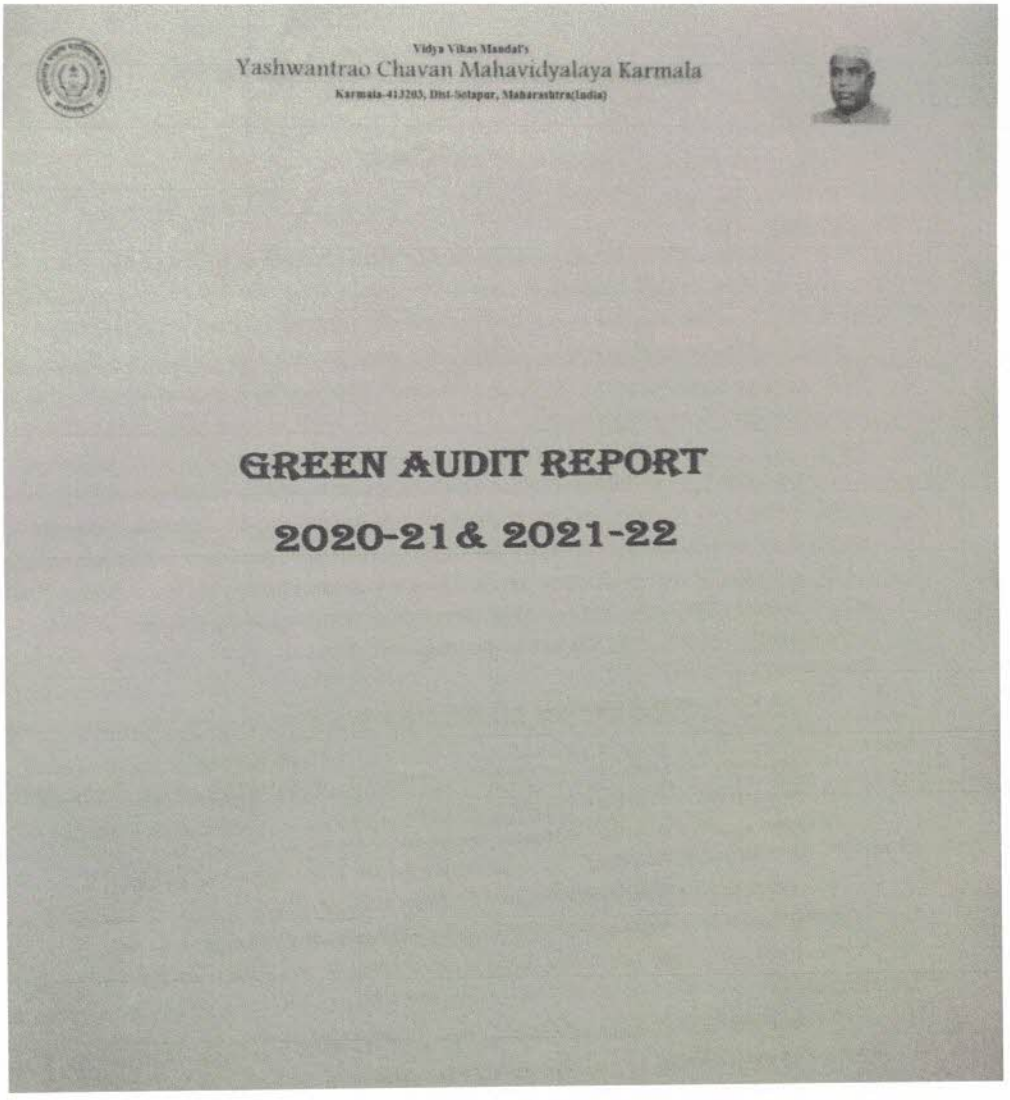
7.1.3. Quality audits on environment and energy regularly undertaken by the institution

Sr. No.	Content
1	**Green Audit/Environment Audit**
2	**Energy Audit**
3	**Clean and Green campus**
4	**Beyond the Campus environment promotion and sustainability activities**

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

1. GREEN AUDIT



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KARMALA

Principal
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Vidya Vikas Mandal's

Yashwantrao Chavan Mahavidyalaya Karmala

Karmala-413203, Dist.Solapur, Maharashtra(India)

Affiliated

to

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

About Institute:

Yashvantrao Chavan College, Karmala, Tal Karmala, Dist Solapur had two faculties viz. Arts and Commerce since beginning. Later on the science wing was started in the academic year 2017-18 as a special case due to ever growing demand from the students in the rural region. The college is affiliated to Punyashlok Ahilyadevi Holkar Solapur University. The college offers undergraduate courses namely, B.A., B.Com, both Marathi medium and B. Sc. in English medium along with certificate courses.

Goal

Yashwantrao Chavan Mahavidyalaya, Karmala, aspire to establish itself as an institution of excellence thriving on the tri-pillars of inclusiveness, integrity and innovation. Equipped with advanced infrastructure and empowered with ingenuous minds it shall seek to design customized curricula to meet the growing challenges in higher education. In doing so, the college will offer diverse communities with rich academic experience and open the gates of knowledge and research for all, through successful global partnerships.

Objectives

- To cater education to the students from different socio-economic strata irrespective of caste, creed and class.
- To contribute significantly for overall personality development of students through academic, sports, cultural and extension activities.
- To impart a perfect blend of traditional and modern education
- To inculcate moral values and nurture a compassionate and progressive attitude.
- To sensitize the students for environmental issues and preservation of natural resources so as to contribute to economic growth of the nation in a sustainable manner.

Mission

"Our mission is to create and develop "Modern" youth as responsible citizen with multi-dimensional personalities by inculcating among students a blending of cultural awareness, compassionate and progressive attitude, scientific insights and time-tested traditional values".

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Preface

The concept of 'GREEN AUDIT-2020-21 & 2021-22 was put forth by Hon'ble Shri Vilas Ramchandra Ghumare Secretary, Vidya Vikas Mandal's Yashawantrao Chavan Mahavidyalaya, Karmala was established in 1966. He is involved in tree plantation programmes for the last 30 years. Being visionary and committed to upliftment of weaker section of society he is always proactive for environmental conservation. He has demonstrated how eco-friendly campus can provide healthy and comfortable atmosphere for the college going students. It was his idea to carry out green audit for the campus of Yashawantrao Chavan Mahavidyalaya, Karmala. We are happy to shoulder the responsibility.

Green audit of a college campus aims at understanding the present environmental status and to find out ways to internalize environmental issues which are well felt externally. It is also an attempt to develop initiative of all the stakeholders, viz. management, Principal, staff, students and parents to develop campus which ensures clean and green environment for learners. We also hope that such kind of exercise can develop environmental awareness among the families of students and in turn villages. With this vision in mind attempt has been made to document the green status of the campus adopting proper tools and methodology. For this, aspects like landscaping and plantation, solid waste management, recycling of waste water, conservation of energy, water conservation, naturally rainwater harvesting and minimum usage of paper, E-Waste collection, segregation of wet and dry waste, etc. have been considered for our observations.

We are happy to note that the college exhibits almost all the aspects of "Green Campus" with participation of stakeholders in true sense of the term. It is well reflected in the activities like tree plantation with good phyto-diversity, organic farming, natural rain water harvesting, waste water management, green building, use of renewable resources etc.

Besides this college, the Vidya Vikas Mandal's management runs Yashawantaro Chavan Mahavidyalaya and Namdeorao Jagtap Adhayapak Vidyalaya in Karmala.

The college was started initially with Arts and Commerce streams by enrolling 200 students with the aims i) to impart value – based education, embodying socio-cultural and commercial training in order to achieve all around development of the students personality, and ii) to encourage the students participation in corporate life and to make them self-confident and self-reliant.

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It is a grant-in-aid two-faculty. Now College is affiliated to *Punyashlok Ahilyadevi Holkar* Solapur University, Solapur. It obtained permanent affiliation of the University for the UG programmes in 2002, and has been recognized by the UGC under 12 (B) and 2 (f) of the UGC Act in 1991 and 1996 respectively.

The changes in the fee structure are followed strictly as per the university and government rules and the fee structure is printed with the prospectus. The financial matters are authenticated through the university and the government auditors.

In all its quality effort in higher education the institution has built up a mechanism to monitor the performance of the institution by seeking feedback from the students, teaching, non-teaching staff, prominent alumni and stake holders.

Yashwantrao Chavan Mahavidyalaya, Karmala is a very popular college in the state of Maharashtra. It is one of the leading Colleges in Arts, Humanities and Social Sciences and Business Finance and Commerce. It is located in Karmala, Maharashtra. UG, PG courses taught & Research Centre are in this institution.

Acknowledgements:

We are very much thankful to Principal Dr. Laxman Patil and IQAC coordinator Dr. Abhimanyu Mane. NAAC think tank team for motivating us and giving us the opportunity for energy audit. We would like to express our sincere thanks to Dr. Abhimanyu Mane, Head Department of English, and faculty members of English and all respected staff, faculty members and students those who have taken part in this audit survey for each department, labs, offices etc. of Yashvantrao Chavan Arts, Science and Commerce Mahavidyalaya, Karmala. We tried our best to present this energy report as per requirements of college and our expertise work.

Bio-Geo Consultancy

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GREEN AUDIT REPORT- 2020-21 & 2021-22

Principal's Message

I am pleased to offer my message on the occasion of the publication of Report of 'Green Audit'. Yashwantrao Chavan College and being a part of the *Vidya Vikas Mandal* is truly a blessing. It is my honor and privilege to be writing to you as your principal. This is the place where an education movement was motivated by Vilas Ramchandra Ghumare sowed the seeds of education in the soil of Karmala.

I am pleased to deliver my message on the occasion of the release of the 'Green Audit' report. Working at Yashwantrao Chavan College and being a part of the *Vidya Vikas Mandal* is truly a blessing. It is my honor and privilege to write to you as your Principal.

I am aware that only infrastructure and impressive building do not create a desirable education. The powerful manpower with brilliant professional skills and sound knowledge of global world makes collage perfect. Our teachers play an important role in creating ideal and unique students with scientific, democratic, spiritual and universal principles. Elevated moral values and positive sense of globalization should be of prime concern in our college. Our many students and faculty have been presenting papers in nationalized and International conferences, and many have published their effort in research journals of reputation. Our quality in academics and connected area has been acknowledged by **NAAC** committee.

Most importantly, environmental values inculcated in our students help to create environmental concern in the villages around the college. We also try to train our students to identify environmental opportunities with the activities like organic farming, fish farming, fodder development, optimal use of water for agriculture, etc.

Green Audit is useful for all of us to understand environmental resources in scientific way. The report would be useful for us for future development. Efforts made by our institution for the protection of environment and biodiversity conservation have been well appreciated in the audit. It encourages us for further strengthening environment of our campus in particular and the areas around in general. I express my heartfelt thanks to expert members of team carrying out Green Audit of our campus.

Dr. L. B. Patil
Principal

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Green Audit Report

{2020-21 & 2021-22}

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About Karmala Town:

The municipality was established at Karmala in 1867 and is now governed under the Maharashtra Municipalities Act, 1965. It covers an area of 11.9 square miles (31 km^2). The municipal council is composed of 15 members with two seats being reserved for the scheduled castes. Karmala is the headquarters of the taluka bearing the same name. It is located about 12 miles (19 km) to the north of the Jeur railway station and about 82 miles (132 km) from the Solapur railway station. It has an average elevation of 562 metres (1,844 ft). The Karmala city is divided into 17 wards for which elections are held every 5 years. The Karmala Municipal Council has population of 23,199 of which 11,905 are males while 11,294 are females as per report released by Census India 2011. The Karmala fort was developed by **Rao Rambha Nimbalkar** when the zone was given upon him as his jagir.

Country	India
State	Maharashtra
District	Solapur
Government Body	Municipal Council
Elevation	562 m (1,844 ft)
Latitude & Longitude	18.42° N 75.20° E.
Total Population (2011)	23199
Official Languages	Marathi
Time zone	UTC+5:30 (IST)
PIN	413203
Telephone code	912182
Vehicle registration	MH-45

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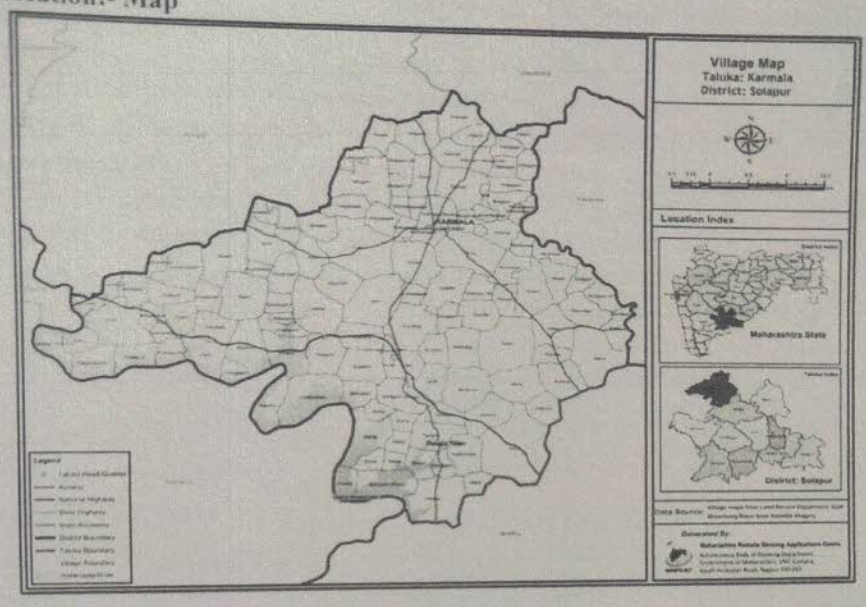
Location:- Map



Climate:

Karmala Weather Forecast. Providing a local hourly Karmala weather forecast of rain, sun, wind, humidity and temperature. The Long-range 12 day forecast also includes detail for Karmala weather today. Live weather reports from Karmala weather stations and weather warnings that include risk of thunder, high UV index and forecast gales. See the links below the 12-day Karmala weather forecast table for other cities and towns nearby along with weather conditions for local outdoor activities. Karmala is 559 m above sea level and located at 18.42° N 75.20° E. Karmala has a population of 22809. Local time in Karmala is 8:24:47 AM IST.

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Meteorology / Climate

Climate data for Karmala

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °C (°F)	36.7 (98.1)	39.7 (103.5)	43.8 (10.8)	44.1 (111.4)	45.0 (113)	42.9 (109.2)	37.5 (99.5)	16.2 (97.2)	37.6 (97.9)	38.9 (102.1)	37.3 (99.1)	36.1 (97)	45.0 (113)
Average high °C (°F)	32.0 (89.6)	33.9 (93.1)	37.7 (99.9)	39.8 (103.7)	40.2 (104)	34.0 (93.2)	29.9 (85.8)	29.5 (85.1)	30.9 (87.62)	33.3 (91.9)	31.7 (89.1)	30.1 (86.2)	33.6 (92.5)
Daily mean °C (°F)	21.9 (71.4)	24.0 (75.2)	26.8 (80.2)	30.1 (86.2)	31.7 (89.1)	29.2 (84.6)	27.4 (81.3)	26.5 (79.7)	27.6 (81.7)	26.9 (80.4)	24.1 (75.4)	22.5 (72.5)	26.6 (79.9)
Average low °C (°F)	12.1 (53.8)	13.5 (56.3)	17.9 (64.2)	21.7 (71.1)	23.3 (73.9)	24.0 (75.2)	23.8 (74.9)	24.1 (75.4)	21.9 (71.4)	20.0 (68)	15.2 (59.4)	13.7 (56.7)	19.3 (66.7)
Record low °C (°F)	4.7 (40.7)	5.1 (41.2)	8.9 (48)	12.6 (54.7)	15.0 (59)	19.5 (67.1)	20.3 (68.5)	19.7 (67.5)	15.6 (60.1)	11.9 (53.4)	6.4 (43.5)	5.9 (42.6)	4.7 (40.7)
Precipitation mm (inches)	0 (0)	0.1 (0.004)	1.2 (0.05)	9.9 (0.39)	20.4 (0.8)	75.8 (2.98)	99.4 (3.91)	65.7 (2.59)	62.1 (2.44)	42.6 (1.68)	14.8 (0.58)	2.1 (0.58)	394.1 (15.52)
Avg. precipitation days	0.0	0.01	0.05	0.3	1.1	5.9	9.5	7.6	5.3	2.1	1.0	0.2	33.06
% humidity	55	49	32	33	46	72	77	83	79	66	56	57	58.75
Mean monthly sunshine hours	290.0	281.1	304.8	312.5	327.7	172.0	118.1	105.8	189.7	265.6	295.1	299.3	2,961.7

Source #1: Temperature and Precipitation: IMD 1990-2015)

Source #2: Sun hours and Humidity: NOAA (1991–2007)

Demographics:

Karmala is a Taluka located in Solapur district of Maharashtra. It is one of 11 Talukas of Solapur district. There are 123 villages and 1 towns in Karmala Taluka. As per the Census India 2011, Karmala Taluka has 53719 households, population of 254489 of which 132700 are males and 121789 are females. The population of children between age 0-6 is 31054 which is 12.2% of total population. The sex-ratio of Karmala Taluka is around 918 compared to 929 which is average of Maharashtra state. The literacy rate of Karmala Taluka is 66.3% out of which 73.22% males are literate and 58.77% females are literate. The total area of Karmala is 1593.01 sq.km with population density of 160 per sq.km. Out of total population, 90.88% of population lives in Urban area and 9.12% lives in Rural area. There are 13.84% Scheduled Caste (SC) and 1.7% Scheduled Tribe (ST) of total population in Karmala Taluka.

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Karmala Population Facts

Number of Households	53719
Population	254489
Male Population	132700 (52.14%)
Female Population	121789 (47.86%)
Children Population	31054
Area	1593.01 km2
Population density/km2	160
Sex-ratio	918
Literacy	66.3%
Male Literacy	73.22%
Female Literacy	58.77%
Scheduled Tribes (ST) %	1.7%
Scheduled Caste (SC) %	13.84%

Introduction:

Yashvantrao Chavan Mahavidyalaya, Karmala established in 1966 leads 26 acres area of campus, where with senior college there is administrative building, canteen, Secondary and higher secondary school. About 3000 population provided with facility of water, canteen, toilet, electricity.

Before establishment of this campus it was bare land, after construction of various building we develop greenery in surrounding area of the building, with keeping view to creates eco-friendly environment in this campus we are aware about sustainable use of this campus, we undertake activities like landscaping and plantation, processing and reuse of solid waste of the plant debris and canteen, recycling of the waste water, rainwater harvesting, energy conservation, e-waste management keep the environment of the campus clean and fresh enhance educational environment.

Green audit is defined as it is ultimately about corporate responsibility. It is the process of assessing the environment impact of an organization, process, project, product etc. An examination of what a company is doing to prevent its business activities from harming the environment.

We are making green audit of campus and facilities to keep environment of college campus eco-friendly, we conduct following activities

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Objectives of the study:

The main objective of the green audit to promote the environment management and conservation in the college campus. The purpose of the audit is to identify, quantify, describe and priorities frame work of environment sustainability in compliance with the applicable regulations, policies and standards.

The main objectives of carrying out Green audit are.

- To introduce and aware students regarding importance of our surrounding environment and its protection.
- To secure the environment and minimize the threats posed to human health by analyzing the pattern and extent of resource use on the campus
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost.
- To bring out a status report on In order to perform Green audit, the methodology environment due to the activities of the institution.
- To find the innovative ideas to minimize the future threats to the environment.

Methodology:

Included different tools such as survey of campus plant, physical inspections of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. The study covered the following areas to summaries the present status of environment management in the campus;

- Water management
- Energy conservation
- Waste management
- E-waste management
- Green area management

Landscaping and Plantation:

Important Aim and objective of plantation are as below

Aim:

1) To develop campus eco-friendly

2) To creates healthy environment for learning

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Objectives:

1) Plants provides natural oxygen
2) Plants keeps surrounding environment clean and cool
3) Plants protect from dust which are collected on foliage
4) Trapping of dust on leaves creates dust free environment in building.
5) Increase aesthetic view of the campus
6) Plants are important it creates natural habitat for birds and animal.

Landscaping:

Landscape is an art to develop specific space of land into green with aesthetic view commonly called as 'beautification'. Earlier our college campus land was a bare land. After establishment of the Yashvantrao Chavan Mahavidyalaya, Karmala, in year 1966 landscaping is done, 26 acres of land has various buildings such as hostel, canteen, school, senior college, junior college toilet building, staff quarters and ladies hostel surrounding area of the building were bare land of rocks because of water scarcity it was very difficult to made campus green, it was disaster for us because without plants how this campus can breath after 16 years of efforts now our project developed as one of the Eco-friendly campus whole campus is divided for specific type of plantation now in our campus green by planting of 35 species of plants. Students of earn & learn, N.S.S., Nature Club, Department of Botany and non-teaching staff take care of the campus and keep the campus green and clean.

Plantation:

Aims and Objectives:

1) To create healthy environment
2) To develop the natural habitat in the campus
3) Increase oxygen level of the campus.
4) Keep surrounding environment cool.
5) Plants give shade.
6) Plant gives natural habitat for birds and animals including micro-organism

Plantation of plant sapling had been implemented as per location, different variety of plans are planted in various places with keeping aesthetic view and type of soil texture.

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Table -I : Location wise Survey of College Campus plants

Sr.no	Location	No of Plants
1	College Porch-1 (Inside)	10
2	College Porch-2 (Outside)	128
3	College front side (Including Right & Left)	18
4	Botanical Garden(Including front side)	275
5	Canteen Surrounding	08
6	Indoor hall Surrounding	49
7	Play Ground	148
8	Staff Parking	03
9	Girls Parking	08
10	Boys Parking	12
11	College main road (Both side)	41
12	Main gate right patch	00
13	Main gate entrance	02
14	Washroom side	03
15	College back side	260
16	D. Ed. College surrounding area	29
	Total no. of plants	994

Table –II : Habit Survey Of Campus Plants

Sr.No	Habit	Number
1	Trees	579
2	Shrubs	246
3	Herbs	152
4	Climbers	17

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Table –III : Number of Plants Present in Campus

Sr. No.	Botanical Name	Common Name	Family	Habit	No. of Plants
1	Aeglemarmelos (L) Curreia	Bel	Rutaceae	Tree	2
2	Albizialebbeck (L) Benth	Rain Tree	Miomsaceae	Tree	4
3	Aloe vera (L.) Burm.f.	Korphad	Liliaceae	Herb	13
4	Alstoniascholaris (L.) R. Br.	Satptparni	Apocynaceae	Tree	10
5	Annonasquamosa L.	Shitaphal	Annonaceae	Tree	11
6	Azadirachataindica L	Kaduneem	Meliaceae	Tree	33
7	Bauhoniapurpuria L.	Bauhonia, Apta	Fabaaceae	Tree	4
8	Bombaxcieba L.	Katesavar(Silk cotton)	Malvaceae	Tree	2
9	Bougainvillea spectabilisWilld.	KagdiPhul	Nyctaginaceae	Climber	15
10	Buteamonosperma	Palas	Fabaceae	Tree	1
11	Cascabelathevetia L. (Lippold)	Bitti	Apocynaceae	Shrub	4
12	Cassia fistula Linn	Bahawa	Fabeaceae	Tree	11
13	Combretumindicum (L.)	Madhumalti	Combretaceae	Climper	1
14	Cycas revolute Thunb.	Cycas	Cycadaceae	Tree	47
15	CyperusalternifloliusRottb.	Umbrella palm	Cyperaceae	Herb	2
16	DalbergiasisooRoxb.	Shisham	Fabaceae	Tree	1
17	*Delonixregia*Rafin	Gulmohor	Caesalpiniaceae	Tree	25
18	Durantaerecta L.	Golden duranta	Verbenaceae	Shrub	170
19	Eucalyptus globulusLabill.	Neelgiri	Myrtaceae	Tree	11
20	Ficusbengalensis L.	Banyan Tree	Moraceae	Tree	32
21	Ficusbenjamina L.	Ficus tree	Moraceae	Tree	1
22	Ficus elastic Roxb.exHornem.	Rubber Tree	Moraceae	Tree	59
23	FicusracemosaRoxb.	Umber/Audumber	Moraceae	Tree	19
24	GliricidiasepiumKunth	Giripishpa	Fabaceae	Tree	61
25	Hyophorbelagenicaulis(L.H.Bailey) H.E.Moore	Bottle palm	Arecaceae	Tree	3
26	Jacaranda mimosifolia D. Don	Neelgulmohar	Bignonaceae	Tree	16
27	Leucaenaleucocephala(Lam.) de Wit	Subabul	Mimosaceae	Tree	15
28	Mangiferaindica L.	Mango	Anacardiaceae	Tree	2
29	Micheliachampaca (L.) Baill. ex Pierre.	Champa	Magnoliaceae	Tree	2
30	Moringaoleifera Lam	Shevga	Moringaceae	Tree	7
31	Murrayakoenigii (L.) Spreng	Curry Leaf	Rutaceae	Tree	3
32	Nyctanthes arbor-tristis L.	Parijat	Oleaceae	Shrub	3

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33	Phyllanthusemblica L.	Avala	Phyllanthaceae	Tree	2
34	Pithecellobiumdulce (Roxb.) Benth	Vilayti Chinch	Fabaceae	Tree	13
35	Plumeriarubra L.	Red Chaffa	Apocyanaceae	Tree	2
36	Plumeria obtuse L.	White Chaffa	Apocyanaceae	Tree	1
37	Pongamiapinnata (L.) Pierre	Karanj	Fabeaceae	Tree	14
38	Psidiumguajava L.	Peru	Mrytaceae	Tree	1
39	Ricinuscommunis L.	Erand	Euphorbiaceae	Shrub	5
40	Saracaashoka L	Ashoka	Fabaceae	Tree	13
41	Santalum album L.	Chandan	Santalaceae	Tree	5
42	Sennasiamea (Lam.) Irwin et Barneby	Kashid	Caesalpinaceae	Tree	5
43	SpathodeacampanulataP. Beauv.	Fountain tree	Bignoniaceae	Tree	13
44	Syzygiumcumini (L.)	Jamun	Euphorbiaceae	Tree	2
45	Tabernaemontanadivaricata (L.) R.Br. ex Roem. &Schult.	Tagar	Apocynaceae	Shrub	1
46	Tamarindusindica L.	Chinch	Fabaceae	Tree	27
47	TerminaliacatappaL.	Indian Badam	Combretaceae	Tree	2
48	Thespesiapopulnea(L.) Sol. ex Corrêa	Ran bhendi	Malvaceae	Tree	1
49	Thujaoccidentalis L.	Morpankhi	Cupressaceae	Tree	19
50	Ziziphus jujube Mill	Ber / Bor	Rhamnaceae	Tree	3
				Varieties 50	719

Table- IV : List of Some Medicinal Plants in the College campus

Sr. No	Botanical name	Local name	Part used	Uses
1	Aegle marmelos (L) Curreia	Bel	Leaves, Fruits	Fever, Eye diseases, Diarrhea, skin diseases, cough.
2	Aloe vera (L.) Burm.f.	Korphad	Leaves	Digestive system disorders, skin care, Inflammation
3	*Azadirachata indica* L.	Kadu-Neem	Leaves , seeds	Expectorant cure digestive germs & worms
4	Bixa orellana L.	Shandri	Seeds, Leaves	Laxative, cardiotonic, hypotensive, expectorant, and antibiotic. Used in pharmaceutical, cosmetic, textile, and especially food industries
5	Butea monosperma	Palas	Leaves, Flowers	leprosy, strangury, gout, skin diseases, thirst sensation; flower juice is used to treat eye diseases
6	*Cassia fistula* Linn.	Bahava/ Amaltash	Whole Plant	Leaves used for erysipelas, malaria, rheumatism, and ulcers, buds used for biliousness, constipation, fever,

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20	Tinospora cordifloia Miers	Gulvel	Stem, Leaves	an anti-inflammatory, anti-diabetic, and even as an anti-cancer agent.
21	*Vitex negundo* L.	Nirgudi	Leaves, Seeds, Roots.	Relieves muscle aches and joint pains, to treat excessive vaginal discharge, edema, skin diseases, pruritus, helminthiasis, rheumatism and puerperal fever.

Table - V : Theme Localities

Sr. No.	Theme	Location	Plants
1	Oxygen rich	Main road, College campus	Tulsi, Pimpal, Neem
2	Beauty	Botanical Garden, Front of college	Ficus, Croton, Cynadon, Palm,Cycas.
3	Medicinal Plants	Botanical garden	Bahava, Adulsa,Tulsi, Palas, Tetu, Korpad,
4	Shade	Botanical garden, college road, Ladies Hostel, Girls Parking, Canteen front side.	Chinch, Avala, Ficus, Sena,, Bitti, Gulmohar
5	Avenue	College road and way to botanical garden, Hostel	Bitti, Gulmohar, Nilgiri, False Ashok, Neem,
6	Palms	College front, Indoor Stadium front side.	Areca palm, fish-tail palm
7	Gymnosperms	Botanical garden	Cycas, Thuja, X-mas tree,

1. Solid Waste Management:

The college activities have very less impact on the environment as the college is very responsive of generating less waste and recycling it and by passing it through the scientific ways that enable the used material to be recycled ensuring that less natural resources are used. Waste generated on the campus is segregated as a solid waste, liquid waste, and e-waste.

For the collection of regular solid waste (Dry and Wet) garbage bins are kept at different places on the campus and in laboratories. The collected solid waste is picked up by Municipal Corporation, Karmala time to time for proper disposal and recycling. Waste from plants is also collected and used in Vermicomposting units for preparation of organic compost.

2. Liquid waste Management:

Liquid waste are the Liquids such as wastewater, fats, oils or grease (FOG), used oil, liquids, solids, gases, or sludges and hazardous household liquids. These liquids that is hazardous or potentially harmful to human health or the environment. They can also be

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Aim and objective:

E-waste is the future coming environmental problem will create hazards to our environment, it is non-degradable waste can pollute water, soil and air.

With keeping this view we are aware about destructive material mainly metal, insulating materials present in the e-waste like CD, scrap, mobile like devices, computer waste like wiring, metals, and unused pen drive.

Items and Their Toxic Components:

Sr. No.	Item	Components
1	Refrigerator	CFC/HC/Rubber
2	PC & Laptops	CRT, Fluorescent Lamp, Copper
3	Television	Metal, CRT, Plastic BRF
4	Washing Machine	Rubber, Electric Wire, Metal & Motor
5	Computer Batteries	Cadmium
6	Capacitor & Transformer	PBC
7	Printer Circuit Board	Lead & Cadmium
8	Cathode Ray Tubes	Lead Oxide & Cd
9	Cable Insulation / Coating	PVC
10	Switches & Flat Screen Monitor	Mercury

Activity / Observations:-

With keeping view to minimize the pollution created through the e-waste, we have carried out the scientific disposal of e-waste by two ways

1) Collection of e- waste in e- waste box
2) Reuse of the component of unused electronic devices.

Collection of E-Waste:

We have installed e- waste box it the Electronics laboratory, and our students, staff put unused electronic devices and component like CD, PD, memory card, sim card, etc.it also collected and few of reuse and remaining e-waste is given to e-waste scrap purchaser for proper reuse and disposal of such e-waste. Awareness is done by electronic subject faculty members to class to class by telling about e-waste and its impact on environment.

This activity runs throughout the year and e-waste is collected in e-waste box, On 10 December 2021 in Campaign of e- waste collection, total 2 kg of e- waste was collected and out

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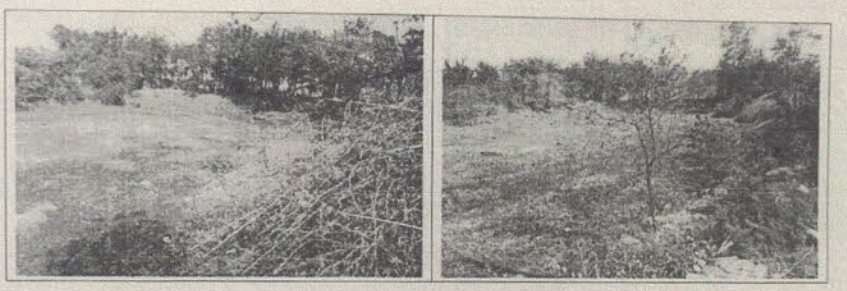
of this some was reused for preparation of best from waste activity. And some items were repaired.

Recommendations:-

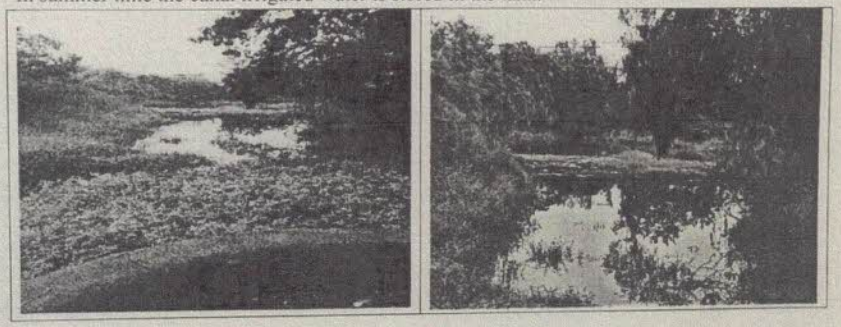
1. Always purchase recycled resources where these are both suitable and available.
2. Reuse devices after repairing.

Construction of tanks and bunds:

The College has artificial built-up tank (approximate 50 lakh liters) in which the campus rainwater harvesting is done in the rainy season.



Maintenance of water bodies and distribution system in the campus:
In summer time the canal irrigated water is stored in the tank.



Recommendations:-

1. Increase the Pits for rain water harvesting.
2. Construct the underground tank for the storage of rain water harvest.

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Energy Conservation:

Aim:

1) To minimize the use of natural resources
2) Conservation of energy

Objective:

1) To save non-conventionally produce electric energy
2) Use of conventional source of energy
3) Minimization of electric expenses

Activity/ Observations:

Energy conservation is the burning problem of the country, there is pressure due to great demand for electricity and shortage of this non-conventional source of energy.

We have implemented energy conservation programs with three ways

1) Use of LED tube in the college building
2) Use of solar water heater
3) Solar power plant for electricity production

Environment Awareness Program

- **Aim and objective:**

To plan, organize and implement programs like landscape and plantation, water management & conservation, and rain water harvesting. To provide education that prepares students for leadership and social responsibility teaching them to think and communicate effectively and develop a global awareness.

To introduce environmental education programs for strengthen the existing ecological and environment related training infrastructure.

- To provide consultancy to other institutions and organizations in for the establishment of similar institutions with a view to bringing sustainability.
- To organizer training programs for vocation list of environmental careers.
- To strengthen Global Environmental Education Programs for standardization of greening- activities.
- To introduce environmental education programs in strengthen the existing ecological and environment related training infrastructure.
- To provide environmental education that prepares students for leadership and social responsibility by teaching them to think and communicate effectively and develop global environmental awareness and sensitivity.

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List of Activities with Dates:

Sr. N0.	ACTIVITY NAME	Date
1.	Watershed Management Visit	21/10/2022
2.	Disaster Management Program	05/06/2021
3.	Nursery Visit	26/8/2022
4.	Tree Plantation	22/8/2022
5.	Ozone Day	1609/2022
6.	*Nala* Bunding Visit	23/03/2022
7.	Disaster Management 1 Day Program	20/03/2022
8.	Tree Plantation by Department of Geography	21/10/2022
9.	Visit to Organic Farming	24/03/2022
10.	Environmental Awareness	05/06/2021
11.	Importance and Conservation of Plants	22/08/2022
12.	Tree Plantation by NSS students	22/08/2022
13.	NSS other some activities	18/11/2022

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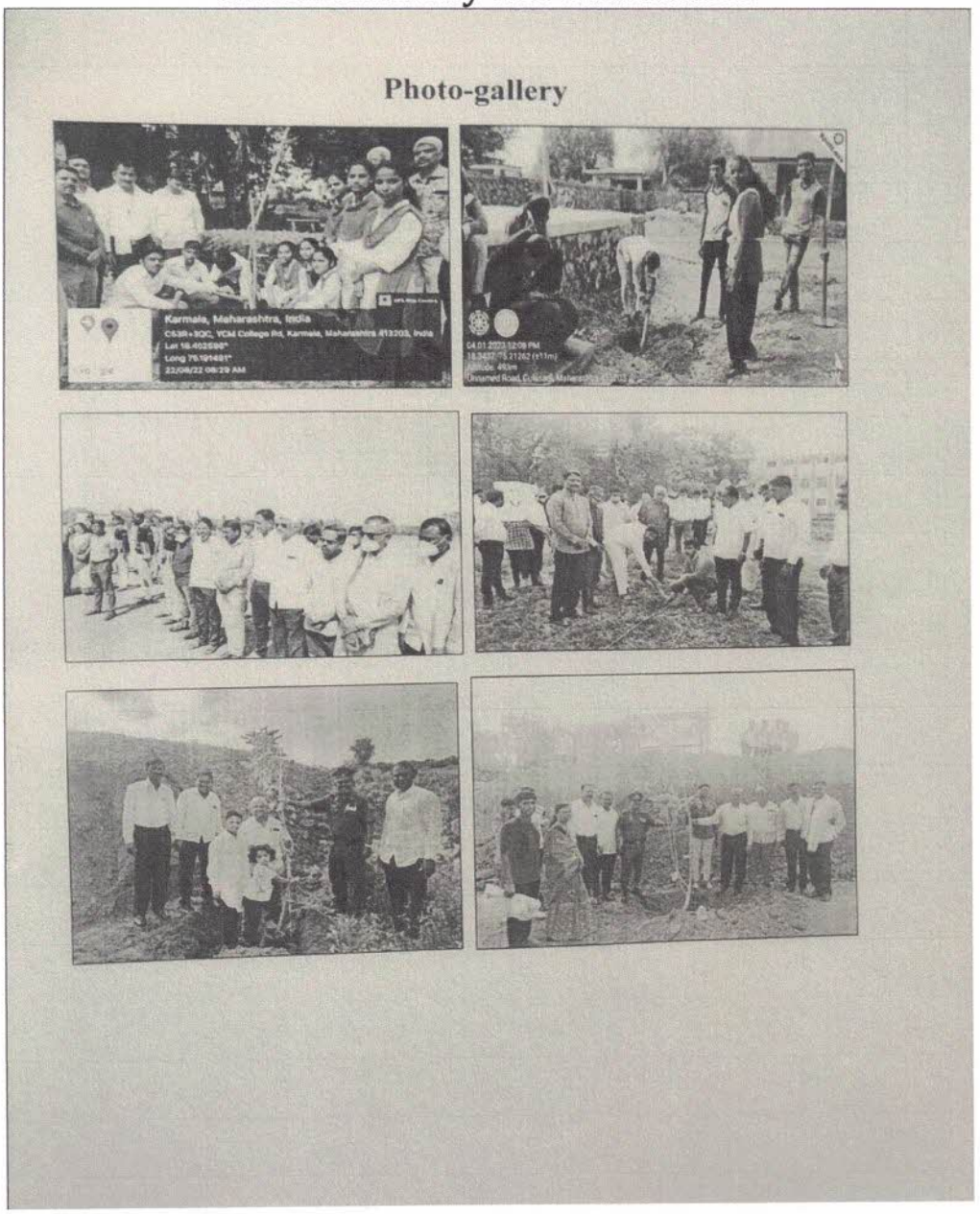

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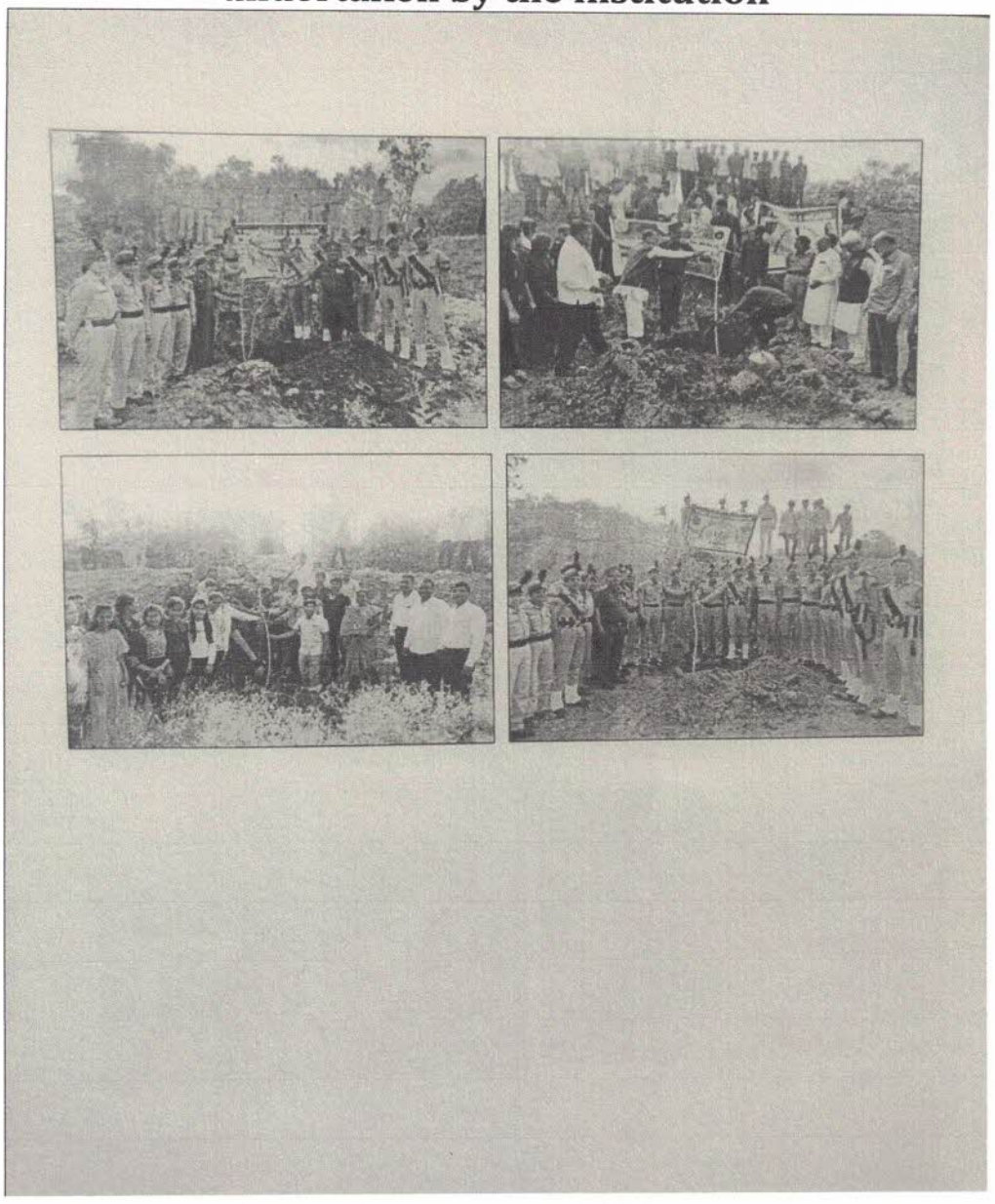

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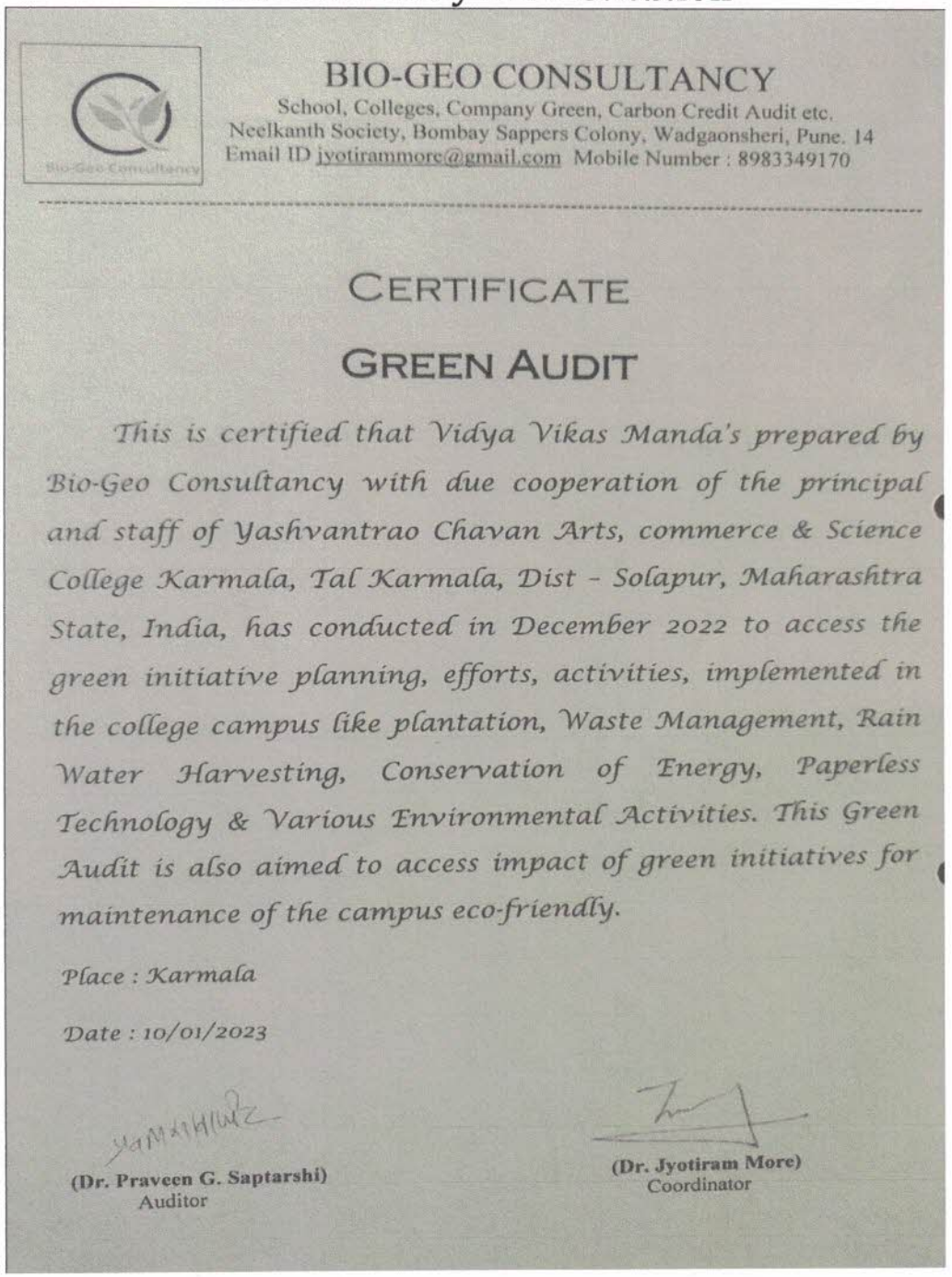

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Neelkanth Society, Bombay Sappers Colony, Wadgaonsheri, Pune. 14
Email ID jyotirammore@gmail.com Mobile Number : 8983349170

CERTIFICATE

GREEN AUDIT

This is certified that Vidya Vikas Manda's prepared by Bio-Geo Consultancy with due cooperation of the principal and staff of Yashvantrao Chavan Arts, commerce & Science College Karmala, Tal Karmala, Dist - Solapur, Maharashtra State, India, has conducted in December 2022 to access the green initiative planning, efforts, activities, implemented in the college campus like plantation, Waste Management, Rain Water Harvesting, Conservation of Energy, Paperless Technology & Various Environmental Activities. This Green Audit is also aimed to access impact of green initiatives for maintenance of the campus eco-friendly.

Place : Karmala

Date : 10/01/2023

(Dr. Praveen G. Saptarshi)
Auditor

(Dr. Jyotiram More)
Coordinator

Co-Ordinator
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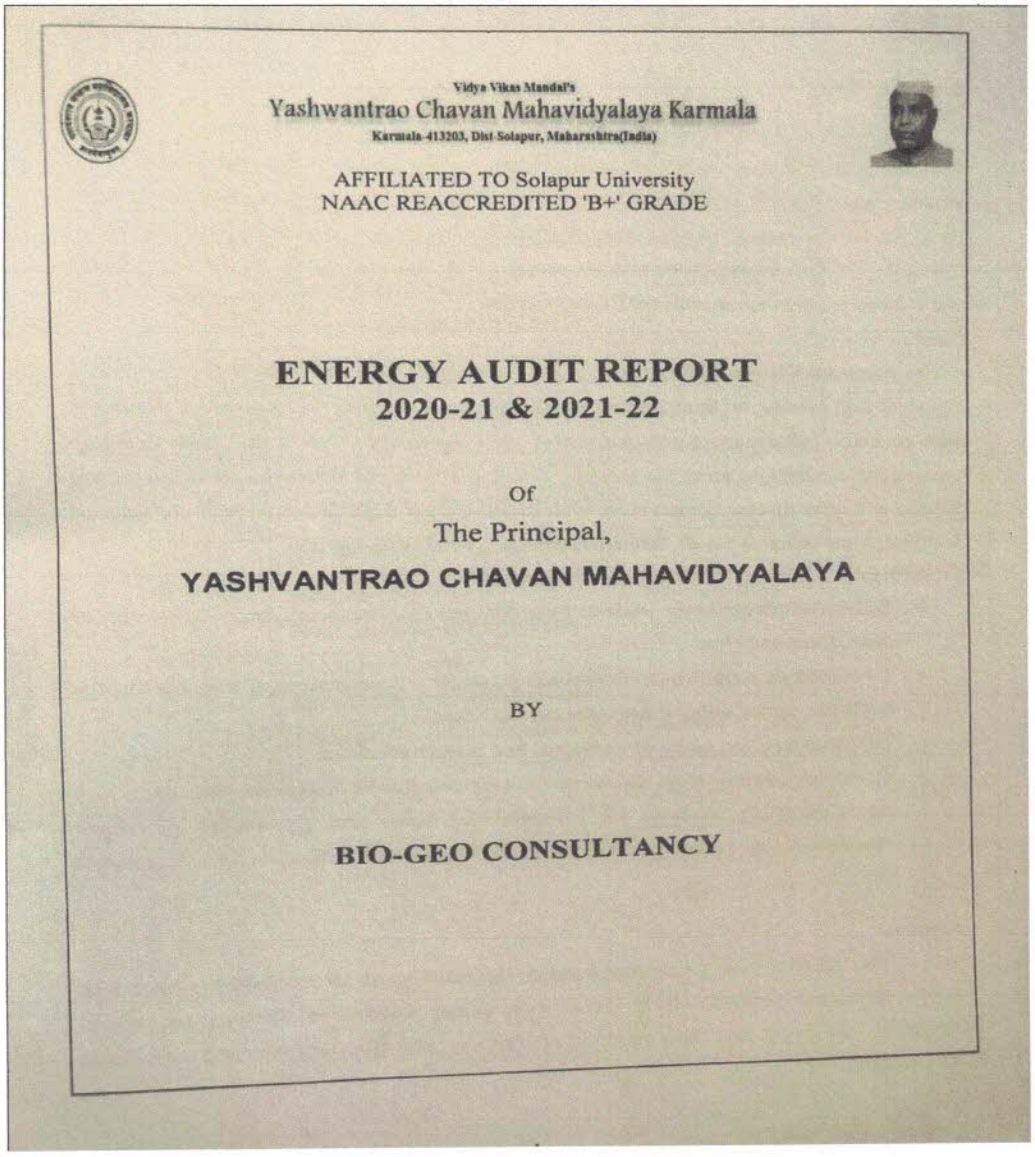
2. ENERGY AUDIT



Vidya Vikas Mandal's
Yashwantrao Chavan Mahavidyalaya Karmala
Karmala-413203, Dist-Solapur, Maharashtra(India)

AFFILIATED TO Solapur University
NAAC REACCREDITED 'B+' GRADE

ENERGY AUDIT REPORT
2020-21 & 2021-22

Of
The Principal,
YASHVANTRAO CHAVAN MAHAVIDYALAYA

BY

BIO-GEO CONSULTANCY

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Vidya Vikas Mandal's

Yashwantrao Chavan Mahavidyalaya Karmala

Karmala-413203, Dist-Solapur, Maharashtra(India)

About Institute:

Yashvantrao Chavan College, Karmala, Tal Karmala, Dist Solapur had two faculties viz. Arts and Commerce since beginning. Later on the science wing was started in the academic year 2017-18 as a special case due to ever growing demand from the students in the rural region. The college is affiliated to Punyashlok Ahilyadevi Holkar Solapur University. The college offersundergraduate courses namely, B.A., B.Com, and B. Sc. in both Marathi and English medium along with certificate courses.

Goal

Yashwantrao Chavan Mahavidyalaya, Karmala, aspire to establish itself as an institution of excellence thriving on the tri-pillars of inclusiveness, integrity and innovation. Equipped with advanced infrastructure and empowered with ingenuous minds it shall seek to design customized curricula to meet the growing challenges in higher education. In doing so, the college will offer diverse communities with rich academic experience and open the gates of knowledge and research for all, through successful global partnerships.

Objectives

- To cater education to the students from different socio-economic strata irrespective of caste, creed and class.
- To contribute significantly for overall personality development of students through academic, sports, cultural and extension activities.
- To impart a perfect blend of traditional and modern education
- To inculcate moral values and nurture a compassionate and progressive attitude.
- To sensitize the students for environmental issues and preservation of natural resources so as to contribute to economic growth of the nation in a sustainable manner.

Mission

"Our mission is to create and develop "Modern" youth as responsible citizen with multi-dimensional personalities by inculcating among students a blending of cultural awareness, compassionate and progressive attitude, scientific insights and time-tested traditional values".

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Preface

Energy Audit is the effort made to reduce the consumption of energy by using energy efficient devices and services along with behavioral aspect. It has also inquired about convenience of the concerned persons for achieving energy competence of the campus. The undergraduate students Department of Geography under the guidance faculty have completed the necessary survey work for energy audit. The data regarding requirement of energy devices and their duration in each classroom, laboratory, room and the open spaces have been collected. The work was carried out by observing number of tubes, fans, refrigerators, A.C.s, electronic instruments, etc. in each room. Thus, component wise and area specific consumption of electricity have been quantified. This was the basis for designing strategic plan to reduce electricity consumption.

We really appreciate the effort put by management for creating awareness of energy usage among the staff and students, willingness for investing for renewable energy such as solar energy and making good framework of rules energy saving. We appreciate enthusiasm exhibited by the management of the college during the process of energy audit. The vision of the institution, 'Green campus and save our green nature' is being followed in true sense of the term. We really appreciate to develop in house good quality weather station in the college.

Acknowledgements:

We are very much thankful to Principal Dr. Laxman Patil and IQAC coordinator, NAAC think tank team for motivating us and giving us the opportunity for energy audit. We would like to express our sincere thanks to Dr. Abhimanyu Mane, Head Department of English, faculty members of English and all respected staff, faculty members and students those who have taken part in this audit survey for each department, labs, offices etc. of Yashvantrao Chavan Arts, Science and Commerce College, Karmala. We tried our best to present this energy report as per requirements of college and our expertise work.

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CHAPTER NO – 1

Introduction

1.1 Introduction:

Energy crisis is one of major problem in exiting world where demand of energy is increasing rapidly. Energy is prime focus due to rapid growth and development of technology. Proper utilization of Energy is one of the major aspects of any developing country. Today the need of energy has increased greatly in order to meet the demand of ever increasing consumption of it. This energy crisis problem will be solved through Energy conservation and use of energy efficient equipment.

1.2 Objective of Energy Audit

The Energy Audit provides the 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's in major areas.
- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.
- 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.
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The energy audit provides the vital information base for overall energy conservation Programme covering essentially energy utilization analysis and evaluation of energy conservation measures.

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1.3 Need for Energy Audit

- The primary objective of Energy Audit is to determine ways to reduce energy consumption per unit of product output or to lower operating costs.
- To minimize the cost of energy
- To minimize the operational cost
- To minimize the cost for repair & reconstruction
- To increase the quality of environment that contribute to increased work productivity
- Preventive measure for energy wastage
- Maintenance and quality control programmes
- Helps to understand more about the ways energy and fuel are used in any industry.
- Help in identifying the areas where waste can occur & where scope for improvement exists.
- Positive orientation to cost reduction.
- Preventive maintenance & quality control programs
- Check the variation of energy cost.
- Reliability of energy supply
- Identify energy conservation techniques.
- Finding the feasible solution for energy wastage
- Energy auditing provide 'benchmark' for managing energy in the organization

1.4 Present Scenario of College campus

The college has three storied building on a piece of 26 acres of land. There is a beautiful garden in the front area. The college has 20 classrooms and 5 well equipped science laboratories and Geography research lab. The college has computer labs for science. In addition to this Gymkhana hall, Girls common room, Boys common room, Auditorium for various function, well-furnished office, Principal's Room, Library with reading room, YCMOU center. Every head of department have separate cabin.

1.5 General Information:

Bio-Geo Consultancy conducted the energy audit at Vidya Vikas Manda's Yashvantrao Chavan Arts, commerce & Science College Karmala, Tal Karmala, Dist – Solapur 413203 in December 2022. The purpose of the energy audit was to address the status of the Electrical systems, Energy uses, performance assessment of various facilities like A.C. system, Fans, lighting system, Printers, Pumps etc.

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General Information about the Yashvantrao Chavan Arts, commerce & Science College		
Sr. No.	**Items**	**Details**
1	Location	Yashvantrao Chavan College, Karmal, Tal Karmala, Dist Solapur. 413203
2	Establishment Year	1966
3	Campus Size	26Acre
4	Affiliation	Punyashlok Ahilyadevi Holkar Solapur University
5	Departments	11
6	Faculties	16
7	No. of Courses	255
8	Mode of Education	Co-Education
9	Official Website	http://www.ycmkarmala.org/

Bio-Geo Consultancy has observed certain shortcomings in energy systems and their uses. Some of the techno-commercially implementable solutions to improve system efficiency, performance of different equipment and safety level are purposed in this report.

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CHAPTER NO - 2

Energy Audit Methodology and Scope

2.1 What is Energy Audit?

Energy today has become a key factor in deciding the product cost at micro level as well as in dictating the inflation and the debt burden at the macro level. Energy cost is a significant factor in economic activity at par with factors of production like capital, land and labor. Same is the case for educational institutes. More importantly, colleges and schools in the rural areas face the challenges of power cut and frequently interrupted power supply causing lack of internet facilities in turn putting obstacles in on-line classes, disturbing prompt communication with university and schedule of laboratory work. At times even smooth conduct of exams becomes trouble some. Any educational institute cannot be held responsible for the issues of shortage of power in the country, particularly, in rural areas. However, it becomes the responsibility of a good institute to find the ways and means to address these externalities. The college has decided to do so and hence the present audit is meaningful for strategizing conservation of electricity on one hand and improving the share of green energy on the other. Energy conservation measures essentially mean using less energy for the same level of activity. Energy Audit attempts to balance the total energy inputs with its use and serves to identify all the energy streams in the systems and quantifies energy consumption according to its discrete function. Energy Audit helps in energy cost optimization, pollution control and safety. It also suggests the appropriate methods to improve the operating & maintenance practices of the system. It is instrumental in coping with the situation of variation in energy cost, availability, reliability of energy supply, decision on appropriate energy mix, decision for using improved energy efficient equipment, instrumentations and technology.

2.2 Energy Audit Methodologies

A. Data Collection

Data collection is very important step in energy audit. Data collection includes,

1. Relevant data like electricity bills for the year 2020-21 & 2021-22.
2. List of lighting load, fan, computer and air conditioner for each department.
3. Voltage, Current and Power are measured at each feeder.

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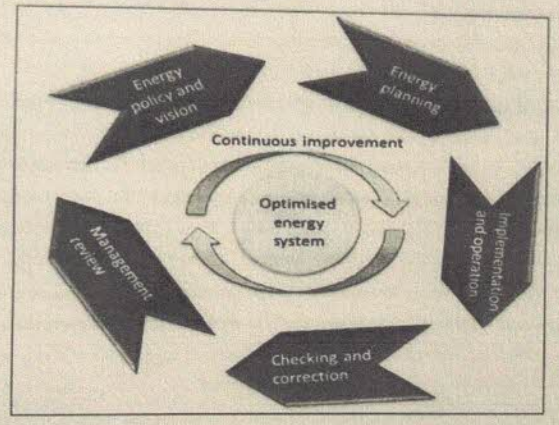
B. Data Analysis

Data analysis is next important step after data collection. The areas for implementation and energy conservation opportunities are identified.

C. Action Taken

Action taken report must be critically examined. It involves implementation of strategies based on measurement of actual energy consumption. In this methodology different areas of energy consumption are identified.

2.3 Energy Management Cycle Diagram:



2.4 Methodology

Board guidelines indicating the methodology for such an energy audit is given below. Possible stages for interaction/conference are also indicated.

Phase-I

1. Collections of data on operational parameters, energy consumption both normal and electrical, coal and power quality etc., through a questionnaire.
2. Study the existing plant capacities and their performance to assess plant operations.
3. Study of the specific energy consumption (both thermal and electrical) department-wise and plant as a whole.

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4. Study of the power sources, distribution system and drive controls, load factor and efficiency of large motors (above 10 kW), process automations, plant illuminations etc.
5. Collection of requisite data and analysis and identification of specific areas with potential for conservation of thermal and electrical energy.
6. Field measurements of operational parameters and carrying out heat and mass balance.
7. Study of limitations, if any, in the optimal use of thermal and electrical energy.
8. Formulation of specific recommendations along with broad system concept for conservation of thermal and electrical energy.
9. Preparation of capital cost estimates and establishing techno-economic feasibility for recommended measures.
10. No investment and/or marginal investment for system improvements and optimization of operations.
11. Major investment due to incorporation of modern energy efficient equipment and up gradation of existing equipment.
12. Formulating tentative time schedule for implementation of the recommendation.
13. Undertaking broad cost benefit analysis in terms of savings in energy consumption per unit of production and pay-back period.

Phase-II

Follow-up with the industry on periodic basis to ascertain the level of implementation of recommendation and assist, if requiredd, in implementation of the measures to achieve energy efficiency.

2.5 Types of Energy Audit

A. Preliminary Energy Audit

The Preliminary Energy Audit focuses on the major energy suppliers and demands usually accounting for approximately 70% of total energy. It is essentially a preliminary data gathering and analysis effort. It uses only available data and is completed with limited diagnostic instruments. The PEA is conducted in a very short time frame i.e. 1-3 days during which the energy auditor relies on his experience together with all the relevant written, oral visual information that can lead to a quick diagnosis of the plant energy situation. The PEA focuses on the identification of obvious sources of energy wastage's. The typical out put of a PEA is a set of recommendations and immediate low cost action that can be taken up by the department head.

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B. Detailed Energy Audit

The detailed audit goes beyond quantitative estimates of costs and savings. It includes engineering recommendations and well-defined project, giving due priorities. Approximately 95% of all energy is accounted for during the detailed audit. The detailed energy audit is conducted after the preliminary energy audit. Sophisticated instrumentation including flow meter, flue gas analyzer and scanner are use of compute energy efficiency.

1. Review of Electricity Bills, Contract Demand and Power Factor: For the last one year, in which possibility will be explored for further reduction of contract demand and improvement of power factor

2. Electrical System Network: It would include detailed study of all the Transformer operations of various Ratings / Capacities, their operational pattern, Loading, No Load Losses, Power Factor Measurement on the Main Power Distribution Boards and scope for improvement if any. The study would also cover possible improvements in energy metering systems for better control and monitoring.

3. Study of Motors and Pumps Loading: Study of motors (above 10 kW) in terms of measurement of voltage (V), Current (I), Power (kW) and power factor and thereby suggesting measures for energy saving like reduction in size of motors or installation of energy saving device in the existing motors. Study of Pumps and their flow, thereby suggesting measures for energy saving like reduction in size of Motors and Pumps or installation of energy saving device in the existing motors / optimization of pumps.

4. Study of Air conditioning plant: w.r.t measurement of Specific Energy consumption i.e kW/TR of refrigeration, study of Refrigerant Compressors, Chilling Units, etc. Further, various measures would be suggested to improve its performance.

5. Cooling Tower: This would include detailed study of the operational performance of the cooling towers through measurements of temperature differential, air/water flow rate, to enable evaluate specific performance parameters like approach, effectiveness etc.

6. Performance Evaluation of Boilers: This includes detailed study of boiler efficiency, Thermal insulation survey and flue gas analysis.

7. Performance Evaluation of Turbines: This includes detailed study of Turbine efficiency, Waste heat recovery.

8. Performance Evaluation of Air Compressor: This includes detailed study of Air compressor system for finding its performance and specific energy consumption

9. Evaluation of Condenser performance: This includes detailed study of condenser performance and opportunities for waste heat recovery.

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10. Performance Evaluation of Burners: This includes detailed study on performance of Furnace / Burner, thermal insulation survey for finding its efficiency

11. Windows / Split Air Conditioners: Performance shall be evaluated as regards, their input power vis-a-vis TR capacity and performance will be compared to improve to the best in the category

12. Illumination: Study of the illumination system, LUX level in various areas, area lighting etc. and suggest measures for improvements and energy conservation opportunity wherever feasible.

13. DG Set: Study the operations of DG sets to evaluate their average cost of Power Generation, Specific Energy Generation and subsequently identify areas wherein energy savings could be achieved after analysing the operational practices etc. of the DG sets.

14. The entire recommendations would be backed up with techno-economic calculations including the estimated investments required for implementation of the suggested measures and simple payback period. Measurement would be made using appropriate instrumentation support for time lapse and continuous recording of the operational parameters.

15. Completion Period: We usually start the field data collection at site with in one and half months' time, from the date of receipt of work order and the draft energy audit report is submitted thereafter in 1 month time. Finalization of energy audit report is normally completed within 3 months. (After completion of the audit study, the findings and recommendations are discussed with the technical head and the final report with recommendations is submitted.

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2.6 List of Energy Audit Instruments

Sr. No	Name of the Instrument	Intended Use
1	Three Phase & Single Phase Power Analyser	Used to measure, record real time Power Consumption, analysis of electrical load, demand control, harmonics and transient. It is done without interrupting the connections.
2	Luxmeter	Used for measurement of illumination level
3	Digital Multimeter	Used for measurement of voltage. Current and resistance.
4	Non-Contact Tachometer	Used for measurement of speed of rotation equipment.
5	Thermo-hygrometer	Used for measurement of air velocity & humidification, ventilation, Air-conditioning and refrigeration systems etc. Also used for calculation of dew point to find out the heat being carried away by outgoing gases in industries. Where product drying requires hot air.
6	Anemometer	Used for measuring the flow and speed of Air in air conditioning
7	Digital Temperature & Humidity monitor	Used for measurement and monitoring of temperature and humidity
8	Digital Manometer	Used for measurement of differential pressure.

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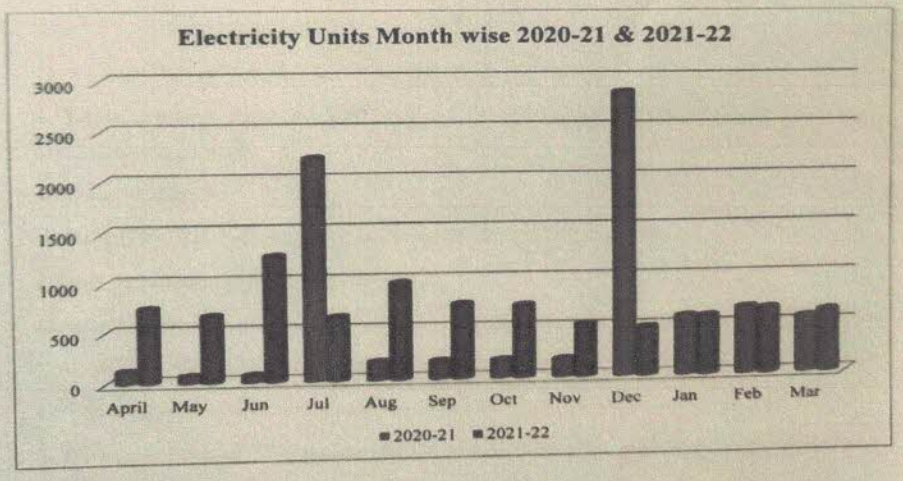
Chapter No. 3
Energy Use Profile

3.1 Electricity Units Month wise 2020-21 & 2021-22

Month	2020-21 Bill Units	2020-21 Bill Amount in Rs.	2021-22 Bill Units	2021-22 Bill Amount in Rs.
April	126	1345	754	8515
May	74	796	674	7544
Jun	74	796	1264	14211
Jul	2230	20925	649	7283
Aug	185	2476	983	10773
Sep	185	2476	763	8474
Oct	185	2476	743	8265
Nov	185	2476	536	7555
Dec	2870	31342	497	5695
Jan	611	7056	608	6855
Feb	686	7862	672	8086
Mar	581	6734	639	7615
Total	**7992**	**86761**	**8782**	**100870**
Average	**666**	**7230**	**732**	**8406**



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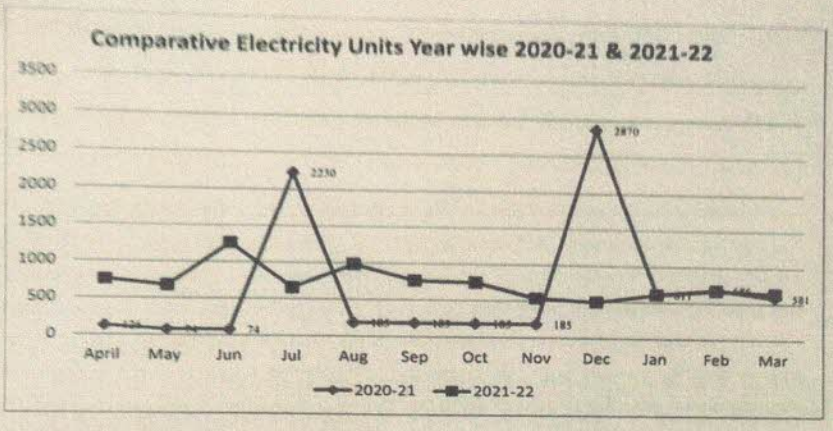

3.2 Executive Summary:

The objective of the audit was to study the energy consumption pattern of the facility, identify the areas where potential for energy/cost saving exists and prepare proposals for energy/cost saving along with investment and payback periods.

The salient observations and recommendations are given below.

1. Yashvantrao Chavan College, Karmal, Tal Karmala, Dist Solapur uses energy in the following forms:

a. From MSEDCL

b. Electricity SOLAR Grid connected solar plant (15.3kw)

c. High Speed Diesel Generator (HSDG)

Electrical energy is used for various applications, like: Computers, Lighting, Air-Conditioning, Fans Other Laboratory Equipment, Printers, Refrigerators, Xerox machines, CCTV, UPS, LCD Projector, Router system, Flood light, and Pumping motor etc.

2. The average cost of energy is around Rs. 666 & 732/- in 2020-21 & 2021-22 respectively.

3. The Specific Energy Consumption (SEC) is the ratio of energy required per square meter.

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In this case the SEC is evaluated as electrical units consumed per square meter of area. It is calculated as under for (Electricity): **0.21504 kWh/Sq.m.**

4. After the measurement and analysis, we propose herewith following Energy Efficiency Improvement measures.

Apart from the above suggestions, as a renewable energy and sustainability initiative, it is recommended to install 3kW roof top solar PV power plant which can save the 25% of annual electricity consumption of the college. Also, following suggestions are made for energy saving purpose: All computers have to be set for power save mode for switching off screen if not used for 05 minutes and hibernate if not used for morethan 60 minute. Students may be educated towards saving of electricity by displaying messages in the classroom and common public area for switching off lights, fans and computers when not required. Fans should be used only in the hot summer climate and has to be replaced by 5 STAR rated energy efficient fans to reduce consumption

3.3 Past Electricity Bills Analysis:

Electricity Consumption (2020-21 & 2021-22)

Monthly electricity consumption analysis

- The College has one single Phase connection. Following table givesthe detail of bills:
- Load Allowed:15KW
- Meter No. E 05316655341

Sr. No.	Meter No.	Load Allowed	Single/Three Phase
1	E 05316655341	15KW	Three Phase

- The average Electrical Energy Consumption per day in Academic year 2020-21 & 2021-22 is **21.90 & 24.06 KWH Units** respectively.
- Highest Electrical Energy consumption 2230 units in Jul 2020 & 2870 units in Dec 2020 units were recorded due to **Covid 19 Quarantine Centre.**

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- The average Electrical Energy Consumption per day **cost works out to be *Rs. 238/- & 276/-in the year of 2020-21 & 2021-22 respectively.***
- Monthly average consumption is **666 & 732** kWH amounting to Rs7230 & 8406/- *in the year of 2020-21 & 2021-22 respectively.*
- The yearly average electricity Units consumption is 7992 & 8728 kWH amounting to ***Rs. 86761/-* & Rs. 100870** year 2020-21 & 2021-22 respectively.
- The consumption pattern is shown above.

3.4 Summary Details:

From the above mentioned Electrical Energy Consumption Analysis, some options of energy saving or low energy consuming devices may be suggested. The college has accepted the suggestions made by the experts. Comparative analysis has proved that this initiative has saved power consumption.

3.5 Specific Energy Consumption:

Specific Energy Consumption (SEC) is defined as energy usage per unit production in any sector like agriculture, manufacturing, service, etc. Here, it is calculated as the ratio of total electricity consumption in kWh to total number of students of the college. The average yearly consumption of electricity is **666 kW & 732 KW** for the year 2020-21 & 2021-22 respectively. The student strength in the almost same year is 2021-22. Thus, SEC for the college is **6.38 kW** & 6.92 kw per student in 2020-21 & 2021-22 respectively. Also per student cost is Rs. 69.30 in 2020-21 & Rs. 79.50 in the year of 2021-22. This is certainly not so high as compared with other educational institutes under the Solapur University. By calculating SEC, we can crudely identify the factors of energy efficiency or inefficiency. The present report has identified the areas having further scope to reduce the consumption.

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Chapter No. 4

Conclusion and Action Plan

4.1 Conclusion:

The Power Factor is the ratio of electrical power consumed by various components used by the college to the same supplied by AC grid. If there is good efficient transportation and use of power through pumps, tubes, laboratory equipment, computers, backup systems, etc. PF would be 100%. However, any activity cannot be 100% efficient. By and large it ranges from 70 to 80%. It is useful calculation to understand whether loss of power is beyond the limit and immediate measures are warranted. Most utility bills are influenced by KVAR usage. A good Power Factor provides a better voltage, reducing the pressure on electrical distribution network, reducing cable heating, cable over loading and cable losses, reducing over loadings of control gears and switch-gears etc.

Whenever the average power factor over a billing cycle or a month, whichever is lower, of a High Tension consumer is below 90%, Penal charges shall be levied to the consumer at the rate of 2% (two %) of the amount of monthly energy bill (excluding of Demand Charges, FOCA, Electricity Duty and Regulatory Liability Charge etc.) For power factor of 0.99, the effective incentive will amount to 5% (five percent) reduction in the energy bill and for unity power factor the effective incentive will amount to 7% (seven percent) reduction in the energy bill. Here in case of the college under scrutiny PF is good enough and no penal charges have been levied in the year 2021-22. This is plus point observed in the audit process.

4.2 Energy Conservation Action Plan:

Following are the energy conservation action plan is possible as per the detailed energy audit. These energy conservation opportunities are of the type of minimum cost investment.

- Water management system must be in place. Reduction in water consumption by addressing leakages of taps and other miscellaneous utilities. Installation of flow meters which will help in reduction of water consumption.
- As per the survey of connected load in the campus approved electrical demand is too large. It is suggested to reduce maximum demand, if possible.
- Rainwater harvesting can be implemented for reducing pumping hours and ultimately for saves in electrical energy.
- Replacement of simple tubes & bulbs monitors with LED.

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- Display Sign boards at different eminent locations in the building to create awareness amongst staff and students
- Install solar street lights in the institute, mess and hostel campus.
- Replace old electric fans by energy efficient fans
- Small wind mills can be placed on institute and surrounding as institute location is away from population and sufficient wind velocity available.
- Electric distribution must be renovated and all safety features are required to consider. It is suggested to have firefighting system to be installed in the distribution room.

4.3 Department wise load consumption:

1) Principal Office/Cabin:

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	04	160	03	480
2	Fan	60	03	180	06	1080
3	PC	12	01	12	01	12
4	LED	33	01	33	05	165
5	Printer	200	01	200	01	200
6	CCTV	5	01	05	24	120
7	AC	55	No	00	00	00
8	Refrigerator	250	01	250	00	250
9	Inverter	10	01	10	24	240
10	Xerox	80	No	00	00	00

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2) Administration Office

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	05	200	06	1200
2	Fan	60	05	300	06	1800
3	PC	12	07	84	06	504
4	LED	33	No	00	00	00
5	Printer	200	05	1000	04	4000
6	CCTV	5	02	10	24	240
7	AC	55	No	00	00	00
8	Refrigerator	250	No	00	00	00
9	Inverter	10	01	10	24	240
10	Xerox	80	01	80	02	160

3. IQAC

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	02	80	02	160
2	Fan	60	01	60	02	120
3	PC	12	01	12	02	24
4	LED	33	00	00	00	00
5	Printer	200	01	200	½	100
6	CCTV	5	01	05	24	120
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

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4. Passage

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	06	240	05	1200
2	Fan	60	01	60	03	180
3	PC	12	No	00	00	00
4	LED	33	No	00	00	00
5	Printer	200	00	00	00	00
6	CCTV	5	03	15	24	36
7	AC	55	No	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Submersible Pump	3728.5	01	3728.5	01	3728.5

5. Gym

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	03	120	03	360
2	Fan	60	03	180	03	540
3	PC	12	01	12	½	06
4	LED	33	01	00	00	00
5	Printer	200	01	200	½	100
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

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6. Department of Marathi

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	01	40	02	80
2	Fan	60	01	60	02	120
3	PC	12	01	12	½	06
4	LED	33	00	00	00	00
5	Printer	200	00	00	00	00
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

7. Department of English

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	01	40	02	80
2	Fan	60	01	60	02	120
3	PC	12	01	12	½	06
4	LED	33	00	00	00	00
5	Printer	200	01	200	½	100
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

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8. Department of Hindi

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	01	40	02	80
2	Fan	60	01	60	02	120
3	PC	12	01	12	½	06
4	LED	33	00	00	00	00
5	Printer	200	01	200	½	100
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

9. Department of Economics

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	01	40	02	80
2	Fan	60	01	60	02	120
3	PC	12	01	12	½	06
4	LED	33	00	00	00	00
5	Printer	200	01	200	½	100
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

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Yashwantrao Chavan Mahavidyalaya,
Karmala,Tal. Karmala Dist. Solapur

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Karmala, Dist. Solapur.

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

12. **Department of Chemistry**

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	05	200	02	400
2	Fan	60	04	240	02	480
3	PC	12	00	00	00	00
4	LED	33	00	00	00	00
5	Printer	200	00	00	00	00
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

13. **Department of Physics**

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	05	200	02	400
2	Fan	60	04	240	02	480
3	PC	12	00	00	00	00
4	LED	33	00	00	00	00
5	Printer	200	00	00	00	00
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

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

16. **Department of Zoology**

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	05	200	02	400
2	Fan	60	03	180	02	360
3	PC	12	00	00	00	00
4	LED	33	00	00	00	00
5	Printer	200	00	00	00	00
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

17. **Department of .....**

Sr. No.	Name of Appliance	Power Rating (Watt)	Quantity	Power Consumption (Watt)	Usage per Day Hr.	Power Consumption/day (Watt)
A	B	C	D	E = C X D	F	G = E X F
1	FTL	40	02	80	02	160
2	Fan	60	02	120	02	240
3	PC	12	01	12	½	06
4	LED	33	00	00	00	00
5	Printer	200	01	200	½	100
6	CCTV	5	00	00	00	00
7	AC	55	00	00	00	00
8	Refrigerator	250	00	00	00	00
9	Inverter	10	00	00	00	00
10	Xerox	80	00	00	00	00

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4.4 Abbreviations:

AVR	: Automatic Voltage Regulator (electricity)
CFL	: Compact Fluorescent Lamp
FTL	: Fluorescent Tube Lamp
kVA	: kilo Volt Ampere
kVAr	: kilo Volt Ampere reactive
kW	: kilo Watt
kWp	:kilo Watt peak
kWh	: kilo Watt hour (Unit of Electricity)
LED	: Light Emitting Diode
LT	: Low Tension
PF	: Power Factor
MEDA	: Maharashtra Energy Development Agency
MSEDCL	: Maharashtra State Electricity Distribution Company Limited
Solar PV	: Solar Photo Voltaic

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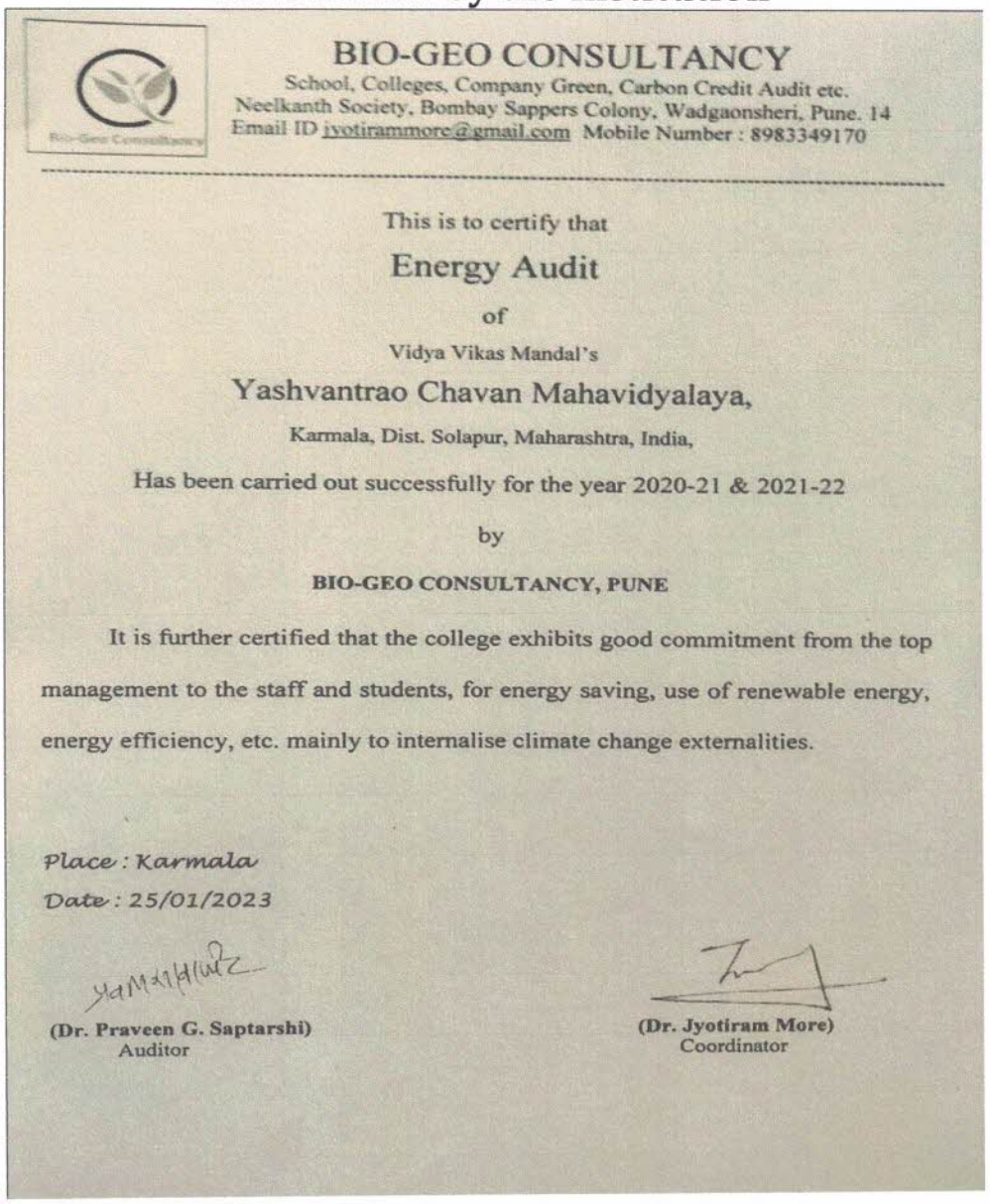

BIO-GEO CONSULTANCY

School, Colleges, Company Green, Carbon Credit Audit etc.
Neelkanth Society, Bombay Sappers Colony, Wadgaonsheri, Pune. 14
Email ID jyotirammore@gmail.com Mobile Number : 8983349170

This is to certify that

Energy Audit

of

Vidya Vikas Mandal's

Yashvantrao Chavan Mahavidyalaya,

Karmala, Dist. Solapur, Maharashtra, India,

Has been carried out successfully for the year 2020-21 & 2021-22

by

BIO-GEO CONSULTANCY, PUNE

It is further certified that the college exhibits good commitment from the top management to the staff and students, for energy saving, use of renewable energy, energy efficiency, etc. mainly to internalise climate change externalities.

Place : Karmala
Date : 25/01/2023

(Dr. Praveen G. Saptarshi)
Auditor

(Dr. Jyotiram More)
Coordinator

Co-Ordinator
IQAC
Yashwantrao Chavan Mahavidyalaya,
Karmala,Tal. Karmala Dist. Solapur

YASHWANTRAO CHAVAN MAHAVIDYALAYA
KARMALA

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Karmala, Dist. Solapur.

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

3. CLEAN AND GREEN CAMPUS INITIATIVES

No Garbage, No Plastic and Green Campus helps us to create an Eco friendly atmosphere in the college which boost the educational scenario of the college. Yashwantrao Chavan Mahavidyalaya NSS and college students' staffs take part in clean and green campus. Campus beautification committee has been appointed for the supervision of this initiative.

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KARMALA

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Karmala, Dist. Solapur.

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

Wall Paper and Poster Presentation

In order to maintain hygiene in the college campus Yashwantrao Chavan Mahavidyalaya, Karmala run activities of maintaining a clean college environment which sets a good example amongst the students.

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Karmala, Dist. Solapur.

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A Clean and Green college campus is a place where environment friendly practices and education combine to promote sustainability in the campus and the objective of the mission is to implement the approach and attitude towards sustainable education by creating a healthy atmosphere

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KARMALA

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Karmala, Dist. Solapur.

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

4. BEYOND THE CAMPUS ENVIRONMENT PROMOTION AND SUSTAINABILITY ACTIVITIES

Yashwantrao Chavan Mahavidyalaya, Karmala students and teachers takes a drive in the near by villages every year for Tree Plantation to combat many environmental issues like deforestation, erosion of soil, desertification in semi-arid areas, global warming and hence enhancing the beauty and balance of the environment. Trees absorb harmful gases and emit oxygen resulting in an increase in oxygen supply. Rakshabandhan is celebrated by tying Rakhi to the tree.

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Construction Of Toilet (Sauchlaya) And Cleaning The Drainage Line By NSS Student Of Yashwantrao Chavan Mahavidyalaya, Karmala

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Karmala, Dist. Solapur.

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

NSS Department Along With Solapur District Administration Working For Health And Hygiene In Pandharpur Vari (Swachbharat Abhiyan)

पंढरपूर येथे महास्वच्छता अभियान महाविद्यालयाचा सहभाग (निर्मल वारी , हरित वारी अभियान)

पाणी फौंडेशन आयोजित पदर्शन पाहण्यासाठी तहसील कार्यालय करमाळा येथे स्वयंसेवक

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

NSS department conducts Health, Hygiene and clean surrounding campaign in slum areas in karmala town and near by villages. Importance of clean surroundings keeping the environment clean is important to being healthy. Many disease-causing germs exist in dirty environments, such as the ones that cause diarrhea and worm infections. This means that many diseases can be prevented through good personal hygiene, and by keeping the environment clean.

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