



CRITERION 7

SSR CYCLE IV

INSTITUTIONAL VALUES AND BEST PRACTICES

7.1. Institutional Values and Social Responsibilities

7.1.3: Quality audits on environment and energy regularly undertaken by the Institution.

Green audit/environmental audit report for the year 2021 -2022

A.P.C. Mahalaxmi College for Women

Thoothukudi



GREEN & ENERGY AUDIT

2021-22



DCW LIMITED

SAHUPURAM – 628 229

THOOTHUKUDI DISTRICT– 628 229

CIN: L24110GJ1939PLC000748 / GST No: 33AAACD0559N1ZN



Web: www.dcwlimited.com

ACKNOWLEDGEMENT

21.12.2022

We express our sincere gratitude to **A.P.C. Mahalaxmi College for Women, Thoothukudi** to be a part of their mission towards Energy Conservation. We are thankful to the Management, Principal, HODs and Staffs of **A.P.C. Mahalaxmi College for Women, Thoothukudi** with whom we have interacted during the field study for their whole-hearted support in undertaking measurements and eagerness to assess the system/equipment efficiencies and saving potential.

We are also thankful to concerned Faculty members and Staff Members for helping us during the field study.

Authorized Signatory

J. Pon Saravanan, B.E.,M.B.A.

H. Radhakrishnan, M.E.

Energy Auditor, EA -24382

for DCW Ltd.

Sahupuram.

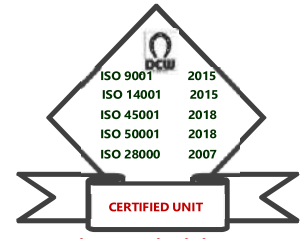


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CERTIFICATE

21.12.2022

This is to certify that **A.P.C. Mahalaxmi College for Women, Thoothukudi** has conducted a detailed “Green and Energy Audit” for its campus during the academic year 2021-2022. The green audit was conducted in accordance with the applicable standards prescribed by the Central Pollution Control Board, New Delhi, and the Ministry of Environment, Forest and Climate Change, New Delhi. The audit involves water, wastewater, energy, air, green inventory, solid waste, etc., and gives an 'Environmental Management Plan', which the college can follow to minimize the impact on the institutional working framework. In an opinion and to the best of our information and according to the information given to us, said green audit gives a true and fair view in conformity with environmental auditing principles accepted in India.

Authorized Signatory

J. Pon Saravanan, B.E.,M.B.A.

H. Radhakrishnan, M.E.

Energy Auditor, EA -24382

for DCW Ltd.

Sahapuram.

Executive Summary

Green auditing is an essential step to identify and determine whether the institutions practices are sustainable and ecological. Traditionally, we were upright and efficient users of natural resources. But over the period of time, excessive usage of resources like water, electricity, petrol, etc. have become habitual for everyone especially, in urban and semi-urban areas.

Green audit standardizes all such practices and provides an efficient way to use natural resources. In the time of climate change and resource exhaustion it is necessary to re-check the processes and convert it in to green and sustainable. Green audit provides an approach for it. It also increases overall awareness among the individuals working in institution towards the eco-friendly environment.

This is the first attempt to conduct a Green Audit of this College campus for fulfilment of NAAC criteria. This Audit was mainly focused on greening indicators like consumption of energy in terms of electricity and fossil fuel, quality of soil, water usage, vegetation, waste management practices and carbon foot print of the campus. Initially a questionnaire was shared to know about the existing resources of the campus and resource consumption pattern of the students and staffs in the College.

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment. The College believes that there is an urgent need to address these fundamental environmental problems and reverse the trends. The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution.

Initially a questionnaire survey was conducted to know about the existing resources of the campus and resource consumption pattern of the students and staff in the college. In order to assess the quality of water and soil, water and soil samples were collected from different locations of the college campus and analysed for its parameters. Collected data was grouped, tabulated and analyzed. Finally a report pertaining environmental management plan with strength, weakness and suggestion on the environmental issue of campus is documented.

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Chapter - 1

1.1 Green Audit

Modernization and industrialization are the two important outputs of the twentieth century that have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources, and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar with global issues like global warming, greenhouse effect, ozone depletion, climate change, etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for a sustainable environment.

Green Campus Audit procedures includes the definition of green audit, methodology on how to conduct Green audit at Educational Institutions and Industrial sectors as per the checklist of Environment Management Systems and International Standards on ISO 14001:2015, Indian Green Building Council, Swachh Bharath Scheme under Clean India Mission to understand the principles and importance of various audits in the context of the organization and risk assessment at 360° views. It analyses to help the educational institutions and industries to maintain eco-friendly environment and personal hygiene to various stakeholders and supports the nation as a whole for the noble cause of environmental protection and nature conservation which in turn enhances the quality of life to all living beings.

1.1.1 Green Campus and Environment Policy

The green campus aims to provide an education and awareness in a clean and green environment to the stakeholders with regards to environmental compliance. This scope applies to all employees and students of the Institution to provide an eco-friendly atmosphere through proper disposal of wastes and steps taken to recycle the biodegradable wastes. Utilization of eco-friendly supplies and an effective recycling programme to maintain the campus free from hazardous wastes.

The concept of eco-friendly culture is disseminated among the students as well as rural community through various awareness programmes, seminars / conferences reuse and

recycle the waste materials. Attempts are made to limit energy usage and also replace non-renewable energy sources with renewable energy sources. The Head of the Organization, Department Heads and Senior Managers including Management Representatives are responsible for monitoring the go green initiatives of the College / University and maintain a clean/green campus. In addition, the staff and student volunteers from Nature club, Eco clubs, Science club, Fine Arts club, Youth Red cross unit, NCC and NSS units are also responsible for the implementation of the green campus and environment policy in the Organization.

1.1.2 Environment Friendly Campus

The organization is responsible to provide an eco-friendly atmosphere to the stakeholders along with making good drinking water facility to the students and staff members. The organic manure, cow dung, farmyard manure and vermicomposting for the cultivation of plants should be adopted. All non-compostable, single-use disposable plastic items, single-use plastic utensils, plastic straws and stirrers should be avoided. Education on the commitment to plastic-free alternatives for all incoming and current students, staff and faculty should be undertaken. Reduction of use of papers alternated with e-services and e-circulars, etc. and proper disposal of wastes, recycling and suitable waste management system should be taken into consideration.

1.1.3 Why Green Audit

The intention of the green audits is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring, etc. for making the institution eco-friendlier. Students are the major strength of any academic institution. Practicing green action in any educational institution will inculcate the good habit of caring for natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, no vehicle day, Rainwater harvesting, etc. will make the students good citizens of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

1.1.4 Aims and Objectives of Green Audit

- To recognise the initiatives taken towards the green campus by means of gardening by the Organization.
- To identify and provide baseline information to assess threat and risk to the ecosystem due to Organization development.
- To recognise and resolve different environmental threats of the Organization.
- To grow a large number of oxygen producing and carbon-di-oxide absorbing plants in the campus to give a pure atmosphere to the stakeholders.
- To ensure proper utilization of resources available in the surrounding areas towards future welfare of the community.
- To set a procedure for disposal of all kinds of wastes and use green cover as a carbon sink for pollution free air.
- To assess the greenish nature of an Organization campus in terms of trees, herbs, shrubs, climbers and reflected in reducing the environmental pollution soil erosion, biodiversity conservation, landscape management, natural topography and vegetation.

1.1.5 Benefits of Green Auditing

There are several benefits on conduct of green audit by the Organization which may be definitely useful to improve the campus significantly after receiving the report of audit. The following are the major benefits of the green auditing.

- Enhancement of the Organization profile and reach the global standards in proving the green campus and eco-friendly atmosphere to the stakeholders.
- Creation of wastewater treatment facility and solid waste management provision in the campus for recycling of wastewater and solid wastes to minimize the air, water and soil pollution.
- Implementing status of the rain harvesting system, water reservoirs, percolation pond, etc. in the campus to increase the ground water level.
- Establishment of terrace garden, herbal garden, kitchen, zodiac, ornamental gardens, etc. for enhancing teaching and learning and commercial exploitation.

- Treated water consumption towards plant cultivation, canteen, hostel, machinery cleaning, transport, toilet use and etc. on water consumption and per capita water consumption per day calculation.
- Documentation of the number of oxygen producing and carbon dioxide absorbing plants planted in the campus to give pure atmosphere to the stakeholders.
- Operation of water irrigation, drip and sprinkler irrigation methods to improve the green campus.
- Studying the biodiversity conservation through Life Sciences and Biological Sciences people to conserve economically important, rare and endangered plant and animal species in the campus ecosystem.
- Conduct of outreach programmes for dissemination of Green Campus motto and Green pledge initiatives to rural, tribal and urban people through Eco club, Nature club, Science club, Fine Arts club, Youth Red Cross unit, NCC and NSS bodies.
- The plants available in the campus must be tagged with their common name and Botanical name for the stakeholders to impart the knowledge on medicinal and ornamental, economic and food values of plant varieties.
- Conduction of awareness programmes and cultural activities on global warming, environmental changes and ecosystem maintenance to the stakeholders.
- Steps taken for organic, inorganic, toxic, e-waste, biomedical, food, sewage waste management, segregation of wastes and reuse methods.
- Public transport, low-emitting vehicles and control of car smokes and exhaust towards carbon accumulation in the campus by carbon footprint studies.
- More efficient resource management, provide basis for improved sustainability and creation of plastic free campus to evolve health consciousness among the stakeholders.
- Impart environmental education through systematic environmental management approach and improving environmental standards by making a benchmark for environmental protection initiatives.
- Recommendations for improving the green initiatives, planning and efforts in the campus after audit report to improve further.

1.2 About the College

Well into the fifth decade of service in the field of education, A.P.C. Mahalaxmi College for Women, Thoothukudi has played a pivotal role in educating generations of rural girls. The college offers 10 undergraduate programmes and 5 post graduate courses. The Departments of Tamil, Mathematics, Chemistry, Commerce and English are recognized as Research centres. At present there are around 1800 students in the institution. Thirty two faculty are research guides; 80 scholars have enrolled under them. Since its inception in 1973, the constructive ideals of the Founder President, Kulapathi A.P.C. Veerabahu, have been pervading the spirits of all those who are associated with the well-being of the institution. His son, the President of the college, Thiru. A.P.C.V. Chockalingam, and Mrs. Subbulakshmi Chockalingam, the Secretary of the institution have inherited the legacy of his commitment and have been serving as guiding stars for all the activities.

The college has been developing in leaps and bounds since then. The college has made a significant contribution to the inhabitants of the vicinity, particularly to the rural women, who have suffered years of social oppression. The Founder's vision was to enlighten and empower women with values. Today, as envisioned by him, the institution has always trodden a non-sectarian, non-commercial, service-oriented path to reach the zenith of success.

The unflinching support, dedication, and contribution offered by the committed team of teaching and non-teaching faculty help uphold the high motives and steadfast principles of the Founder President. Anbu, Arivu, and Aram (Love, Knowledge and Virtue) are the three sovereign words that form the college motto. Serving the needy by providing access to higher education and extending support services to them forms the very nucleus of our institution. Student amenities and support services are provided sufficiently to enrich the campus experience. The institution has, as its primary concern absorbing under privileged students and returning employable and socially sensitive graduates.

The opportunities provided here promote their ability, regardless of their fortuitous circumstances of birth or position. They are taught to tackle the obstacles that come their way. Our students are also oriented on how to develop values, self-respect, dignity and

integrity. The concerted effort of all those associated with the institution convert their dreams into realities.

The education imparted at APCMC has helped lay the groundwork for many successful graduates through the following ways:

- A harmonious co-existence with no prejudice towards caste, creed or religion imparting values of national integration, social justice and harmony through co- curricular, extra-curricular activities in the form of contests, competitions and special lectures.
- Inducting social awareness and social responsibility through campaigns and camps
- Moulding the nature, aptitude and aspiration of the students by providing apt platforms, both inside and outside the campus and by conferring awards like Best Outgoing Student, Best Library User, Best volunteer in NSS, Best volunteer in Student.

The college aspires to offer more opportunities to the students to realize their responsibilities and enable them to handle multiple roles in the society with dexterity. The management, the staff and the students work as a family together towards the same goal with a sense of togetherness. Our college has been reaccredited by NAAC with B+ in March 2019. Our college secured a place in BAND 1 category in the NIRF 2021 rankings, BAND II category in NIRF 2022 and BAND 1 category in NIRF 2023 rankings. Our journey towards accomplishing greater goals continues.

Vision & Mission of the college

To Enlighten and Empower with values.

To enrich the marginalized women with human values through quality education.

GOOGLE LOCATION OF APCM COLLEGE FOR WOMEN



Latitude 8.827107720142013° Longitude N, 78.12968496673113° E

COLLEGE ENTRANCE:



A.P.C. Mahalaxmi College is located in Thalamuthu Nagar, Sankaraperi, Thoothukudi, Thoothukudi District of Tamil Nadu State, and India.

COURSES OFFERED BY THE COLLEGE

CATEGORY	COURSES
UNDERGRADUATE PROGRAMS	B.A. Tamil
	B.A. English
	B.A. History
	B.Com
	B.Sc. Mathematics
	B.Sc. Chemistry
	B.Sc. Zoology
	B.Sc. Mathematics – Self Finance
	B.Sc. Computer Science- Self Finance
	B.Sc. Physics- Self Finance
	B.Com- Self Finance
POSTGRADUATE PROGRAMS	M.A. Tamil
	M.Sc. Mathematics
	M.Sc. Mathematics
	M.Sc. Chemistry- Self Finance
	M.Sc. Zoology- Self Finance
	M.Sc. Computer Science- Self Finance
	M.Com.- Self Finance
RESEARCH COURSES	Ph.D. Tamil
	Ph. D. English
	Ph. D. Chemistry
	Ph. D. Commerce
	Ph. D. Mathematics

1.2.1 Campus Infrastructure

The general details of the A.P.C.Mahalaxmi College are given below in the table

S.No	PARTICULARS	DETAILS
1	Name of the college	A.P.C. Mahalaxmi College
2	Address	Thalamuthu Nagar, Sankaraperi, Ettayapuram Road, Thoothukudi 628002
3	Contact Person	Dr.P.Bala Shanmuga Devi (Principal) Dr. T. Lilly Golda (IQAC Coordinator)
4	Contact (Ph. No)	+91 461 2345655
5	Email. ID	principal@apcmcollege.ac.in
6	Type of Building	Tile and Concrete
7	Annual Working Days	180 Days
8	Number of Shifts	10 shift
9	Number of Departments	23 Departments

TOTAL PERMANENT POPULATION OF THE COLLEGE

The total number of students, teachers, and non-teaching staff in the college is given below:

PARTICULAR	COURSE	MALE	FEMALE	TOTAL
Students	UG	-	1,883	1,883
	PG	-	252	252
	M.Phil.	-	-	-
Teachers	Aided	-	30	30
	Self-finance	-	81	81
Non-Teaching Staff	Aided	4	28	32
	Management	3	2	5
Subtotal	-	5	2,200	2,207
Approximate Number of Visitors (Per day)				50

The campus infrastructure consists of the following: A.P.C. Mahalaxmi Ammal Block, Main Block, V.P. Ulagammal Block, Computer Science Block, Prof. Srinivasa Ragavan Building, Auditorium, Canteen, Restroom, Library etc.

S. No	NAME OF BUILDING	PURPOSE
1	SECURITY CABIN	Security
2	EASTERN BLOCK	Classrooms: Mathematics, IQAC record room, General Hall, Sick Room
3	A.P.C. MAHALAXMI AMMAL BLOCK	Classrooms: Zoology, Physics Lab: Botany, Zoology, Physics, Non-computer lab Physical Director Room
4	MAIN BLOCK (First Floor) North	Class Room: Tamil, Tamil Research Room Dining Hall
5.	MAIN BLOCK (First Floor) South	Classroom: B. Com, M. Com Auditorium
6.	MAIN BLOCK (Ground Floor)South MAIN BLOCK (Ground Floor) North	Classroom: English English Research room, Language lab Allied Physics lab, Dining Room Classroom: Unaided B.com Guest room
7	V.P. ULAGAMMAL BLOCK	Conference Hall (Multi-Purpose) Central Bank
8	COMPUTER SCIENCE BLOCK OLD	Class room: Computer science, Lab
9	Prof. SRINIVASA RAGAVAN BUILDING	Class room: Chemistry and lab, Research room, Chemistry store room, History, Commerce Aided Secretary's Room, Principal's Room, President's Room, Regular and SF office room, Lunch room, Record Room
10.	APC VEERABAGHU NINAIVU NOOLAGAM	Library, New seminar Hall (multipurpose)

1.2.2 Campus Highlights

The Institution offer 9 undergraduate courses and 6 postgraduate courses. 5 departments are recognized as research centres with state-of-the-art laboratories. College has signed MoU with Institute for Entrepreneurship and Career Development (IECD), Bharathidasan University, Tiruchirappalli to offer 19 short term courses.

Highly competent faculty with rich academic experience tutor students on curriculum that meets the needs of employers. A.P.C. Mahalaxmi Ammal Memorial Scholarship Endowment provides an opportunity to advance the education of the economically backward students

Over 13 MoUs have been signed for academic collaborations. Multiple pathways for academic success are created through internships, projects and field visits. Focus to encourage innovative talents and spirit of entrepreneurship amongst students through the Entrepreneurship Development Cell and the Institution's Innovation Council. Students Amenities centre caters to the need of the student community.

Scholarships and Awards for academic excellence motivate students to aim high. Campus Placement and Training Programmes on core competency developments like employability skills, and awareness on employment avenues. Access to over 10,000 volumes of Books, CDs / DVDs, e-journals and e-books with online databases are available in library for Students and Staff use.

The Placement Cell in tie up with Redington Foundation @ CSR, Guindy, Chennai equips aspiring students through the Skill Development courses. Placements record in reputed firms. The Physical Education department of our college has facilities for basketball, shuttle- cork, volley ball, table tennis, badminton and athletic.

Round the clock security system with CCTV surveillance is available in the campus.

1.3 Introduction of Auditing Firm:

DCW Ltd is a leading Chemical Powerhouse built over 8 decades on a foundation of Innovation. Incorporated in January 1939 taking over India's first Soda Ash factories in Dhanghadra, Gujarat, we are now amongst the country's fastest growing multi-product, multi-location chemical companies.

With a successful record of innovating and pioneering new products and processes, we have a strong presence in the Chlor-Akali, Soda Ash and PVC business segments. Our competitive edge is further enhanced by the diversity of our product portfolio moving towards high value add specialty chemicals

DCW Mission: “We endeavour to become a chemical powerhouse by growing in a globally competitive market with a focus on the environment and community by optimising the use of all available resources.”

DCW Vision: To enhance stakeholder value by innovating and diversifying into synergistic businesses while emphasising the 4R’s (Reduce, Reuse, Recycle and Recover) as we continue to practice social responsibility.

DCW manufactures three categories of Chemicals namely Specialty Chemicals, Intermediate Chemicals and Commodity Chemicals.

Specialty Chemicals

- C-PVC
- Synthetic Iron Oxide Pigment
- Synthetic Rutile

Intermediate Chemicals

- Sodium Bicarbonate
- Hydrochloric Acid
- Liquid Chlorine
- Trichloroethylene
- Utox
- Ferric Chloride
- Sodium Hypochlorite
- Ammonium Bicarbonate

Commodity Chemicals

- Soda Ash
- Caustic Soda
- PVC

A diversified product portfolio & rigorous quality standards have enabled us to meet demand across all major global markets. Our social & environmental commitments go beyond talking points, translating into concrete programs with real world results. Our focus on major Capex combined with increasing domestic & global demand has enabled us to drive growth & value creation. We take a holistic approach to supporting our employees development for both their careers as well as by helping improve their overall quality of life.

We have now evolved into a diversified, business with a portfolio of over 14 products along with a strong exports clientele, with a major presence in the USA, Europe, Japan, Malaysia and Netherlands. Our Basic Chemistry product range provides key ingredients to the manufacturers of agricultural products, detergents, food, pharmaceuticals, pigments, fertilizers, alumina and other industrial products. Moreover, to maintain sustained economic growth and build an innovative product pipeline, we have established our R&D centre in Sahupuram, Tamil Nadu, which is home to world-class a Research & Development capability in chemistry.

DCW Overview:



1.4 About Audit Team:

On behalf of College / Institutions

S. No	Name	Position/ Department
1.	Dr. N. Subbu Lakshmi	Principal (Incharge)
2.	Dr. T. Lilly Golda	IQAC Coordinator

Audit team conveners / Members of various disciplines

S. No	Conveners/ Members	Designation / Department
1.	Dr .R. Selvalatha	Department of Tamil
2.	Dr. V. Sornalakshmi	Department of Botany
3.	Dr. V. Shyamala Susan	Department of Computer Science
4.	Dr. K. ChitraChellam	Department of Commerce
5	Dr. K. Bala Deepa Arasi	Department of Mathematics
6	Dr. R. Samundeeswari	Department of Commerce
7	Dr. P.Yogeswari Nithya	Department of Chemistry
8	Dr. R. Anista	Director of Physical Education
9	Mrs. A.Sahaya Arthy	Department of Computer Science
10	Mrs. R. Suya Padhra Haridha	Department of Physics

On behalf of External Auditing Team:

Audit Team:

- H. Radhakrishnan, M.E. - 26 years experience in Electrical Maintenance and certified Energy Auditor of Bureau of Energy Efficiency, India.
- J. Pon Saravanan, B.E., M.B.A. – 28 years experience in Electrical Maintenance.

Both are qualified Internal Auditor for ISO 9001: 2015, ISO 14001: 2018, ISO 45001:2018 and ISO 50001:2018 standards.

Chapter – 2:

2 Green Audit Methodology

A pre-audit meeting provided an opportunity to reinforce the scope and objectives of the audit and pre-audit discussions were held on the basis of green initiatives taken and the current scenario of the College campus. This meeting is an important prerequisite for the green audit because it is the first opportunity to understand the concerns. It was held with the concerned person of the college regarding initiatives taken by the college. In order to perform green audit, the methodology that included different tools such as preparation of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations was adapted.

2.1 Management Commitment

The Management of the college has shown a commitment towards green auditing during the pre-audit meeting. They were ready to encourage all green activities. It was decided to promote all activities that are environmentally friendly such as awareness programs on the environment, campus farming, planting more trees on the campus, etc., after the green auditing. The management of the college was willing to formulate policies based on a green auditing report.

2.2 Audit Stage

Green Audit was done with the help of co-associates involving different student groups, teaching, and non-teaching staff. The green audit began with the teams walking through all the different facilities at the College, determining the different types of appliances and utilities as well as measuring the usage per item (Watts indicated on the appliance or measuring water from a tap) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency, or general characteristics of certain appliances. Data collection was done in the sectors such as Energy, Waste, Green Area, Carbon footprint, and Water use. College records and documents were verified several times to clarify the data received through surveys and discussions.

The study covered the following areas to summarize the present status of environmental management on the campus:

- Water Management
- Green Area Management
- Energy Management

2.3 Methodology

- Onsite Visit

Field visit was conducted by the Audit Team. The key focus of the visit was on assessing the status of the green cover of the Institution, their waste management practices and energy conservation strategies etc.

- Focus Group Discussion

The Focus Group discussions were held with staff members and the management focusing various aspects of Green Audit. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional and local level.

- Energy and waste management

With the help of Teaching, Non-teaching staff, students, Administrative officer, the audit team has assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college. The monitoring was conducted with a detailed questionnaire survey method.

2.4 Data analysis and final report preparation

Proper analysis and presentation of data produced from work is a vital element. In the case of a green audit, the filled questionnaires of the survey from each group were tabulated as per their modules, in Excel spread sheets. The tabulated data is then used for further analysis. For a better understanding of the results and to avoid complications, averages, and percentages of the tables were calculated. A graphical representation of these results was made to give a quick idea of the status. Interpretation of the overall outcomes was made which incorporates all the primary and secondary data, references, and interrelations within. Final report preparation was done using this interpretation.

Green Audit Report (2021-22)

The study covered the following areas to summarize the present status of environment management in the campus.

- Green area management
- Water management
- Energy Management

Chapter - 3

3 Green Area Management

College campus is considered as one of the Green Educational Institution with a rich flora and faunal diversity. The campus now quite clean, green and has much less pollution to the rest of the city. The College campus is important not only from education point of view but also as green lung.

Green Area Management includes the plants, greenery and sustainability of the campus to ensure that the buildings conform to green standards. This also helps in ensuring that the Environmental Policy enacted, enforced and reviewed using various environmental awareness programmes.

3.1 Observations

- It covers both qualitative and quantitative measurements including physical observation of greeneries in terms of growing of natural and planted vegetation and their maintenance.
- An account of a large number of Oxygen producing and Carbon-di-oxide absorbing plants planted in the Campus are taken into consideration to give pure atmosphere to the stakeholders.
- Many trees are maintained in the campus (around 45species) to maintain the biodiversity.
- Various tree plantation programmes are being organized at college campus through NSS (National Service Scheme) unit and Management. This program helps in encouraging eco-friendly environment which provides pure oxygen within the institute and creates awareness among campus students.

3.1.1 Qualitative Measurements

S.No	Requirements and checklists of the audit Conformity	Yes	No	NA
1	Have internal Green campus audit procedures been developed and implemented in the Organization?	✓		
2	Have programmes for the achievement of Green campus objectives and targets been established and implemented as on today?	✓		
5	Have responsibilities been assigned for programmes at each appropriate function and level for environment monitoring.	✓		
6	Are the following environmental aspects considered in sufficient detail?			
	a. Drinking water / RO water / Borewell water / Open well water / Pond water / Municipal or Corporation water use and to check quality of water periodically	✓		
	b. Wastewater treatment facility	✓		
	c. Sufficient number of trees, shrubs, herbs and lawns	✓		
	d. Solid waste management facility	✓		
	e. Rain harvesting system, water reservoirs, etc	✓		
	f. Aquarium and aquatic (hydrophytes) plants	✓		
	g. Establishment of herbal garden, ornamental gardens, etc.	✓		
	h. Water well, Bore well, lake, water reservoir facility	✓ bore well is there		
	i. Water consumption towards plant cultivation, canteen, hostel, toilet use	✓		
	k. Per capita water consumption per day calculated		✓	
7	Whether plants are tagged properly with their common name and Botanical name for stakeholders?	✓		
8	Signing of MoU with Govt. / NGOs / Industries		✓	
9	Are any biofertilizers, organic manures, farmyard manures, vermicompost, green manures and chemical fertilizers used for maintaining plants?	✓		
10	Implementation of Government schemes (Swatch Bharath Abhiyan under Clean India Mission)	✓		
11	Functioning of Nature club, Eco club, Cell, Forum, Association, NCC, NSS bodies and Social Service League for students and staff members on biodiversity conservation, green campus development, etc.	✓		

12	Conduction of awareness programmes and cultural activities on global warming, environmental changes and ecosystem maintenance to the stakeholders	✓		
S.No	Requirements and checklists of the audit Conformity	Yes	No	NA
13	Conduction of outreach programmes for dissemination of green campus initiatives, natural resources, environmental pollution and biodiversity conservation to rural, tribal and urban people	✓		
14	Implementation of composting pits, vermicompost unit, recycling of kitchen / Food wastes collected from Canteens, Cafeteria, Food court and other places	✓		
15	Maintenance of plantations in the campus and steps taken for water scarcity during summer season to maintain plants	✓		
16	Steps taken for organic, inorganic, toxic, e-waste, biomedical, food, sewage waste management, segregation of wastes and reuse methods	✓		
17	Public transport, low-emitting vehicles and control of car smokes and exhaust towards environment monitoring		✓	
18	Projects and Dissertation works and Scholarly publications on environmental science and management carried out by students and staff members		✓	
19	Implementation of advanced methods for watering plantations (Drip irrigation, Sprinkler irrigation, etc.)		✓	
20	Use of metering for water utility, automation, water device, remote water lines, etc.		✓	
25	Campus facilities for disabled, special needs and or maternity care including security, safety and health infrastructure facilities for stakeholder's wellbeing	✓ Dis ability friendly environment is available		

3.1.2 Quantitative Measurements

S.No.	Details of Plant and animal species	Numbers / Percentage
1	Total types of Trees inside the Campus	36
2	Total types of medicinal species inside the Campus	34
3	Total types of Ornamental Plants inside the Campus	14
4	Total types of Trees inside the Campus	36
5	Total number of living Birds	40

6	Percentage of Forest Vegetation	15%
7	Percentage of Planted Vegetation	85%

Ensuring the rich biodiversity in the green campus is an important parameter which reflects the real-time ecosystem. Plants are indicators for assessing the varying levels of environmental quality. In general, plants improve the outdoor air quality with increased oxygen levels and reduced temperature and carbon-di-oxide. The green and varying colour of the flowering plants improve the ambience of the Organization environment. The existence of such plants and birds in the green campus may be recorded for the rich flora and fauna which are being considered as a value addition to the campus.

List of shrubs observed inside of the college campus:

S.No	Common Name	Scientific Name	Total in Nos
1	Nuna, Manjanathi, Indian mulberry	<i>Morinda coreia</i>	4
2	Pigeon berry	<i>Duranta erecta</i>	1
3	Nandiyavattai, Crape jasmine	<i>Tabernaemontana divaricata</i>	11
4	Chappotta, Chikoo, Sapodilla plum	<i>Manilkara zapota</i>	5
5	Idly poo, Vetchi, Ixora	<i>Ixora coccinea</i>	3
6	Matulai, pomegranate	<i>Punica granatum</i>	8
7	Marudaani, Henna or Mehndi	<i>Lawsonia Inermis</i>	1
8	Kambli chedi, White Mulberry	<i>Morus alba</i>	2
9	Narthangai, Citron	<i>Citrus medica</i>	1
10	Indian ash tree	<i>Lannea coromandelica</i>	1
11	cemmayir-konrai, flamboyant	<i>Delonix regia</i>	1
12	Then pazham, Jamaica Cherry	<i>Muntingia calabura</i>	2
13	Koyya, guava	<i>Psidium guajava</i>	2
14	Parijat, Pavazha malli, Coral Jasmine	<i>Nyctanthus arbor-tristis</i>	1

List of ornamental plants observed botanical garden of the college campus:

S.No	Common Name	Scientific Name	Total in Nos
1	Thanga Arali	<i>Tecoma stans</i>	1
2	Korangu vaalu, monkey tail plant		1
3	Hibiscus	<i>Hibiscus rosa-sinensis</i>	21
4	Thoothuvalai, purple fruited pea eggplant, climbing brinjal	<i>Solanum procumbens</i>	1
5	Tulsi	<i>Ocimum tenuiflorum</i>	1
6	Pacha elai, Basil	<i>Coleus amboinicus</i>	1
7	Rambai	<i>Baccaurea motleyana</i>	1
8	Kuppai meni	<i>Acalypha indica</i>	90
9	Vadamalli	<i>Globe amaranthus</i>	10
10	Kozhikode Leaf-Flower.	<i>Phyllanthus rheedei</i>	18
11	Jasmine	<i>Oleaceae</i>	10

12	Rose	<i>Rosa rubiginosa</i>	5
13	Nandhiyavattam	<i>Pinwheelflower</i>	3
14	Pichi poo	<i>Jasminum grandiflorum</i>	1

List of medicinal herbs observed inside of the college campus:

S.No	Scientific Name	Common Name	Number
1.	<i>Ocimum tenuiflorum</i>	Tulsi, Holy basil	15
2.	<i>Melia azedarach</i>	Malai Vembu, Persian Lilac	4
3.	<i>Clerodendrum inerme</i>	Sangam, Glory Bower	10
4.	<i>Wedelia trilobata</i>	Trailing Daisy	50
5.	<i>Catharanthus roseus</i>	Nithyakalyani, Madagascar periwinkle	8
6.	<i>Phyllanthus amarus</i>	keelanelli, Carry Me Seed	35
7.	<i>Aloe vera</i>	Katrzhai, Aloe	3
8.	<i>Sesbania grandiflora</i>	Agati, Hummingbird tree	4
9.	<i>Pandanus amaryllifolius</i>	Ramba, Fragrant Pandan	2
10.	<i>Lawsonia inermis</i>	Marudaani, Henna	5
11.	<i>Cardiospermum helicacabum</i>	Mudakattan, Balloon vine	7
12.	<i>Byrophyllum pinnatum</i>	Katti potta kutti podum, Air Plant	
13.	<i>Plectranthus amboinicus</i>	Karppuravalli, Oma valli, Cuban Oregano	4
14.	<i>Cymbopogon citratus</i>	Vasana pullu, Karpura pullu, Lemon grass	4
15.	<i>Vetiveria zizanioides</i>	Vettiver, Cuscus grass	5
16.	<i>Talinum portulacifolium</i>	Ceylon spinach	4
17.	<i>Orthosiphon spiralis</i>	Poonai meesai, Cat's Whiskers	2
18.	<i>Tinospora cordifolia</i>	seenthil, Gulbel	2
19.	<i>Kaempferia galangal</i>	kaccholam, Aromatic Ginger	2
20.	<i>Acorus calamus</i>	Vasambu, Sweet Flag	4
21.	<i>Solanum trilobatum</i>	Thoothuvalai, Purple fruited Peaegg Plant	15
22.	<i>Alpinia calcarata</i>	Sitharatthai, Snap Ginger	2
23.	<i>Andrographis paniculata</i>	Nilavembu	4
24.	<i>Bacopa monnieri</i>	Brahmi	2
25.	<i>Cissus quadrangularis</i>	Pirandai	4
26.	<i>Justicia adhatoda</i>	Adathoda	3
27.	<i>Piper nigrum</i>	Milagu, Black Pepper	6
28.	<i>Solanum surattense</i>	Kandagathiri	3
29.	<i>Piper longum</i>	Tippili, Long Pepper	6
30.	<i>Centella asiatica</i>	Vallarai keerai, Indian Pennywort	4
31.	<i>Morinda citrifolia</i>	Noni, Indian mulberry	
32.	<i>Piper betle</i>	Vettilai, Betel	5
33.	<i>Costus igneus</i>	Insulin Plant	15
34.	<i>Calotropis gigantea</i>	Vellerukku, Crown Flower	8

The institution has rich diversity of plants and trees contributing to the greenery of the campus and serves as a habitat for various fauna. The following are the details related to the plants and trees present in the campus.

List of trees and their numbers observed inside of the college campus:

S.No	Common Name	Scientific Name	Total in Nos	Trees
1.	Arali, Nerium	<i>Nerium oleander</i>	6	Tree
2.	Bael tree	<i>Aegle marmelos</i>	2	Tree
3.	Marudha maram, Arjun tree	<i>Terminalia arjuna</i>	1	Tree
4.	Puli, Indian date	<i>Tamarindus indica</i>	1	Tree
5.	Manjadi, aanaikundrimani, Red Bead Tree	<i>Adenanthera pavoniana</i>	2	Tree
6.	Mantharai, Butterfly Tree, Purple orchid tree	<i>Bauhinia purpurea</i>	2	Tree
7.	Naruvalli	<i>Cordia evolutior</i>	1	Tree
8.	Aalamaram, Banyan	<i>Ficus benghalensis</i>	3	Tree
9.	Vembu, Neem	<i>Azadirachta indica</i>	95	Tree
10.	Nettilinkam, Ashok Tree, Mast Tree	<i>Polyalthia longifolia</i>	49	Tree
11.	Aranelli, Gooseberry Tree	<i>Phyllanthus acidus</i>	6	Tree
12.	Ulakkaipaalai, Kannupala, Ceylon Ironwood	<i>Manilkara hexandra</i>	1	Tree
13.	Vadumai, Indian-almond	<i>Terminalia catappa</i>	6	Tree
14.	Thennai, Coconut	<i>Cocos nucifera</i>	10	Tree
15.	Periya-takarai, Wild Tamarind	<i>Leucaena leucocephala</i>	2	Tree
16.	Malavembu, Chinaberry tree	<i>Melia azedarach</i>	1	Tree
17.	Murungai, Drumstick, Horse Radish	<i>Moringa pterygosperma</i>	2	Tree
18.	Naval, Black plum, Jambolan, Java plum	<i>Syzygium cumini</i>	14	Tree
19.	Pungai, Pongam Tree, Indian Beech Tree	<i>Pongamia pinnata</i>	53	Tree
20.	Tekku, Teak	<i>Tectona grandis</i>	6	Tree
21.	Vaagai, Siris Tree	<i>Albizia lebbeck</i>	3	Tree
22.	Chavukku, Australian pine	<i>Casurina equisetifolia</i>	1	Tree
23.	Agati, Hummingbird tree	<i>Sesbania grandiflora</i>	1	Tree
24.	Marudaani, Henna or Mehndi	<i>Lawsonia Inermis</i>	1	Tree
25.	Ponnarali, Yellow oleander	<i>Thevetia peruviana</i>	1	Tree
26.	Moongil, Indian Thorny Bamboo	<i>Bambusa arundanacea</i>	1	Tree
27.	Kodukkaai puli, Madras Thorn	<i>Pithecellobium dulce</i>	3	Tree
28.	Cliff Date Palm	<i>Phoenix rupicola</i>	2	Tree
29.	kondrai, Golden shower tree	<i>Cassia fistula</i>	1	Tree

30.	Indian ash tree	<i>Lannea coromandelica</i>		Tree
31.	cemmayir-konrai, flamboyant	<i>Delonix regia</i>	1	Tree
32.	Kal Ittchi, Bat tree	<i>Ficus amplissima</i>	1	Tree
33.	Sampangi, White Champa or White Frangipani	<i>Plumeria alba</i>	1	Tree
34.	Maa, Mango	<i>Mangifera indica</i>	5	Tree
35.	Valai, Banana	<i>Musa sp</i>	3	Tree
36.	Perunkondrai, Yellow flame tree	<i>Peltophorum pterocarpum</i>	7	Tree

There are some plants like Neem & Indian Tulip which are being considered highly efficient in oxygen production and carbon dioxide absorption which in turn reflected the quality of the green campus. If more oxygen is made available in the campus naturally, the stakeholders may be free from various cardiovascular and pulmonary problems and breathing troubles.

3.1.3 Trees, Herbs, Shrubs and Climbers

Lawns are gazing features of unutilized land made to cover the soil with green grass for the ambience of the place to have a greenish look. The advantage of lawn is that it prevents the unintended weeds growth in the unutilized landscape areas.

Trees that are native to land with medicinal value, ethnicity and environmental value add an advantage to green building. Purpose of trees is to provide shade, atmospheric CO2 sequestration and supply of oxygen that serves the purpose of a green campus.

Herbs are small plants with medicinal values and shrubs are small plants with thick stems and can hold soil to some extent than the herbs and serve the purpose of soil erosion. Climbers can grow with the support of wall structures and the climbers can enhance the wall value with greeneries. College campus has a large number of trees, herbal plants, shrubs, climbers, lianas, twiners and lawns.

It is further observed that all the plants are growing profusely and showing healthier free from pests and diseases attack. A total of 19 type of shrub species are available in the campus. Similar to that of shrubs, there are 16 kinds of medicinal herbs available in the College campus.

3.2 Recommendations:

- Ensure that an audit is conducted annually and action is taken on the basis of audit report, recommendation and findings.
- Indoor plantation to inculcate interest in students, Bonsai can be planted in corridor to bond a relation with nature.
- Environmental Policy for the College shall be prepared and followed.

Chapter - 4

4 Water Management

4.1 Observations

List of usage of the water in our institution	Drinking, cleaning, gardening, canteen and laboratory use
Is there any water leaks?	No, as and when noticed corrective measures are taken.
Are taps left running? Are there any dripping taps? Do taps need maintenance?	Taps are not left running. Leakages in water taps will be repaired immediately.
Are hot water heater timers set correctly?	3 water heaters with timers
What is the source of water?	Municipal water and water laden in tanker provided by the management
Where does waste water go?	Channeling the water to our plants and trees
Does the college have rainwater harvesting unit?	Yes.
Is water escaping from overflows either inside or outside buildings	Inside the building.
Write down few ways that could reduce the amount of water used in your institute.	<ul style="list-style-type: none"> • It is immediately reported to concerned authorities who take corrective measures. • All are instructed to close water taps immediately after usage. • Water quality parameters were checked once in three months
Quantity of water stored in your overhead water tank	39,500 Litres
No. of water taps in laboratories. Amount of water used per day in each lab	No. of water taps in laboratories – 36 No's. Amount of water used per day in each lab Chemistry Lab – 700 Litres Zoology Lab – 750 Litres Botany Lab – 35 Litres

Details of Source of Fresh Water and the Areas where it is used are given below:

The main source of freshwater is municipal water. The freshwater is mainly used for drinking, laboratory usage, gardening and domestic activity.

S.No	Water usage	Number of Points
1.	Canteen	1
2.	Toilet with flush	84
3.	Water taps	80
4.	Wash basin	10
5.	Garden	3

Details of the Underground Storage tank and overhead water tank are given below

S. No	Storage tank	Numbers	Capacity/horse power
1.	Underground Storage tank	4	96 KL, 40 KL, 26 KL and 52 KL
2.	Overhead Water tank	5	91 KL, 22 KL, 2 KL, 2 KL, 2 KL
3.	Motor	4	3 HP-2, 1 HP-2

4.1.1 Rainwater Harvesting System:

Indian traditional rainwater harvesting systems are constructed based on three modes either direct pumped, indirect pumped or by gravity alone in the campus. In addition, lakes, bonds, water channels and any other water reservoir methods are considered as the rainwater harvesting system.

The green campus should have adopted any of the above said modes of rainwater harvesting or any new methods that has the benefit of conserving the water resource as well. A small square shaped pit containing gravels and sands may be 25 constructed near the building in which rainwater will be harvested from the roof of the building using a pipe.

Recharge bore well inside the campus Rain water harvesting units are also functioning for recharging ground water level. There are soaking pits available widespread all over the campus. The collected rooftop water is collected in the recharge wells. While, the rainwater

from paved area are sent to recharge wells through storm water drains. The recharge wells are cleaned manually for every year



4.1.2 Water Distribution Methods

Water is stored in the underground storage tank of capacity 96 KL, 40 KL, 52 KL, 26 KL and then is transferred to 05 overhead tanks of total capacity 119 KL using 4 HP pump and later distributed to washrooms, drinking, laboratories, Canteen water purifiers and gardening .

4.1.3 Drinking water

Reverse Osmosis Technology (RO) stem Installed to provide safe / hygienic drinking water to the stakeholders.



Once in Three months the college has collected and analyzed the water quality parameters. The major parameters analyzed include colour, odour, turbidity, dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity. **Dec- 21 result is given below.**

Dec 2021

S.No	Parameter studied	Permissible level	Calculated values
1.	Appearance before filtration	Clear	Clear
2.	Appearance before filtration	Clear	Clear
3.	Odor	Agreeable	Agreeable
4.	Taste	Agreeable	Agreeable
5.	pH	6.5 to 8.5	7.0
6.	Specific Conductance at 25° (µmhos/cm)	250	101
7.	Total Dissolved solids (mg/l)	500	29.3
8.	Turbidity (NTU)	5	< 0.5

4.2 Recommendations

- There is a need for monitoring and controlling overflow and periodically supervision drills should be arranged.
- Minimize wastage of water and use of electricity during the reverse osmosis process and ensure that the equipment used are regularly serviced and in good condition.

Chapter: 5

5 Energy Management

Energy is one of the major inputs for the economic development of any country. The fundamental goal of energy management is to produce goods and provide services with the least cost and least environmental effect. Also, it can be said as “the strategy of adjusting and optimizing energy, using system and procedure so as to reduce energy requirements per unit of output while holding constant or reducing total costs producing the output from these systems”.

5.1 Energy Audit

The energy audit is a key to a systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with its use and serves to identify all the energy streams in a facility. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliance, natural gas and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. The study carried out also analyzed the use of alternate energy resources that are eco-friendly. Energy resources utilized by all the departments, support services, and the administrative buildings, include Electricity, Solar Roof Top Systems, and Diesel Generators installed on the campus.

- The first objective is to acquire and analyze data and find the necessary consumption pattern of these facilities.
- The second objective will be to calculate the wastage pattern based on the results of the first objective.
- The final objective is to find and implement solutions that are acceptable and feasible.

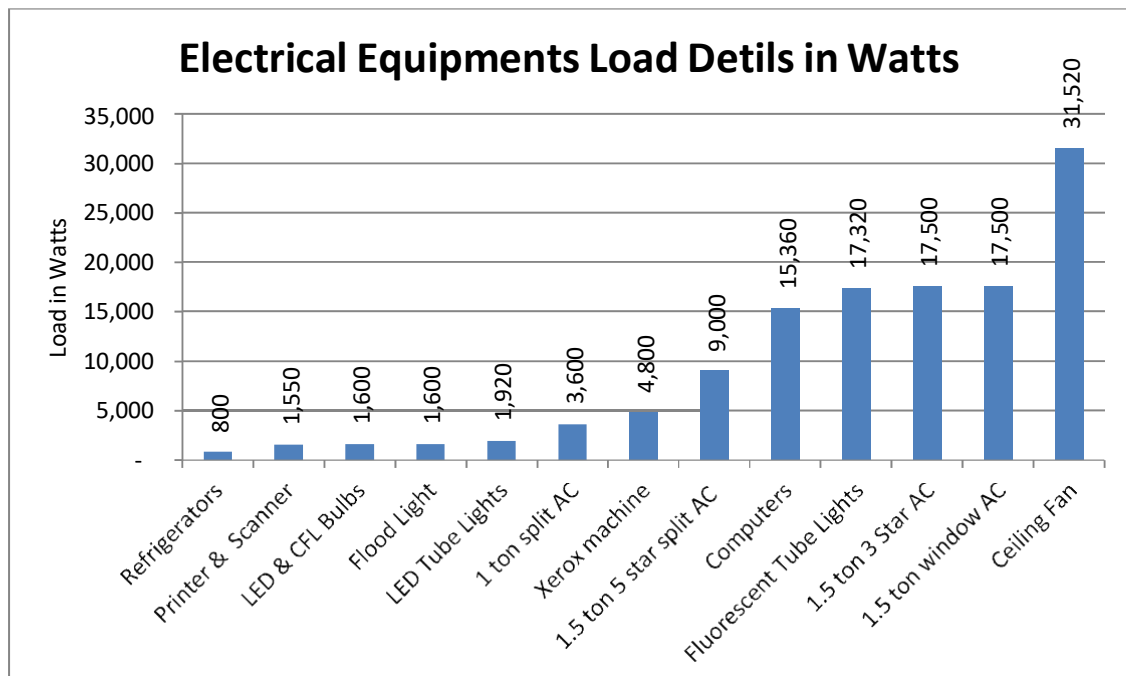
5.2 Source of Energy

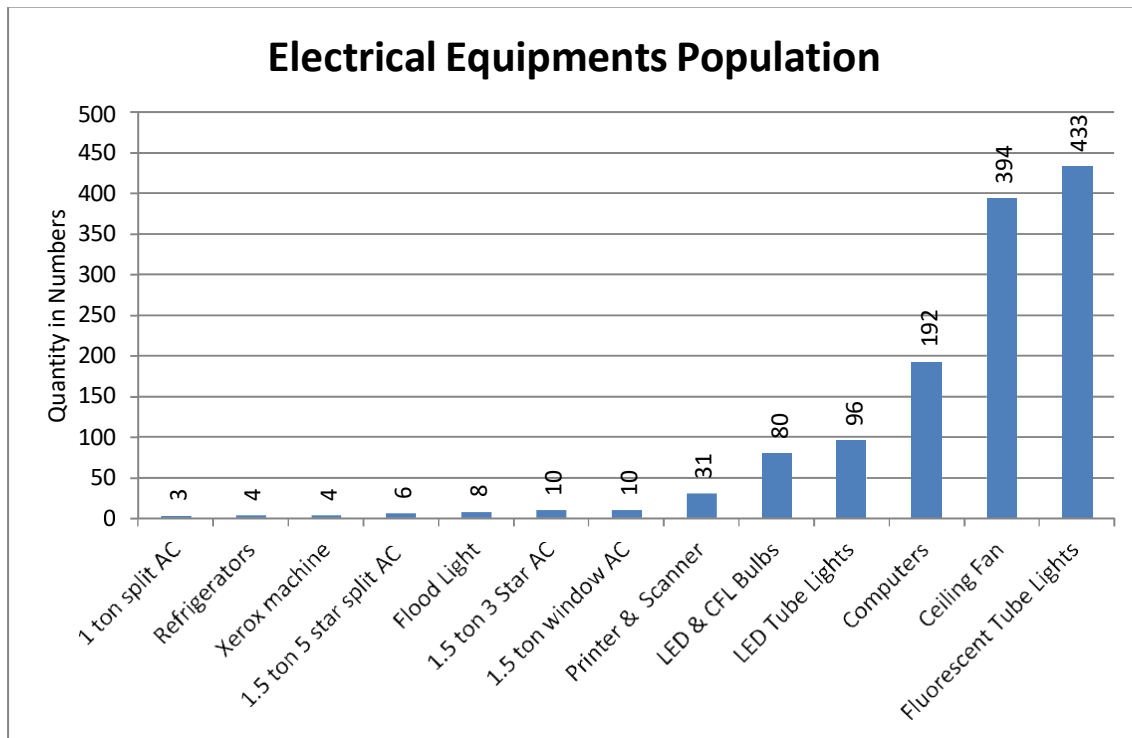
College withdraws Energy from Followings:

- Electricity from TANGEDCO
- From Emergency DG Set
- From Solar panels

5.3 Electrical Inventory Details

S. No	Equipments	Capacity in Watts	Quantity in Numbers	Total load in Watts
1	LED Tube Lights	20	96	1,920
2	Fluorescent Tube Lights	40	433	17,320
3	LED & CFL Bulbs	20	80	1,600
4	Refrigerators	200	4	800
5	Ceiling Fan	80	394	31,520
6	Computers	80	192	15,360
7	Printer & Scanner	50	31	1,550
8	Xerox machine	1,200	4	4,800
9	1.5 ton 3 Star AC	1,750	10	17,500
10	1.5 ton 5 star split AC	1,500	6	9,000
11	1.5 ton window AC	1,750	10	17,500
12	1 ton split AC	1,200	3	3,600
13	Flood Light	200	8	1,600

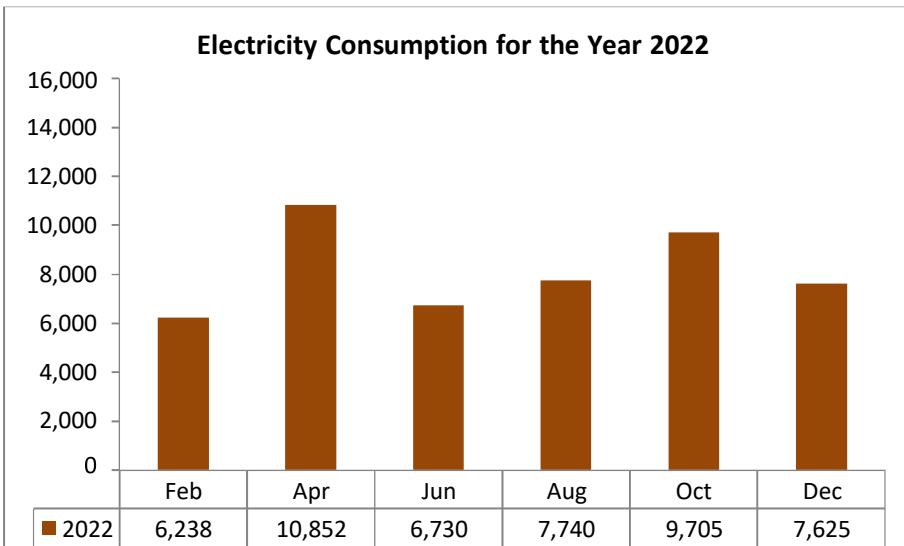
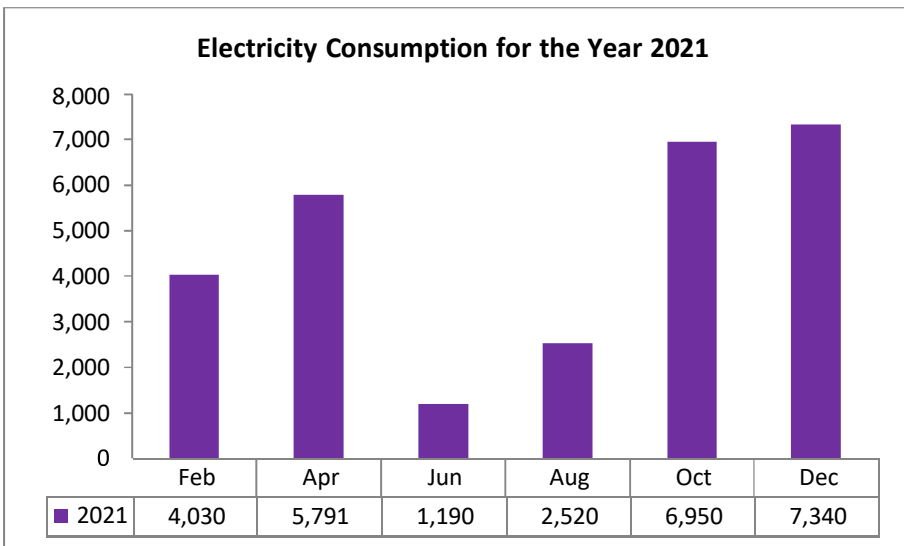
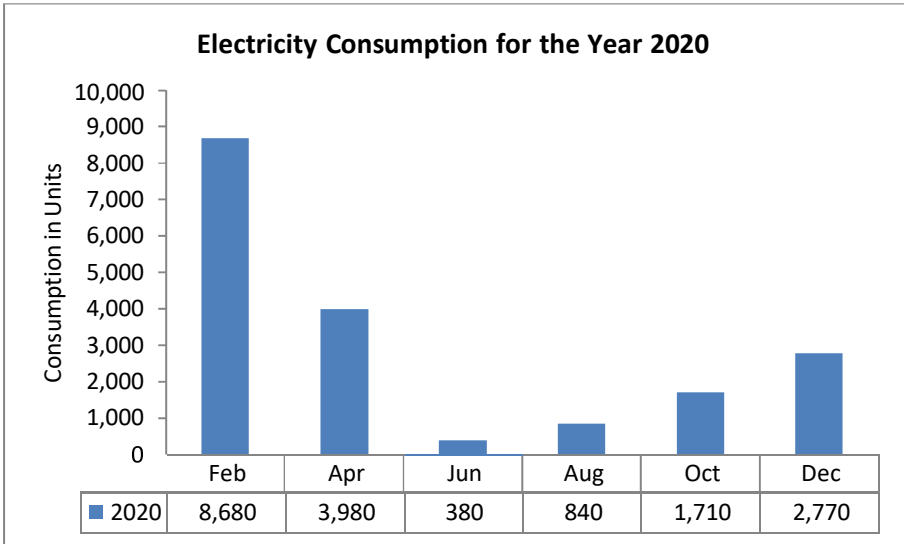




5.4 Energy Consumption Pattern

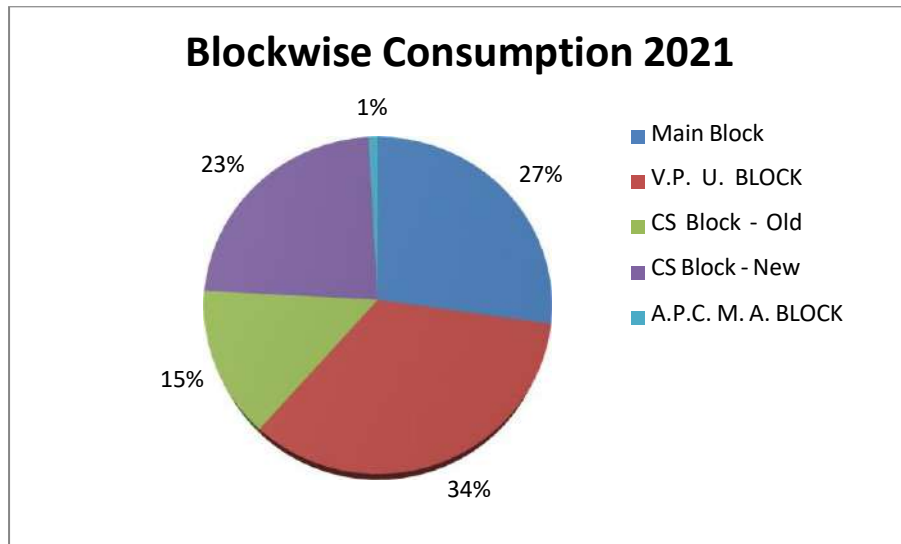
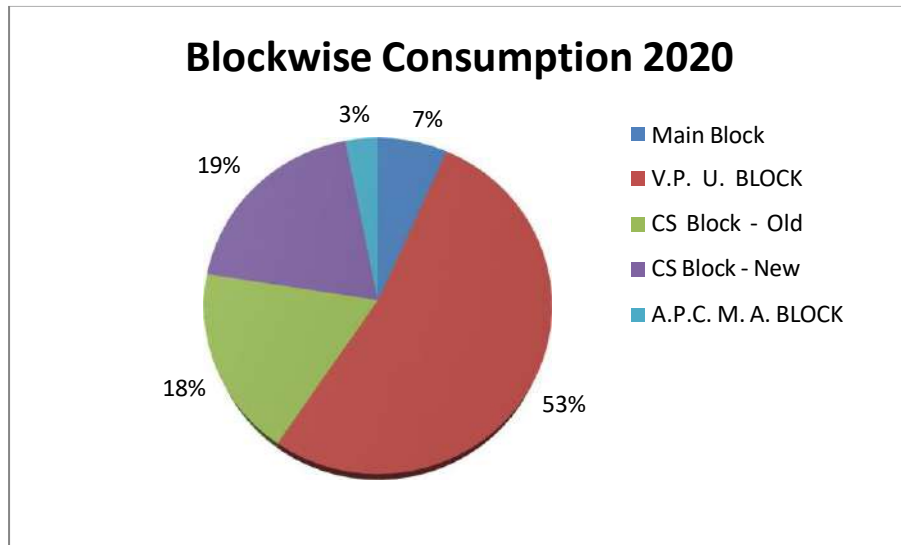
Bimonthly Electricity Bill Summary of year 2020 to 2022 as follows.

	2020	2021	2022
Feb	8,680	4,030	6,238
Apr	3,980	5,791	10,852
Jun	380	1,190	6,730
Aug	840	2,520	7,740
Oct	1,710	6,950	9,705
Dec	2,770	7,340	7,625
Total	20,380	29,842	50,912

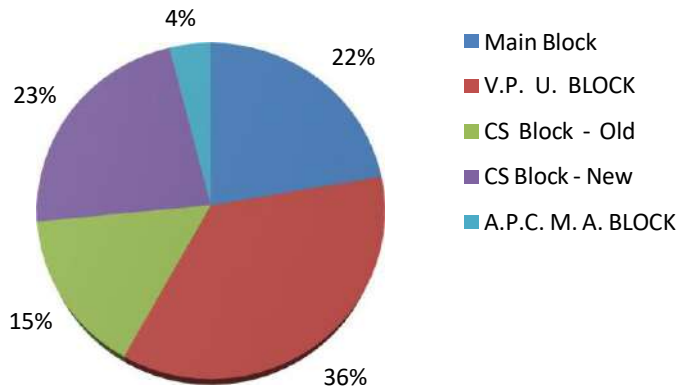


Block wise Consumption Pattern:

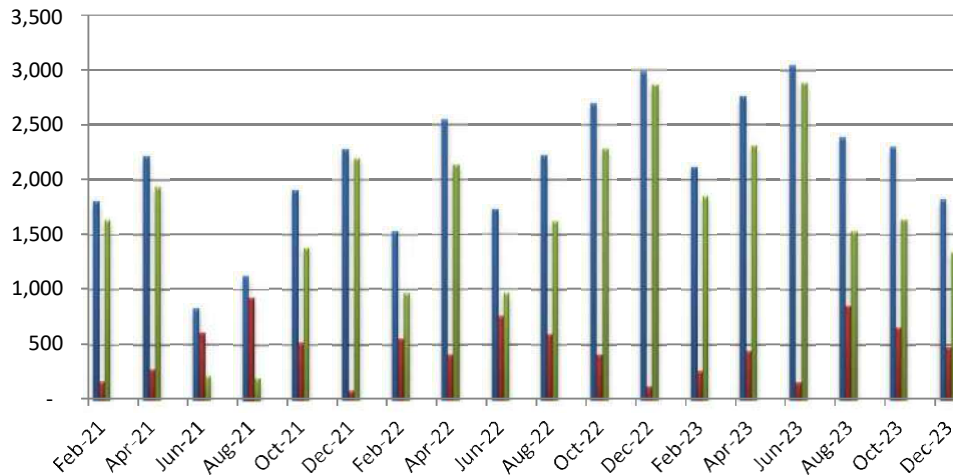
	2020	2021	2022
Main Block	1,220	7,590	10,880
V.P. U. BLOCK	9,700	9,531	17,500
CS Block - Old	3,310	3,980	7,540
CS Block - New	3,560	6,470	11,030
A.P.C. M. A. BLOCK	570	250	1,940
Others	2,020	2,021	2,022
	18,360	27,821	48,890



Blockwise Consumption 2022



Admin Building Solar Net Meter Consumption pattern



	Feb-21	Apr-21	Jun-21	Aug-21	Oct-21	Dec-21	Feb-22	Apr-22	Jun-22	Aug-22	Oct-22	Dec-22	Feb-23	Apr-23	Jun-23	Aug-23	Oct-23	Dec-23
Import from Grid	1,810	2,220	830	1,130	1,910	2,280	1,538	2,552	1,730	2,230	2,700	2,990	2,120	2,760	3,050	2,393	2,307	1,820
Export to Grid	170	280	610	930	520	80	560	410	760	600	410	120	265	445	160	856	660	479
Net Consumption	1,640	1,940	220	200	1,390	2,200	978	2,142	970	1,630	2,290	2,870	1,855	2,315	2,890	1,537	1,647	1,341

5.5 Observation:

- The Campus uses Electrical Energy to Light, cool, run laboratory equipment's and pump ground water.
- An average power of 40 KW is consumed by the institution on daily basis. (Power consumption during COVID-19 Lockdown period of 2020-21 has not considered for comparison purpose).
- There have been no significant changes in the power consumption pattern for the remaining years.

- The majority of Power (about 80% of Total power) is being used for A/C, Ceiling Fans, Fluorescent Tube Lights and Computers.
- Computers are set to automatic power saving mode when not in use and almost all computer monitors are LED.
- In all class room inefficient Fluorescent tube lights and old inefficient ceiling fans are being used.
- Few Air conditioners have Star Rating and remaining are old inefficient types.
- Admin Building has 10 KW Solar Power panel with Net Metering System. After usage the remaining Power generated is exported to Grid through Net meter.

5.6 Recommendation:

- The management should support more for renewable and carbon-neutral electricity options on any energy- purchasing consortium, with the aim of supplying all college properties with electricity that can be attributed to renewable and carbon-neutral sources.
- More LED lights should be installed to reduce power consumed for lighting. By considering Financial crunch, instead of replacing all fluorescent tube lights into LEDs immediately during failure they may be switched to LEDs and a time frame may be established.
- In campus premises electricity should be shut down from main supply after occupancy time, to prevent power loss due to eddy current.
- Cleaning of tube-lights/bulbs to be done periodically, to remove dust over it.
- Records on Solar Energy Generation, Consumption and Export details on daily basis should be maintained. Based on that records daily tracking and maintenance on Solar panels should be done.
- The Vendor for the Solar panel may be contacted to install the APP in Admin Building P.C as well as the Mobile Phone of Finance controller of the Institution because Solar Power Export is Revenue for the institution.
- Even though the institution has Diesel Generators to cater power during Grid failure condition, records for monthly power generation, diesel consumption and Specific Fuel Consumption not available.

Chapter - 6

6 Carbon Footprints



A carbon footprint (or greenhouse gas footprint) is a calculated value or index that makes it possible to compare the total amount of greenhouse gases that an activity, product, company or country adds to the atmosphere. A carbon footprint is the total amount of greenhouse gases (including carbon dioxide and methane) that are generated by our actions. Carbon footprints are usually reported in tonnes of emissions (CO₂-equivalent) per unit of comparison.

It includes direct emissions, such as those that result from fossil-fuel combustion in manufacturing, heating, and transportation, as well as emissions required to produce the electricity associated with goods and services consumed. In addition, the carbon footprint concept also often includes the emissions of other greenhouse gases, such as methane, nitrous oxide, or chlorofluorocarbons (CFCs).

The average carbon footprint for a person in the United States is 16 tons, one of the highest rates in the world. Globally, the average carbon footprint is closer to 4 tons. To have the best chance of avoiding a 2°C rise in global temperatures, the average global carbon footprint per year needs to drop to under 2 tons by 2050. Lowering individual carbon footprints from 16 tons to 2 tons doesn't happen overnight! By making small changes to our actions, like eating less meat, taking fewer connecting flights and line drying our clothes, we can start making a big difference.

Techniques to reduce Carbon Footprint:

- Reduce Waste and Spoilage.
- Usage of Renewable energy sources
- Improving energy efficiency.
- Implementation of 4R Techniques (Reduce, Recycle Reuse and Refuse).

Carbon Footprint Calculation:

This calculation has two portions one is Emission calculation and the other one is Absorption calculation.

Assumptions:

The following assumptions based on well researched and globally accepted empirical procedures are used for assessing the carbon footprint as well as for determining the remediation measures:

- The coefficients taken are as per IPCC, International Energy Agency, India's BEE, or United Nations' FAO [in the case of food related ones] as well as from India specific studies by Research Institutions.
- The carbon emitted by a car while consuming 1 litre of petrol is taken as 2.3 kg CO₂, and of diesel as 2.68 kg CO₂
- Average distance covered by a car per litre of petrol in cities at 17 km
- The 'km run' by a bus as 4 km/L of diesel in towns and cities
- For the 'per capita carbon footprint' calculation, a bus is assumed to carry 50 passengers.
- For an autorickshaw, the fuel need is assumed at 1 litre of fuel capable of getting 16 km of running on petrol.
- Two wheelers are expected to get 50 km/litre on Petrol
- Carbon absorption capacity of one full-grown tree per year as 25 kg CO₂
- Carbon absorption capacity of semi-grown trees per day as 50% of that of full grown
- Carbon absorption of bush plants as varying widely according to the species. As a general guide, the per-plant carbon absorption is assumed as 0.4 Kg CO₂
- We roughly estimate that an average person exhales about 0.66 kilograms of CO₂ in a day.

Emission calculation per Year:

Data Obtained from Component Audits in the foregoing Chapters are used for Emission Calculation.

These component audit findings give us the following data:

- The total number of persons (students, teachers, other members of staff, visitors including parents and guests) involved in normal functioning of the institution
- The type and number of vehicles normally used for transportation
- The forms and quantity of energy used in the campus and their origin

CO₂ Emission from usage of Electricity:

$$\begin{aligned}
 &= \text{Average Electricity used per year in kWh/1000} \times 0.84 \\
 &= 40,000 \text{ kWh} / 1000 \times 0.84 \\
 &= 40 \times 0.84 \\
 &= \mathbf{33.60 \text{ Tons}}
 \end{aligned}$$

CO₂ Emission from DG Set to produce Electricity:

2640 grams of CO₂ per litre of diesel burned.

$$\begin{aligned}
 &= 900 \text{ Litres} \times 2.64 / 1000 \\
 &= \mathbf{2.38 \text{ Tons.}}
 \end{aligned}$$

CO₂ Emission from Transportation:

Staff used totally 10 cars used per day at an average running distance of 40 KMs.

2390 grams of CO₂ per litre of petrol burned.

$$\begin{aligned}
 &= (40 \text{ KMs} \times 220 \text{ days} / 17) \text{ Litres} \times 10 \times 2.39 / 1000 \\
 &= \mathbf{12.37 \text{ Tons. For Car.}}
 \end{aligned}$$

Totally 142 Bikes used per day at an average running distance of 10 KMs.

2390 grams of CO₂ per litre of petrol burned.

$$\begin{aligned}
 &= (10 \text{ KMs} \times 210 \text{ days} / 50) \text{ Litres} \times 142 \times 2.39 / 1000 \\
 &= \mathbf{14.25 \text{ Tons. For Bikes.}}
 \end{aligned}$$

CO₂ Emission by Respiration of Human Beings:

For calculation purpose it has considered 2198 persons for averagely 5 hours per day for 180 days in a year. An average person exhales about 0.66 kilograms of CO₂ in a day.

$$\begin{aligned}
 &= (0.66 / 24) \times (5 \times 180 \times 2198) / 1000 \\
 &= \mathbf{54.4 \text{ Tons}}
 \end{aligned}$$

Total CO₂ Emission = 33.6 + 2.38 + 12.37 + 14.25 + 54.4 = 117 Tons / Year.

Absorption calculation per Year:

The following Data Obtained from Component Audits in the foregoing Chapters is used for Emission Calculation.

- The total number of persons (students, teachers, other members of staff, visitors including parents and guests) involved in normal functioning of the institution
- The type and number of Trees, Plants, Herbs, and Shrubs planted inside the campus.

CO₂ Absorption by Trees:

For calculation purpose it has considered a tree absorbs approximately 25kg of CO₂ per year. Totally 295 Trees are inside the campus.

$$= 25 \times 295 / 1000$$

$$= \mathbf{7.375 \text{ Tons}}$$

For calculation purpose it has considered a semi tree absorbs approximately 50% of that of full grown trees. Totally 256 Semi grown Trees are inside the campus.

$$= 0.5 \times 25 \times 256 / 1000$$

$$= \mathbf{3.2 \text{ Tons}}$$

There are approximately Hedge Plants 3200 of various species being raised in the gardens and grown in the areas where no buildings are built. Carbon absorption of bush plants varies widely with their species. As a general guide, the per-plant carbon absorption is assumed as 0.4 Kg CO₂

$$= 0.4 \times 3200 / 1000$$

$$= \mathbf{1.28 \text{ Tons}}$$

Total CO₂ Absorption = 7.375 + 3.2 + 1.28 = 11.85 Tons / Year.

Uncompensated CO₂ Emission part will indicate the Carbon Footprint.

$$= \text{Total CO}_2 \text{ Emission} - \text{Total CO}_2 \text{ Absorption}$$

Carbon Foot Print for the Institution is 117 – 11.88 = 105.12 Tons / Year

Chapter - 7

7 Green Initiatives and Best practices followed in the Organization

- It is observed that College is maintaining more than 50% of the green cover area after building construction as per the guidelines of World Green Building Council and Indian Green Building Council to provide a healthy environment and eco-friendly atmosphere to the stakeholders.
- In view of floral biodiversity in College campus, all the plants are growing profusely and showing healthier free from pests and diseases.
- In view of faunal biodiversity College campus have living Mammals, visiting Mammals and birds.
- The Campus has a well maintained Vermicomposting Unit. After harvesting the compost was used as manure for trees and potted plants in the campus. Remaining were packed and sold to the students and faculty members. The compost was sold for Rs. 1,300 in the year 2022-2023.
- The campus has a maximum number of more oxygen producing and carbon-di-oxide absorbing plants such as Money plant, Neem tree and Pongam trees including some of the shrub and herbal plants.

Green Campus Activities. Environmental Day Celebration and Green initiatives Photos to be included.





Availability of Dustbins in the various locations

- The campus has a Manual incinerator.



Chapter - 8

8 Opportunities for Improvements

- The name board may be kept in each plant species in which the common name along with binomial name may be mentioned.
- It is recommended to develop 'Environment Policy' encourage the students and staff to take the prime in the conservation of the Environment with respect to environmental protection.
- Solar power plant capacity shall be enhanced so that it fulfils at least 70% of the electricity requirements.
- More LED lights should be installed to reduce power consumed for lighting.
- Plant distribution program in nearby villages and societies should be initiated periodically.
- The Manual incinerator may be converted into Eco friendly incinerator for Sanitary Napkin Pad disposal.

Chapter - 9

9 Conclusion

The environmental awareness initiatives taken by the management are substantial. The Environmental awareness programmes initiated by the administration proves that the campus is going green. The Herbal garden and Vermicomposting Unit maintained by the College is highly appreciable. Few recommendations are added for waste management and waste reduction using alternate eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus and thus aid in a sustainable environment and community development

This audit involved extensive consultation with all the teams, interactions with key personnel on wide range of issues related to Environmental aspects. The audit has identified a few observations for making the campus premise more environment friendly. The recommendations are mentioned with observations for College campus team to initiate actions. The audit team opines that the overall site is well-maintained from the environmental perspective. Few things that are important to initiate urgently includes initiation of drip irrigation and checking of water flow of taps.

Chapter - 10

10 References

- 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 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