	VICAT APPRATUS NIDDLE ONLY	1050.00	HARIDARSHAN ENT	12/2/2014	Yes
223.	Civil Engineering	Concrete Lab.	L-I CHAT FLASK & LI CHAT MOULD	2835.00	HARIDARSHAN ENT	17/2/14	Yes
224.	Civil Engineering	Concrete Lab.	ELECT VIBRATOR	900.00	GIVEN PRESENT BY STUDENT	25/4/2014	Yes
225.	Civil Engineering	Fluid Mechanics	RED WOOD VISCOMETER	5649.00	EIE	8/2/2010	Yes
226.	Civil Engineering	Fluid Mechanics	Kinematic viscometer	18810.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
227.	Civil Engineering	Fluid Mechanics	Free & Forced vortex app-	57285.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
228.	Civil Engineering	Fluid Mechanics	FROUD'S LAW APP-	129200.00	HARIDARSHAN ENTERPRISE.	29/10/2012	Yes
229.	Civil Engineering	Fluid Mechanics	Rain guage	38475.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
230.	Civil Engineering	Fluid Mechanics	DOUBLE RING INFILTROOMETER	5794.00	AVADHOOT FEBRICATION	3/1/2012	Yes
231.	Civil Engineering	Structure Analysis	COLUMN BUCKLING APPARTUS	18000.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
232.	Civil Engineering	Structure Analysis	CLARK MAX WELL RECIPROCAL	20700.00	HARIDARSHAN ENTERPRISE	29/3/2011	Yes
233.	Civil Engineering	Structure Analysis	TROLLEY FOR MATERIAL	18000.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
234.	Civil Engineering	Structure Analysis	CEMENT MORTAR CUBE	18000.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
235.	Civil Engineering	Structure Analysis	TONGES FOR OVEN	360.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
236.	Civil Engineering	Structure Analysis	HAND GLOVES FOR OVEN	180.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
237.	Civil Engineering	Structure Analysis	PETRI DISH 50x17MM	1800.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
238.	Civil Engineering	Structure Analysis	HYDROMETER DEVICE	720.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
239.	Civil Engineering	Structure Analysis	PORCELIN DISH	1890.00	HARIDARSHAN ENTERPRISE	29/32010	Yes
240.	Civil Engineering	Structure Analysis	BLUE LITMUS PAPER	225.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
241.	Civil Engineering	Structure Analysis	HYDROCLORIC ACID	144.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes

242.	Civil Engineering	Structure Analysis	HYDROGEN PEROXIDE	180.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
243.	Civil Engineering	Structure Analysis	SODIUM CARBONATE	90.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
244.	Civil Engineering	Structure Analysis	SODIUM HEXAMETAPHOSPHATE	144.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
245.	Civil Engineering	Structure Analysis	SODIUM HYDROXIDE	81.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
246.	Civil Engineering	Structure Analysis	STANDARD SAND GRADE 1-2-3	7560.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
247.	Civil Engineering	Structure Analysis	SURVEYING UMBRELLA	6480.00	HARIDARSHAN ENTERPRISE	29/3/2010	Yes
248.	Civil Engineering	Structure Analysis	TWO HINGED ARCH APP-	25460.00	ASEW	7/6/2010	Yes
249.	Civil Engineering	Structure Analysis	THREE HINGED ARCH APP-	25460.00	ASEW	7/6/2010	Yes
250.	Civil Engineering	Structure Analysis	SHEAR CENTER APP-	20975.00	ASEW	7/6/2010	Yes
251.	Civil Engineering	Structure Analysis	ELASTIC & CONTINUOUS BEAM	25650.00	ASEW	7/6/2010	Yes
252.	Civil Engineering	Structure Analysis	DEFLECTION OF TRUSS APP-	25175.00	ASEW	7/6/2010	Yes
253.	Civil Engineering	Structure Analysis	CURVED BEAM APP-	25175.00	ASEW	7/6/2010	Yes
254.	Civil Engineering	Structure Analysis	PORTAL FRAME	24510.00	ASEW	7/6/2010	Yes
255.	Civil Engineering	Structure Analysis	DIGITAL LOAD INDICATOR	18240.00	ASEW	7/6/2010	Yes
256.	Civil Engineering	Structure Analysis	DIGITAL STRAIN INDICATOR	18240.00	ASEW	7/6/2010	Yes
257.	Civil Engineering	Structure Analysis	ELECTRIC HOT PLATE	3040.00	ASEW	7/6/2010	Yes
258.	Civil Engineering	Structure Analysis	ACCELERATED CONCRETE TANK	46075.00	ASEW	7/6/2010	Yes
259.	Civil Engineering	Structure Analysis	HUMIDITY CHAMBER	49210.00	ASEW	7/6/2010	Yes
260.	Civil Engineering	Structure Analysis	ELECTRIC BALANCE(300 GM)	18525.00	ASEW	7/6/2010	Yes
261.	Civil Engineering	Structure Analysis	SPECIFIC GRAVITY BOTTLE	356.00	ASEW	7/6/2010	Yes
262.	Civil Engineering	Geotechnical Engineering	CONE PENETRATION	1728.00	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
263.	Civil Engineering	Geotechnical Engineering	CONE CUTTER WITH RAMMER & DOLLY	1210.00	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes

264.	Civil Engineering	Geotechnical Engineering	LIQUID LIMIT DEVICE	1815.16	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
265.	Civil Engineering	Geotechnical Engineering	SHRINKAGE LIMIT DEVICE	1296.54	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
266.	Civil Engineering	Geotechnical Engineering	PAN BALLECE WITH WEIGHT	1988.02	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
267.	Civil Engineering	Geotechnical Engineering	SIMPLE AUGER SCREW TYPE	1988.02	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
268.	Civil Engineering	Geotechnical Engineering	SWELL TEST APP-WITH PROVIDING RING	31981.32	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
269.	Civil Engineering	Geotechnical Engineering	TRI AXIAL SHEAR TEST APP-	95943.96	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
270.	Civil Engineering	Geotechnical Engineering	PYCNOMETER BOTTLE	673.00	EIE Instrumants	11/4/2011	Yes
271.	Civil Engineering	Geotechnical Engineering	PLATIC LIMIT DEVICE	753.00	EIE Instrumants	11/4/2011	Yes
272.	Civil Engineering	Geotechnical Engineering	CONSOLIDATION APP-	27486.67	EIE Instrumants	11/4/2011	Yes
273.	Civil Engineering	Geotechnical Engineering	DIRECT SHEAR APP-	42381.90	EIE Instrumants	11/4/2011	Yes
274.	Civil Engineering	Geotechnical Engineering	PERMEABILITY APP-	18868.26	EIE Instrumants	11/4/2011	Yes
275.	Civil Engineering	Geotechnical Engineering	AUTOMATIC SOIL COMP-	45095.87	EIE Instrumants	11/4/2011	Yes
276.	Civil Engineering	Geotechnical Engineering	DENSITY HYDROMETER	1177.91	ASEW	28/8/2011	Yes
277.	Civil Engineering	Geotechnical Engineering	SAND PROCURING DEVICE	2119.80	ASEW	28/8/2011	Yes
278.	Civil Engineering	Geotechnical Engineering	VANE SHEAR APP	20256.60	ASEW	28/8/2011	Yes
279.	Civil Engineering	Geotechnical Engineering	UNCONFINED COMPRESSION TESTER	20761	eie instrumants	12/2/2012	Yes
280.	Civil Engineering	Geotechnical Engineering	SOIL EXTRUDER	15181.00	HARIDARSHAN ENT	18/12/2013	Yes
281.	Civil Engineering	Geotechnical Engineering	STANDARD PENITRATION TEST	45360.00	HARIDARSHAN ENT	5/9/2013	Yes
282.	Civil Engineering	Geotechnical Engineering	SOIL EXTRUDER	15181.00	HARIDARSHAN ENT	18/12/2013	Yes
283.	Civil Engineering	Environmental Engineering	MUFFLE FURNES	16422.84	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
284.	Civil Engineering	Environmental Engineering	WATER ANALYSIS KIT WITH FOLLOWING PERAMETER		HARIDARSHAN ENTERPRISE.	30/3/2011	Yes

285.	Civil Engineering	Environmental Engineering	WATER HARDNESS TEST PACK	605.05	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
286.	Civil Engineering	Environmental Engineering	TEST PACK FOR ALKALINITY	777.92	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
287.	Civil Engineering	Environmental Engineering	TEST PACK FOR CHLORIDE	691.92	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
288.	Civil Engineering	Environmental Engineering	TEST PACK FOR CALCIUM HARDNESS	605.05	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
289.	Civil Engineering	Environmental Engineering	TEST PACK FOR PHOSPHATE	1123.67	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
290.	Civil Engineering	Environmental Engineering	TEST PACK FOR SULPHATE	1210.10	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
291.	Civil Engineering	Environmental Engineering	TEST PACK FOR IRON	605.05	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
292.	Civil Engineering	Environmental Engineering	TEST PACK FOR DISSOLVED OXYGEN	1123.67	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
293.	Civil Engineering	Environmental Engineering	TEST PACK FOR RESIDUAL CHLORINE	1386.80	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
294.	Civil Engineering	Environmental Engineering	TEST PACK FOR NITRITES	777.92	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
295.	Civil Engineering	Environmental Engineering	TEST PACK FOR NITRATES	1296.54	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
296.	Civil Engineering	Environmental Engineering	TEST PACK FOR AMMONIA	1296.54	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
297.	Civil Engineering	Environmental Engineering	TEST PACK FOR FLUORIDES.	864.36	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
298.	Civil Engineering	Environmental Engineering	TEST PACK FOR WATER SOFTNESS.	864.36	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
299.	Civil Engineering	Environmental Engineering	TEST PACK FOR CARBONDIOXIDE	605.05	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
300.	Civil Engineering	Environmental Engineering	CONDUCTIVITY METER.	4840.41	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
301.	Civil Engineering	Environmental Engineering	COLOUR COMPARTMENT PLATE	2160.90	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
302.	Civil Engineering	Environmental Engineering	ACIDITY	720.30	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
303.	Civil Engineering	Environmental Engineering	DIGITAL COD DEGESTER	16422.84	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
304.	Civil Engineering	Environmental Engineering	BACTERIOLOGICAL INCUBATOR	17287.20	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
305.	Civil Engineering	Environmental Engineering	TEST TUBE STANDS	1152.48	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes

306.	Civil Engineering	Environmental Engineering	NESTLER TUBE.	216.09	HARIDARSHAN ENTERPRISE.	30/3/2011	Yes
307.	Civil Engineering	Environmental Engineering	P H METER	8512.00	ie instrumants	11/4/2011	Yes
308.	Civil Engineering	Environmental Engineering	WATER TEST KIT	997.00	ie instrumants	11/4/2011	Yes
309.	Civil Engineering	Environmental Engineering	FLASK	1590.00	ie instrumants	11/4/2011	Yes
310.	Civil Engineering	Environmental Engineering	TRIPOD STAND.	670.50	ie instrumants	11/4/2011	Yes
311.	Civil Engineering	Environmental Engineering	INHOF CON	7980.00	ie instrumants	11/4/2011	Yes
312.	Civil Engineering	Environmental Engineering	REFRIGERATOR	56530.00	ASEW	9/6/2011	Yes
313.	Civil Engineering	Environmental Engineering	TURBIDITY METRER	8008.00	ASEW	9/6/2011	Yes
314.	Civil Engineering	Environmental Engineering	SPECTRO PHOTO METER	28076.72	ASEW	9/6/2011	Yes
315.	Civil Engineering	Environmental Engineering	BOD INCUBATOR THERMAL PRINTER KIT	56059.00	ASEW	9/6/2011	Yes
316.	Civil Engineering	Environmental Engineering	GLASSWERE	19714.15	ASEW	9/6/2011	Yes
317.	Civil Engineering	Environmental Engineering	MORTOR AND PESTLE	84.79	ASEW	9/6/2011	Yes
318.	Civil Engineering	Environmental Engineering	LITMUS PAPER	1884.34	ASEW	9/6/2011	Yes
319.	Civil Engineering	Environmental Engineering	HAND HELD TECHOMETER	2625.00	KURTAM ENT-	18/10/2011	Yes
320.	Civil Engineering	Environmental Engineering	PAN BALLECE electronic	19665.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
321.	Civil Engineering	Environmental Engineering	Binocular microscope	8550.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
322.	Civil Engineering	Environmental Engineering	High volume sampler	68400.00	HARIDARSHAN ENTERPRISE.	1/12/2011	Yes
323.	Civil Engineering	Environmental Engineering	FUEL GAS ANALYSER	1368000.00	HARIDARSHAN ENTERPRISE.	9/1/2012	Yes
324.	Civil Engineering	Environmental Engineering	WATER DISTILLATION ASSAMBALY	42750.00	HARIDARSHAN ENTERPRISE.	25/01/2012	Yes
325.	Civil Engineering	Environmental Engineering	ENV LAB CHEMICALS	53710.74	GANESH STATIONARY ,MEHSANA	18/4/2013	Yes
326.	Civil Engineering	Environmental Engineering	COD TUBE WITH CONDENCER BOTTLE	4536.00	HARIDARSHAN ENT	18/2/14	Yes

327.	Civil Engineering	Environmental Engineering	WAT MAN FILTER PAPER 41 NO	3150.00	HARIDARSHAN ENT	20/2/14	Yes
328.	Civil Engineering	Environmental Engineering	WAT MAN FILTER PAPER 12.5 CM	3150.00	HARIDARSHAN ENT	20/2/14	Yes
329.	Civil Engineering	Earthquake Engineering	SHAKE TABLE & Diff MODLES	627000.00	SHRI HARE KRISHNA TECHNOVISION	18/1/13	Yes
330.	Civil Engineering	NACP LAB	ACER PC SYSTEM	604850.00	PACE COMPUTER CONSULTANT P LTD, AHMEDABAD	2/5/2012	Yes
331.	Civil Engineering	NACP LAB	HCL PC SYSTEMS	681250.00	BY PRIME INFO, HCL INFO LTD.	12/10/2013	Yes
332.	Civil Engineering	NACP LAB	Power Saver UPS 600 VA	46250.00	MARK INFO, MEHSANA	22/1/2014	Yes

**GANPAT UNIVERSITY**  
**U V Patel College Of Engineering**  
**Department of Electrical Engineering**  
**Major Equipment List**

Sr No	Equipment Name	Specification
1	Dual Trace Oscilloscope	Model-3305
2	SinglePhase Transformer	1-kva 230/115 v
3	Systronics Function Generator	modal no 1013
4	Kew Make D.C Reg.Power Supply	3-Ø ,440V,50hz,16A
5	"KEW" Make 3-Ø Choke Coil	3-Ø ,440V,50hz, 10A/ph
6	Decade Resistance Box	Model RDB 4
7	Decade Capacitance Box	Model CDB 4
8	Decade Inductance Box	Model LDC 4
9	Ambros Maxwell Bridge	Model-11982
10	"Ambros" Make High Resistance Box	1 to 10000 Ohm
11	Kew Make Current Transformer	5VA, Class1.0,20/5A
12	Kew Make Potential Transformer	3-Ø 400/110,Class-1
13	MetraVi Make Digital Multimeter	Model 702
14	A.C Position Control System Kit	Matrix
15	Matrix Make Linear Control System	0,1,2-Order System
16	Digital Storage Oscilloscope	NB-106C
17	PID Controller	Model-PID-1
18	Compensation Design	Model-CD-02
19	Linear System Simulator	Model-LSS-1
20	D.C Position Control (Moter Unit Of D.C Position Control)	Model-DCP-1
21	D.C Position Control System Kit	-
22	Perpheral Application Board	Model-PAB-01
23	8-Bit Parallel ADC/DAC Add-on Card Make "Ni-Tech"	"Ni-Tech"
24	8-Bit AD/DA Interfacing Module IC-26	-
25	Traffic Light Control Kit IC-12	-
26	Relay Interfacing Kit IC-15	-
27	I2C Protocol Demonstration Kit	Ni tech
28	SPI Protocol Demonstration Kit	Ni tech
29	Multiplexer/Demultiplexer	Adtron-2522/2523
30	Timer Application IC-555	Adtron-9042
31	D.C Regulated Power Supply	Model-ST4077
32	Power Electronics Lab XPO-PE	XPO-PE
33	Advance DC to DC Converter Panel	P-37
34	Scientific Make Multioutput Power Supply 0-30V-2A,±15V-1A,5V-5A	PSD-3304
35	Isolation Transformer (230V/230V)	1kva
36	Power Scope Attachment	Ansuman
37	Microcontroller Based Three Phase Induction Moter Drive (SPWM And SVM Combined) "Ni-Tech" Make	"Ni-Tech"
38	Microcontroller Based Control Rectifier Fed Separately Excited DC (SEDC) Moter Drive "Ni-Tech" Make	"Ni-Tech"
39	Microcontroller Based Four Quadrant Chopper Fed PMDC Moter Drive "Ni-Tech" Make	"Ni-Tech"

Sr No	Equipment Name	Specification
40	Microcontroller Based BLDC Moter Drive "Ni-Tech" Make	"Ni-Tech"
41	Three Phase Thyristor Firing Card With Power Card	"Ni-Tech"
42	Transmission Line Simulator Unit	0-1 A
43	Tranformer Protecation Simulation Electrical Panel With Resistive Load Bank And Transformer	Model: PS-TPSU Numerical / Microprocessor based Relay/should be of ABB/Alstom
44	Motor Protecation Simulation Study Electrical Panel With 3-Ø Induction Moter Set	Model: PS-MPSU-3,Numerical / Microprocessor based Relay should be of ABB/Alstom Make
45	Generator Protecation Simulation Electrical Panel With 3-Ø Induction Moter Generator Set	Model: PS-GPSU,Numerical / Microprocessor based Relay should be of ABB/Alstom Make
46	Non Directional Inverse Time Over Current Relay E/F O/C	-
47	Electro Mechanical Type IDMT Over Current Relay Study Trainer	Model-VPL-102
48	Strain Gauge Transducers	-
49	Displacement Sensing Transducers	-
50	HP-Personal Computer	(1) HP Perdesk 405G2 MT(A8-6410QC)- G5V03AV 8GB/500GB/USBKB+Mouse/MSWin 8.13-3-3 Warranty (2)HP V193 18.5Inch LCD Monitor- GJW86AA#ACJ
51	Scintific make LCR meter	Model: SM-6019
52	32-Bit Micro-controller Kit	Make Ni-Tech
53	H-Bridge Inverter Card	Make Ni-Tech
54	Electrial Project Panel With Muitspan Pokler Meter 3φMCB,1φMCB,5amp Socket &3φ&1φ Terminals	
55	Resistive Load Bank 3-ph-20Amp	
56	Impulse Generator	100 KV I.G, 30KV TRA
57	High Voltage Insulation test	30KV TRA
58	Transformer Oil Testing Kit	0-15 Motorized
59	"EL+MO" make Sq.cage Induction motor	3φ,3hp,1440rpm
60	"EL+MO" make Slipering Induction motor	3φ 3hp,.1440rpm
61	"EL+MO" make M.G set Induction mo.&compound gen.	3φ ,3hp,.1500rpm com.gen. 2.2kw, 230v
62	"EL+MO" make M.G set compound motor	3hp,230v.1500rpm com.gen. 2.2kw 230v
63	"KEW" make H.V Breakdown Tester	0-50v,100ma
64	Motor-Gen. set D.C shunt motor	7.5hp,220v, 1500rpm, ACgen.3φ,5kva,415v, 1500rpm
65	Synchronus motor	3φ,400v,50Hz 1500rpm
66	"HITECH" make Salenoid type Linear Actuator	-
67	"New Tech" make Pressure measurent Transduser unit	
68	"NEW Tech" make Distance measurent unit (L.V.D.T)	
69	"HITECH" make Level measuring unit Capacitive transducer	

Sr No	Equipment Name	Specification
70	"Matrix" make Angular Displacement using Capacitive transducer	
71	OC/SC Test&Parellel Operation Panel Set.	
	(1) Panel	
	(2) Resistive Load Bank 10 steps	1 $\phi$ ,230V,15A
72	3 $\phi$ ,Squirrel cage Induction Motor Panel Set.	
	(1) Panel	
	(2)3 $\phi$ ,Squirrel cage Induction Motor	kw-3.7,A-7.0,1441rpm
	(3) Variable Auto Transformer	3 $\phi$ ,415V,10A
73	DC Shunt Motor Coupled To Non Salient Pole Alternator Synchronization Panel Set.	
	(1) Panel	
	(2)DC Shunt Motor Coupled To	5.2kw,1500rpm, 220v,28A
	Non Salient Pole Alternator	3 $\phi$ ,415V,5kva, 6.9A,1500rpm
74	DC Shunt Motor Panel Set.	
	(1) Panel	
	(2)DC Shunt Motor	3.5kw,1500rpm, 220v,18.6A
	(3) Resistive Load Bank 7 steps	3 $\phi$ ,440V,5kw
75	DC Series Motor Coupled With DC Series Generator Panel Set.	
	(1) Panel	
	(2)DC Series Motor Coupled With	3.5kw,1500rpm, 230v,20A
	DC Series Generator	3.5kw,1500rpm, 220v,16A
	(3) Resistive Load Bank 10 steps	1 $\phi$ ,230VDC 3.5kwDC
76	3KVA, 3 $\phi$ Transformer	(In)440v(out)230v
77	3 $\phi$ 20A Variac Auto Transformer	3 $\phi$ 20A
78	Universal (AC/DC) Motor With Control Panel	
	(1) Panel	
	(2) Universal (A.C/D.C) Motor	1.5kw,1500rpm, 220v,8.4A
79	A.C 1 $\phi$ Motor (CSCR&CSIR Type) With Control Panel	
	(1) Panel	
	(2) 1 $\phi$ Induction Motor	1.5/2 kw/HP,1440rpm, 230v,5.6A
80	A.C Pole Changing Induction Motor With Control Panel	
	(1) Panel	
	(2) 3 $\phi$ Induction Motor	5 kw/HP,1440rpm, 415v,7.5A
81	Three Phase Power Logger	Fluke Model:1735 Sr.No. S123830985B6
82	Stepper Motor (27)	-----
83	BLDC Motor (29)	-----
84	Servo Motor (31) (Towerpro-SG5010)	-----

## Research Facility:

### [1] Photoelasticity Apparatus:



(a)



(b)

**Fig. 1 Photoelasticity apparatus**

**Photoelasticity** describes changes in the optical properties of a material under mechanical deformation. It is a property of all dielectric media and is often used to experimentally determine the stress distribution in a material, where it gives a picture of stress distributions around discontinuities in materials. Photoelastic experiments (also informally referred to as *photoelasticity*) are an important tool for determining critical stress points in a material, and are used for determining stress concentration in irregular geometries.

Photoelasticity is a nondestructive, whole-field, graphic stress-analysis technique based on an opto-mechanical property called birefringence, possessed by many transparent polymers. Combined with other optical elements and illuminated with an ordinary light source, a loaded photoelastic specimen (or photoelastic coating applied to an ordinary specimen) exhibits fringe patterns that are related to the difference between the principal stresses in a plane normal to the light propagation direction. The method is used primarily for analyzing twodimensional plane problems, which is the emphasis in these notes. A method called stress freezing allows the method to be extended to three dimensional problems. Photoelastic coatings are used to analyze surface stresses in bodies of complex geometry.

### **Applications:**

Photoelasticity has been used for a variety of stress analyses and even for routine use in design, particularly before the advent of numerical methods, such as finite elements or boundary elements. Digitization of polariscopy enables fast image acquisition and data processing, which

allows its industrial applications to control quality of manufacturing process for materials such as glass and polymer. Dentistry utilizes photoelasticity to analyze strain in denture materials.

Photoelasticity can successfully be used to investigate the highly localized stress state within masonry or in proximity of a rigid line inclusion (stiffener) embedded in an elastic medium. In the former case, the problem is nonlinear due to the contacts between bricks, while in the latter case the elastic solution is singular, so that numerical methods may fail to provide correct results. These can be obtained through photoelastic techniques. Dynamic photoelasticity integrated with high-speed photography is utilized to investigate fracture behavior in materials. Another important application of the photoelasticity experiments is to study the stress field around bi-material notches. Bi-material notches exist in many engineering applications like welded or adhesively bonded structures.

## **[2] FFT Analyzer:**



(a)

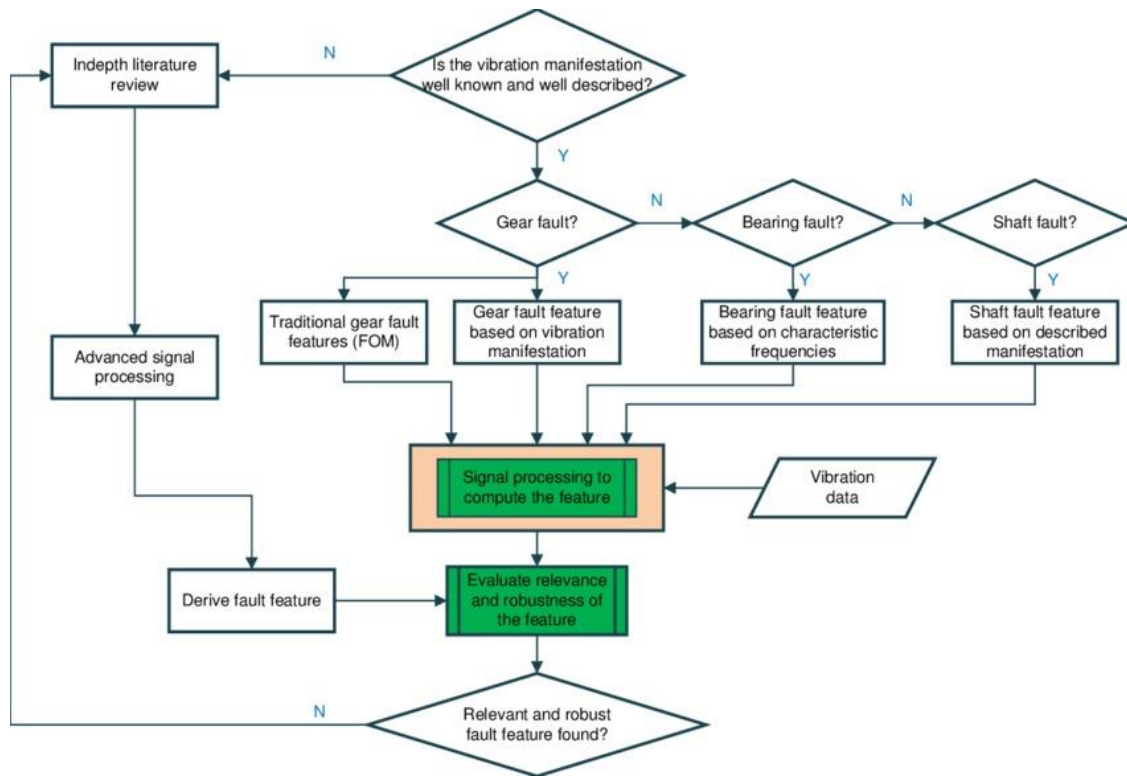


(b)



(c)

**Fig. 2 FFT analyzer**



**Fig. 3 Flow chart for fault detection using FFT analyzer**



**Fig. 4 Application of FFT analyzer**

### **Specifications:**

Basic 4 channel vibration FFT analyzer:

SIRIUS Mini 3xACC, 1xACC+ data acquisition system

Up to four single-axis or one triaxial IEPE/ICP® accelerometers

Microphone (1x-4x)

1x Tacho

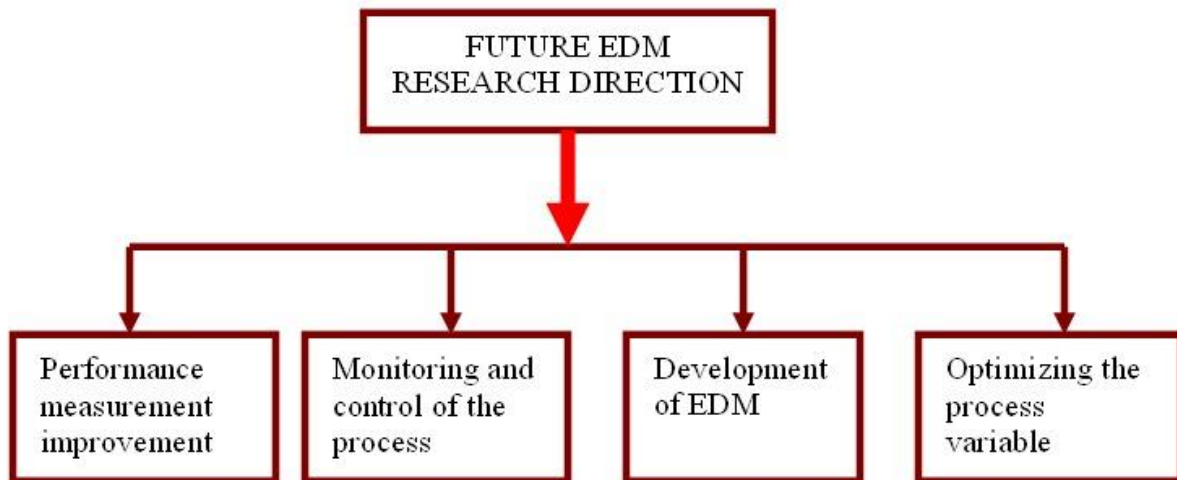
Inspecting measured data in the frequency domain is often the primary part of analyzing and monitoring signals. Data from a variety of sensors are used across virtually all industries in order to solve problems, optimize designs, test prototypes, monitor machinery, and many other jobs like the ones listed below:

- Predictive machine health monitoring
- Structural dynamics analysis
- Durability testing
- Fatigue analysis
- Rotating machinery and rotating equipment analysis
- Bearing fault detection
- Order tracking analysis
- Torsional and rotational vibration analysis
- Combustion analysis
- Human body vibration tests
- Room acoustic, loudspeaker design, environmental noise analysis
- Brake noise testing
- Mechanical shock response tests, drop tests, impact tests

### **[3] Electric Discharge Machine:**



**Fig. 4 Electric Discharge Machine**



**Fig. 5 Proposed area of research on EDM process**

Electrical discharge machining, or EDM, is a non-contact process that can machine parts regardless of their hardness. It involves placing an electrode or wire and an electrically conductive workpiece into a circulating dielectric fluid. The fluid acts as an insulator until a specific spark gap and voltage ionizes it and enables a spark to travel to the workpiece.

Using a CNC, the operator moves the electrode or wire as needed and rapidly turns the current on and off. This accommodates the flushing of molten material (often called “swarf”) from the workpiece.

Electrical discharge machining (EDM), also known as spark machining, spark eroding, die sinking, wire burning or wire erosion, is a metal fabrication process whereby a desired shape is obtained by using electrical discharges (sparks). Material is removed from the work piece by a series of rapidly recurring current discharges between two electrodes, separated by a dielectric liquid and subject to an electric voltage. One of the electrodes is called the tool-electrode, or simply the *tool* or *electrode*, while the other is called the workpiece-electrode, or *work piece*. The process depends upon the tool and work piece not making physical contact.

When the voltage between the two electrodes is increased, the intensity of the electric field in the volume between the electrodes becomes greater, causing dielectric break down of the liquid, and produces an electric arc. As a result, material is removed from the electrodes. Once the current stops (or is stopped, depending on the type of generator), new liquid dielectric is conveyed into the inter-electrode volume, enabling the solid particles (debris) to be carried away and the insulating properties of the dielectric to be restored. Adding new liquid dielectric in the inter-electrode volume is commonly referred to as *flushing*. After a current flow, the voltage between the electrodes is restored to what it was before the breakdown, so that a new liquid dielectric breakdown can occur to repeat the cycle.

#### **[4] Pin on Disc Wear Testing Machine:**



**Fig. 6 Pin on Disc Wear Testing Machine**

The Pin on Disc Friction and Wear Test Rig is primarily intended for determining the tribological characteristics of wide range of materials under conditions of various normal loads. During the test, the friction force, wear and temperature are continuously monitored on a digital display as well as acquired online and logged onto the computer. It is carried out to predict the wear performance of materials and to investigate the wear mechanisms that occur.

#### **Technical specifications:**

1. Normal load range – up to 200 N
2. Frictional force range – up to 200 N with a resolution of 1N with tare facility
3. Wear measurement range – +/-2mm with tare facility
4. Sliding speed – 0.26 to 12 m/s
5. Disc speed - 100 to 2000 rpm
6. Preset timer range – up to 99 hrs: 59 min: 59sec
7. Wear disc diameter –165 mm (En31 disc 58 - 60 HRC)
8. Wear disc track diameter - 10 to 140 mm

9. Specimen pin diameter/diagonal –dia. 3 mm to 12 mm
10. Pin Length – 25 to 30 mm
11. Data acquisition system – up to 8 channels with National Instruments DAQ card
12. Pin heating System - up to 250°C
13. Lubricant re-circulation system
14. Specimen Holders

### **[5] Induction Furnace:**



**Fig. 7 Induction furnace**

An induction furnace is an electrical furnace in which a coil carrying alternating electric current surrounds the container or chamber of metal. Eddy currents are induced in the metal, the circulation of these currents producing extremely high temperatures for melting the metals and for making alloys of exact composition. It is used to melt iron, steel, copper, aluminum and precious metals.

### Technical Specifications:

Input volts: 415

Output KW: 25

Frequency: 10000 Hz

### [6] VCR Engine Test Setup Single Cylinder 4 Stroke Diesel Engine (Computerized):

The setup consists of single cylinder, four stroke, VCR (Variable Compression Ratio) Diesel engine connected to eddy current type dynamometer for loading. The setup enables study of VCR engine performance for brake power, indicated power, frictional power, BMEP, IMEP, brake thermal efficiency, indicated thermal efficiency, Mechanical efficiency, volumetric efficiency, specific fuel consumption, A/F ratio and heat balance. **Lab view** based Engine Performance Analysis software package “**IC Engine Soft**” is provided for on line performance evaluation. Variable compression ratio is a technology to adjust the compression ratio of an internal combustion engine while the engine is in operation. This is done to increase fuel efficiency while under varying loads. Variable compression engines allow the volume above the piston at top dead centre to be changed.



**Fig. 7 Variable compression ratio diesel engine**

### Specifications:

- Product: Computerized VCR Diesel Engine Test Setup Single
- Cylinder, Four Stroke
- Engine: Make Kirloskar, Type Single Cylinder, Four Stroke
- Diesel, Water Cooled, Power 3.5 kW at 1500 rpm, Stroke 110 mm, bore 87.5 mm. 661 cc, CR 17.5, Modified to VCR engine CR range 12 to 18

- Dynamometer: Type Eddy Current, with Loading Unit
- Air Box: M S Fabricated with Orificemeter and Manometer
- Fuel Tank: Capacity 5 Ltrs.
- Calorimeter: Type Pipe in pipe
- Piezo Sensor: Range 5000 PSI, with low noise cable
- Crank angle Sensor: Resolution 1 Deg, Speed 5500 RPM with TDC pulse

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Supporting Research Facility

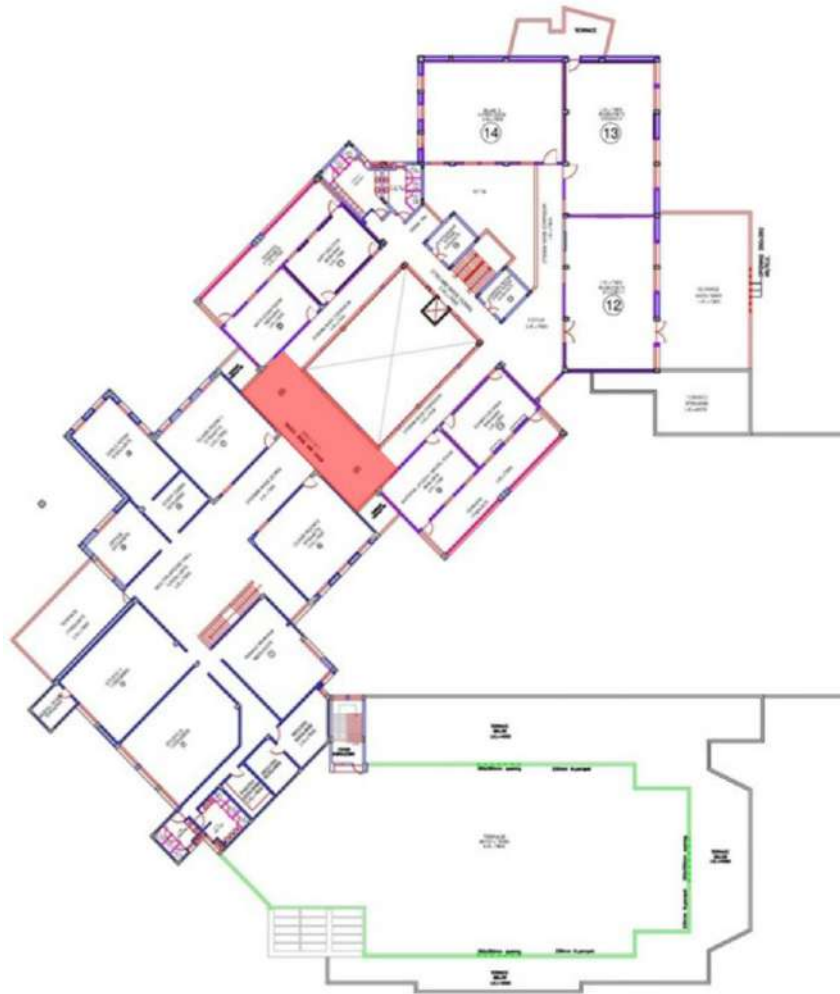
## **Art Gallery/Court**

The art Gallery infrastructure and the diverse range of activities conducted within it at the Institute Of Architecture (IOA) are instrumental in promoting innovation, research, and creativity within

the field. The art court serves as a collaborative space, enabling interdisciplinary collaboration, practical application of theoretical concepts, research endeavours, and professional development. These activities enhance the quality of education, foster sustainability, and contribute to the overall academic excellence of IOA.

**Infrastructure:**

The Institute Of Architecture (IOA)'s art Gallery is located on the second floor of the building and measures 128 meters square (16 meters X 8) meters. it serves as a hub for innovation, research, and exhibitions, playing a vital role in advancing the field of Architecture and Interior Design.



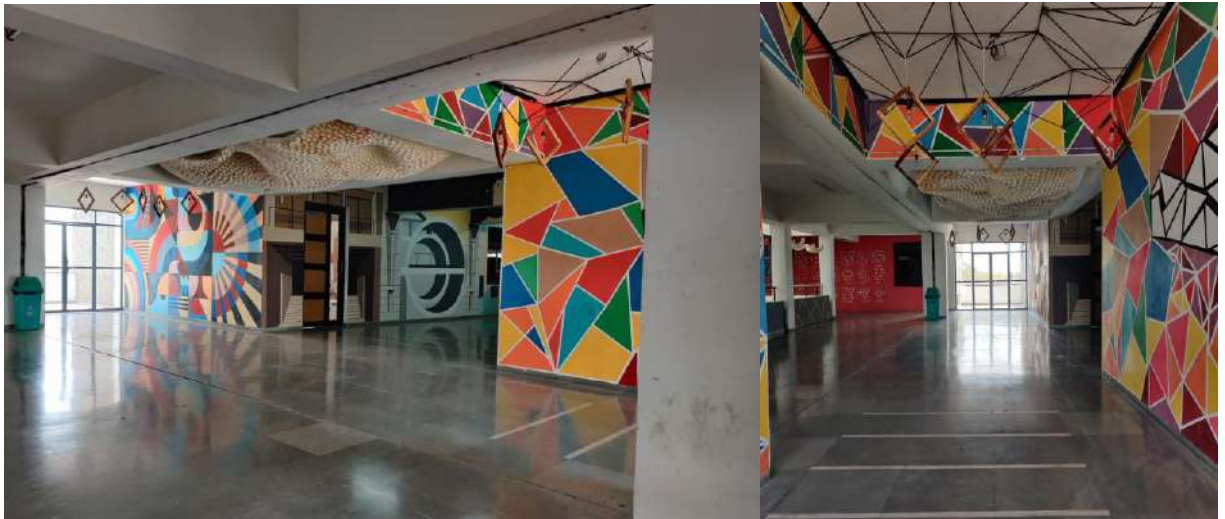
IOA 2nd Floor, highlighting the Art Court

The art Gallery at IOA is purposefully designed to facilitate creative exploration, and collaboration, and showcase the outcomes of research and innovation. The art court offers ample open space, allowing for flexible arrangements and accommodating diverse activities, workshops, and exhibitions. This adaptable environment supports unhindered movement and fosters creativity.



Large openings on either side and a connection with the naturally lighted atrium fill the art court with abundant natural light, creating an aesthetically pleasing ambience while reducing the reliance on artificial lighting during daylight hours. This sustainable design feature contributes to energy efficiency and promotes well-being.

The art court can be equipped with dedicated display boards, screens, and hanging systems. These features enable the exhibition of student work, research outcomes, and visual representations, encouraging knowledge-sharing and fostering a culture of excellence.



#### **Activities conducted:**

The art Gallery serves as a vibrant hub for a wide range of activities that promote innovation, research, and collaboration within the field of Architecture and Interior Design. Some key activities conducted in the art court include:

- **IGBC Affiliated Workshops and Lectures:** The art court became the host for workshops and lectures in collaboration with the Indian Green Building Council (IGBC). These events

focus on sustainable practices, energy-efficient designs, and green building concepts. Through these activities, students and faculty are exposed to the latest trends and research in sustainable architecture and interior design.

These workshops address sustainability in architecture and interior design. They also focus on ecological considerations, resource optimization, and innovative approaches to creating sustainable built environments. The art court serves as a platform to explore and experiment with sustainable design solutions.



Green Sketching campaign for World Green Buiding Week

- **Innovation in Materials, Native Art, and Design:** The art court facilitates workshops that delve into indigenous design principles, traditional art forms, and a diverse range of materials. These activities promote cultural heritage preservation, sustainability, and innovative design practices, fostering a deeper understanding of contextual design.



Steel structures through various materials and design composition

The art court serves as a space for students and faculty to engage in research projects, prototype development, and experimentation. These activities contribute to the advancement of knowledge and the development of innovative solutions for real-world challenges.

The activities conducted in the art court hold immense importance in fostering innovation and research within the field of Architecture and Interior Design. They contribute to:

- **Exploration of New Ideas:** The art court serves as a catalyst for exploring and experimenting with new ideas, materials, and technologies. By providing a space for innovation and research, it encourages students and faculty to push boundaries, challenge conventional practices, and develop novel approaches to architectural and interior design challenges.
- **Cross-Disciplinary Collaboration:** The art court fosters interdisciplinary collaboration by bringing together students and faculty from various disciplines. Through these collaborations, diverse perspectives are shared, leading to creative problem-solving and the generation of innovative ideas. This interdisciplinary approach reflects the complexity of real-world design projects.
- **Knowledge Dissemination:** The art court provides a platform for sharing research findings, design concepts, and innovative ideas. Exhibitions and workshops conducted in the art court facilitate the dissemination of knowledge, encouraging dialogue, constructive critique, and peer learning. This process enhances the collective understanding of architecture and interior design principles and promotes continuous improvement.
- **Professional Development:** The art court activities contribute to the professional development of students. Through research projects, workshops, and exhibitions, students gain practical experience, refine their design skills, and develop a deep understanding of the industry. These experiences prepare them to become competent professionals in the field of Architecture and Interior Design.