ENERGY AUDIT REPORT
FOR
MALLIGE COLLEGE OF PHARMACY
#71, Silvepura, Chikkabanvara Post,
Bangalore, 560090

Carried For
Academic Year 2022-2023

Carried Out By

ELION TECHNOLOGIES & CONSULTING PVT LTD
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MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

INDEX

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

EXECUTIVE SUMMARY

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VISION

To create ethical, knowledgeable and professional pharmacists in the field.

MISSION

To become a "Centre of excellence" by providing quality and research oriented Pharmacy education to meet the need of the industry, community and other stake holders through continuous training and up-gradation of infrastructure of learning and practicing Pharmacy profession.

Our facilities includes a library, hostels, a student cafeteria serving multiple cuisines to satisfy different palates, laboratories for all the branches of science, a gym and a fitness center with state of the art equipment, sports arena with facilities for various games, a digital library as well as transport facilities for our students and staff. We has a wi-fi campus allowing the students flexibility and luxury of working from any part of the campus at any time. Our facilities are built to ensure and encourage all round development of its students, nurturing the world of tomorrow.

Electricity is supplied by Bangalore Electricity Supply Company Limited and for backup powers supply DG Set are available. Total sanction load is 25KVA.

Elion Technologies and Consulting Pvt Ltd team conducted the Detail Energy audit for the year 2022-2023.

The energy audit included detailed data collection, analysis of data and identification of specific energy saving proposals.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

CHAPTER – I
INTRODUCTION

M/S Mallige College of Pharmacy evinced interest in availing the services of Elion Technologies and Consulting Pvt Ltd for conducting energy audit of their premises.

Elion Technologies and Consulting Pvt Ltd team conducted the Detail Energy audit for the year 2022-2023.

This report is on the energy audit carried out M/S Mallige College of Pharmacy. The detailed energy audit comprised of the following activities:

- Data collection of power consuming equipment's.
- A brief session on energy management was conducted to seek more inputs from the personnel engaged in operation and maintenance of electro mechanical services.
- Analysis of collected data.
- Discussion with the officials on the identified proposals.
- Discussion and reporting of the findings of energy audit with the Engineers and management staff.

All the identified energy savings proposals have been discussed with the executives concerned before finalizing the projects.

The contents of the report are based solely on the data provided by Mallige College of Pharmacy officials during the energy audit.

The management should implement the suggestions made in the report after verifying requisite safety aspects.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

Methodology for Energy Audit:

The following is a list of general procedure and information undertaken during the energy audit:

1. General information of the plant.
2. Baseline energy description.
3. Past energy consumption bills which includes electricity bills.
4. On site data collection
5. Energy analysis of different sectors.
6. Recommendation of energy conservation measures.

The primary goal of the energy audit was to identify sources and areas of potential energy savings and cost saving throughout the Plant by measures of optimization, replacement, retrofitting, and on the other hand, to also provide recommendations on operational and maintenance practices improvements.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

CHAPTER – II
ACKNOWLEDGEMENT

Elion Technologies and Consulting Pvt Ltd places on record it's thanks to M/S Mallige College of Pharmacy for entrusting the task of conducting energy audit study.

We acknowledge with gratitude the whole hearted support and cooperation extended by all team members while carrying out the study.

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★ IQAC CELL

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

CHAPTER – III
PROCESS DESCRIPTION & ENERGY CONSUMPTION DETAILS

PROCESS DESCRIPTION

The main areas of energy consumption as observed during the audit are as follows:

- Air Conditioners
- Lighting

The main sources of energy to meet the required consumptions are as follows:

- Electricity supply from Power Distribution Company.
- DG set.
- Solar Power Plant of capacity 50KW.

Consumption pattern for energy is given below:

ELECTRICITY CONSUMPTION PATTERN

Months	Contract Demand (KVA)	Billable Demand (KVA)	KWH Import	KWH Export	Net Payable Amount
Jan-22	25	21	205.00	1683.00	4726
Feb-22	25	21	243.00	1645.00	4231
Mar-22	25	21	1040.00	4065.00	14955
Apr-22	25	21	975.00	4115.00	15190
May-22	25	21	998.00	3360.00	10051
Jun-22	25	21	874.00	3446.00	34362
Jul-22	25	21	1354.00	2445.00	23727
Sep-22	25	21	1625.00	3600.00	16238
Oct-22	25	21	425.00	2125.00	5672
Nov-22	25	21	1005.00	3038.00	7870
Dec-22	25	21	1016.00	2150.00	1935
Jan-23	25	21	1070.00	2610.00	4618
Feb-23	25	21	1100.00	3410.00	9704

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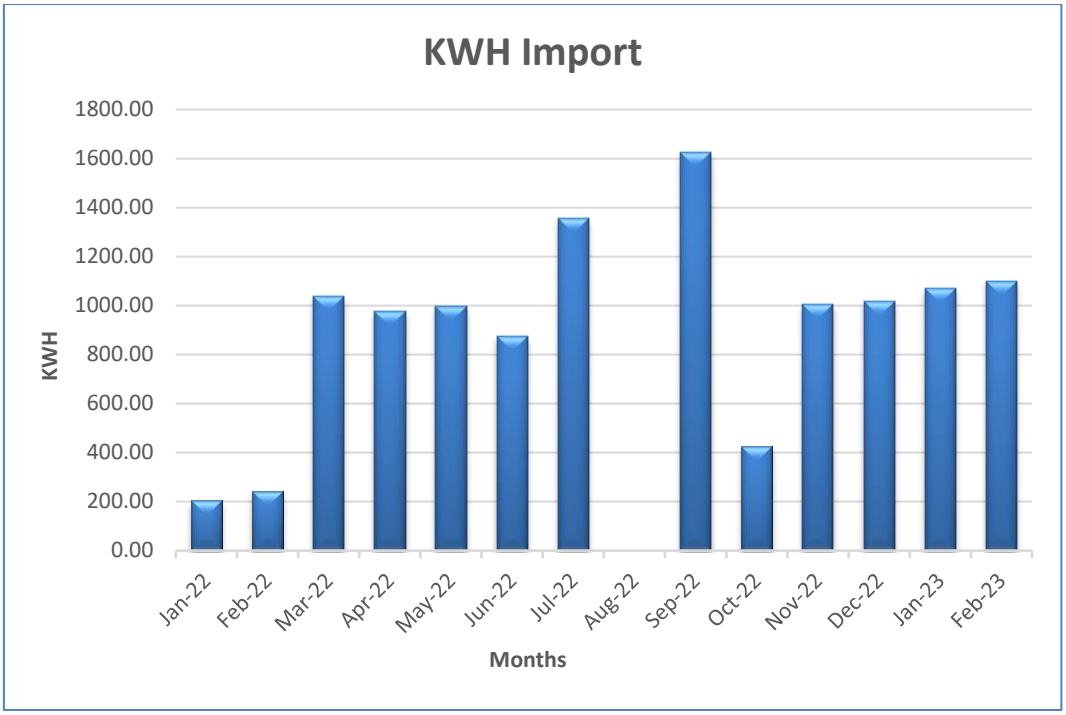
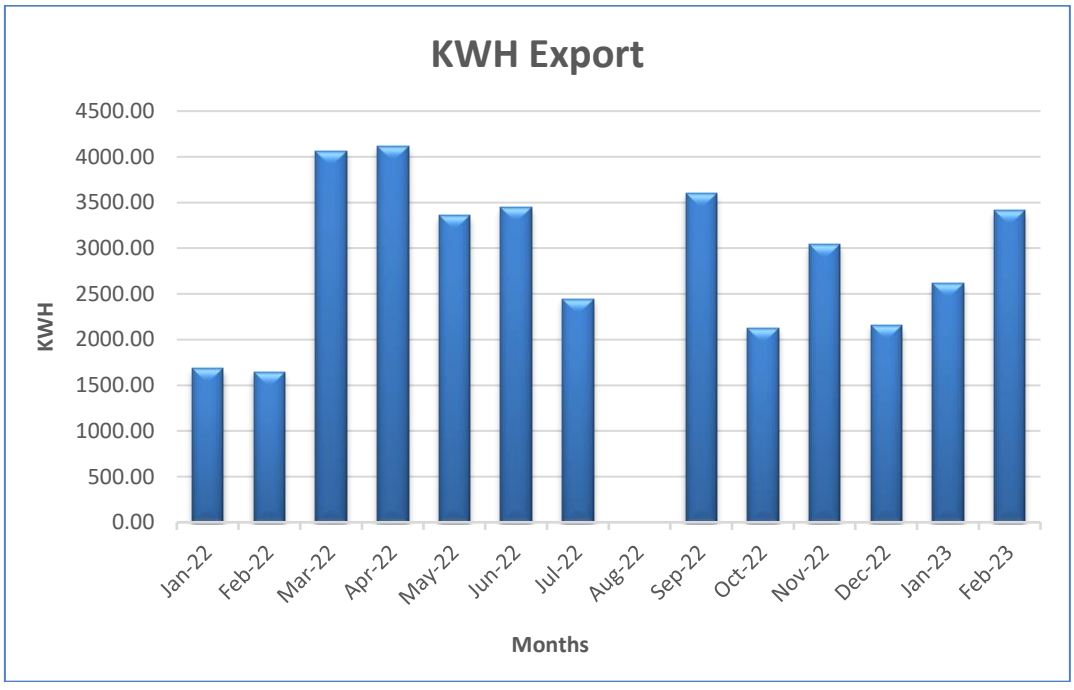
PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

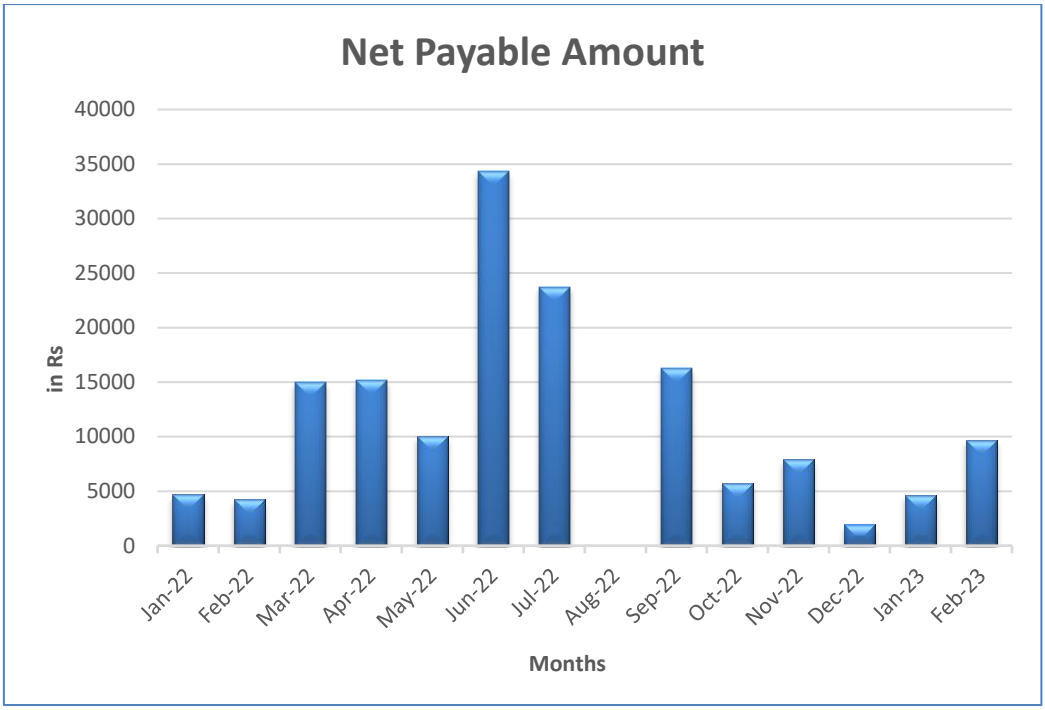




MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090



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Mallige College of Pharmacy
Bangalore-560 090

CHAPTER – IV
LIGHTING SYSTEM

The inventory of lighting was collected and following is the summary:

Type- LED/CFL/Conventional -Bulb/Tube Light	Location	Rating	Quantity	Number of Hours being turned on
LED	Board Room and Office	7W	9	3
	Class Rooms	7W	4	3
	Laboratories	7W	29	3
	Auditorium	7W	25	3
	Corridor	7W	7	3
CFL	Machine Room And Corridor	7W	9	Nil
TUBELIGHT	Labs , Corridor Class Rooms And		107	Nil

Observation:

Most of the lighting used are LED. CFL and Tube lights are being used at certain locations. It was informed that college has planned to replace CFL and Tube lights in phased manner with replacement of faulty lights with LED.

Recommendation:

- Sticker to SWITCH OFF LIGHT and SAVE ENERGY to be displayed
- CFL and tube lights to be changed to LED

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

CHAPTER – V
PUMPS AND MOTORS

Pumps and motors are used for pumping of water. The details of the pumps and motors are given below:

- 2 HP Submersible pump is used which is operated for 4 hours a day having flow rate of 140US at a head of 70 FT at 1500 RPM.
- 15 HP Motor is used which is operated for 5 hours a day.

Observation:

All pumps and motors are functioning properly and well maintained.

Recommendation:

Proper maintenance and upkeep of pump and motor to be done.

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★ IQAC CELL

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

CHAPTER – VI
AIR CONDITIONING

Windows and Split AC's are used in facility for air conditioning. Temperature maintained is 20°C.

Type Windows/Split/Package and Location	Capacity in Ton	Whether any star rating available	Set temperature
Animal House	1 Ton	-	20
Instrument Room	1 Ton	-	20
Principal Room	1 Ton	-	20

Observation:

All air conditioners are found to be functioning properly and well maintained.

Recommendation:

- All doors to be kept closed while using the air conditioners and regular annual service of AC's should be carried out.
- Set Temperature of Air Conditioner shall be maintained at 26°C.
- A reduction in 1°C set point temperature, the energy cost comes down by 5%. By carefully selecting the seasonal temperature in different areas as per requirement considerable saving on account of power consumption can be achieved.
- Whenever Air Conditioners are replaced in future, BEE star rated air conditioners shall be considered which are highly energy efficient.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

CONCLUSION

The energy audit conducted at M/S Mallige College of Pharmacy has revealed that college is doing good work in having sustainable college. The college is sustainable in energy consumption and net positive. To further reduce energy consumption, college should implement the recommendation made in report.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

ENVIRONMENT AUDIT REPORT
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MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

CONTENTS

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

ACKNOWLEDGEMENT

Elion Technologies and Consulting Pvt Ltd thanks the management of Mallige College of Pharmacy for assigning this important work of Environmental Audit. We appreciate the co-operation to our team for completion of study.

For giving us necessary inputs to carry out this very vital exercise of Environment Audit. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

CONCEPT

The term 'Environmental audit' means differently to different people. Terms like 'assessment', 'survey' and 'review' are also used to describe similar activities. Furthermore, some organizations believe that an 'environmental audit' addresses only environmental matters, whereas others use the term to mean an audit of health, safety and environment-related matters. Although there is no universal definition of Environmental Audit, many leading companies/ institutions follow the basic philosophy and approach summarized by the broad definition adopted by the International Chambers of Commerce (ICC) in its publication of Environmental Auditing (1989).

The ICC defines Environmental Auditing as:
"A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of safeguarding the environment and natural resources in its operations/projects."

The European Commission, in its proposed regulation on environmental auditing, has also adopted the ICC definition of Environmental Audit.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

INTRODUCTION

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues.

Environmental Management Systems (EMS) is very popular in the industrial sector, but the general belief is that EMS is something pertaining to industries only. Other parts of the world have started adopting compatible environmental management systems either voluntarily or for promoting standards by external certification. International environmental standards do not suit the existing Indian educational system.

A very simple indigenized system has been devised to monitor the environmental performance of educational institutions. It comes with a series of questions to be answered on a regular basis. Environmental conditions may be monitored from angles that are relevant to Indian requirements, without stress on legal issues or compliance. This innovative scheme is user- friendly and totally voluntary. The environmental monitoring system helps the institution to set environmental examples for the community and to educate young learners. It can be adapted to urban and / or rural situations.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

OVERVIEW OF INSTITUTE

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List of courses offered by the institute:

- D-Pharm
- B-Pharm
- Pharm D
- M. Pharm
- PhD

Details of the infrastructure of Mallige College of Pharmacy is as per below:

Total Area: 2 Acres
Green Area: 1 Acre

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

Building Name	Areas	Size
Mallige College of Pharmacy	Total build up area	4369 sq. ft
	Carpet area & administrative area	466 sq. ft
	Instruction area	2789 sq. ft
	Amenities	1114 sq. ft

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

AUDIT OBJECTIVES

The broad aims/ benefits of the eco-auditing system would be –

- Environmental education through systematic environmental management approach
- Improving environmental standards
- Benchmarking for environmental protection initiatives
- Reduction in resource use
- Financial savings through a reduction in resource use
- Curriculum enrichment through practical experience
- Development of ownership, personal and social responsibility for the college campus and its environment
- Enhancement of university profile
- Developing an environmental ethic and value systems in young people

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★ IQAC CELL

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

EXECUTIVE SUMMARY

An environmental audit is a snapshot in time, in which one assesses campus performance in complying with applicable environmental laws and regulations. Though a helpful benchmark, the audit almost immediately becomes outdated unless there is some mechanism in place to continue the effort of monitoring environmental compliance.

This is second environmental audit of institute for NACC affiliation; QS Program and doing their bid towards environmental protection and environmental awareness at local and global front. Audit criterion is environmental cognizance, waste minimization and management, biodiversity conservation, water conservation, energy conservation and environmental legislative compliance by the campus. A questionnaire is used during audit. This audit report contains observations and recommendations for improvement of environmental consciousness.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

AREA OF IMPROVEMENTS

- Environment Policy to be adopted by the University Campus.
- Water Meter should be installed at the borewell and daily consumption of water shall be recorded to keep a check on water usage.
- Use of recycled paper shall be encouraged in the campus.
- Equipments when not in use shall be switched off and should not run in standby modes or ideal.
- Environmental drills for response against spillage and leakage of chemicals in the campus.
- Signages on water and energy saving to be displayed.

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★ IQAC CELL

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

ENVIRONMENTAL AUDIT - QUESTIONARE

The areas of eco/environmental/green auditing to be followed/practiced by participating institutions:

I. Waste Minimization and Recycling
II. Greening
III. Energy Conservation
IV. Water Conservation
V. Clean Air
VI. Animal Welfare
VII. Environmental Legislative
VIII. General Practices

Dose any Environmental Audit conducted earlier?
No

What is the total permanent population of the Institute?

	Male	Female	Total
Students	350	190	540
Teachers	26	20	46
Non-Teaching Staff	14	11	25
Sub Total	390	221	611
Approximate Number of Visitors (Per day)			60
What is the total number of working days of your campus in a year?			280

Where is the campus located?
The campus is Located in outskirts of Bangalore.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

Which of the following are available in your institute?

1	Garden area	Yes
2	Playground	Yes
3	Kitchen	Yes
4	Toilets	Yes
5	Garbage Or Waste Store Yard	Yes
6	Laboratory	Yes
7	Canteen	Yes
8	Hostel Facility(numbers)	Yes (1)
9	Guest House	NIL

Which of the following are found near your institute?

1	Municipal dump yard	NIL
2	Garbage heap	NIL
3	Public convenience	NIL
4	Sewer line	NIL
5	Stagnant water	NIL
6	Open drainage	NIL
7	Industry – (Mention the type)	NIL
8	Bus / Railway station	NIL
9	Market / Shopping complex / Public halls	NIL

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★ IQAC CELL

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

I - WASTE MINIMIZATION AND RECYCLING

1.	Does your institute generate any waste? If so, what are they?	1. Only day to day paper waste is generated. 2. Biodegradable waste in canteen.
2.	What is the approximate amount of waste generated per day? (in Kilograms/month) (approx.)	30KG
3.	How is the waste generated in the institute managed? By 1 Composting 2 Recycling 3 Reusing 4 Others(specify)	Composting
4.	Do you use recycled paper in institute?	Nil
5.	Do you use reused paper in institute?	Nil
6.	How would you spread the message of recycling to others in the community? Have you taken any initiatives? If yes, please specify.	Nil
7.	Can you achieve zero garbage in your institute? If yes, how?	Yes, We use different colored dustbins. Recyclable (Green) and Non-recyclable (Blue) dustbins and dispose that day itself for the composting.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

II – GREENING THE CAMPUS

1.	Is there a garden in your institute?	Yes
2.	Do students spend time in the garden?	Yes
3.	Total number of Plants in Campus	Around 500
4.	Suggest plants for your campus. (Trees, vegetables, herbs, etc.)	Coconut trees, cherry blossom trees, bamboo trees, garden with show plants , teak wood trees, oleander shrubs, Vasaka, marigold plant etc.
5.	Is the university campus have any Horticulture Department	Yes
	Number of Staff working in Horticulture Department	3
6.	Number of Tree Plantation Drives organized by School per annum.(If Any)	1
7.	Number of Trees Planted in Last FY.	200
	Survival Rate	175
8.	Plant Distribution Program for Students and Community	Yes
9.	Plant Ownership Program	Yes

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

III - ENERGY

1.	List ten ways that you use energy in your institute. (Electricity, LPG, firewood, others). Using this list, try to think of ways that you could use less energy every day.	1. Solar Energy 2. LPG 3. Generator 4. Electricity
2.	Are there any energy saving methods employed in your institute? If yes, please specify. If no, suggest some	1. College Corridors are wide with good ceiling height. All the corridors receive good daylight. 2. Our Classrooms, Labs and Library have high ceiling with wide doors and large windows. Windows are kept open to adequate daylight. 3. Our Classroom walls, corridors and labs are white-washed, this enhances the daylight received. 4. Will switching off the fans and lights when not required. 5. Lighting is not required all the times in college
3.	How many CFL/LED bulbs has your institute installed?	CFL - 9, LED - 109
4.	Are any alternative energy sources employed / installed in your institute? (photovoltaic cells for solar energy, windmill, energy efficient stoves, etc.,) Specify.	Solar Energy
5.	Do you run “switch off” drills at institute?	Nil
6.	Are your computers and other equipment’s put on power-saving mode?	Yes

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

7.	Does your machinery (TV, AC, Computer, weighing balance, printers, etc.) run on standby modes most of the time? If yes, how many hours?	Computer, Printer, Weighing Balance (6-7 Hours)

IV - WATER CONSERVATION

1.	List four uses of water in your institute	1. Garden 2. Laboratories 3. Toilets 4. Drinking Water 5. Cleaning
2.	How does your institute store water? Are there any water saving techniques followed in your institute?	Underground Sump
3.	If there is water wastage, specify why and How can the wastage be prevented /stopped?	Nil
4.	Locate the point of entry of water and point of exit of waste water in your institute.	Entry - From underground sump Exit - Drainage

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★ IQAC CELL

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

5.	Write down four ways that could reduce the amount of water used in your institute	1. No leakage in toilets. 2. No leakage in laboratories. 3. Yearly once will change the pipes laboratories as well as toilets. 4. Will use refillable water bottle. 5. Will use rain water for lawn by periodically aerating.
6.	Record water use from the institute water meter for six months (record at the same time of each day). At the end of the period, compile a table to show how many litres of water have been used.	Meter not available.
7.	Does your institute harvest rain water?	Yes
8.	Is there any water recycling System.	Nil

V - CLEAN AIR

1.	Are the Rooms in Campus are Well Ventilated?	Yes	
2.	Window Floor ratio of the Rooms	25%	
3.	What is the ownership of the vehicles used by your school? (Please Tick ✓ only one)		Yes
			Operator-owned vehicles
		✓	School-owned vehicles
			A combination of campus-owned and operator-owned vehicles

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
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4.	Provide details of school-owned motorized vehicles?	Buses	Cars	Vans	Other	Total
	No. of vehicles	03		01		04
	No. of vehicles more than five years old	01				01
	No. of Air conditioned vehicles			01		01
	PUC done	YES		YES		

5.	Specify the type of fuel used by your school's vehicles:	Buses	Cars	Vans	Other
	Diesel	✓			
	Petrol				
	CNG			✓	
	LPG				
	Electric				

6.	Air Quality Monitoring Program (If Any)	Nil
7.	Students suffer from respiratory ailments? (If Any)	Nil
8.	Details of Genset	Genset Power Bank, 15KV Engine Number: BCO4206327 DG Set Serial No. 0857/17 Ojus Power & Technologies Pvt.Ltd Usage : NIL because we have UPS

VI – ANIMAL WELFARE

1.	List the animals (wild and domestic) found on the campus (dogs, cats, squirrels, birds, insects, etc.)	1. Dogs - 2 2. Squirrel - 30 3. Birds - Approx. 100 4. White Rats - 50 5. Rabbits - 10

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL, Mallige College of Pharmacy Bangalore-560 090

2.	How many dogs in your area have undergone Animal Birth Control - Anti Rabies (ABC - AR)?	Nil
3.	Does your institute have a Biodiversity Programme or a KARUNA CLUB?	Nil

VII - ENVIRONMENTAL LEGISLATIVE COMPLIANCE

1.	Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
2.	Does your institute have any rules to protect the environment? List possible rules you could include.	Yes Conserve water to protect the earth, use products that are environment friendly, recycle food waste with compost etc.
3.	Dose Environmental Ambient Air Quality Monitoring conducted by the Institute?	Nil
4.	Dose Environmental Water and Wastewater Quality monitoring conducted by the Institute?	Yes
5.	Dose stack monitoring of DG sets conducted by the Institute?	Yes
6.	Is any warning notice, letter issued by state government bodies?	NIL
7.	Dose any Hazardous waste generated by the Institute? If yes explain its category and disposal method	Yes The waste generated is classified into the following types: **1. Solid waste Management** Solid waste includes both biodegradable and non-biodegradable components. The

MALLIGE COLLEGE OF PHARMACY ★ IQAC CELL ★ BANGALORE

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

		non-biodegradable solid waste generated in the campus include, paper, plastic water bottles, metal cans etc. Biodegradable waste includes food waste, vegetable peels, leaves etc. There are separate dust bins for the biodegradable and non-biodegradable waste which are placed at various location on campus. Biodegradable waste are allowed to degrade or decompose by dumping it into the pit on campus. Leaf litter is allowed to decompose systematically over a period of time to be used as manure for the gardens in the institute. 'Use and throw' items like paper cups, plates etc. used in the college canteen is disposed in our own dumping pit and after that waste is incinerates every week. **2. Liquid waste Management** Waste water generated from the laboratories is small in quantity; hence they are handled along with solid waste. **3. E-waste Management** E-waste or electronic waste is created when an electronic product is discarded after the end of its useful life. E-waste mainly includes

		obsolete electronic devices, such as computer systems, servers, monitors, compact discs (CDs), printers, scanners, copiers, calculators, fax machines, battery cells etc. E-waste is disposed off through vendors. **4. Biomedical waste management** Biomedical waste from the microbiology and pharmacology labs consisting of microorganisms and animals disposed off by using:- Microorganisms destroys by the Autoclave method. Recommendation for sterilization in an autoclave is 15 minutes at 1210C. Moist heats destroy by the irreversible denaturation of enzymes and structural proteins. Animal waste in pharmacology laboratory is disposed in deep pits which are covered and closed with thick layer of earth.
8.	Dose any Bio medical waste generated by the Institute? If yes explain its category and disposal method	Biomedical waste from the microbiology and pharmacology labs consisting of microorganisms and animals disposed off by using:- Microorganisms destroys by the Autoclave method. Recommendation for sterilization in an autoclave is 15 minutes at 1210C. Moist heats destroy by the irreversible denaturation of enzymes and structural proteins.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

		Animal waste in pharmacology laboratory is disposed in deep pits which are covered and closed with thick layer of earth.

VIII - GENERAL

1.	Are you aware of any environmental Laws pertaining to different aspects of environmental management?	Yes
2.	Does your institute have any rules to protect the environment? List possible rules you could include.	Yes
3.	Does housekeeping schedule in your campus?	Yes
4.	Are students and faculties aware of environmental cleanliness ways? If Yes Explain	Yes
5.	Dose Important Days Like World Environment Day, Earth Day, and Ozone Day etc. eminent in Campus?	Yes
6.	Dose Institute participated in National and Local Environmental Protection Movement?	Yes
7.	Dose Institute has any Recognition/certification for environment friendliness?	Nil
8.	Dose Institute using renewable energy?	Solar
9.	Dose Institution conducts a green/environmental audit of its campus?	Yes

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MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

10.	Has the institution been audited / accredited by any other agency such as NABL, NABET, TQPM, NAAC etc.?	Nil

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MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
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Bangalore-560 090

RECOMMENDATIONS

- Environment Policy to be adopted by the University Campus.
- Water Meter should be installed at the borewell and daily consumption of water shall be recorded to keep a check on water usage.
- Use of recycled paper shall be encouraged in the campus.
- Equipments when not in use shall be switched off and should not run in standby modes or ideal.
- Environmental drills for response against spillage and leakage of chemicals in the campus.
- Signages on water and energy saving to be displayed.

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★ IQAC CELL

MALLIGE COLLEGE OF PHARMACY ★ BANGALORE ★

PRINCIPAL,
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Bangalore-560 090

CONCLUSION

This audit involved extensive consultation with all the campus team, interactions with key personnel on wide range of issues related to Environmental aspects. Overall, 40% of university campus is for landscaping. The audit has identified several observations for making the campus premise more environmentally friendly. The recommendations are also mentioned with observations for university campus team to initiate actions.

The audit team opines that the overall site is maintained well from environmental perspective. There are no major observations but recommendation is made in this report which would further strengthen the goal to achieve 100% environment friendly campus.

MALLIGE COLLEGE OF PHARMACY IQAC CELL BANGALORE

MALLIGE COLLEGE OF PHARMACY BANGALORE

PRINCIPAL,
Mallige College of Pharmacy
Bangalore-560 090

REFERENCE

- The Environment [Protection] Act – 1986 (Amended 1991) & Rules-1986 (Amended 2010)
- The Petroleum Act: 1934 – The Petroleum Rules: 2002
- The Central Motor Vehicle Act: 1988 (Amended 2011) and The Central Motor Vehicle
- Rules:1989 (Amended in 2005)
- Energy Conservation Act 2010.
- The Water [Prevention & Control of Pollution] Act – 1974 (Amended 1988) & the Water (Prevention & Control of Pollution) Rules – 1975
- The Water [Prevention & Control of Pollution] Cess Act-1977 (Amended 2003) and Rules- 1978
- The Air [Prevention & Control of Pollution] Act – 1981 (Amended 1987) The Air (Prevention & Control of Pollution) Rules – 1982
- The Gas Cylinders Rules – 2016 (Replaces the Gas Cylinder Rules – 1981
- E-waste management rules 2016
- Electrical Act 2003 (Amended 2001) / Rules 1956 (Amended 2006)
- The Hazardous Waste (Management and Handling and Trans-boundary Movement) Rules, 2008 (Amended 2016)
- The Noise Pollution Regulation & Control rules, 2000 (Amended 2010)
- The Batteries (Management and Handling) rules, 2001 (Amended 2010)
- Relevant Indian Standard Code practices

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