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GREEN AND CLEAN CAMPUS COLLEGE OF ENGINEERING AND TECHNOLOGY, AKOLA

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Abstract: There is an inseparable bond between man and nature. For man, there cannot be an existence removed from nature. However, because of man's thoughtless actions, equilibrium in nature is getting disturbed and the pulse of human life is becoming erratic. A Green Campus is a place where environmental friendly practices and education combine together to promote sustainable and eco-friendly practices in the campus. The *Green Campus Concept* offers an Institution the opportunity to take the lead in redefining its Environmental culture and developing new paradigms by creating sustainable solutions to environmental, social and economic needs of the mankind. Greening the campus envisage sweeping away wasteful inefficiencies and using conventional sources of energies for its daily power needs, appropriate disposal handling and effective reuse & recycling program for sustainability. Strategies applied regarding Green and Clean campus are discussed in this paper.

Keywords: Climatic design, sustainability, energy efficiency.



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INTRODUCTION

A Green Campus is a Cleaner, Safer and Healthier Place to Live and Work with an Environment conducive to Learning & foster a culture of self-sustainability to make the entire campus environmental friendly.

We have planned a Blue Print to implement green campus initiatives. These strategies are being incorporated into the process right from the stage of Institutional Campus Planning with the aim of developing a clean and green campus.

We are striving hard to develop our Institutions on a self –sustainable basis in the areas of power, water and cleanliness.

We have taken it up as a Mission to create awareness by active participation of the faculty, staff and students by contributing collectively to develop an eco-friendly sustainable campus. This initiation by our Institute has been instrumental in disseminating the concept of eco-friendly culture to the community and region.

Through Green Campus Initiatives we wish to develop our campus as a Living Laboratory for Innovation. In nutshell, Green Campus is an Education Community with optimum land use, environmental planning and resource management i.e., improving energy efficiency, conserving resources, enhancing environmental quality including habitat preservation, healthy living environment, use of renewable energy and management of wastes, water recycling etc

OUR ACTION PLAN

1. OUR SOCIETY

Ours is the second Largest Education Society established by Dr. Panjabrao alias Bhausaheb Deshmukh Bhausaheb's mission –education to the downtrodden Our Shri Shivaji Education Society, Amravati is a premier educational institution of Central India with branches in all the districts of Vidarbha in Maharashtra. It is registered as a Public Charitable Trust (R.N. F/89)(founded in 1931-32) . Its founder President was the late Dr. Panjabrao alias Bhausaheb Deshmukh who established various schools, colleges, hostels and other teaching and technical institutions and devoted all his energy for strengthening and enlarging the activities of the Shri Shivaji Education Society, Amravati.

The Society was registered in December 1932. In 1958, it had one primary school, seven middle schools and eight colleges. Today it runs 24 senior colleges 54 Jr. colleges, 75 middle schools, 35 hostels mainly in the region of Vidarbha but also in other parts of the state. The educational institutions cover areas like agriculture, arts, bio-technology, computers, education, physical education, engineering, horticulture, information technology, law, medicine, micro-biology and the pure sciences. It also runs a Polytechnic for boys and girls at Amravati

Along with other members, Bhausaheb devoted himself to educate the people by establishing school and colleges far and wide in the Vidarbha. The Society was awarded the Dr. Babasaheb Ambedkar 'Dalit Mitra' Award in 1993-94 by the Govt. of Maharashtra. In the year 1999-2000 the Society was awarded the 'Gadge Maharaj Memorial Award, on 5th September, 2000 the Govt. of Maharashtra declared the Society as the "Best Administered Society" in the state and bestowed upon it a cash award of Rs. 1 lakh. In its citation, the State Government formally recognized the seminal contribution made by the Society in the field of education and cultural advancement. We are proud of our Legacy.

2. OUR INSTITUTE

Ours is the pioneer Institute imparting Technical Education in our region since its inception 1983. Our College of Engineering & Technology, Akola is central India's premier multi disciplinary Engineering institute engaged in education, applied research, training and consultancy services which focuses clearly on Engineering

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Nearest Aerodrum	SHIVANI, AKOLA.

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3. OUR CAMPUS - Area – 9.73 Acres

Regional setting and connectivity

College Campus is situated on National Highway No.6, at about 13 km from Bus Stand, 15 km from Railway station and 6 km From Shivani Aero drum. Easily accessible by Private Vehicles. It is surrounded by farms on East and west sides, on north National Highway No. 6

Topography-

Our college campus is surrounded by agricultural land on east, west and south side. Nala is flowing on south side which is full of water 3 months of year i.e. in Monsoon. It is having pollution free Atmosphere, different types of flora and fauna.

Economic Base of Campus – It is Educational Institute.

Campus Design - We ourselves as an initiative have developed our premises under Dr. Bhausaheb Deshmukh Research Cell.

A) Details of initiatives already taken by Administration for promoting Green Campus

1) PLANNING AND DESIGNING OF CAMPUS

Optimum land use- planning of campus is compact planning with multiplexing of spaces e.g. Barrier free studios that can be used as exhibition spaces. Studios are equipped with furniture that is space efficient. We have provided built in cupboards in studios in Architecture dept. Building, for students equipments. Walls of Studios are constructed with rat trap bond so as to protect from harsh sun rays in summer.

In computer Department courses are carried out in two shifts hence optimum use of functional spaces is carried out.

We have provided ramps and toilets for physically handicapped persons.

In order to admit more light and ventilation a fully glazed steel casement windows are provided which admit 100% natural light and comfortable air circulation.

The workplaces are arranged to take advantage of natural light and ventilation from windows.

2) LANDSCAPING

-Taking in to consideration the hot and dry climate of Akola we have provided ground covers in the form of lawns in overall campus to reduce heat gain and to create a microclimate. On the periphery of entire campus the existing trees are preserved and in addition to that number of trees has been planted in entire campus forming the green belt, which acts as a buffer zone for sound and heat. Such kind of tree plantation will reduce carbon percentage and increase oxygen level. This creates a healthy and pollution free environment.

Court yard in Architecture department is provided with sitting tiers with reused flooring material in combination with lawns and beautiful flowerbeds.

Every year the staff and students are involved in tree plantation. Up till now numbers of trees has been planted in College as well as Akola city.

The campus is having 5,000 numbers of trees including small plants, medium, big trees, belt of bamboo tree and two gardens which have made the campus environment fresh and eco-friendly.

NSS unit is also carrying out tree plantation as regular activity in campus and nearby villages during NSS winter camps.

Faculty Staff and students are encouraged to plant trees inside and outside the campus on special occasions.

3) FENESTRATION AND SHADING-

In entire campus all the building blocks with sunken windows are provided which prevent harsh sunrays and rain. Maximum use of north light is used. Sufficient numbers of doors and windows are provided. Deciduous trees are planted near building blocks which gives protection from harsh sun rays.

4) BUILDING MATERIAL AND CONSTRUCTION TECHNIQUES.

Locally available materials are used. Walls of Studios are constructed with rat trap bond so as to protect from harsh sun rays in summer. Verandahs are provided so as to protect from sun. Collage building is painted in light colour so as to radiate maximum heat.

5) INITIATIVES BY USING OF ENERGY EFFICIENT APPLIENCES-

Energy audit is conducted for saving of electrical power.

Resistive based fan regulators are replaced by solid state devices based regulators which reduce losses in the electrical power also electronic ballasts are used to control power.

Replacing old light systems by energy efficient Compact Fluorescent Lamps (CFL) tubes and bulbs. The faculty, staff and students takes care of switching off lights, fans and other electrical devices to avoid wastage of energy when they are not in use.

Single switch is used to switch off classroom, laboratory power supply for fans and light points. The workplaces are arranged to take advantage of natural light and ventilation from windows.

Energy awareness campaigns have been carried out for the student, faculty and staff members. Placards, notice boards have been used for creating awareness about power saving and safety.

6) WASTE MANAGEMENT-Everyday all the academic buildings and other surrounding area in the campus are cleaned by sweepers and they separate out waste and dispose accordingly.

Classrooms and studios are provided with dustbins which are prepared by students by reusing other materials.

Composting-

With the vision to produce fertilizer with the campus using the waste generated in the campus, the waste compost plant is installed and operated by department of civil engineering in college campus; Waste excluding polythene generated in the campus is converted in to compost by using PDKV culture.

The waste mainly generated being a teaching institute is used papers along with other organic waste like leaves and garden residues. Initially all the organic and inorganic waste is separated so that organic waste can be put for composting.

After 4 to 6 turnings in the period of four month, the fertilizer is obtained (approximately quantity of 20 sags of 50 kg). The efficiency obtained on volumetric basis is 111kg / cu-m / four months. Similarly another lot is obtained in the interval of four months.

Other waste materials are also used in construction i.e. **Recycling** is done.

E-WASTE MANAGEMENT

Out-dated and low-end e-components are being used for demonstration. E.g. CRO, Function Generator like these electronics equipments have been used as demonstration models in respective laboratories.

The major e-waste such as out of use instruments / equipment, CRTs, Printers, Computers, Electronics gadgets, circuits, kits have been written off and then it is sold out to buyers by auctioning.

All the miscellaneous e-waste such as CDs, batteries, fluorescent bulbs, PCBs and electronic items are collected from every department and office, and delivered for safe disposal.

Useful parts of electronic gadgets like resistors, capacitors, inductors, diodes, transistors, thrusters etc have been removed from the gadgets for reuse purpose in practical /projects.

7) WATER HARVESTING

Rainwater / roof water harvesting has been done in entire campus to increase underground water table. Surface run of & roof top water is collected and used for garden irrigation.

Rainwater is collected from each shade and corner campus and drop into into the wells

For water harvesting survey has been carried out and underground storage tanks are constructed in campus. The tress and lawns are maintained with water drips and sprinklers respectively.

Reuse of waste water for gardening.

Every year NSS volunteers are involved in Special Camp where they construct CCTs (Contour Crafting Traversing) and coffer dams.

8) ENVIRONMENT CONSCIOUSNESS

Thus the institute is very much conscious about environmental issues. Regular practices and activities have been adopted to create environmental awareness. The institute is very keen for making the campus eco-friendly by adopting certain measures and policies. All the academic buildings and other surrounding area in the campus are cleaned regularly by sweepers. The Institute has adopted energy conservation practices, tree plantation and water harvesting for making the campus clean, green and healthy.

The institute has adopted following strategies for environmental consciousness:

Regular Campus Cleanliness, Polythene free and smoking free zone helps to make campus eco -friendly. Green belt evergreen trees and plants.

Tree Plantation on the occasion of Independence Day & "Tree plantation Day". Reduction in usage of papers by digitizing most of the records.

Effective utilization of rough papers (one side printed) for printing.

Students are motivated for eco- friendly practices.

Remedies such as-

Maximum use of Public transport by students and staff. Sharing of cars and two wheelers by staff and students. Announcing 'NO VEHICLE DAY '.24 December 2016 , 1May 2017 was announced as no vehicle day in our Campus.

Providing enough singes in entire campus for proper circulation of vehicles to minimize fuel consumption, reducing noise level, indication of parking spaces.

Entire college map is located at the main entry so as to avoid inconvenience for circulation in entire campus.

Minimizing the paved area and maximizing permeable area so as to percolate more water in to ground and minimize heat gain.

Beautiful landscape is provided in entire campus to create cheerful and healthy atmosphere.

Various types of flora and faunas exists in our beautiful n cheerful campus.

Co-existence of various species occurs in our campus.

Site inventory –on periphery of entire campus data regarding trees, shrubs, plants, climbers has been studied and experts opinion has been taken for their usefulness and conservation.

Topography of entire campus has been studied and remedial measures are taken for disposal of storm water/ rain water.

Measures regarding channelization, pitching, turfing of existing Nalla has been taken under consideration as a proposal to increase water level, to avoid soil erosion and to beautify campus.

Proper drainage systems have been provided to collect and dispose off sewage water in entire campus. In existing COETA Campus problem areas are identified such as dark corridors, insufficient ventilated areas, and remedial measures are suggested.

Use of solar energy is under consideration.

LED lights are suggested to minimize electrical energy consumption

Awareness/training workshops are organized in the campus regarding Cost Effective Technology, Energy Efficiency, renewable energy applications, and taking suitable measures for energy conservation.

Suitable architectural retrofit options for building envelop (floor, roof, walls etc.) and energy efficient glasses for windows are under consideration.

The redesigning of exterior surfaces of the buildings with energy efficient material is under consideration. Any other innovative actions/ points to be taken for making existing campus green.

INITIATIVE TO WORDS GREEN CAMPUS BY VARIOUS DEPARTMENTS

1. 1) CHEMICAL & POLYMER TECHNOLOGY

a) PLASTIC WASTE MANAGEMENT

i) Recycling Process

1. Grinding
2. Extrusion
3. Standard Industrial palates

ii) Pyrolysis :- (Value added Products)

These Products in the Three States –

- Solid Liquid and Gaseous.
- They have Absence of Oxygen.
- Pyrolysis is reverse process to recover hydrocarbons.

iii) Liquid fuel --Industries require Greece. Due to increase in temperature in industries and because of melting of grease in Mechanical Process get higher temperature greasing is to be done frequently. The grease normally used in industry contents its excreted from Soap. We have added polymeric base to Greece for which our Institute have **patent**. Polymer liquid fuel can be uses as boiler fuel. We have been practically using liquid fuel with lending of Polymer base in several Industrial Unit at M.I.D.C., Akola successfully which is without in basic designing for Burning Unit.

iv) Modification of Bitumen

In construction of Village Roads, State and National Highways. Bitumen is normally used because of heavy traffic Bitumen develops cracks to reduce the cracking of Bitumen. We have added 4% of Plastic Waste for bridging the cracks and improvisation penetration index P.W.D.(Public Work Department, Akola) has accepted add ion of 4% of Plastic waste, for their Road Projects for, which we having and Reading and Test Certificates

v) Plastic for Energy recovery from waste

We have designed, Kilns for '*down jet combustion*. Down jet Combustion Technique show minimal level of Car and other Gases. Where the efficiency is seen to be 35% to 40%

vi) Seed Processing

In seed Processing Units for cleaning of cotton seeds and removal of sheathing. There was a tradition of

using Hydrochloric Acid (HCL) , Sulphuric Acid (H₂SO₄)is created – about 60 to 80%. Which is highly corrosive and hazardous to environment and health and this spend acid used to be drained in low line areas quarries, which change nature of soil resulting in contamination of water and environment. We have developed environment solution of generation of dry Hydrochloric Acid in gaseous form. We have developed and technique where dry HCL gas is used without use of Sulphuric Acid (H₂SO₄). The nonuse of Sulphuric Acid (H₂SO₄) is instrumental in preserving the Environment. This is a Pilot Project.

vii) Plastic Tags for Packing of Bags

Earlier lead tags were used. We have introduced use of Plastic Tag instead Lead tags which insured the quality of Product.

viii) Seed Coating

We have developed a Water Soluble Polymer for coating of seeds. Which maintains the desired moisture level for germination. This help ensuring quality of seed and its branding.

For example: **Soya been Seeds:** Soya been is only seed having its embryo outside it. In transportation, because of frequent impacts during loading and unloading the germination value is significantly reduced. Because of Polymer Coating the germination quality increased to level of more than 70% and process is *Cost Effective*.

2) ARCHITECTURE DEPARTMENT-

Planning of building is compact planning with multiplexing of spaces e.g. Barrier free studios that can be used as exhibition spaces. Studios are equipped with furniture that is space efficient. We have provided built in cupboards in studios for students equipments.

Steel windows are used which admit 100% light and ventilation.

Walls of Studios are constructed with rat trap bond so as to protect from harsh sun rays in summer.



OUR BEAUTIFUL CAMPUS



OUR BEAUTIFUL CAMPUS



VARIETY OF TREES IN CAMPUS



WORKSHOP AREA

CONCLUSION

We strongly feel that, Sustainability should be integrated in every course, every discipline and every subject offering. We are working towards the same in our campuses

We are planning to expand our network and reach out to the larger student community to generate awareness on Environment Protection & Sustainability

We are striving to achieve excellence in not only making our own campuses green by adopting best practices; but also collaborating with other campuses to exchange ideas and expertise which would be mutually beneficial and lead us towards a Sustainable future.

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