GREEN AUDIT REPORT
FOR
SWAMI SHRADDHANAND COLLEGE

Elion Technologies & Consulting Private Limited

307, 3rd Floor, DDA Lal Market, H-Block
Vikas Puri, New Delhi-110018
Contact No: +91 9013923982, +91 9013890526
Web: www.elion.co.in

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Acknowledgment

Elion Technologies and Consulting Pvt Ltd places on record it's thanks to Swami Shraddhanand College for entrusting the task of conducting green audit study.

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

Site Information

Name of College	Swami Shraddhanand College
College Address	Swami Shraddhanand College, University of Delhi, Alipur, Delhi, 110036
Execution Partner	Elion Technologies & Consulting Pvt Ltd
Communication Address	307, 3rd Floor DDA Lal Market H-Block Vikas Puri, New Delhi-110018
Date of Audit	20th June 2023
Year of Audit	2022 – 2023
Total Area of College	37667 Sq. Meter
Build up area	7783 Sq. Meter
Total Green Area	12399 Sq. Meter

Overview of Institute

Swami Shraddhanand College, a constituent College of Delhi University, is run under the trusteeship of Delhi Govt. It is a co-educational institution and imparts instructions in various subjects at both undergraduate and post-graduate levels. Situated in the sylvan ambience of North Delhi, the College has completed 56 years of its existence. From the humble beginning in the Gandhi Ashram building in Narela, the college is now one of the premier institutions of Delhi University. It is equipped with qualified teaching staff, specialized laboratories and adequate library facilities. It is an autonomous body.

The college has extensive playgrounds, which provide an excellent opportunity for budding sportsmen and athletes to participate in various games and sports and to improve their skills and capabilities. Scholarships and freeships are given to deserving students. Every year a number of prizes are awarded to students on their meritorious achievements in academic and extra-curricular activities.

The students' societies / associations play a vital role in improving the academic environs of the college. For each subject, there is a society to stimulate the interests of the students in the subject and establish its interlinking with the society at large. The societies/associations sponsor lectures, seminars, exhibitions etc., and undertake programmes and activities to make the subject more interesting and more relevant for societal need.

List of courses offered by the institute:

- B.Sc. (H) Botany
- B.Sc. (H) Zoology
- B.Sc. (H) Physics
- B.Sc. (H) Chemistry
- B.Sc. (H) Microbiology
- B.A. (H) English
- B.A. (H) Hindi
- B.A. (H) Geography
- B.A. (H) History
- B.Com. (H)
- B.Com. (P)
- B.Sc. (P) Physical Science
- B.Sc. (P) Life Science
- B.Sc. (P) Agrochemical and Pest Control
- B.A (P)

Introduction

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of institute. It aims to analyses environmental practices within and outside of the concerned place, which will have an impact on the eco-friendly atmosphere. Green audit is a valuable means for a college to determine how and where they are using the most energy or water or other resources; the college can then consider how to implement changes and make savings. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students' better understanding of green impact on campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

The rapid urbanization and economic development at local, regional and global level has led to several environmental and ecological crises. On this background it becomes essential to adopt the system of the Green Campus for the institutes which will lead for sustainable development and at the same time reduce a sizable amount of atmospheric CO2 from the environment. The National Assessment and Accreditation Council, New Delhi (NAAC) has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through carbon footprint reduction measures.

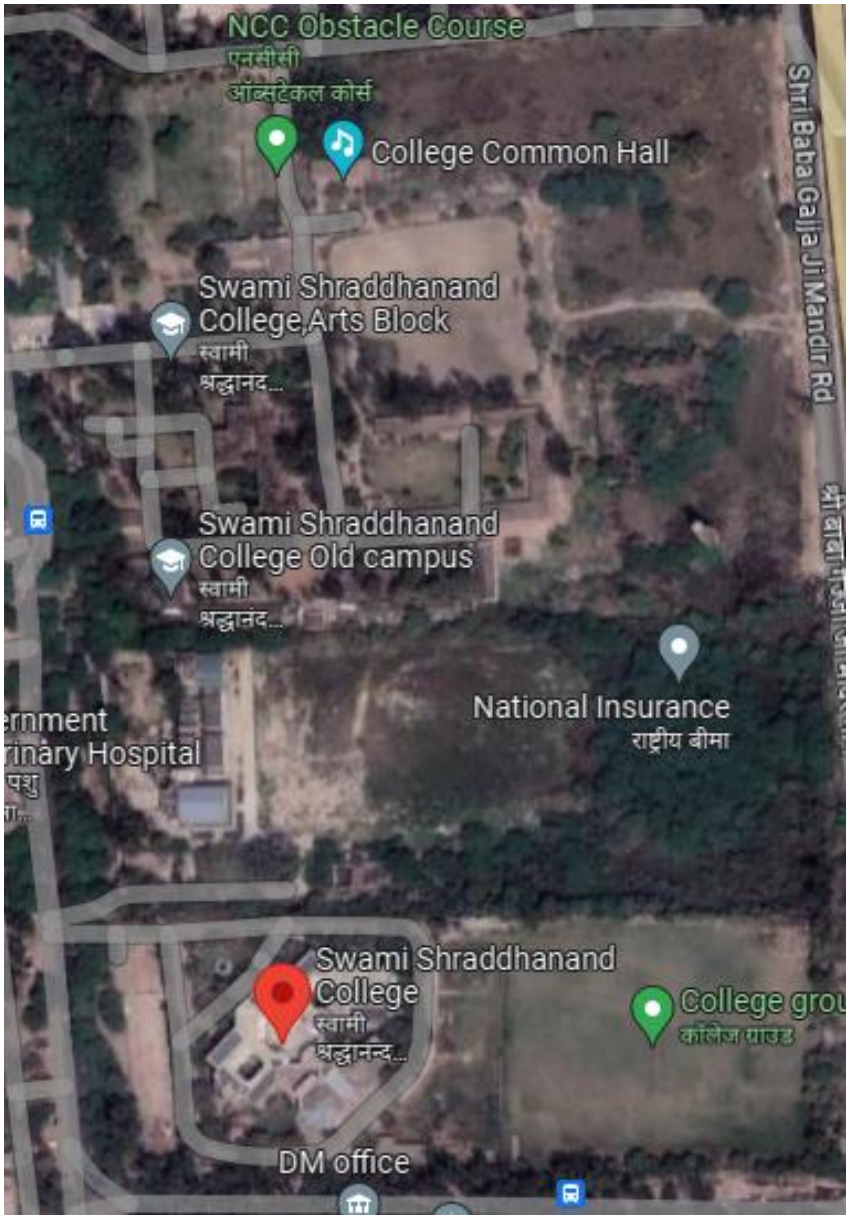
Advantages of Green Audit:

Green Audit is assigned to the Criteria 7 of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India that declares the institutions as Grade A, Grade B or Grade C according to the scores assigned at the time of accreditation. Some main advantages of green Audit are:

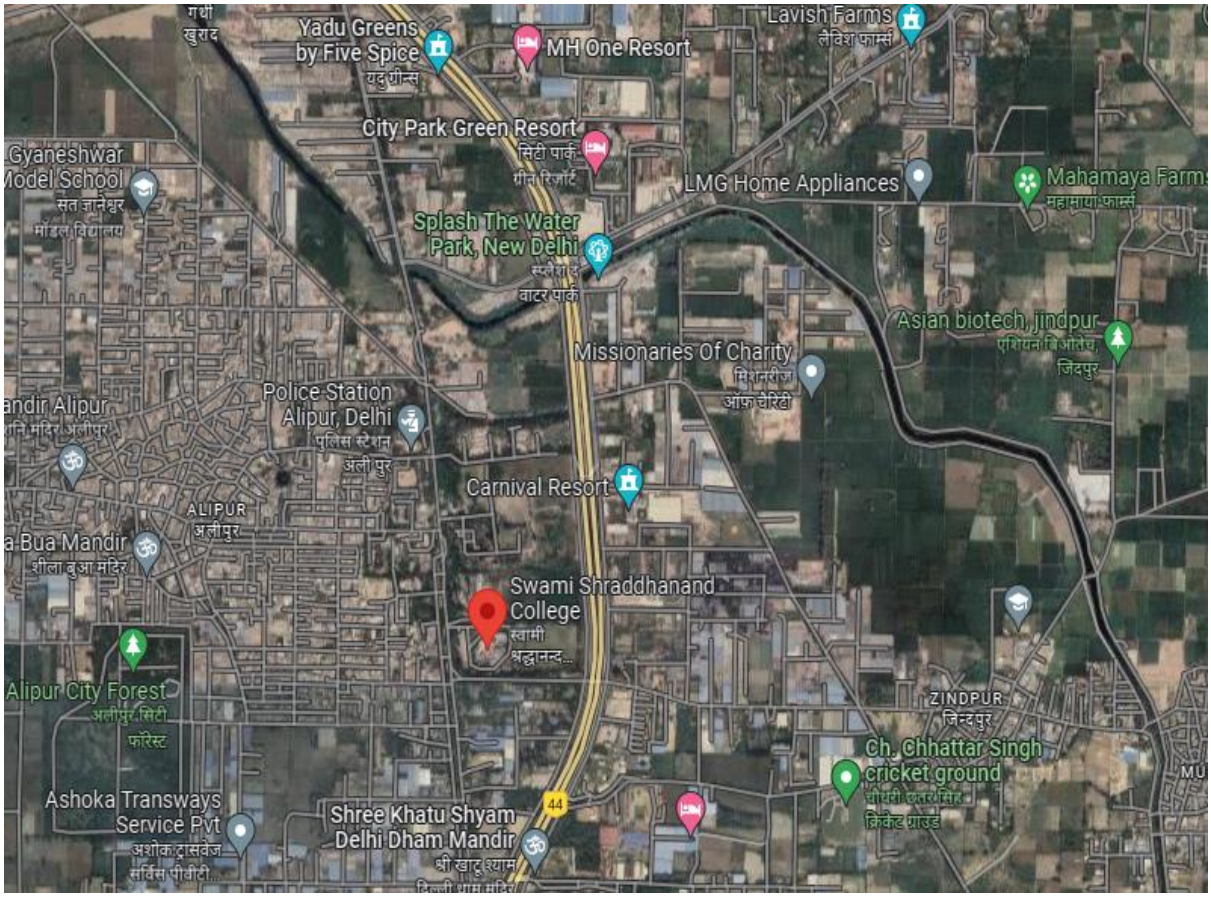
- It helps to shield the environment.
- Minimizing the waste and managing the cost.
- Authenticate conformity with the implemented laws.
- Minimizing the energy consumptions and focus on green and clean energy.
- Ambient Environmental Condition.
- Awareness and Training on Sustainability for Students.
- Awareness about environmental guidelines and duties.

Environment Setting

The land use around the campus is sub urban commercial land with shops, hospitals and other infrastructures in near vicinity and adjacent to National Highway 44.



Swami Shraddhanand College Campus



Location of Swami Shraddhanand College Campus

Green Audit

For Green Audit following 13 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.

a) Good Daylight Design and Ventilation
b) Water Efficiency
c) Wastewater Management
d) Indoor Air Quality
e) Energy Efficiency
f) On-site Energy Generation
g) Temperature and Acoustic Control
h) Paper Waste Management
i) E-Waste Management
j) Canteen and Solid Waste Management
k) Universal Access and Efficient Operation and Maintenance of Building
l) Green Belt
m) Green Programs (Green initiatives)

3.1 Good Daylight Design and Ventilation

a) Corridors are wide with good ceiling height. All the corridors receive good daylight.

Corridors consisting windows

b) Classrooms, Labs and Library have large windows. Adequate daylight is received through the windows during daytime.

Natural Daylight in classrooms

Daylight through windows in labs

c) Classroom walls, corridors and labs are white-washed, this enhances the daylight received.

Classrooms

d) Curtains are provided on some of the windows to avoid glare.

Curtains provided in the rooms

e) Laboratories and washrooms are provided with exhaust fans to disperse heat, fumes and odors.
f) Stair cases receive daylight through windows provided at various levels.

Natural Daylight in staircases

3.2 Water Efficiency:

a) Ground water and Government water supply are the two main sources for water supply in the campus.
b) Water is stored in underground tank of capacity 100KL and 20 overhead tanks of capacity 2KL each.

Storage tanks

c) Centralized RO Plant is available and water coolers are available at various locations.

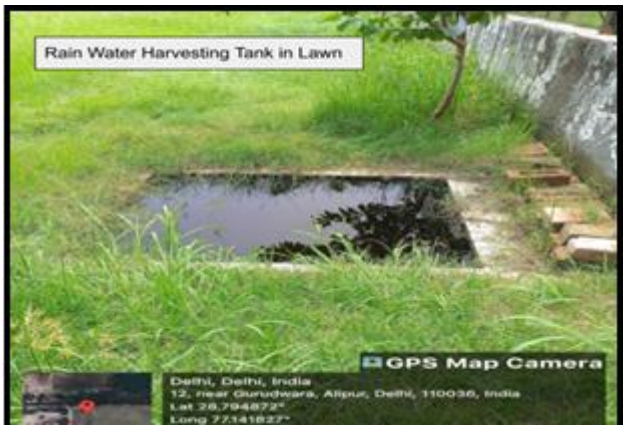
RO Plant

RO treated water

d) Normally mops are used for floor cleaning and hose is used for cleaning once a

week.

e) Dual flushing system is not provided in the washrooms. The process of installation of this system is under progress.
f) Signages are provided in washrooms emphasizing water conservation.
g) Rejected water from air conditioners and RO Plant is used for gardening purpose and for flushing in the washrooms.
h) Rain water harvesting system is available in the college.



Rainwater harvesting tank

3.3 Wastewater Management:

a) Septic tank is available in the campus for storage and treatment of wastewater.

Septic Tank

3.4 Indoor Air Quality;

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, as it relates to the health and comfort of building occupants. Some common indoor pollutants are listed as below:

- Molds and other allergens – This may arise from water seeping into the building envelope or skin, plumbing leaks, condensation due to improper ventilation, or from ground moisture penetrating a building part.
- Carbon monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels.
- Volatile organic compounds (VOCs) – VOCs are emitted by paints and lacquers, paint strippers, pesticides, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions etc.
- Carbon dioxide – Due to human respiration
- Particulate matter – Due to construction and maintenance activities

Major observations under indoor air quality are as below:

a) In classrooms the mode of ventilation is natural (through windows) and is enhanced by fans. Air conditioners are used in some of the rooms.
b) Heating Ventilation and Air Conditioning (HVAC) system does not exist. Split and Windows Air conditioners are used for cooling inside the campus.
c) Indoor plants are seen in the College. Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits. Refer Annexure 1 for details.
d) Exhaust fans are provided in the washrooms and labs.
e) Green belts have been set up in campus area.
f) Indoor Air Quality tests have not been carried out. Same needs to be carried out at least once a year.

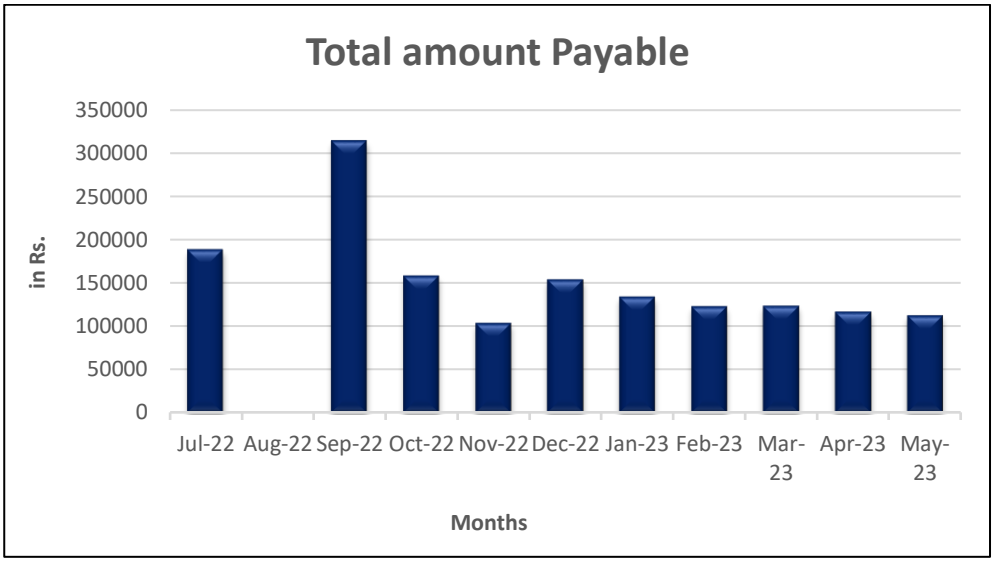
3.5 Energy Efficiency:

Electricity:

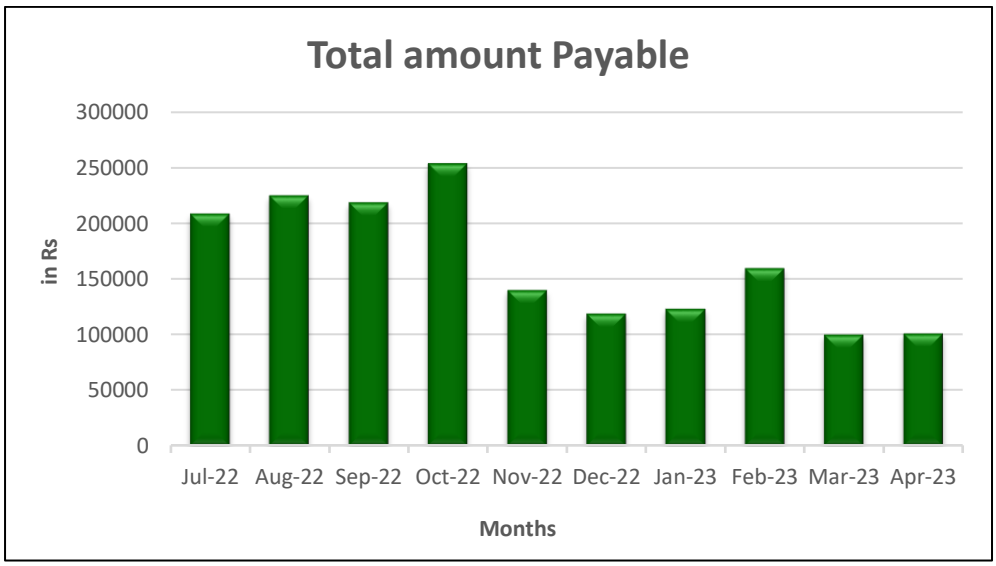
Power is supplied by Tata Power Delhi Distribution Limited. The major electricity consuming equipments' are Computers, Air Conditioners, LED Lights, Fans, LED Tube lights, Refrigerators, Printers, Scanners, Water Coolers, etc.

Following are details of energy consumption:

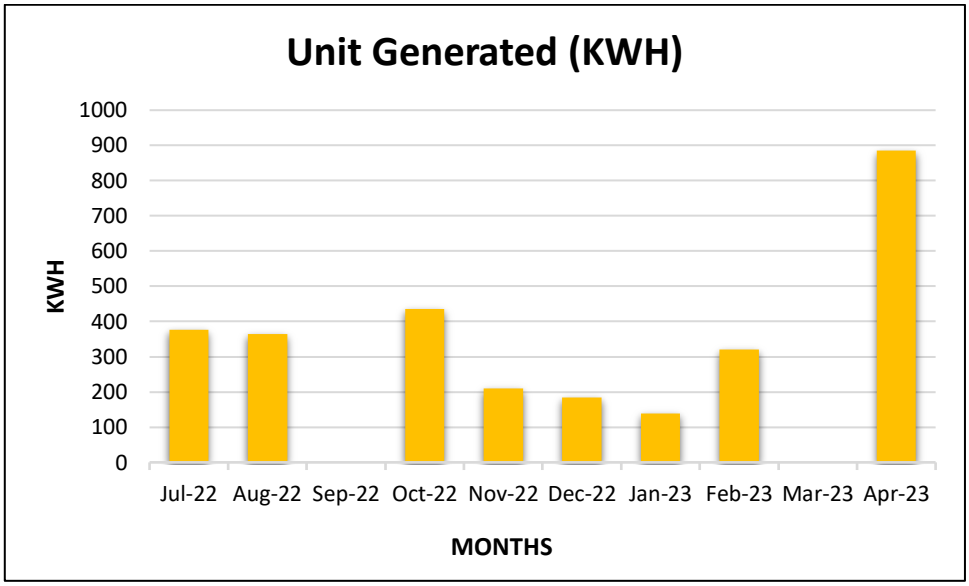
- The energy charges pattern for the bill no. 60006159861 of Old Building is:



- The energy charges pattern for the bill no. 60007761947 of New Building is:



- There is an inhouse Solar Generation plant provided on the new building, data is collected and scrutinized:



It was observed that:

a) Campus has air conditioners which are in good working condition.
b) LED lights and LED tube lights are installed in the entire campus.

LED lights

c) Solar power plant of capacity 50KW is installed in the campus.

Solar Power Plant

3.6 On Site Energy Generation (usage of LPG/ Natural Gas):

a) LPG gas is used in the campus for cooking.
b) Solar Power plant of capacity 50KW is provided in the college.

3.7 Temperature and Acoustic Control

a) White washed rooms & corridors and white/ off-white flooring improve the lighting conditions.

b) The campus has done tree plantation all around the campus which helps in reducing temperature.

Landscaping Trees and Plants in College Campus

Landscaping Trees and Plants in College Campus

c) There is no noise pollution around the campus.

3.8 Paper Waste Management:

Being academic institution, waste paper is the main solid waste generated in the premises. The College has taken steps to minimize and avoid paper usage.

It was observed that:

a) An MOU has been signed with Jagriti NGO for disposal of paper waste generated in the campus.

Certificate of recycling

b) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy, digitalization (scanning) is practiced.
c) Internal notices and communications are through E-mail/WhatsApp/Paper Notices.

3.9 E-Waste Management:

a) The campus is digitalized to a large extent. This includes classrooms, library, internal mails etc.
b) E-waste is collected and stored in respective department and is disposed through registered vendors.

E-waste collection

3.10 Solid Waste Management:

It was observed that:

a) Wet waste and dry waste segregation is practiced in the premises. Separate bins are provided for wet biodegradable and dry recyclable waste.

Separate Bins are provided

b) The college dispose-off its waste through composting and recycling.

Composting

3.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

a) College is easily accessible. Staircase and ramps are provided in the campus. Staircases are wide and uncluttered and it is easy to have safe evacuation during any emergency.

Ramps Provided

Wide Staircases

b) Fire Extinguishers, Fire buckets are provided for firefighting.
c) Directional exit signages and floor markings are present on every floor of the campus.
d) Regular Fire Safety Trainings is given to staff of the college on regular basis.

3.12 Green belt/ Landscaping:

a) Some Large trees and plants are planted in the premises. Plantation also helps maintaining lower temperatures of the area.
b) Potted plants are also kept around the campus.

3.13 Green Initiatives:

a) College is regularly celebrating cultural programs along with Environment Day, Earth Day, Yoga Day etc.
b) Various awareness programs about cleanliness, environment sustainability, green environment etc are organized by the campus management.
c) Solar power plant is available in the campus.

Celebration of various days

Recommendations/Suggestions

For Improving Energy Consumption:

a) Every classroom and lab with central switch board can have a diagram linking location of a tube light, fan etc. with corresponding switch. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.
b) Installation of automatic lights with sensors can be considered.
c) Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing. Equipment with star rating, using eco-friendly materials; with safe disposal policy to be preferred. Policy of returning equipment at the end-of-life span to the supplier to be preferred.
d) For purchasing new electronic appliances, star rating provided by Bureau of Energy Efficiency (BEE) should be considered. The equipment which has maximum star ratings could be purchased, which will consume less energy, ensure environmental sustainability and also operate at low cost.
e) Usage of light reflectors is recommended as the reflectors can spread light to relatively large areas.
f) If possible, computers should be switched off from main power connections.
g) Notices/signages can be put up/displayed near switches and on notice boards, informing students and staff to switch off all electrical appliances when not in use.
h) Control sensors can help to reduce consumption by automatically dimming lights when people are not around, and keeping blinds open to use natural light & reduce energy consumption.
i) Raise awareness:
   - Encourage students to help in monitoring energy consumption & implement corrective actions.
   - Integrate energy education into classroom learning.

Water Conservation:

a) Provide information on water usage and savings to students/ staff through notices, screen savers in computer labs.
b) Dry sweep or use a sponge broom, when possible, instead of using a hose to clean floors, sidewalks, or other hard surfaces.
c) Minimize/ reduce water usage by installing water saving faucets such as pressmatic taps, tap aerators, jet sprays etc.
d) Installation of waterless urinals can be considered to reduce water consumption.
e) Water balance diagram can be prepared to quantify the water consumption by installing water meters at key points. Based on data gathered, appropriate measures can be taken to reduce the water consumption.

f) At present, rejected water from air conditioners and purifier is not used anywhere. It is recommended to use rejected Water from air conditioning unit and reject water from water purifiers for watering gardening and flower pots.

Paper and other Solid Waste Reduction:

a) Inventories of all solid waste generated in the premises must be maintained.
b) Enhance recycling. This can be done by creating a group where students can recycle books, personal clothes and other material to needy students. This can be an initiative under green program.
c) Standard Operating Procedures (SOP) for Solid and E-waste management and for recycling of waste should be prepared & practiced. The SOP's may include collection, segregation and reuse of different types of wastes, if any (e.g. biodegradable waste for composting). This will help in safe disposal of waste to recycle agencies.
d) Training as well as awareness programs should be organized on segregation of biodegradable waste and recycling of waste. Efforts should be taken to inform students about recycling options and signs should be posted on appropriate bins indicating what could be dumped in each bin.
e) The college can introduce online app, which can be useful for conducting internal exams, assignment/ reports submission. This system can also be used for displaying important notices, timetables.
f) Paper usage shall be monitored to understand the impact of digitization in the facility.

Others:

a) Water from air conditioning unit and reject water from water purifiers is not used anywhere, same should be utilized.
b) Indoor Air Quality tests have not been carried out. Same needs to be carried out at least once a year.
c) Environmental advisory committee could be formed. The discussions/ information sharing among different departments can generate lot of ideas and awareness on green issues.
d) Maintain minutes of meetings of environmental committees; evaluate the effectiveness of various environmental programs conducted by the institutes. Set annual targets for Green Initiatives & monitor them closely. Create 'Green Champions'.
e) Since each student uses computer lab, the screen savers can be set up for creating environmental awareness. (Ergonomics, water conservation etc.). Short 30 second pop up can be displayed on computer screens when they are on standby mode. Or wallpapers informing students about environment conservation can be created.
f) Consider detailed energy audit (energy consumption, thermal emission, visual comfort) and water audit.

g) Adopt environmentally responsible purchasing policy, and work towards creating and implementing a strategy to reduce environmental impact of its purchasing decision.

Annexure 1 – Indoor Gardening Details

SSN College campus is full of all kinds of trees. More than 300 trees of 66 different species are present in the new campus. In the new campus, besides the rows of small lawns there is one botanical garden, one herbal garden and one Saghann Vann. Proper labelling and naming are there on all the trees. The landscape is well maintained and regular pruning and cutting of the twigs and hedges are done. The potted plants contain all varieties including succulents, cacti and flowering plants. The campus has a variety of flora including honeybees, butterflies, moths, squirrels etc.

List of trees of Swami Shraddhanand College (New campus)

S.NO.	NAME OF THE SPECIES	FAMILY	COMMON NAME
1	*Roystonea regia*	Arecaceae	CUBAN ROYAL PALM/ BOTTLE PALM
2	*Aegle marmelos*	Rutaceae	BAEL
3	*Grevillea robusta*	Proteaceae	SILVER OAK
4	*Delonix regia*	Fabaceae	GULMOHAR
5	*Fernandoa adenophylla*	Bignoniaceae	MARODPHALI
6	*Ficus amplissima*	Moraceae	PIPALI
7	*Ficus virens*	Moraceae	PILKHAN
8	*Ficus lyrata*	Moraceae	FIDDLE-LEAF FIG
9	*Peltophorum pterocarpum*	Fabaceae	YELLOW FLAMETREE
10	*Schleichera oleosa*	Sapindoideae	KUSUM TREE/GUM LAC TREE
11	*Pterospermum acerifolium*	Malvaceae	KANAK CHAMPA
12	*Livistona chinensis*	Arecaceae	CHINESE FAN PALM
13	*Caryota urens*	Arecaceae	FISH TAIL PALM
14	*Wodyetia bifurcata*	Arecaceae	FOXTAIL PALM
15	*Latania lontaroides*	Arecaceae	RED LATAN
16	*Erythrina variegata*	Fabaceae	INDIAN CORAL TREE
17	*Casuarina equisetifolia*	Casuarinaceae	HORSETAIL SHE-OAK,
18	*Alstonia scholaris*	Apocynaceae	DEVIL'S TREE/SCHOLAR TREE
19	*Adansonia digitata*	Malvaceae	KALPAVRIKSHA /AFRICAN BAOBAB
20	*Bombax ceiba*	Malvaceae	SILK COTTON TREE, KAPOK TREE/SEMAL
21	*Monoon longifolium*	Annonaceae	FALSE ASHOKA
22	*Terminalia ivorensis*	Combretaceae	BLACK AFARA
23	*Plumeria obtusa*	Apocynaceae	WHITE CHAMPA
24	*Leucophyllum frutescens*	Scrophulariaceae	ASH-BUSH
25	*Calliandra haematocephala*	Fabaceae	RED POWDER PUFF

26	***Thuja occidentalis***	**Cupressaceae**	**MORPHANKI**
27	***Neolamarckia cadamba***	**Rubiaceae**	**KADAM**
28	***Hamelia patens***	**Rubiaceae**	**FIREBUSH**
29	***Vitex negundo***	**Lamiaceae**	**NIRGUNDI**
30	***Senna pallida***	**Fabaceae**	
31	***Manilkara hexandra***	**Sapotaceae**	**KHIRNI**
32	***Manilkara zapota***	**Sapotaceae**	**CHICOO**
33	***Phyllanthus emblica***	**Euphorbiaceae**	**AMLA**
34	***Ficus carica***	**Moraceae**	**FIG**
35	***Ravenala madagascariensis***	**Strelitziaceae**	**TRAVELLER'S PALM**
36	***Tectona grandis***	**Lamiaceae**	**TEAK**
37	***Phoenix sylvestris***	**Arecaceae**	**SILVER DATE PALM**
38	***Putranjiva roxburghii***	**Putranjivaceae/Euphorbiaceae**	**PUTRANJIVA**
39	***Ficus maclellandii***	**Moraceae**	**AALI FICUS**
40	***Dalbergia sissoo***	**Fabaceae**	**SHISHAM**
41	***Morus alba***	**Moraceae**	**SEHTOOT**
42	***Terminalia arjuna***	**Combretaceae**	**ARJUN TREE**
43	***Tamarindus indica***	**Fabaceae**	**IMLI**
44	***Bauhinia tomentosa***	**Fabaceae**	**YELLOW BELL ORCHID TREE**
45	***Pongamia pinnata***	**Fabaceae**	**KARANJ**
46	***Holoptelea integrifolia***	**Ulmaceae**	**PAPRI**
47	***Madhuca longifolia***	**Sapotaceae**	**MAHUWA**
48	***Spondias dulcis***	**Anacardiaceae**	**AMBARELLA, AMADA**
49	***Dracaena fragrans***	**Asparagaceae**	**CORNSTALK DRACAENA / VICTORIA**
50	***Nyctanthes arbor-tristis***	**Oleaceae**	**PARIJAT/HARSINGAR**
51	***Saraca indica***	**Fabaceae**	**ASOKA TREE, SITA ASHOK**
52	***Azadirachta indica***	**Meliaceae**	**NEEM**
53	***Ficus religiosa***	**Moraceae**	**PEEPAL**
54	***Citrus × aurantiifolia***	**Rutaceae**	**NARANGI**
55	***Punica granatum***	**Lythraceae**	**Pomegranate**
56	***Syzygium cumini***	**Myrtaceae**	**Jamun**
57	***Prosopis juliflora***	**Fabaceae**	**kikar**
58	***Psidium guajava***	**Myrtaceae**	**AMROOD/ Guava**
59	***Tecoma stans***	**Bignoniaceae**	**Yellow trumpet**
60	***Euphorbia tirucalli***	**Euphorbiaceae**	**pencil cactus**
61	***Beaucarnea gracilis***	**Asparagaceae**	**nolina palm**
62	***Rhapis excelsa***	**Arecaceae**	**broadleaf lady palm**
63	***Dypsis lutescens***	**Arecaceae**	**ARECA PALM**
64	***Ficus microcarpa***	**Moraceae**	
65	***Ficus benjamina***	**Moraceae**	
66	***Murraya koenigii***	**Rutaceae**	**CURRY PATTA**

Plants	VOC it removes	Indoor source of VOC's	Plant care
 Aloe Vera	Formaldehyde, Trichloroethylene and Benzene	Chemical based cleaners and paints	Easy to grow with enough sunlight
 Bamboo Plant	Formaldehyde, Trichloroethylene and Benzene	Paints, Plastics, Wood products etc.	Thrives under low light conditions as well as easy to maintain
 Chinese Evergreen	Benzene	Paints	Low maintenance plant that prefers low light conditions.
 English Ivy	Formaldehyde, Benzene, Air borne fecal matter particles	Wood, Paper products, Air borne fecal – matter particles from pests	Easy to maintain

 Janet Craig	Formaldehyde, Benzene and Trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
 Golden Pothos or Devils Ivy	Formaldehyde, Cleanses air	Exhaust fumes, carpeting materials, panelling and furniture products made with particle board	Extremely easy to maintain under low to bright light conditions. Fast growing and grows well under fluorescent light.
 Mass Cane	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Medium to low light tolerant plant. Requires little water for growth.
 Snake plant	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety Of light conditions. Hard to damage or kill.

 Peace Lily	Formaldehyde, benzene and trichloroethylene	Paints, Plastics, Wood products etc.	Relatively easy to maintain. Survives in low light conditions.
 Red-edged Dracaena	Formaldehyde and trichloroethylene	cooking fuels, wood products, facial tissues, personal care products and waxed papers	Drought resistant and Tolerates a variety of light conditions. Hard to damage or kill.
 Spider Plant	Formaldehyde, benzene, carbon monoxide and xylene	cooking fuels, wood products, Printing	Easy to maintain under medium to bright light condition.
 Parlor Palm	Purifies indoor air	-	Easy to maintain

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