



Krishak Education Society's

Arts, Commerce and Science College, Arvi

NAAC "B+" (Third Cycle)

Dist. Wardha, Maharashtra . Email-principal_acscr@rediffmail.com



Criterion 7 : Institutional Values and Best Practices

7.1.3

Estd.)

Krishak Education Society's

(1963

Arts, Commerce & Science College, Arvi

NAAC "B+" Grade

Tah. Arvi, Distt. Wardha. ☎ (07157) 222070, 222307

E-mail - principal_acscrv@rediffmail.com

Principal

Dr. H. R. Virulkar



President

Adv. D. N. Kale

Ref. No. SR/IQAC

Date: 07-08-2023

Declaration

This is to declare that the information, reports, true copies, and numerical data etc. furnished in this file as supporting documents is verified by IQAC and found correct.


IQAC Co-ordinator
Arts, Com. & Sci. College
Arvi


PRINCIPAL
Arts, Commerce & Science
College, Arvi, Dist. Wardha.

Policy Document on Environment and Energy Usage



Policy Document On Environment and Energy Usage

Environment and Energy Usage policy of Arts, Commerce and Science College, Arvi is to manage energy in such a systematic way so as to minimize its impact on the environment. The college is very much aware of its responsibility towards keeping campus green and pollution free. In college campus and botanical garden of the college different varieties of plants has been cultivated without use of chemical pesticides and herbicides. All stakeholders' works for the betterment of eco-friendly campus including air, water, noise, soil quality, waste management, care for flora and fauna in campus, the importance of paperless working, plans for adopting solar powered energy sources etc. Internal Green and Environmental audit committee as well as Energy audit committee of college plan and work to foster a culture of self sustainability and make the entire campus environmental friendly.

Scope:

With the aim of developing clean and green campus, "The Green Campus, Environment and Energy Policy" will develop exciting co-curricular and extracurricular practices that encourage staff and students to take the lead in creating positive changes.

Aims and Objectives of Policy:

Arts, Commerce and Science College, Arvi not only target to impart quality education but also understand responsibility towards the protection of the environment for the future generation. The college wishes to create environmentally safe practices to ensure that the college campus is kept green by reducing its carbon footprint.

Aims and Objectives of the policy are as follows:

- Efforts to keep clean and pollution free campus
- Efficient use of energy
- Efforts to waste reduction
- Sensible use of water
- Ethical practices

- Extension education activities.

Green Initiatives:

- Following green initiatives are taken by Administration, Nature and Science Club, NSS unit and all department of college.
- **Initiatives for greening the campus:**
 1. Healthy practice of use of bicycles
 2. Ban on the use of plastic
 3. Landscaping with trees and plants.
 4. Smoke-free and Tobacco-free campus.

> Facilities for alternate sources of energy and energy conservation measures:

1. Solar energy: Solar based LED lights in campus
2. Use of LED bulbs: Use of LED bulbs in Auditorium, office, many classrooms and Laboratories.
3. Power management features are activated on every computer and monitor.
4. Promotion of 'Save Energy Tips': Stickers displaying the message of protecting environment, saving electricity, papers and energy are posted on key places in college premises.

➤ Management of degradable and non-degradable waste:

1. Solid waste management:- Vermicomposting is done mainly by use of garden waste as substrates. Biodegradable solid wastes are used in botanical garden.
2. Liquid waste management: Waste water of laboratories is carried through underground drainage.
3. E-waste: Minor repair of are done laboratories staff. E- waste is sold as scrap to local garbage dealer in order to ensure their safe recycling.
5. Waste recycling system: Notice boards, parking stands, poster stands, etc are made from broken furniture.

➤ Water conservation facilities available in the Institution:

1. Rain water harvesting
2. Bore well recharge system
3. Water tank overflow alarm system & Proper water distribution system in the campus

➤ Quality Audits:

1. Green and Environment audit
2. Energy audit

➤ **In campus and beyond the campus environmental promotional activities:**

1. Tree plantation and sapling distribution
2. Regular cleanliness drives under Swachhata Action Plan
3. Encourage paperless work culture
4. Awareness programmes for students, faculty and society
5. Involvement of the community to achieve its clean environment objective

The Institute intends to pursue a programme of continuous improvement in our procedures, practices and review the policy on a regular basis to evaluate continued relevance and to monitor compliance. All the necessary efforts will be made to involve all stakeholders in Green Campus Initiatives.

Ref No: EEPL/2021-22/C52

Date: 03/12/2021

ENVIRONMENTAL AUDIT CERTIFICATE

This is to certify that Empirical Exergy Private Limited (EEPL) Indore M.P. has conducted Environmental audit in **Arts, commerce & Science College, Tah. Arvi, Dist. Wardha (MH)**, for the academic Year 2020-21.

Noteworthy initiatives taken by the college:

- ❖ Automatic Watering 360 adjusting misting nozzle irrigation dippers System for plants.

There is much scope for system improvement by adopting water conservation measures, waste water management practices as indentified and recommended in the project report in a phase manner to conserve environment.

We avail this opportunity to express our sincere gratitude to the college management for their wholehearted support and co-operations during the audit.

This certificate is being issued on the basis of the Environmental Audit conducted at the site.

For- Empirical Exergy Private Limited

Rajesh Kumar Singadiya (Director)

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS] from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



Ref No: EEPL/2021-22/C53

Date: 03/12/2021

GREEN AUDIT CERTIFICATE

This is to certify that Empirical Exergy Private Limited, Indore M.P. has conducted green audit at **Arts, commerce & Science College**, Tah. Arvi, Dist. Wardha (MH). for the academic Year 2020-21.

The college has taken good initiative for green campus under the campaign of plantation. The campus protects age old trees in addition to several new trees and plants planted. There is lush green with garden, lawns, flowers and plants wherever there is open space. The management also conducted awareness program for students & faculty to develop green campus.

- ❖ The college has around 283 species planted in the campus
- ❖ It has a 5 kWp solar photovoltaic roof top system.

There is much potential for improvement of system by adopting green cover conservation measures as identified and recommended in the audit report.

We avail this opportunity to express our sincere gratitude to the management for their wholehearted support and co-operations during the green audit.

This certificate is being issued on the basis of the Green Audit conducted by EEPL.

For- Empirical Exergy Private Limited

Rajesh Kumar Singadiya (Director)
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Member of ISHRAE [58150]



Ref No: EEPL/2021-22/C51

Date: 03/12/2021

ENERGY AUDIT CERTIFICATE

This is to certify that Empirical Exergy Private Limited (EEPL) Indore M.P. has conducted energy audit in **Arts, commerce & Science College**, Tah. Arvi, Dist. Wardha (MH). for the academic Year 2020-21.

Noteworthy initiatives taken by the college:

- ❖ 5 kWp solar PV roof top system on college campus.

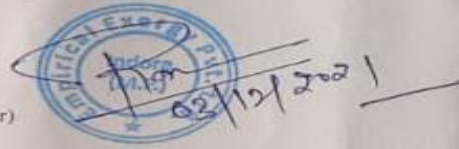
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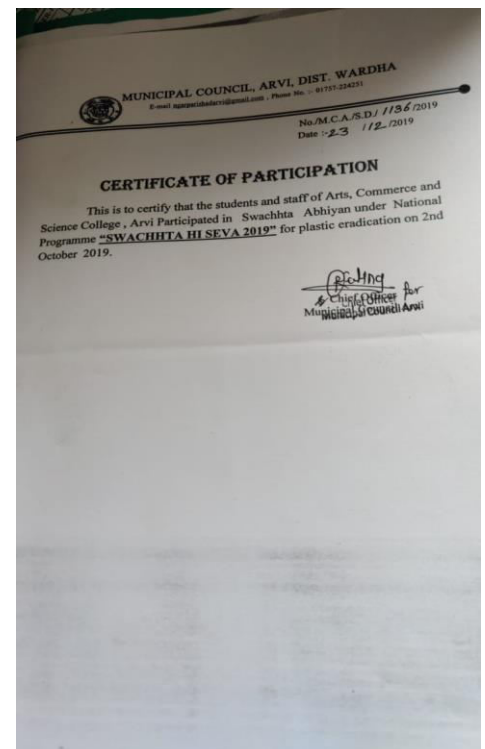
Krishak Education Society's
ARTS COMMERCE AND SCIENCE COLLEGE, ARVI, DIST. WARDHA

An Extension Activity Report- 2019

"SAY NO TO PLASTIC"

Indiscriminate use of plastic by people of Arvi area is responsible for accumulation plastic especially in the region Market, road-side and public places. Chemistry department took initiative to start an extension activity- "Say No To Plastic", on 15 th Aug 2019, in order to aware people of this region about limited use of plastic in the day today life and motivate them for "Bring your own bag" in the Market.

On the occasion of Gandhi Jayanti, all the departments of our college under extension activity organized plastic eradication program in collaboration with **Municipal Corporation Arvi** cooperated well by supplying Masks, Hand gloves and Garbage Van. In this activity more than 100 students of college along with faculties were participated.



MASS AWARENESS CAMPAIGN
AWARENESS RALLY & WALL PAINTING-“SWACHHTA HI SEVA”

DATE: 14/02/2022 **TIME:** 10 AM Onwards

NAME OF INSTITUTE INVOLVED: Arts, Commerce and Science college Arvi, Dist. Wardha **In collaboration with Municipal corporation Arvi.**

VENUE: Gaurakshan ward Arvi

BENEFICIARIES: 450 people of Gaurakshan ward Arvi.

Total No.of Participants: apprx. 100 students

Introduction: *“Cleanliness is next to Godliness”* It is the mantra of Mahatma Gandhiji, Father of Nation. He demonstrated, propagated and insisted for individual and community cleanliness throughout his life. Following his footprints, Swachh Bharat Mission campaign achieved encouraging results. This vision will be translated into action by bringing in community participation for clean toilets and integrated waste management to make Arvi, Dist. Wardha open defecation free, zero waste, dust free, plastic free and green.

Students organized rally to bring awareness to keep surrounding clean among community people residing at Gaurakshan ward Arvi under the guidance of Dr. A.S. Dahat, Dr. V.V.Hiwase, Dr. V.Y. Muley Dr. P. B. Thakare, Dr.M.S. Bhojar & Prof J. .R. Pande.



“Bring your own Non Plastic Bag-A Drive towards plastic free environment ”

DATE: 27/03/2023

TIME: 10 AM Onwards

Organized by: Arts, Commerce and Science college Arvi, Dist. Wardha In collaboration with Municipal corporation Arvi.

VENUE: Arvi Market Area **BENEFICIARIES:** 500 people of Arvi Market Area.

Total No. of Participants:85students

Total No. of Teacher Involved: 06

Introduction:

“*Say no to Plastic*”. It is the mantra of Mahatma Gandhiji, Father of Nation. He demonstrated, propagated and insisted for individual and community cleanliness throughout his life. Following his footprints, Swachhbharat Mission campaign achieved encouraging results. This vision will be translated into action by bringing in community participation for integrated waste management to make Arvi, Dist. Wardha open defecation free, zero waste, dust free, plastic free and green.

Students with faculty members organized rally to bring awareness to keep surrounding clean among community people residing at Arvi Market Area ward Arvi under the guidance of Dr.A.S.Dahat, Dr.V.V.Hiwase, Dr.V.Y.Muley, Dr.P.B.Thakare, Dr.M.S.Bhoyar & Prof.J.R.Pande.

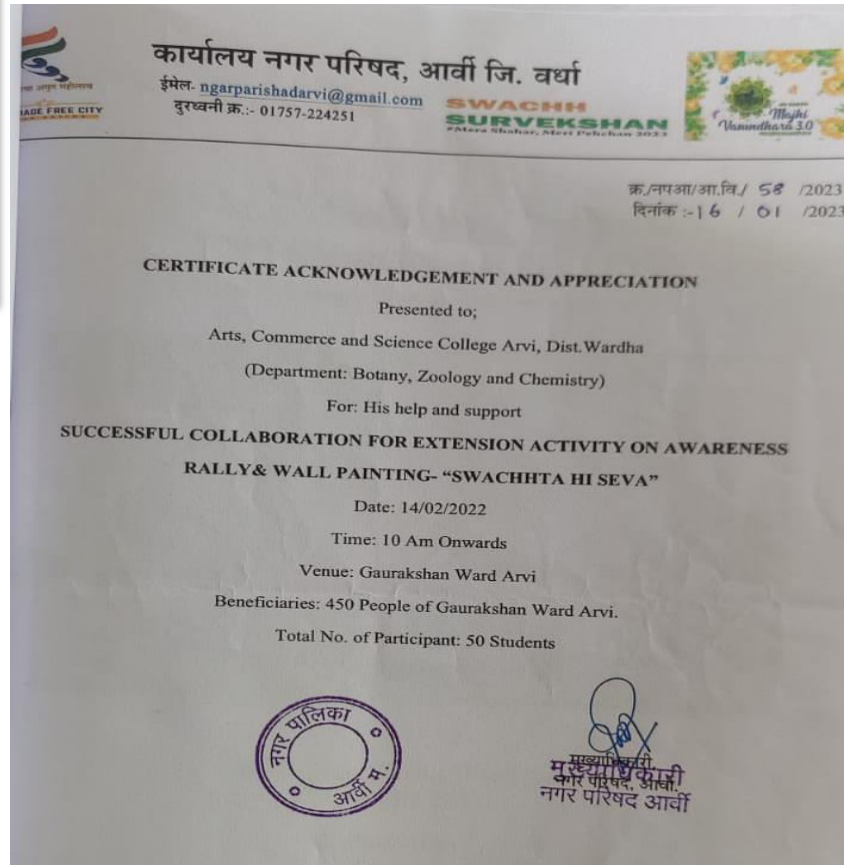
ACTIVITIES:

It is everybody’s responsibility and one should keep themselves and their surroundings clean and hygienic. It also brings good and positive thoughts by which we can slow down the occurrence of diseases.

students have participated in the rally to promote swachh bharat mission. Mass awareness created with various slogans: “Say no to Plastic ...”

Stickers defining bring your own bags and say no to plastic were stuck and distributed to various shops in the market area of Arvi. They have participated in this activity and shown their willingness and interest to keep surrounding clean.





Extension Activity

Name of Activity: Rain Water Harvesting Awareness•

.No. of faculties involved: 05

• No. of students participated: 109

• The department had conducted an extension activity “Rain Water Harvesting Awareness” in collaboration with Krishak Kanya High school, Arvi. During this program, faculty members of department and students from department had visited various colonies of Arvi city and in Krishak Kanya Vidyalaya, Arvi to aware the students and peoples about importance of Rain Water Harvesting. During their visit on 19th October 2019, the faculty members and students of department motivated the peoples in various colonies to arrange the rain water harvesting systems in their homes. Also faculty members along with students visited the Krishak Kanya Vidyalaya, Arvi on 7th March, 2020 and tell the importance of Rain Water Harvesting for future in every home to students of school. Students of our department advised them to aware the peoples in their area also.





Municipal Council Arvi, Dist. Wardha

Email - nagarpalichadarvi@gmail.com
Phone - 01177-224251

क्र.नगरपालिका/अ.स.स/२०२२
दिनांक: ६/०३/२०२२

To,
The Principal
Arts, Commerce & Science College,
Arvi, Dist. Wardha.

Subject :- About conducting 'Rain Water Harvesting Awareness' Programme.

Sir,

With reference to your letter dated 11/02/2022, Municipal Council Arvi is giving you permission to conduct 'Rain Water Harvesting Awareness Programme' and to make people aware of following points regarding Rain Water Harvesting.

- a) Area not less than 500 sq.m. shall have one or more Rain Water Harvesting structures.
- b) The owner/society of every building mentioned in the (a) above shall ensure that the Rain Water Harvesting System is maintained in good condition for storage of water for non potable purposes or recharge of groundwater at all times.
- c) Rain Water Harvesting in a building site includes storage or recharging the ground water by rainwater falling on the terrace or any paved or unpaved surface within the building site.
- d) Open well of a minimum 1 m. diameter and 6m. in depth into which rain water may be channelled and allowed to filter for removing silt and floating material.
- e) The well shall be provided with ventilating covers.
- f) The water from the open well may be used for non-potable domestic purposes such as washing, flushing and for watering the garden etc.
- g) Rain Water Harvesting for recharge of groundwater may be done through a bore-well around which a pit of 1m. width may be excavated upto a depth of at least 3m. and refilled with stone aggregate and sand. The filtered rain water may be channelled to the refilled pit for recharging the bore-well.
- h) The surplus rain water, after storage, may be recharged into ground through percolation pits or trenches or combination of pits and trenches.



4/10/2022 10:56

i) If the open space surrounding the building is not paved, the top layer up to a sufficient depth shall be removed and refilled with coarse sand to allow percolation of rain water into ground.

j) The mouth of all pipes and opening shall be covered with mosquito (insect) proof wire net.

vi) Rain Water Harvesting structures shall be sited as not to endanger the stability of building or earthwork. The structure shall be designed such that no dampness is caused in any part of the walls or foundation of the building or those of an adjacent building.

vii) The water so collected/recharged shall as far as possible be used for non-drinking and noncooking purpose. Provided that when the rain water in exceptional circumstances will be utilised for drinking and/or cooking purpose, it shall be ensured that proper filter arrangement and the separate outlet for bypassing the first rain water has been provided. Provided further that, will be ensured that for such use, proper disinfectants and the water purification arrangements have been made.

viii) The structures constructed under this provision shall not be counted towards FSI computation while applying for building permission.




Chief Officer
Municipal Council Arvi

RAIN WATER HARVESTING AWARENESSPROGRAMME (2021-2022)

Rain water harvesting programme was organized in collaboration with the Arvi Municipal Corporation. The students of B.Sc. final year had participated in the programme. In collaboration with Mathematics and Computer Department the programme was organized.

The said programme organized in the Bhakre Nagar, Arvi on 05 April 2022. We visited the different sites of the area and aware regarding the harvesting the water in the premises of house. Dr. K.P. Kadam, Prof. N.M. Khobragade, Prof. G.R.Yerawar, Prof. M.T. Kolhe, Dr.A.S.Sote and Prof. S.A.Khandare and Students of Departments were participated during the awareness programme.Name of Students of B.Sc. Final year :-

- | | |
|--------------------------------|--------------------------------|
| 1) Abdul Razique Abdul Razzak | 8) Anwaar Nadeem Abdul Rasheed |
| 2) Abhijeet Narayan Shirpurkar | 9) Bhushan Sanjay Sharma |
| 3) Aditya Gajanandrao Farkade | 10) Chandrakant Anilrao Bahe |
| 4) Aditya Santosh Boyat | 11) Devesh Madhukar Meshram |
| 5) Akshay Ghanshyam Vidhate | 12) Dhanshri Narendra Marathe |
| 6) Aman Narayanrao Bhore | 13) Ganesh Ashokrao Sasane |
| 7) Amdeo shankarrao Kuyte | 14) Harshal Shivdas Shirpurkar |



WILD LIFE CONSERVATION WEEK (2nd to 8th Oct. 2022)
Projects on 'Endangered Species of Animal'

Department	:	Department of Zoology and Nature and Science Club
Date	:	08 th October 2022
Participants	:	52 Students
Organizer	:	Zoology Department
Chairperson	:	Dr.H. R. Virulkar
Chief Guest	:	Dr. Vijay Khadse

Brief Report:

Department of Zoology and Nature and Science Club celebrated Wild life Conservation Week on 8th Oct. 2022. Research articles on the Topic 'Endangered Species of Animals' were collected by the student. They were ask to prepare research project on the topic of their own choice. A list of endangered animals and which are extinct was search and information was collected by the students. Oral presentation was given by each student.

A short inauguration programme was organized. Dr. H. R. Virulkar, Principal of the college was the Chairperson of the program. They throw light on the importance of Wild life Conservation and Climate change. Dr. Vijay Khadse , IQAC Coordinator was invited Chief Guest.He aware the students about the imbalance of nature and climate which will destroy all human development if Wild Life is not protected on earth . Coordinator of Nature and Science Club Dr. Anil Dahat guided the student on the importance of conservation of wild life. Introductory speech was given by Dr. V. Y. Muley. Anchoring of the program was done by Dr. M.S. Bhojar and Vote of Thanks was proposed by Miss Dipali Deogade.





Cleanliness drive organized by NSS department 2022-10-01 at Jamtha grampanchayat


PRINCIPAL
Arts, Commerce & Science
College, ARVI Dist. Wardha



**Energy Audit Report of
Arts, Commerce and Science College Arvi,
Year 2020-21**



ENERGY AUDIT REPORT CONSULTATION REPORT



Arts, Commerce and Science College Arvi,

Talegaon Road, Arvi, Tah. Arvi, Dist. Wardha, Maharashtra, India-91

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(2020-21)



**Energy Audit Report of
Arts, Commerce and Science College Arvi,
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**Energy Audit Report of
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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Arts, Commerce and Science College Arvi**. for giving us an opportunity to conduct Energy audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.



Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD (Research Scholar)
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Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



EXECUTIVE SUMMARY

The executive summary of the energy audit report furnished in this section briefly gives the identified energy conservation measures and other recommendation during the project that can be implemented in a phased manner to conserve energy, increase productivity inside the College campus.

ENERGY MANAGEMENT INITIATIVE TAKEN BY COLLEGE

☛ 05 KWp SOLAR PHOTOVOLTAIC ROOFTOP INSTALLATION:

College has 05 KWp solar photovoltaic roof top grid connected system installed college building. Yearly Power generation is 8496 units.

AREA OF IMPROVEMENT

☛ LIGHTING SYSTEM

Replacement of “conventional T-12 (40 Watt) and T-8 (36 Watt)” tube light by energy efficient LED lighting fixture was taken up phased manner.

☛ TIMER CONTROLLED STREET LIGHTS

Installation of “Timer control on Focus Light and street lighting” in college campus is recommended.

☛ CEILING FAN AND EXHAUST FAN:

Replacement of “conventional ceiling fan (60 Watt to 80 Watt)” by energy efficient star rated fan or BLDC based energy efficient fan (20 to 25 Watt) in “admin building, class rooms, laboratories and faculties cabin” have great potential for energy saving.

Replacement of “conventional exhaust fan (90 Watt to 125Watt)” by energy efficient star rated fan or BLDC based energy efficient Fan (20 to 40 Watt) in old building class rooms, laboratories and faculties cabin have great potential for energy saving.

☛ IOT BASED ENERGY MONITORING SYSTEM AT MAIN FEEDER

- Installation of “Cloud based (IoT based) energy monitoring system” including harmonic measurement (total voltage and current harmonic distortion %) in power house will be good initiate for energy monitoring as well as student demo project for management. Expected energy saving potential about 2 to 4%.
- Installation of energy meters on PCC panel with IOT system will monitor line losses of the system. It will give real time measurement of power factor and line losses from the cable.



**Energy Audit Report of
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✚ SYNCHRONIZATION OF DG SET WITH SOLAR SYSTEM

- Installation of “Cloud based fuel and unit generation monitoring system” in DG set will help to monitor specific unit generation by DG set failure of the grid power.
- It was observed that during the power failure of the grid, solar unit generations also stop. Synchronization of the solar system with DG set increases the utilization capacity of the solar system.

✚ Energy Management Workshop and Training:

- Develop energy management policies for College . Establish a procurement policy that is energy saving and eco-friendly.
- Conduct awareness and training programs for faculty, student and non-teaching staffs. Conduct seminars, workshops and exhibitions on energy management education.
- Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in energy management system.



**Energy Audit Report of
Arts, Commerce and Science College Arvi,
Year 2020-21**



**CHAPTER-1
INTRODUCTION**

1.1 About College

The Krishak Education Society, Arvi was established in 1965 by Late Narayanrao Kale, a stalwart of co-operative sector of Maharashtra. This society runs four pre-primary schools, four high schools, one Junior college and one Senior college. Presently Adv. D. N. Kale is the Chairman of this society. He is also a chairman of “Bharat Education Society” which is also one of the esteemed educational societies. The Krishak Education Society is indeed a major stakeholder in the field of higher education in Arvi region. Arts, Commerce and Science College provides educational facilities from Junior to Post Graduation and research under a single roof.

"The college was established in 1963 and primarily only Arts and Commerce faculties were started. In 1965 the college received Government Grants. In 1975, the college started its Junior college in Arts and Commerce faculties. In 1986, first Post-Graduation program i.e. M.Com. was started. In 1989, Arts and Commerce faculties got permanent affiliation of Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur (Formerly Nagpur University). In 1990, the college was recognized by UGC as 2(f) and 12(B) standards. In the session 1992-93, Science faculty was started for U.G. level. In the year 1997-98 subject English Literature was added to Arts faculty.

Vision:

‘Widening the Horizons of Knowledge’

Mission:

To nurture the culture of quality education and strengthen the youth to be the part of nation building movement.



**Energy Audit Report of
Arts, Commerce and Science College Arvi,
Year 2020-21**



Goals and Objectives

- ✚ To provide education to all, especially the students from rural areas and deprived classes at minimum cost and expenditure.
- ✚ To workout a strategic plan for all round development of students.
- ✚ To create educational, social and cultural awareness among students from rural areas.
- ✚ To develop voluntary interest in social service, welfare and to spread message of social equality.
- ✚ To inculcate self service, nationalism and communal harmony.
- ✚ To build capacities amongst students for employment and self employment.
- ✚ To achieve all round development of personality of students.
- ✚ To create interest in science and technology to make students aware of superstitions etc. through rational thinking.
- ✚ To generate awareness among students regarding various competitive examinations.
- ✚ To provide distance education facilities for employed and self-employed learners.



**Energy Audit Report of
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Year 2020-21**



1.2 About College Campus:

The College is spread 76389 sq/m with plenty of open space and sports area interspersed within academic buildings. The details of various department and building are given below:

Total Area of Ground Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Entrance	52.64
2	Office	87.75
3	Principal Room	40.83
4	Staff Room	51.53
5	Reading room	19.1
6	Gents Toilet	2.52
7	Ladies Toilet	2.52
8	lobby	75.64
9	Corridor	204.39
10	Computer Lab	85.23
11	Class rooms (08 Nos)	648
12	Office (YCMOU)	17.77
13	Girls Common Room	29.25
14	Toilet	20.25
Total area of Canteen Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Restaurant	43.45
2	Gents Toilet	8.59
3	Store	8.59
4	Utility	15.07



**Energy Audit Report of
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Total Area of First Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Home Science Lab.	176.67
2	Library	110.79
3	Staff Reading Space	53.6
4	Reference Room	48.78
5	Student Reading Room	80.95
6	Class Room (04 Nos)	261
7	Fashion Design Lab	63.91
8	Auditorium	259.9
9	Music Room	10.65
10	Store	21.3
11	Corridor	137.9
12	Lobby	155.44

Total Area of Second Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Botany Lab	93.67
2	HOD Office (Botany)	12.69
3	Class Room (03 Nos)	180
4	Biotech lab.	130.16
5	Zoology lab	109.62
6	Physics lab	115.92
7	Corridor	74.3



COLLEGE LAYOUT OF VARIOUS FLOORS





Energy Audit Report of
Arts, Commerce and Science College Arvi,
Year 2020-21





Energy Audit Report of
Arts, Commerce and Science College Arvi,
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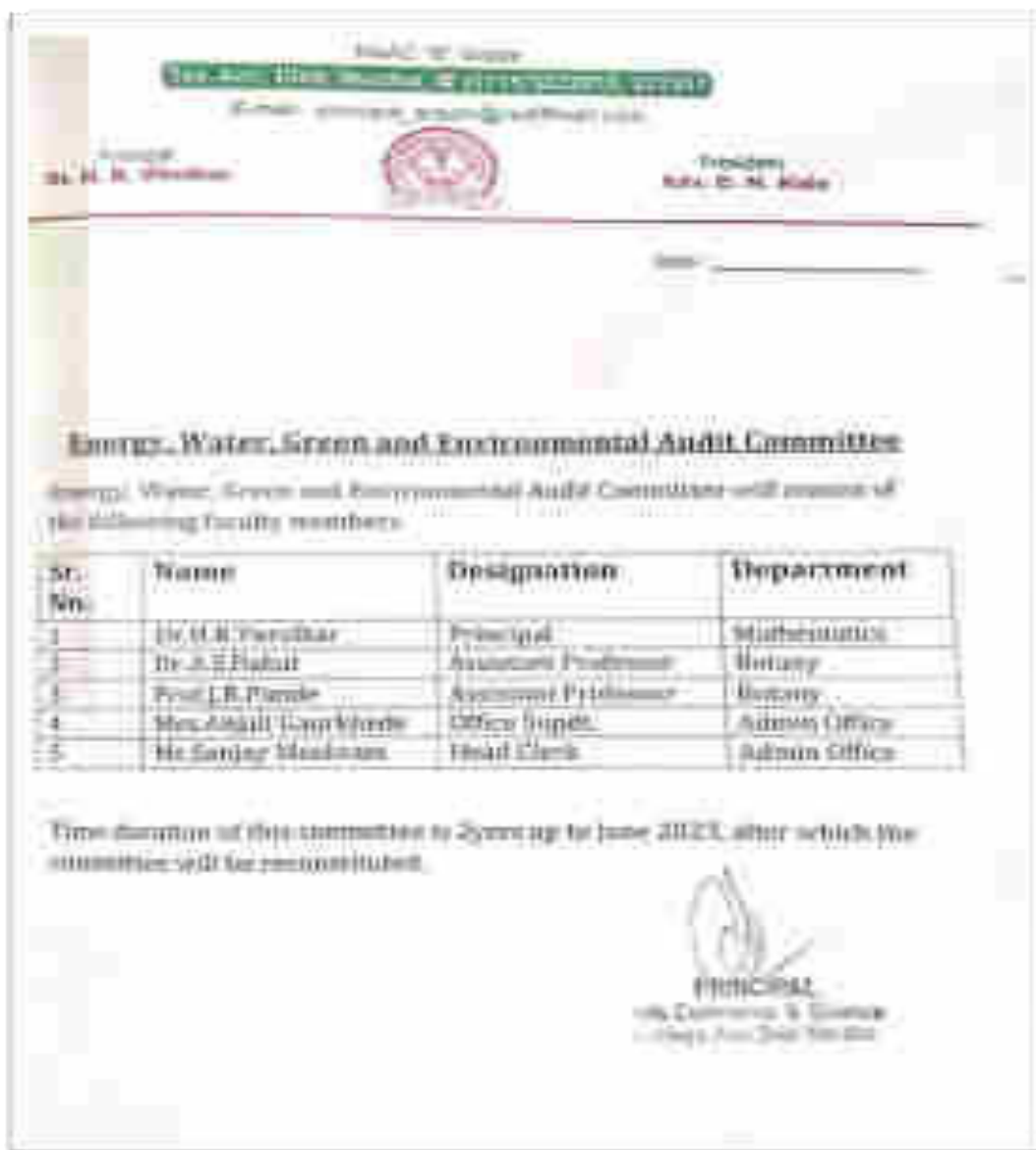




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1.3 Energy Monitoring Committee



1. 4 Energy Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited**,

- ✚ **Mr. Rakesh Pathak**, [Director]
- ✚ **Dr. Suresh Soni** [Reviewer]
- ✚ **Mrs. Laxmi Raikwar Singadiya**,[Energy Engineer]
- ✚ **Mr. Sachin Kumawat** [Project Engineer]
- ✚ **Mr. Ajay Nahra**, [Site Engineer]



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1.5 About Energy Audit

Energy audit helps to understand more about the ways energy is used in any plant and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to final consumer becomes 50%. Hence one unit saved in the end user is equivalent to two units generated in the power plant.

Energy audit is the most efficient way to identify the strength and weakness of energy management practices and to find a way to solve problems. Energy audit is a professional approach in utilizing economic, financial, and social and natural resources responsibility. Energy audits “adds value” to management control and is a way of evaluating the system.

Empirical Exergy Private Limited (EEPL), Indore M.P. carried out the “Energy Audit” at the site to find gaps in the energy consumption pattern for Arts, Commerce and Science College , Arvi. A technical report is prepared as per the need and the requirement of the project.

1.6 Objectives of Energy Auditing

An energy audit provides vital information base for overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures. It aims at:

- Identifying the quality and cost of various energy inputs.
- Assessing present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of thermal and electrical energy economy.
- Highlighting wastage in major areas.
- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.



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1.7 Methodology:

Methodology adopted for achieving the desired objectives viz.: Assessment of the current operational status and energy savings include the following:

- ✚ Discussions with the concerned officials for identification of major areas of focus and other related systems.
- ✚ Team of engineers visited the site and had discussions with the concerned officials / supervisors to collect data / information on the operations and load distribution within the plant and same for the overall premises. The data was analyzed to arrive at a base line energy consumption pattern.
- ✚ Measurements and monitoring with the help of appropriate instruments including continuous and / or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- ✚ Trend analysis of costs and consumptions.
- ✚ Capacity and efficiency test of major utility equipment's, wherever applicable.
- ✚ Estimation of various losses
- ✚ Computation and **in-depth analysis** of the collected data, including utilization of computerized analysis and other techniques as appropriate were done to draw inferences and to evolve suitable energy conservation plan/s for improvements/reduction in specific energy consumption.



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CHAPTER- 2

POWER SUPPLY SYSTEM AND BILL ANALYSIS

2.1 Power Station and Bill analysis 2019-20

- Power Supply From: - MSEDCL
- Customer Number: - 402660060082
- Sectioned Load :- 10 KW
- Overall Unit Rs/Kwh Year-2019-20 = 12.90

Sr.no	Month & Year	Section Load	Total Unit Consumption (Kw)	Amount Rs/-
1	Jul-19	10 KW	1021	13,260/-
2	Aug-19	10 KW	1301	11,620/-
3	Sep-19	10 KW	1173	17,770/-
4	Oct-19	10 KW	1210	28,419/-
5	Nov-19	10 KW	1058	14,200/-
6	Dec-19	10 KW	820	6,780/-
7	Jan-20	10 KW	1115	17,420/-
8	Feb-20	10 KW	1149	10,240/-
9	Mar-20	10 KW	1762	12,450/-
10	Apr-20	10 KW	869	15,570/-
11	May-20	10 KW	874	15,630/-
12	Jun-20	10 KW	863	7,240/-
	Total		13215	1,70,599/-

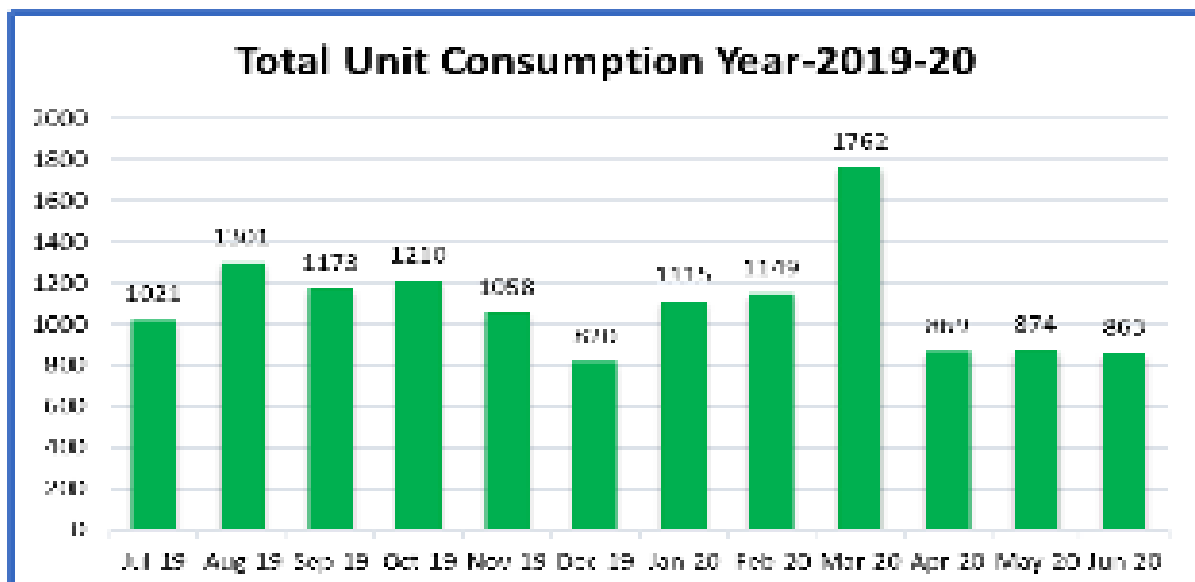


Figure:- Graphical Presentation of Unit Consumption Year-2019-20



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2.2 Power Station and Bill analysis 2020-21

- Power Supply From: - MSEDCL
- Customer Number: - 402660060082
- Sectioned Load :- 10 KW
- Overall Unit Rs/Kwh Year-2020-21 = 09.56

Sr No	Month & Year	Section Load	Total Unit Consumption	Amount Rs/-
1	Jul-20	10 KW	879	7,330
2	Aug-20	10 KW	869	7,330
3	Sep-20	10 KW	2853	28,220
4	Oct-20	10 KW	2040	19,780
5	Nov-20	10 KW	1103	16,530
6	Dec-20	10 KW	447	9,635
7	Jan-21	10 KW	560	3,710
8	Feb-21	10 KW	528	4,500
9	Mar-21	10 KW	409	8,030
10	Apr-21	10 KW	869	2,510
11	May-21	10 KW	948	3,000
12	Jun-21	10 KW	452	3,750
	Total		11,957	1,14,325

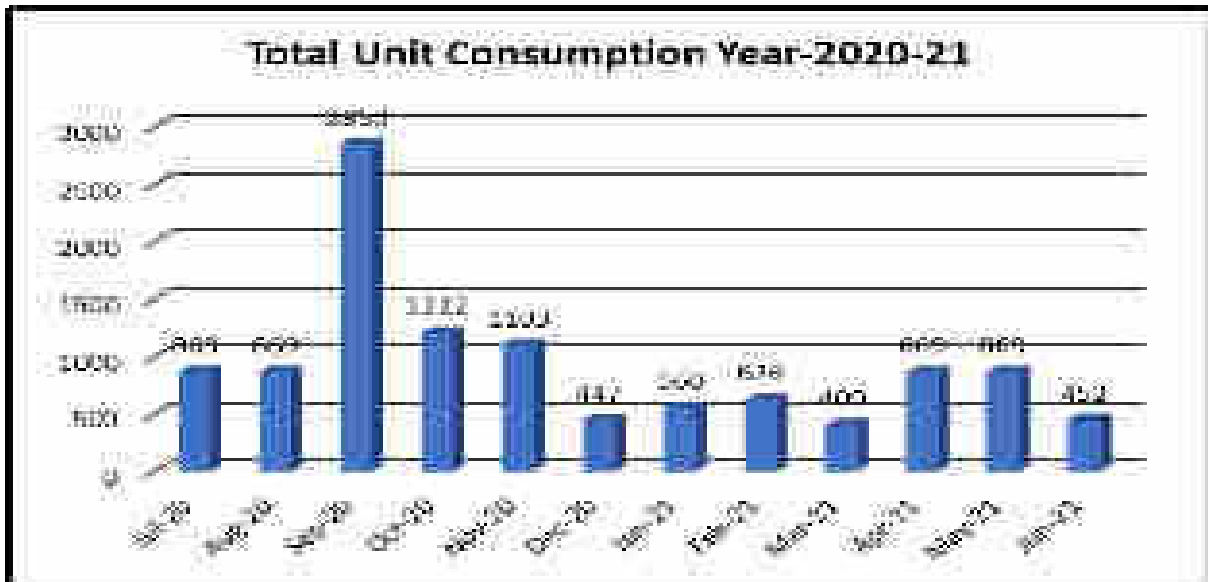


Figure :- Graphical Presentation of Unit Consumption Year-2020-21



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2.3 DG Set :-

There is 1 DG set in power house . Detailed of the DG Sets are given below :

Sr. No.	Parameter	Technical Specification DG Set
1	Make	Kirloskar Brothers Ltd.
2	M/C No	NA
3	Capacity	15 KVA
4	Rated Voltage	230
5	Full load current	65.2
6	Frequency	50
7	Power factor	0.80
8	RPM	1500
9	Phase	Single



Figure :- DG set in Power House

Observation & Suggestion:

- DG set use only in case of grid power failure.
- There is no system to monitor fuel consumptions w.r.t. unit generation.



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2.4 Photovoltaic System (05 Kw)

There is 05 KWp solar photovoltaic roof systems installed on college building in Sep-2018.

System details are given below:

Sr. No	Description	Technical Specification
1	Plant Information	
1.1	Plant capacity	05 KWp
1.2	Location	Arvi College Terrace
1.3	Latitude & Longitude	77.47 E° & 23.17 N°
2	PV Panel Details	
2.1	Make	TATA Power Solar
2.2	Panel Type	Multi-Crystalline
2.3	Panel Wattage	315 Watt
2.4	Panel Tilt Angle	23°
2.5		
3	Inverter Information	
3.1	Make	GOODWE
3.2	Model	GW5000 DT
3.3	Capacity of Inverter	6.5 KW
3.4	No of Inverter	1



Figure :- Solar Plant 5 KWp and Inverter System

Observation: -

It is observed that total solar unit generation is 8496 unit per Year



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2.5 Connected Load of College:

Sr.no	Location	Tub light	Fan	CFL	PC	Printer	Exhaust fan
1	Botanical Department	6	7	1	1	1	0
2	Zoology Department	4	6	1	1	1	0
3	Physics Department	7	7	0	1	1	0
4	Computer Lab	2	7	0	28	4	1
5	Office Room	8	7	0	1	1	0
6	Principal Office	2	3	1	0	0	0
7	library Department	15	27	0	8	1	0
8	Home Science Lab	6	5	1	0	0	3
9	English Lab	2	2	0	19	0	0
10	Class room -01	4	4	0	0	0	0
11	Class Room -02	4	3	0	0	0	0
12	Class Room -03	4	2	0	0	0	0
13	Class Room -04	4	3	0	0	0	0
14	Class Room -05	4	2	1	0	0	0
15	Class Room -06	4	2	1	0	0	0
16	Class Room -07	4	2	0	0	0	0
17	Class Room -08	3	2	1	0	0	0
18	Class Room -09	3	5	0	0	0	0
19	Class Room - 10	3	5	0	0	0	0
20	Class Room -11	2	4	0	0	0	0
21	Class Room -12	3	5	0	0	0	0
22	Class Room -13	1	2	0	0	0	0
23	Class Room -14	2	2	0	0	0	0
24	Staff Room	3	5	7	0	0	0
25	Physical Department	1	1	0	1	0	0
26	Gym	4	1	0	0	0	0
27	NSS Office -01	1	1	0	0	0	0
28	NSS Office-02	1	1	0	1	0	0
29	Exam Room	3	5	0	0	0	0
30	Faison Designing Department	3	3	0	0	0	0
31	NAAC Room	3	1	0	1	1	0
32	Consumer Store	1	1	0	1	1	1
	Total	117	133	14	63	11	5



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Sr.no	Equipment Name	Quantity	Unit Watt	Total Watt	Load %
1	Tube light	117	36	4212	14.46
2	Celling Fan	133	60	7980	27.40
3	Computer System	63	85	5355	18.38
4	CFL	14	18	252	0.87
5	Exhaust Fan	5	150	750	2.57
6	Printer	11	120	1320	4.53
7	Focus Light	40	200	8000	27.46
9	Xerox Machine	3	420	1260	4.33
				29129	100

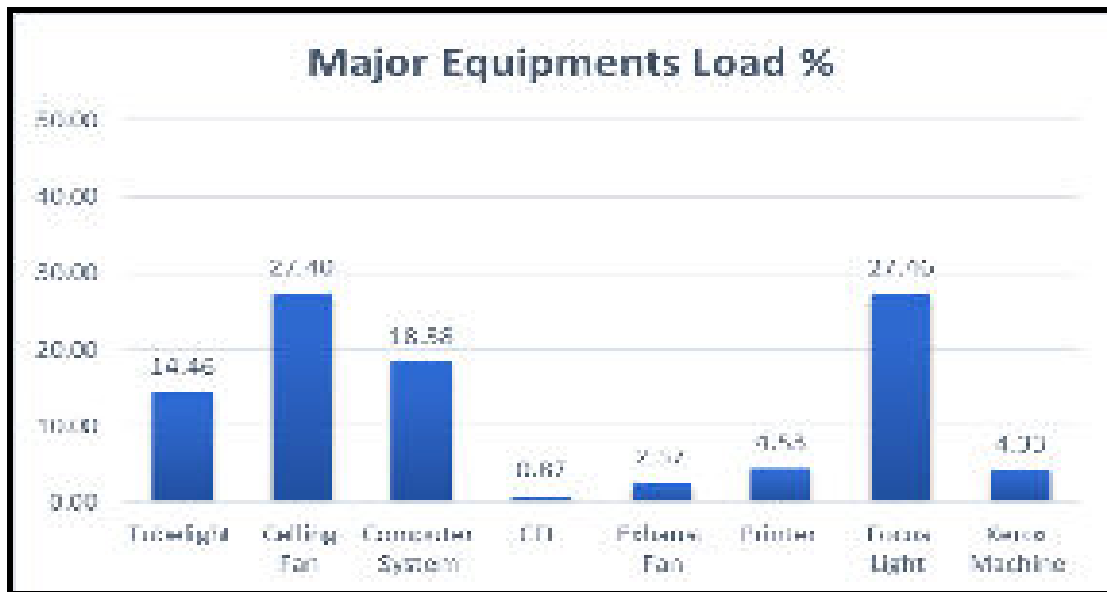


Figure :- Graphical Presentation of connected load Year-2020-21



2.6 Some Photograph of Electrical Equipment's: -

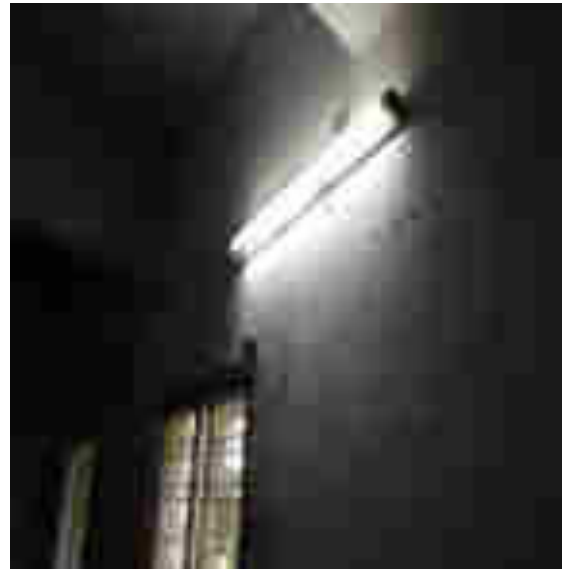


Figure:- Electrical Equipment in College



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ENVIRONMENT AUDIT REPORT CONSULTATION REPORT



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(2020-21)



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Arts, Commerce and Science College Arvi.** for giving us an opportunity to conduct Environment audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.



Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
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Empanelled Energy Auditor with MPUVN, Bhopal M.P.
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Certified Water Auditor (NPC, Govt of India)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



EXECUTIVE SUMMARY

The executive summary of the water audit report furnished in this section briefly gives the identified water conservation measures, that can be implemented in a phased manner to water conservation and increase the productivity of the college.

AREAS FOR IMPROVEMENT AND RECOMMENDATION

FRESH WATER MONITORING SYSTEM:

- Installation of “Cloud based (IoT based) ground water extraction monitoring system” for Borewell to quantify fresh water consumption per day in the College.
- Install water flow meters (Mechanical or Electronics) in distribution network, like College building, main line and gardening line for quantity per day water consumption and waste water generation in the College campus.

WASTE WATER TREATMENT PLANT

- Waste water generated from various departments and canteen should be collect in separate waste water collection tank. It should be treated in proposed STP and ETP plants after that treated water reuse activity like gardening, toilet and wash room etc.

RAIN WATER HARVESTING SYSTEM

- Install rain water harvesting system in college. It was observed that there is good potential for rain water harvesting systems.
- The calculated rainwater harvesting potential is about 704.72 m³/year. Based on total build up area of the college.



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OTHER SUGGESTIONS.

Some of the very important suggestions are: -

- Prepare the water management policy, and work towards creating and implementing a strategy to reduce the water consumption.
- Conduct awareness programs for water conservation and sustainable development.
- Establish institutional ecology policy and set an example of environmental responsibility and practices of resource conservation, recycling, waste management.
- Involve all stakeholders and encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in water conservation and sustainable development.
- Collaborate for interdisciplinary approaches to develop curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.
- Promote 3R education policy (reduces, reuse, and recycle) in campus.
- Arrange training programmes on water management system and nature conservation.
- Ensure participation of students and teachers in local water issues.
- Conduct seminars, workshops and exhibitions on water and environmental education.



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**CHAPTER-1
INTRODUCTION**

1.1 About College

The Krishak Education Society, Arvi was established in 1965 by Late Narayanrao Kale, a stalwart of co-operative sector of Maharashtra. This society runs four pre-primary schools, four high schools, one Junior college and one Senior college. Presently Adv. D. N. Kale is the Chairman of this society. He is also a chairman of “Bharat Education Society” which is also one of the esteemed educational societies. The Krishak Education Society is indeed a major stakeholder in the field of higher education in Arvi region. Arts, Commerce and Science College provides educational facilities from Junior to Post Graduation and research under a single roof.

"The college was established in 1963 and primarily only Arts and Commerce faculties were started. In 1965 the college received Government Grants. In 1975, the college started its Junior college in Arts and Commerce faculties. In 1986, first Post-Graduation program i.e. M.Com. was started. In 1989, Arts and Commerce faculties got permanent affiliation of Rashtrasant Tukadoji Maharaj Nagpur College, Nagpur (Formerly Nagpur College). In 1990, the college was recognized by UGC as 2(f) and 12(B) standards. In the session 1992-93, Science faculty was started for U.G. level. In the year 1997-98 subject English Literature was added to Arts faculty.

Vision:

‘Widening the Horizons of Knowledge’

Mission:

To nurture the culture of quality education and strengthen the youth to be the part of nation building movement.



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Goals and Objectives

- ✚ To provide education to all, especially the students from rural areas and deprived classes at minimum cost and expenditure.
- ✚ To workout a strategic plan for all round development of students.
- ✚ To create educational, social and cultural awareness among students from rural areas.
- ✚ To develop voluntary interest in social service, welfare and to spread message of social equality.
- ✚ To inculcate self service, nationalism and communal harmony.
- ✚ To build capacities amongst students for employment and self employment.
- ✚ To achieve all round development of personality of students.
- ✚ To create interest in science and technology to make students aware of superstitions etc. through rational thinking.
- ✚ To generate awareness among students regarding various competitive examinations.
- ✚ To provide distance education facilities for employed and self-employed learners.



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1.2 About College Campus:

The College is spread 76389 sq/m with plenty of open space and sports area interspersed within academic buildings. The details of various department and building are given below:

Total Area of Ground Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Entrance	52.64
2	Office	87.75
3	Principal Room	40.83
4	Staff Room	51.53
5	Reading room	19.1
6	Gents Toilet	2.52
7	Ladies Toilet	2.52
8	lobby	75.64
9	Corridor	204.39
10	Computer Lab	85.23
11	Class rooms (08 Nos)	648
12	Office (YCMOU)	17.77
13	Girls Common Room	29.25
14	Toilet	20.25
Total area of Canteen Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Restaurant	43.45
2	Gents Toilet	8.59
3	Store	8.59
4	Utility	15.07



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Total Area of First Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Home Science Lab.	176.67
2	Library	110.79
3	Staff Reading Space	53.6
4	Reference Room	48.78
5	Student Reading Room	80.95
6	Class Room (04 Nos)	261
7	Fashion Design Lab	63.91
8	Auditorium	259.9
9	Music Room	10.65
10	Store	21.3
11	Corridor	137.9
12	Lobby	155.44

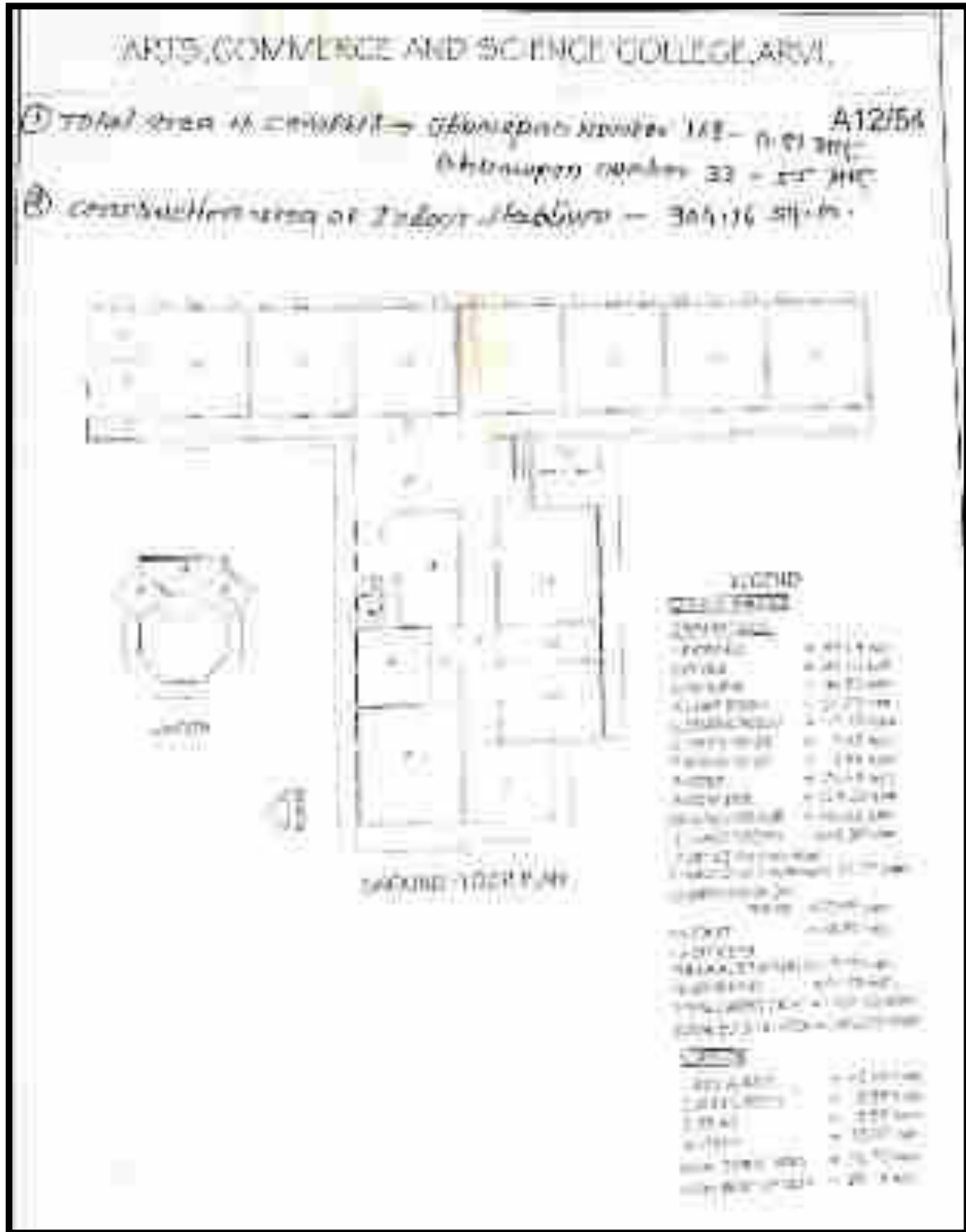
Total Area of Second Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Botany Lab	93.67
2	HOD Office (Botany)	12.69
3	Class Room (03 Nos)	180
4	Biotech lab.	130.16
5	Zoology lab	109.62
6	Physics lab	115.92
7	Corridor	74.3



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COLLEGE LAYOUT OF VARIOUS FLOORS





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1.3 Environment Monitoring Committee



1.4 Environment Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited**,

- 🚩 **Mr. Rakesh Pathak**, [Director]
- 🚩 **Dr. Suresh Soni** [Reviewer]
- 🚩 **Mrs. Laxmi Raikwar Singadiya**,[Energy Engineer]
- 🚩 **Mr. Sachin Kumawat** [Project Engineer]
- 🚩 **Mr. Ajay Nahra**, [Site Engineer]



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1.5 About Environment Auditing

Water audits can be a highly valuable tool for institute in a wide range of ways to improve their energy, environment and economic performance. while reducing wastages and operating costs. Water audits provide a basis for calculating the economic benefits of water conservation projects by establishing the current rates of water use and their associated cost.

1.6 Objectives of Environment audit

The general objective of water audit is to prepare a baseline report on water conservation measures to mitigate consumption, improve quality and sustainable practices.

The specific objectives are:

-  To monitor the water consumption and water conservation practices.
-  To assess the quantity of water, usage, quantity of waste water generation and their reduction within the college.

1.7 Target Areas of Environment audit

This indicator addresses water sources, water consumption, irrigation, storm water, appliances and fixtures aquifer depletion and water contamination are taking place at unprecedented rates. It is therefore essential that any environmentally responsible institution should examine its water use practices.



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1.8 Methodology followed for conducting Environment audit

Step 1: Walk through survey

- ✚ Understanding of existing water sourcing, storage and distribution facility.
- ✚ Assessing the water demand and water consumption areas/processes.
- ✚ Preparation of detailed water circuit diagram.

Step 2: Secondary Data Collection

- ✚ Analyse historic water use and wastewater generation
- ✚ Field measurements for estimating current water use
- ✚ Metered & unmetered supplies.
- ✚ Understanding of “base” flow and usage trend at site
- ✚ Past water bills
- ✚ Wastewater treatment scheme & costs etc.

Step 3: Site Water Audit Planning (based on site operations and practices)

- ✚ Preparation of water flow diagram to quantify water use at various locations
- ✚ Wastewater flow measurement and sampling plan

Step 4: Conduction of Detailed Water Audit & Measurements

- ✚ Conduction of field measurements to quantify water/wastewater streams
- ✚ Power measurement of pumps/motors
- ✚ Preparation of water balance diagram
- ✚ Establishing water consumption pattern
- ✚ Detection of potential leaks & water losses in the system
- ✚ Assessment of productive and unproductive usage of water
- ✚ Determine key opportunities for water consumption reduction, reuse & recycle.

Step 5: Preparation of Water Audit Report

- ✚ Documentation of collected & analysed water balancing and measurement details
- ✚ Projects and procedures to maximize water savings and minimize water losses.
- ✚ Opportunities for water conservation based on reduce/ recycle/ reuse and recharge options



CHAPTER- 2 WATER CONSUMPTION AND WASTE WATER SOURCES

2.1 Details of Source of Fresh Water and Use Areas:

The main source of freshwater is Borewell for the college. The freshwater is mainly used for drinking, housekeeping, gardening, domestic activity and new construction project. Details of the pumps are given in table.

Sr. No	Source of Water	Location	Depth (ft/m)	Type of Pumps	Rated (HP)
1	Municipal Corporation	College Primases	NA	NA	NA
2	Borewell-01	Near Canteen	300 FT Approx.)	Submersible	3 HP

2.2 Water Accounting & Metering system:

It was observed that there is one water meter are installed in Municipal pipe line but there are requirement of water flow meters on Borewell line to quantify per day ground water extraction from Borewell.



Figure: - fresh water supply for college campus



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2.3 Water Storage Capacity in College Campus: -

There are different type of tank available in College for water storage like Underground RCC tank, Overhead RCC tank etc.

Table 2.2: - Water Storage tank in College campus

Sr.no	Tank Type	Location	Size	Quantity	Capacity (M ³)
1	PVC (Sintex)	Terrace	Circular	1	2
2	PVC (Sintex)	College Premises	10 X 10 X 10	1	35 .2
3	RCC Type	Botanical Garden	8 X 8 X 8	1	18
4	Under Ground tank	Ground Floor	8 X 10 X 8	1	22.6
5	Drinking Water tank	First Floor	Circular	1	1

Photographs of water storage tanks.



Fig :- Water Storage Tank and capacity of College Campus



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2.4 Water use areas in College Campus: -

Water is preliminary used for drinking, domestic, gardening and activity. Audit team visited various departments and buildings to determine appliances. The details of washroom, toilet and taps are given in table .

Sr.no	Location	No of Taps
1	Botany Department	12
2	Zoology Department	14
3	Physics Department	2
4	Principal Office	2
5	Home Science Lab	7
6	Indoor Stadium	2
7	Botanical Garden	2
8	College Premises Garden	2
9	Boys Wash room	2
10	Girls Wash room	4
11	Staff wash room	8
	Total	57



2.5 Fresh Water uses for Gardening:

The one of major contribution from fresh water consumption is watering for plants and garden in college campus. College management is already installation of “Automatic Watering 360 adjustable misting nozzle irrigation Dripper’s system” for plants. adjustable drip irrigation tools to provide different amounts of water depending on the water requirements of different plants. The drip speed can be set as for indoor and outdoor plants.



Figure :- Technology for Drip Water Irrigation for plant



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2.6 Waste Water Generation sources: -

At present waste water generated from various departments canteen, Mess, hostels and clinical activity like washrooms, handwash and washing of medical equipment's and RO rejected etc is discharge into drain line.it should be collect is separate tank and treat in proposed STP and ETP plants. After that treated water reuse activity like gardening, toilet and wash room etc.

Sr. No	Key Water Usage Section	Type of water used (raw, treated etc.)	Water Consuming activities
1	Botanical Department	Fresh Water	Drinking and other uses
2	Zoology Department	Fresh Water	Drinking, Food cooking, other Uses
3	Physics Department	Fresh Water	Drinking and other uses
4	Principal Office	Fresh Water	Drinking and other uses
5	Home Science Lab	Fresh Water	Drinking, and other activities
6	Indoor Stadium	Fresh Water	Gardening, Washing

Some photographs of waste water generation sources are given



Figure: - Waste Water Generation sources



CHAPTER- 3 RAIN WATER HARVESTING SYSTEM

3.1. Rain water Harvesting systems

There is good potential for develop rain water harvesting system in college. The rainwater harvesting is a technique to capture the rainwater when it precipitates, store that water for direct use or charge the groundwater and use it later.

There are typically four components in a rainwater harvesting system:

- Roof Catchment.
- Collection.
- Transport.
- Infiltration or storage tank and use.

If rainwater is not harvested and channelized its runoffs quickly and flow out through storm-water drains. For storm-water management the recharge pits, percolation pits and porous trenches are constructed to allow storm water to infiltrate inside the soil.

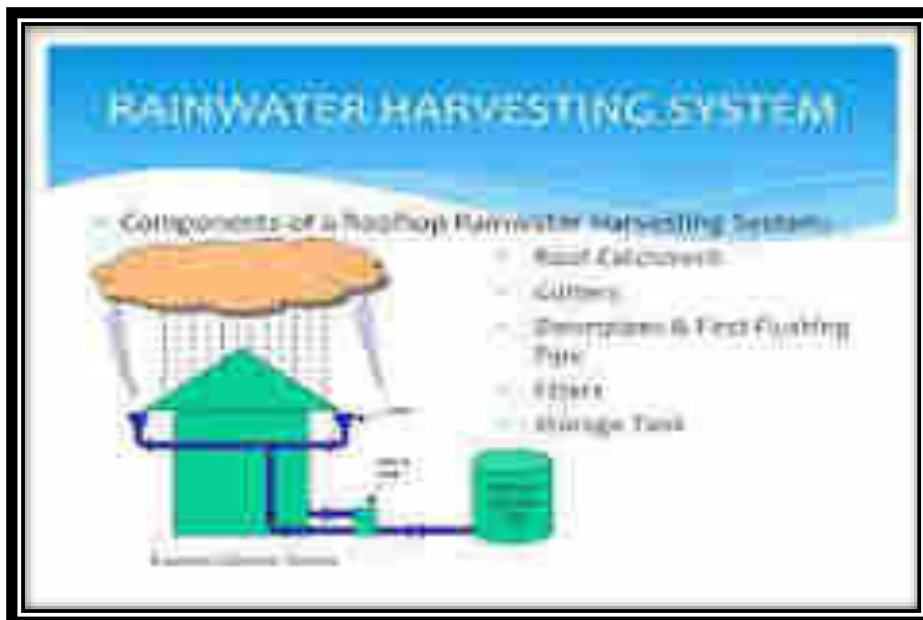


Figure :- Components of a rooftop rainwater harvesting system



3.2 Rainwater Harvesting Potential of the College

The college has total build-up area is about 818.00 m². The average annual rainfall 0.979 m and runoff coefficient 0.88 are considered for commercial building. Accordingly, above figures and consideration, estimated rainwater harvesting potential for the college is about 704.72 m³/year. The following Mathematical Equation is used for the calculation.

RWH Potential = Rainfall (m) x Area of catchment (m²) x Runoff coefficient

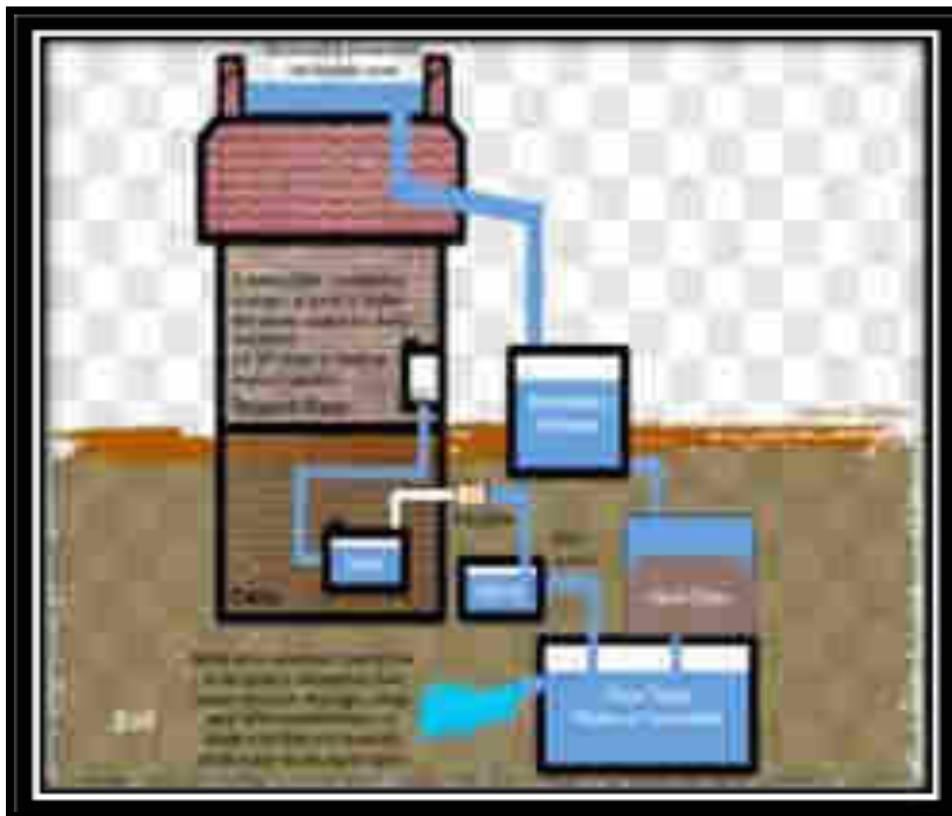


Figure:- Proposed Rain water harvesting system



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**GREEN AUDIT REPORT
CONSULTATION REPORT**



Arts, Commerce and Science College Arvi,

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(2020-21)



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Arts, Commerce and Science College Arvi. for** giving us an opportunity to conduct Green audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.



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EXECUTIVE SUMMARY

Green Initiative Taken by College

CAMPAIGN OF PLANTATION AND GREEN CAMPUS:

College has around **283** trees in the campus. Its good initiative taken by management for green campus under the campaign of plantation. **It's APPRECIABLE.**

Vehicle pooling:

Vehicle pooling use of bicycles has been promoted among students and faculty as a green policy of college. **It's APPRECIABLE.**

AREAS FOR IMPROVEMENT

5 DUST BIN WASTE MANAGEMENT SYSTEM:

- It was observed that college has applied 5 dust bin system for waste management in campus. Waste management system help to implement 3R concept (Recovery, Reuse and Recycling) of different type of waste generated in the college campus.

QR Code System on Tree:

- While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, college can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.

Eco-restoration programmes

- Frame a holistic campus development plan with long-term eco-restoration programmes for replacing exotic acacia plantations with indigenous trees.



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**CHAPTER-1
INTRODUCTION**

1.1 About College

The Krishak Education Society, Arvi was established in 1965 by Late Narayanrao Kale, a stalwart of co-operative sector of Maharashtra. This society runs four pre-primary schools, four high schools, one Junior college and one Senior college. Presently Adv. D. N. Kale is the Chairman of this society. He is also a chairman of “Bharat Education Society” which is also one of the esteemed educational societies. The Krishak Education Society is indeed a major stakeholder in the field of higher education in Arvi region. Arts, Commerce and Science College provides educational facilities from Junior to Post Graduation and research under a single roof.

"The college was established in 1963 and primarily only Arts and Commerce faculties were started. In 1965 the college received Government Grants. In 1975, the college started its Junior college in Arts and Commerce faculties. In 1986, first Post-Graduation program i.e. M.Com. was started. In 1989, Arts and Commerce faculties got permanent affiliation of Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur (Formerly Nagpur University). In 1990, the college was recognized by UGC as 2(f) and 12(B) standards. In the session 1992-93, Science faculty was started for U.G. level. In the year 1997-98 subject English Literature was added to Arts faculty.

Vision:

‘Widening the Horizons of Knowledge’

Mission:

To nurture the culture of quality education and strengthen the youth to be the part of nation building movement.



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Goals and Objectives

- To provide education to all, especially the students from rural areas and deprived classes at minimum cost and expenditure.
- To workout a strategic plan for all round development of students.
- To create educational, social and cultural awareness among students from rural areas.
- To develop voluntary interest in social service, welfare and to spread message of social equality.
- To inculcate self service, nationalism and communal harmony.
- To build capacities amongst students for employment and self employment.
- To achieve all round development of personality of students.
- To create interest in science and technology to make students aware of superstitions etc. through rational thinking.
- To generate awareness among students regarding various competitive examinations.
- To provide distance education facilities for employed and self-employed learners.



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1.2 About College Campus:

The College is spread 76389 sq/m with plenty of open space and sports area interspersed within academic buildings. The details of various department and building are given below:

Total Area of Ground Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Entrance	52.64
2	Office	87.75
3	Principal Room	40.83
4	Staff Room	51.53
5	Reading room	19.1
6	Gents Toilet	2.52
7	Ladies Toilet	2.52
8	lobby	75.64
9	Corridor	204.39
10	Computer Lab	85.23
11	Class rooms (08 Nos)	648
12	Office (YCMOU)	17.77
13	Girls Common Room	29.25
14	Toilet	20.25
Total area of Canteen Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Restaurant	43.45
2	Gents Toilet	8.59
3	Store	8.59
4	Utility	15.07



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Total Area of First Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Home Science Lab.	176.67
2	Library	110.79
3	Staff Reading Space	53.6
4	Reference Room	48.78
5	Student Reading Room	80.95
6	Class Room (04 Nos)	261
7	Fashion Design Lab	63.91
8	Auditorium	259.9
9	Music Room	10.65
10	Store	21.3
11	Corridor	137.9
12	Lobby	155.44

Total Area of Second Floor		
Sr.no	Area Name	Total Area (Sqm.)
1	Botany Lab	93.67
2	HOD Office (Botany)	12.69
3	Class Room (03 Nos)	180
4	Biotech lab.	130.16
5	Zoology lab	109.62
6	Physics lab	115.92
7	Corridor	74.3



COLLEGE LAYOUT OF VARIOUS FLOORS





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1.3 Energy Monitoring Committee



1.4 Green Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited**,

-  **Mr. Rakesh Pathak**, [Director]
-  **Dr. Suresh Soni** [Reviewer]
-  **Mrs. Laxmi Raikwar Singadiya**, [Energy Engineer]
-  **Mr. Sachin Kumawat** [Project Engineer]
-  **Mr. Ajay Nahra**, [Site Engineer]



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1.5 About Green Auditing

Eco campus is concepts 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.

Green audit means to identify opportunities to sustainable development practices, enhance environmental quality, improve health, hygiene and safety, reduce liabilities achieve values of virtue. Green audit also provides a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of “**Arts Commerce and Science college Arvi** ” enables to assess the life style, action and its impact on the environment. This green audit was mainly focused on greening indicators like utilisation of green energy (solar energy) and optimum use of secondary energy sources (petrol and diesel) in the college campus, vegetation, and carbon foot print of the campus etc. The aim of green auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

1.6 Objectives of Green Auditing

The general objective of green audit is to prepare a baseline report on “Biodiversity” and alternative energy sources (solar energy), measures to mitigate resource wastage and improve sustainable practices.

The specific objectives are:

- To suggest measures to make the college campus biodiversity rich
- To demarcate areas within the institute campus which have potential for restoration of biodiversity
- To make recommendations for the conservation, protection and rejuvenation of the natural vegetation and animal life by involving students and faculty members
- To inculcate values of sustainable development practices through green audit mechanism.
- Providing a database for corrective actions and future plans.
- To identify the gap areas and suggest recommendations to improve the green campus status of the college.



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1.7 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time.

Eco-campus concept mainly focuses on the efficient use of energy and water; minimize waste generation or pollution and also economic efficiency. Target areas included in this green auditing is biodiversity, green energy and carbon foot print.

1.8 Audit for Biodiversity

India is mega-biodiversity hottest hot-spot in the world with tremendous diversity in plants and animals. Such biotic forms are endemic to the different bio-geographic habitats in urban and in forest areas of the country as well. Biodiversity is defined as genetic, species and ecosystem diversity, which offers variability and therefore added values to bio-resources.

The most serious and rapidly accelerating of all the global environmental problems is the loss of biodiversity through deforestation and biodiversity cover depletion. Over the past 300 years, many species of organisms, including mammals, birds, butterflies and plants, have been lost due to many anthropogenic activities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen.

1.9 Audit of Green Energy:

According to the **Environmental Protection Agency (EPA)**, green energy provides the highest environmental benefit and includes power produced by solar, wind, geothermal, biogas, low-impact hydroelectric, and certain eligible biomass sources. Green energy can also reduce your carbon footprint and achieve a sustainable lifestyle.





CHAPTER- 2
GREEN CAMPUS AND BIODIVERSITY

2.1 Biodiversity Audit

In the survey, focus has been given on assessment of present status of diversity in form of plants, in college campus and efforts made by the college authorities for nature conservation. Campus is located in the vicinity of approximately more than 283 trees/ medicinal herbs/ ornamental plants. The detail is given below:



Figure :- Plantation in College Premises on World Environment Day .



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Table:- List of plants in college campus

Sr.no	Botanical Name of Plant	Family
1	Monoon longifolium	Annonaceae
2	Pongamia pinnata	Fabaceae
3	Leucaena leucocephala	Fabaceae
4	Eucalyptus globulus	Myrtaceae
5	Azadirachta indica	Meliaceae
6	Alstonia scholaris	Apocynaceae
7	Acacia nilotica indica	Fabaceae
8	Sesbania sesban	Fabaceae
9	Moringa oleifera	Moringaceae
10	Mimusops elengi	Sapotaceae
11	Tectona grandis	Lamiaceae
12	Ailanthus altissima	Simaroubaceae
13	Ziziphus jujuba	Rhamnaceae
14	Butea monosperma	Fabaceae
15	Cycas	Cycad
16	Hardwickia binata Roxb	Caesalpiaceae
17	Tephrosia purpurea	Fabaceae
18	Nyctanthes arbor-tristis	Oleaceae
19	Jasminum grandiflorum	Oleaceae
20	Jasminum officinale	Oleaceae
21	Jasminum auriculatum	Oleaceae
22	Eucalyptus Globulus	Myrtaceae
23	Bambusa vulgaris	Poaceae
24	Grevillea robusta	Proteaceae
25	Chamaecostus cuspidatus	Costaceae
26	Asparagus racemosus	Asparagaceae
27	Combretum indicum	Combretaceae
28	Lantana camara	Verbenaceae



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29	Jasminum sambac	Oleaceae
30	Hibiscus rosa-sinensis	Malvaceae
31	Lawsonia inermis	Lythraceae
32	Justicia adhatoda	Acanthaceae
33	Withania somnifera	Solanaceae
34	Phyllanthus niruri	Phyllanthaceae
35	Bixa Orellana	Bixaceae
36	Delonix regia	Fabaceae
37	Terminalia chebula	Combretaceae
38	Passiflora incarnata	Passifloraceae
39	Holarrhena pubescence Wall/ Holarrhena antidysenterica	Apocynaceae
40	Ocimum tenuiflorum	Lamiaceae
41	Mentha spicata	Lamiaceae
42	Madhuca longifolia	Sapotaceae
43	Piper longum	Piperaceae
44	Putranjiva roxburghii	Putranjivaceae
45	Sapindus mukorossi	Sapindaceae
46	Caesalpinia bonduc	Fabaceae
47	Moringa oleifera	Moringaceae
48	Acacia concinna	Fabaceae
49	Saraca asoca	Fabaceae
50	Acorus calamus	Acoraceae
51	Elettaria cardamomum	Zingiberaceae
52	Cycas	Cycad
53	Dyopsis lutescens	Arecaceae
54	Manilkara zapota	Sapotaceae
55	Tabernaemontana divaricate	Apocynaceae
56	Codiaeum variegatum	Euphorbiaceae
57	Euphorbia pulcherrima	Euphorbiaceae
58	Thuja standishii	Cupressaceae



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59	<i>Hibiscus rosa-sinensis</i>	Malvaceae
60	<i>Jasminum sambac</i>	Oleaceae
61	<i>Pelargonium</i>	Geraniaceae
62	<i>Rosa</i>	Rosaceae
63	<i>Codiaeum variegatum</i>	Euphorbiaceae
64	<i>Dracaena fragrans</i>	Asparagaceae
65	<i>Ficus benjamina</i>	Moraceae
66	<i>Bougainvillea</i>	Nyctaginaceae
67	<i>Mentha spicata</i>	Lamiaceae
68	<i>Jatropha curcas</i>	Euphorbiaceae
69	<i>Prunus amygdalus</i>	Rosaceae
70	<i>Eranthemum pulchellum</i>	Acanthaceae
71	<i>Gardenia jasminoides</i>	Rubiaceae
72	<i>Hibiscus mutabilis</i>	Malvaceae
73	<i>Ixora coccinea</i>	Rubiaceae
74	<i>Mussaenda erythrophylla</i>	Rubiaceae
75	<i>Piper nigrum</i>	Piperaceae



Figure :- Botanical Garden & Herbal Park



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2. 2 Some Photograph of Green campus: -



College has **283** trees in the campus. This is good initiative taken by management for green campus under the campaign of plantation. **It's APPRECIABLE.**



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CHAPTER- 3

GREEN ENERGY AND SUSTAINABLE DEVELOPMENT

3.1 Photovoltaic System (05 Kw)

There is 05 KWp solar photovoltaic roof systems installed on college building in Sep-2018.

System details are given below:

Sr. No	Description	Technical Specification
1	Plant Information	
1.1	Plant capacity	05 KWp
1.2	Location	Arvi College Terrace
1.3	Latitude & Longitude	77.47 E°& 23.17 N°
2	PV Panel Details	
2.1	Make	TATA Power Solar
2.2	Panel Type	Multi-Crystalline
2.3	Panel Wattage	315 Watt
2.4	Panel Tilt Angle	23°
2.5		
3	Inverter Information	
3.1	Make	GOODWE
3.2	Model	GW5000 DT
3.3	Capacity of Inverter	6.5 KW
3.4	No of Inverter	1



Figure: - Solar Plant 5 KWp and Inverter System

Observation: -It is observed that solar system is working condition and Carbon Emission approx. 8.15 tonCO₂e/year.



Chapter-04 Carbon Foot print

4.1 About carbon foot print.

Climate change is one of the greatest challenges facing nations, governments, institutions, business and mankind today.

Carbon footprint is a measure of the impact your activities have on the amount of carbon dioxide (CO₂) produced through the burning of fossil fuels and is expressed as a weight of CO₂emissions produced in tonnes.

We focus on consumption in each of our five major categories: housing, travel, food, products and services. In addition to these we also estimate the share of national emissions over which we have little control, government purchases and capital investment.

For simplicity and clarity all our calculations follow one basic method. We multiply a use input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet and spending behaviour.

Although working out you inputs can take some investigation on your part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in your calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint...





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4.2 Methodology and Scope

The carbon footprint gives a general overview of the College greenhouse gas emissions, converted into CO₂ -equivalents and it is based on reported data from internal and external systems. The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders. The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the “Greenhouse Gas Protocol Corporate Accounting and Reporting Standard” (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions -ISO 14064. This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the College Campus. This involves accounting for, and reporting on, the GHG emissions from all those activities for which the company is directly responsible. The items quantified in this study are as classified under the ISO 14064 standards: The report calculates the greenhouse gas emissions from the College. This includes electricity, as well as emission associated with diesel consumption in the institute vehicle. The emission associated with air travel, waste generation, administration, and marketing related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2 or 3 areas classified under the ISO 14064 standards.

4.3 Carbon emission from Electricity

Direct emissions factors are widely published and show the amount of emissions produced by power stations in order to produce an average kilowatt-hour within that grid region

Unlike with other energy sources the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use comes from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is the significant contributors towards GHGs emission from the unit. Electricity used onsite is the most direct, and typically the most significant, a contributor to a unit's carbon footprint. Thus, using an average fuel mix of generating electricity, carbon dioxide intensity of electricity for national grid is assumed to be 0.9613 KgCO₂/Kwh

(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip) Electricity Purchased from the grid

Sr. No	Parameter	Unit	Value	Emission Factor kg CO ₂ e/kWh	Emission ton CO ₂ e/year
1	Electricity	13,215	kWh	0.9613	12.70

4.4 Other Emissions Excluded

This study did not evaluate the carbon sequestration potential of existing plantation activities and emission from the staff commuting, food supply, official flights, paper products, water supply, and waste disposal and recycling due to limited data availability. The current study identifies areas where data monitoring, recording and archiving need to be developed for enlarging the scope of mapping of GHGs emission in the future years. Accordingly, a set of tools and record keeping procedure will be developed for improving the quality of data collection for the next year carbon footprint studies.



CHAPTER- 5 WASTE MANAGEMENT

5.1 About Waste:

Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed of, which can pose risks to the environment and to public health. Waste management is important for an eco-friendly campus. In college different types of wastes are generated, its collection and management are very challenging.

Solid waste can be divided into three categories: bio-degradable, non-biodegradable and hazardous waste. A bio-degradable waste includes food wastes, canteen waste, wastes from toilets etc. Non-biodegradable wastes include what is usually thrown away in homes and schools such as plastic, tins and glass bottles etc. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals, acids and petrol.

Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated in the college. Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Different types of waste generated in the College Campus.

Sr. No.	Types of Waste	Particulars
1	Solid wastes	Damaged furniture, paper waste, paper plates, food wastes etc
2	Plastic waste	Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc
3	E-Waste	Computers, electrical and electronic parts etc
4	Glass waste	Broken glass wares from the labs etc
5	Chemical wastes	Laboratory waste etc
6	Bio-medical Waste	Sanitary Napkin etc



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2.2 Waste management Practices adopted by the College

College has a different type of waste generated like paper, Plastic, dust and wet waste. The college provided small dustbin to every classroom, office, laboratories, staff room, ladies common room etc and collect the waste material at the end of the day. The waste (Especially dry material) is collected in a big dustbin which are provided at every floor and the next day collected municipal corporation for further processing.

wet waste generated in home economics laboratory as well as waste from agriculture (Tree and plants waste) used in vermicompost unit is one of the best tool to decompose wet waste by earthworm. It will provide several social economics of environmental benefits to the society by way of producing chemical free . safe nutritive and healthy protective (rich in minerals and antioxidants) food for people .

Vermicompost is a sustainable tool for environment, equilibria vermicompost significantly affect the plant growth and hence vermicompost generated from this unit is used in botanical garden and ornamental garden as additional food .





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Figure:- Vermicompost plant in college premises

Recommendation:

Adopted 5 Bin Waste Collection System for collect different type of waste generated in college premises.



Figure: - 5 Dust Bin waste collection System



CHAPTER- 6 RECOMMENDATIONS AND SUGGESTIONS

6.1 QR Code System and Biodiversity:

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, College can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.

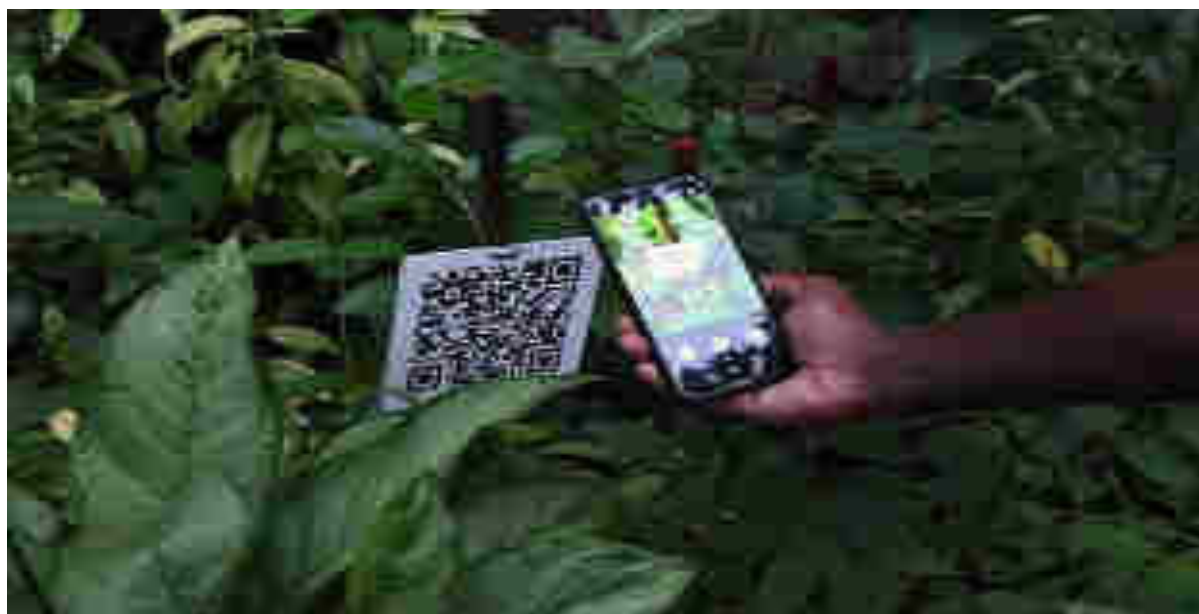


Figure :- QR Code System for plants

These codes can give students all the information they need to know about the tree — from its scientific name to its medicinal value. They only need to put their smart-phones to use. QR codes to them, making it easier for everybody to learn about a plant or a tree at the tip of their fingers,” If any app generating a QR code, which is available for free on the online stores, can be used to avail the information of the trees.

📌 Eco-restoration programmes

- Frame long-term eco-restoration programmes for replacing exotic Acacia plantations with indigenous trees and need of the hour is to frame a holistic campus development plan.



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6.2 Other Suggestions

Some of the very important suggestions are:-

- Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.
- Increase recycling education on campus.
- Increase Awareness of Environmentally Sustainable Development in college campus.
- Practice Institutional Ecology- Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.
- Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development.
- Collaborate for Interdisciplinary Approaches- To develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.
- Increase reduce, reuse, and recycle education on campus.
- Develop a butterfly garden that arouses appreciation towards flora and fauna diversity.
- Name all the trees and plants (Plant DNA barcodes) with its common name and scientific name.
- Arrange training programmes on environmental management system and nature conservation.
- Renovation of cooking system in the canteen to save gas by installation solar water heater system with heat pump.
- Establish a procurement policy that is energy saving and eco-friendly.