Dnyanopasak Shikshan Mandal's

College of Arts, Commerce & Science

Affiliated to

Swami Ramanand Teerth Marathwada University, Nanded

Green Audit Report

Near Z.P., Post Box No. 54,
Parbhani – 431401

May 2017

Prepared by

STEP Private Limited

SUSTAINABLE TECHNOSOLUTIONS FOR ENVIRONMENTAL PROTECTION PVT. LTD.

Registered address:
4A/101, Kalpataru Estate,
Jogeshwari-Vikhroli Link Road,
Andheri East, Mumbai-400093, India.

Office address:
1/C-1/Wing 1, Bindra Rose Society,
Mahakali Caves Road, Andheri East,
Mumbai - 400 093, India.

Website: www.stepsol.com, Email: info@stepsol.com, O: +91 22 28370112, M:+91 9820283540
CIN No: U93000MH2010PTC204592

Green Audit Report of Dnyanopasak Shikshan Mandal's College (DSMC) of Arts, Commerce and Science, Parbhani has been prepared by STEP based on visit to the college campus, checking records and interactions with faculty, non-teaching staff and students. No intrusive study was conducted during the audit.

The audit was conducted on **18th April, 2017.**

The green audit report presents green initiatives taken up by the institution, and provides suggestions and recommendations to improve environmental sustainability.

Ms. Jyoti Palekar
Managing Director
STEP Pvt. Ltd.

Ms. Payal Singwi
Environmental Engineer
STEP Pvt. Ltd.

Mr. Mitesh Gaikwad
Sr. Executive - Environment & Safety
STEP Pvt.Ltd.

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1. Introduction:

Dnyanopasak Shikshan Mandal's College (DMSC) of arts, commerce and science, Parbhani was established in June 1984. It is affiliated to Swami Ramanand Teerth Marathwada University, Nanded. The institution, had undergone NAAC accreditation in August, 2003, and NAAC had awarded B++ status. Consequently, in second cycle NAAC awarded 'A" grade with 3.11 CGPA in assessment and accreditation, the only grade in the entire District. The institute had external academic audit by IQCS and obtained ISO 9001:2008 certification. Now the institute has volunteered re-accreditation for the third cycle in the academic year 2017-2018.

The College has a strength of 2519 Undergraduate and Postgraduate students and 221 Research Students. The institute has 118 teaching faculty members on its payroll. The College offers various courses listed below:

Undergraduate

- Bachelor of Arts, Science and Commerce
- Bachelor of Science (Computer Science)
- Bachelor of Computer Application
- Bachelor of Vocational (Software Development)
- Bachelor of Vocational (Retail Management)

Postgraduate

- Master of Arts in English, Hindi, Marathi, Urdu, Sociology, Economics, History, Political Science and Public Administration
- Master of Commerce
- Master of Science in Microbiology, Computer Science, Chemistry, Mathematics, Botany, Physics, Zoology, Biotechnology and Environmental Technology

Doctoral (Ph.D. Programmes)

- Research Centre in Botany, Microbiology, Chemistry, Zoology, Computer Science, Geology, Hindi, English, Urdu, Sociology, Economics, Political Science, Commerce, History and Publics Administration

Certificate Courses

- Certificate of Competence in Television & Video Production, Spoken English, Banking, e-Commerce and Medical Laboratory Technology
- Post Graduate Diploma in Marketing Management

STEP Private Limited (STEP) team visited the college premises on 18th April, 2017 for the Green Audit. Prior to Audit, STEP prepared questionnaire and checklists. During the audit STEP team visited entire college campus i.e. classrooms, library, washrooms, staff room, administration department, accounts department, computer labs and girls hostel. During the audit, practical exams were in progress.

Campus Information

Building	
C – shaped building (A wing)	
Floor	**Facilities**

Ground and First floor	Account section, Co-operative department, MCVC office, I.Q.A.C office, Principal office, President office, Management office, Pantry, Co-operative store, Gymkhana, NSS department
Second floor	Classrooms
C – shaped building (B wing)	
Ground and First floor	Laboratories, Auditorium, Seminar hall
Second floor	Classroom, Department of commerce and geology
C – shaped building (C wing)	
Ground floor	Master in Computer Applications (MCA) department (not included in the scope of green audit)
First and Second floor	Classrooms and offices, Central library
Hostel Building	
Sports Complex	

The floor-wise layout is presented in **Annexure 1.**

In order to gather necessary information STEP team interacted with following stakeholders:

Name	**Department**
Dr. Sandhya S. Kadam	Principal
Dr Shaikh Md Babar	Geology Department
Shri S. M. Menkudale	Registrar
Mr. Kshirsagar	Librarian
Dr. A. S. Gangane	Department of English
Mr. V. A. Kalyan	Department of Mathematics
Dr. S. C. Aithal	Department of Microbiology
Group of Students	Commerce and Microbiology department

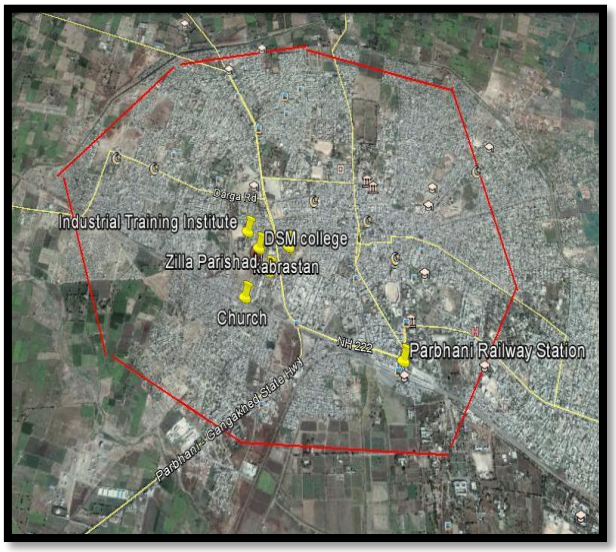
2. Environmental Setting:

DSMC is Grant-in-aid and Co-education institute and was established by an elite group headed by Adv. Ganeshraoji Dudhgaonkar, Ex. M.P., Parbhani.

DSMC is situated on corner near Zilla Parishad. The approach road is quite without much traffic. On the back side, there is an open ground; on east side there is Parbhani railway station; on south east Zilla parishad, and the surrounding land area is mainly residential.

Electricity and water bills are directly received by the DSMC office.

DSM Campus building



Area around DSM Campus

The Institute has a sprawling campus and is spread over 6.07 acres.

3. Green Audit:

Green Audit covered 13 major areas, which were further divided into subareas and the compliance was checked.

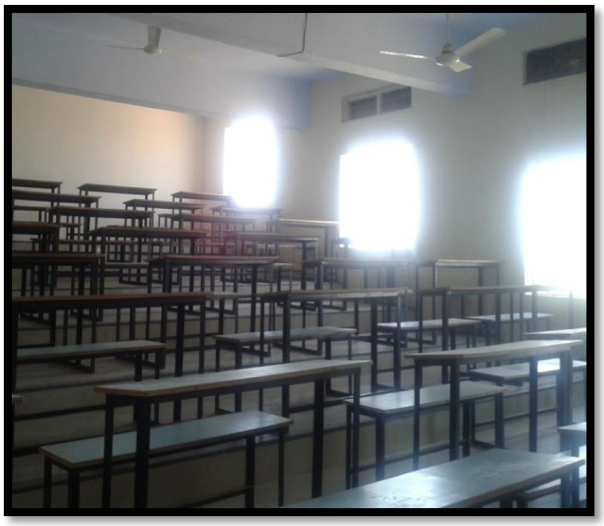
a) Good Daylight Design and Ventilation
b) Water Efficiency
c) Wastewater Management
d) Indoor Air Quality
e) Energy Efficiency
f) On-site Energy Generation
g) Temperature and Acoustic Control
h) Paper Waste Management
i) E-Waste Management
j) Canteen and Solid Waste Management
k) Universal Access and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

3.1 Good Daylight Design and Ventilation:

a) All the corridors receive good daylight due to the large windows.
b) Corridors are wide with good ceiling height.
c) Classrooms also have high ceiling with wide doors and large windows. Windows are kept open to receive sunlight.
d) Curtains are provided on some of the windows to avoid glare.

e) Due to the location on underground floor certain areas like record room, computer lab do not receive ample natural light and fresh air. Hence these rooms are provided with tube lights and air conditioners.
f) Washrooms are provided with exhaust fans to disperse heat, fumes and odours.

Sunlight in rooms



Good ceiling height with large windows

Good sunlight and Ventilation

Sunlight in Corridor

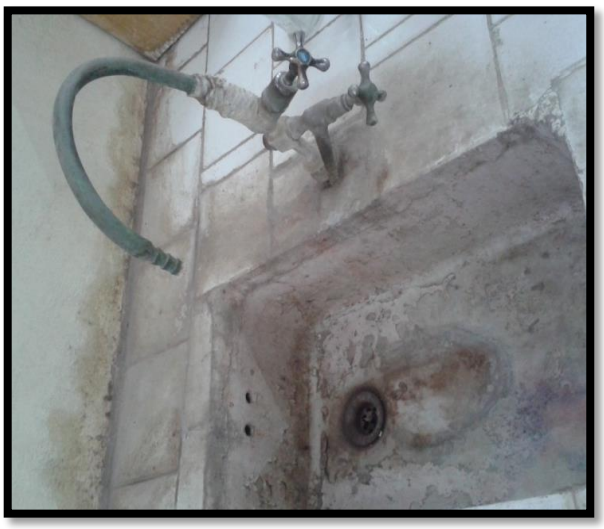
3.2 Water Efficiency:

a) Parbhani City Municipal Corporation (PCMC) supplies water to the institute. PCMC has fixed charges of ₹ 225 as monthly water bill. The charges are independent and not as per water consumption in the premises.
b) Municipal water is stored in the four storage tanks (Make – Sintex, 5 KL capacity each). Taps are provided to this tank for drinking purpose.
c) Municipal water is also stored in a storage tank (Make – Sintex, 10 KL capacity) on ground floor and is pumped to tank located on building terrace (Make – Sintex, 10 KL capacity) from where it is

distributed to washroom basins and laboratories. The water distribution diagram is presented in **Annexure 2**.

d) Parbhani is in Marathwada region of Maharashtra, which is water scarce area. Therefore, rooftop rain water harvesting system is installed for recharging ground water and meeting part of the water requirements.
e) Two rainwater harvesting recharge pits are provided for bore wells. There is two bore well in the institute & one dug well outside of campus.
f) Water from bore well is pumped to storage tank (Make – Sintex, 10 KL capacity) located on building terrace. Stored water is used for flushing and cleaning.
g) Mops are used for floor cleaning.
h) No leaking faucets were seen anywhere in washrooms except on ground floor one drinking water tank was leaking.
i) If water leakage is observed, in-house plumber is called immediately to attend to the complaints.
j) Water conservation faucets in washrooms were not seen. Installation of such faucets can save water and will help in minimising the water footprint of the institute.
k) Dual flushing system is not provided in the washrooms.
l) No signage emphasising water conservation were found in the institute.

Old taps in wash basin



Old taps in wash basin

3.3 Wastewater Management:

a) Sanitary wastewater generated from washrooms is connected to sewerage system provided by PCMC.
b) Chemical wastewater generated in chemical labs in the institute is also connected to sewerage system.
c) Waste water recycle is not practiced in the institute as grey water/ sewage treatment /recycle facility is not provided.

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 pollutant 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 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

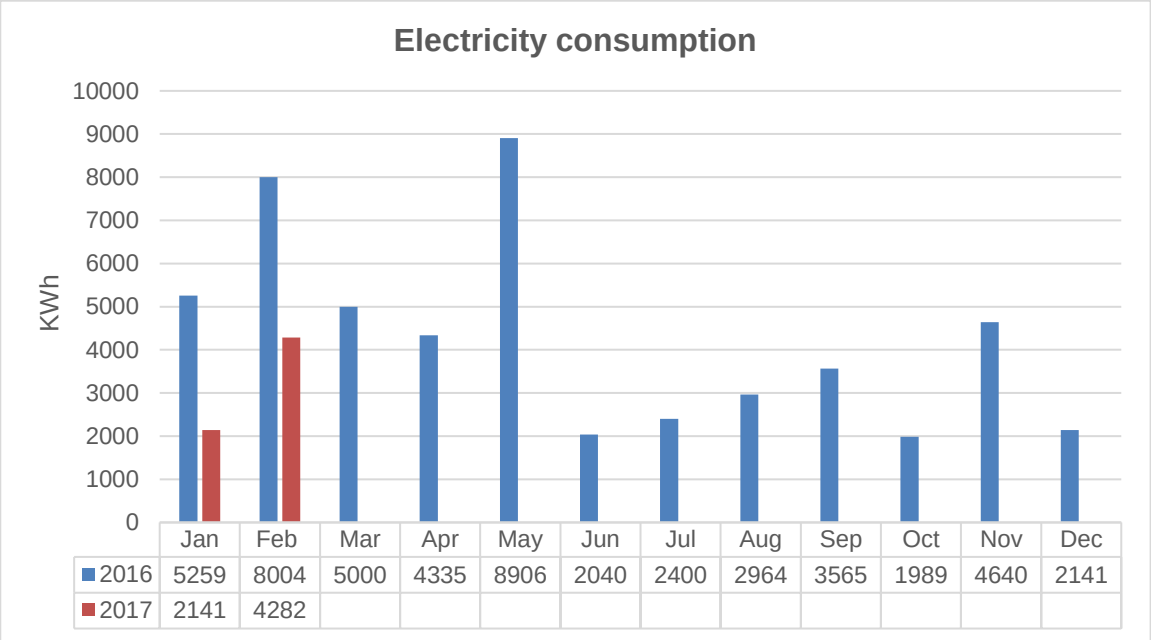
Major observations under indoor air quality is as below:

a) Ventilation is achieved by fans in the institute and air conditioners in some places.
b) Heating Ventilation and Air Conditioning (HVAC) system is not installed.
c) Smoke detectors are not provided in the institiute.
d) Exhaust fans are only provided in washrooms and chemistry lab.
e) No indoor plants were observed in the entire institute. Indoor plants can be plotted not only for the aesthetic appearance but also for health benefits. Refer **Annexure 3** for details.
f) Green belts are constructed in open areas.
g) IAQ awareness signage's can be displayed for sources & causes of indoor air pollution in the institute for making people aware of indoor air pollution and their health impacts.

3.5 Energy Efficiency:

Electricity:

A single electricity meter is provided for the entire complex. The monthly average electricity consumption from January to February 2017 is 3212 KWh (units).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2016	5259	8004	5000	4335	8906	2040	2400	2964	3565	1989	4640	2141
2017	2141	4282										

The above graph indicates that the energy consumption in Jan & Feb – 2017 has decreased as compared to Jan & Feb – 2016. The maximum energy consumptions for 2016 are in the month of May followed by February and the minimum energy consumption is in Oct. Further we presume that the institute has holiday in May/ June each year and Feb comes in winter season, however the consumption in month is higher. It is necessary to monitor the electricity consumption and we suggest that institute carries out an energy audit to understand the reasons & take corrective action. It is also necessary to understand why there is drop (approx. 50%) in energy consumption from 2016 to 2017.

The areas of major consumption of electricity are:
Tube Lights – 407 approximately
Fans – 208 nos. approximately
Air Conditioners – 8 nos. (Not energy rated)
Computers - 226 units
Printers – 40 units
Projector – 7 units

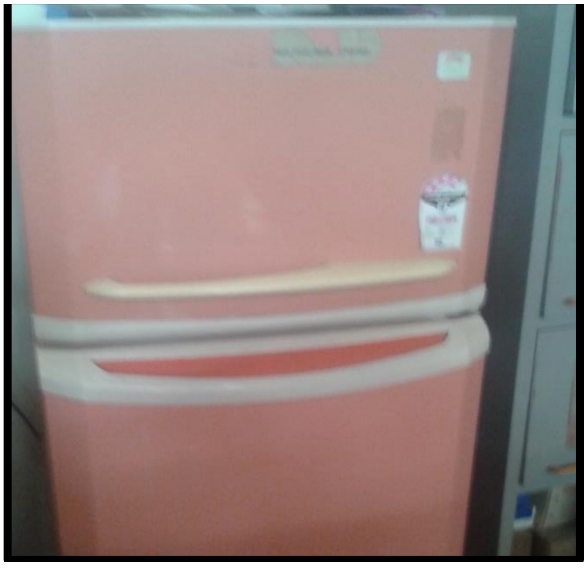
The list of electrical appliances and possible energy intensive areas in the institute is provided in **Annexure 4**.

It was observed that:
a) DSMC has some air conditioners.
b) The refrigerators installed are with four and five star ratings (standards set by Bureau of Energy Efficiency (BEE)].
c) An uninterruptible power supply (UPS) system with inverters are installed I every department and labs as back up in case of power failure. UPS system is typically used to protect hardware such as computers, data centres, telecommunication equipment or other electrical equipment where an unexpected power disruption could cause serious business disruption or data loss.
d) It was observed that reflectors are not provided for tube lights which can reduce electricity consumption.

e) All the computers have LED screens; Computers are always kept on standby mode with power saving screensavers.
f) Multiple tube lights and fans are connected to one switch, so when there is no full occupancy, the area where lighting is not required also gets illuminated. Especially corridor has multiple tube lights which can be replaced by CFL/LED.
g) Non-teaching staff switches on all lights & fans in morning and shut down directly in evening. Lack of control on usage increases the energy consumption.
h) There are no signage encouraging users to switch off light and fans to save electricity. Providing signage through screensavers & posters near electrical switches will help in making students responsible for conservation of electricity.
i) There is no renewable source of energy used e.g. Solar, Wind. However, the institute is planning installation of solar panels to meet the electricity requirements in the FY 2017 - 2018.

Multiple tube lights in corridor

Multiple tube lights in classrooms



Star rated refrigerator

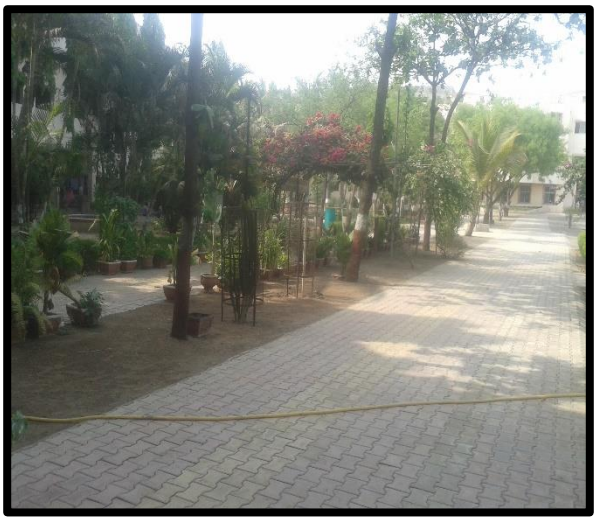
Star rated refrigerator

3.6 On site energy generation (usage of LPG/ Natural Gas):

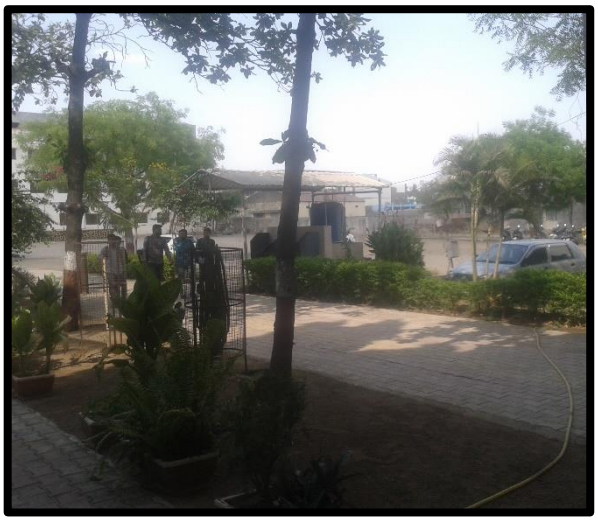
a) Canteen facility is not available in the institute.
b) LPG gas cylinders are used in laboratories and in the hostel building for cooking. Other than this, LPG gas is not used anywhere.
c) There is no dedicated gas storage area. Gas cylinders are refilled as and when required.
d) There are no diesel generators used in the premises.

3.7 Temperature and Acoustic Control:

a) White washed rooms & passages and white/ off-white flooring improve the lighting conditions.
b) DSMC is located far from road side so there is no major noise pollution.
c) DSMC has done mass tree plantation around the building which help in reducing temperature and acoustic control.



Green belt in institute



Green belt in institute

3.8 Paper Waste Management:

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

It was observed that:
a) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy, digitalisation (scanning) is practised.
b) The college library is connected to other college libraries under the Inter Library Loan facilities, E-Library facilities with INFLIBNET N-List and DELNET Consortia.
c) The library is fully automated with bar-coded books, library membership smart cards are issued to students to get access to these books.
d) There are 6000+ e-journals and 3000000+ e-books in library.
e) Internal notices and communications are through E mail/SMS.

f) Faculty and administration staff uses old papers and envelops for internal usages as rough work, file markers, page separators etc.
g) Paper notices are displayed on the notice boards .The dissertation reports, journals, and answer papers are stored as per the University rules. Most of the storage is in computer laboratory, library and staff room. After couple of years, old submissions and answer papers will be archived and stored in a record room at ground floor. Old publications are still stored in the library.
h) As per the memo, for the disposal of old newspaper scrap dealer is called by central purchase department.

3.9 E-Waste Management:

a) DSMC is digitalized to some extent.
b) The institute has 226 PCs, 40 printers, 8 air conditioners in working condition.
c) The generation of E-waste is also large.
d) All E-waste is collected and stored in respected department and once in ten year this e-waste is collected from respective department and given to authorise recycler.
e) The data on E-waste generation and its disposal is not available.
f) There is no documented policy for collection, segregation of e-waste.

3.10 Solid Waste Management:

It was observed that:
a) Wet waste and dry waste segregation is not practised in the premises. No separate bins are provided for wet biodegradable and dry recyclable waste.
b) Combined waste is directly handed over to the PCMC.
c) Hostel is the main area where biodegradable and non-biodegradable waste is generated.
d) The amount of biodegradable waste generation is nearly 4-5 kg/day in hostel. However, there is no signage on the food wastage or segregation of wet and dry waste.
e) In other areas like classrooms, it is mostly paper waste and plastic wrappers.

Dustbin for waste collection

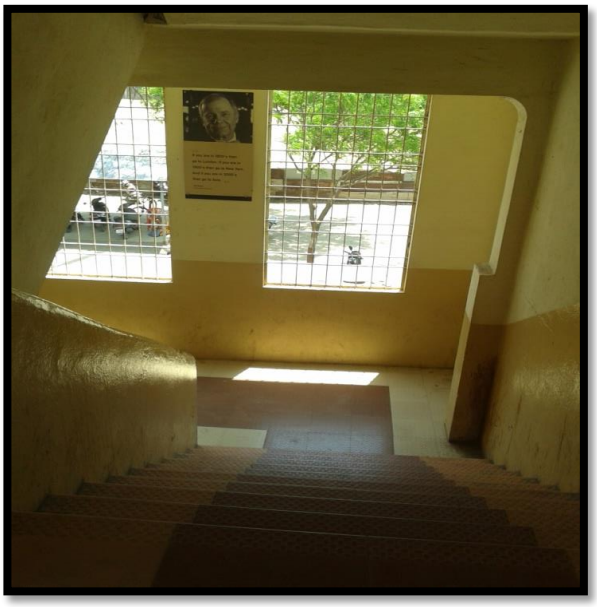
Old papers and books storage in departments

Confidential Document

3.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

a) There is wide and easy access to the main building from the main road. Staircase is provided for staff and students.
b) There are wide windows in the staircase as well as in corridor which allow sufficient light and ventilation.
c) Since the access and staircases are wide and free from clutter, it is possible to have a safe evacuation during emergency.
d) Fire extinguishers and fire hydrants are provided in a few areas for emergency, but required to be serviced and inspected by a fire protection service company at least annually.
e) There is no signage for emergency fire exit.
f) Handrails are not provided on one side of staircase for safety.



Staircase

DSMC entrance

3.12 Green belt/ Landscaping:

a) The Institute has a sprawling campus of 6.07 acres.
b) Large trees are planted in the compound. In the periphery of the campus, along the rear and wings, a thick belt of large trees is planted to bring down noise and cut down dust storms.
c) This plantation will also help keep down severe heat and cold.
d) The trees are planted in such a way that it should not completely obstruct the view of the building from outside and sunlight to room.
e) Indoor plants can be potted along the corridors and entrance of the building.
f) For enhancing the scenic beauty it is suggested to plant flowering trees, which bloom in different seasons, in front of the large trees along the periphery.
g) Vertical Gardening can be done on the compound wall of the institute.

3.13 Green Initiatives:

a) Every year the institute has published some of the sustainable development practices in and outside the institute through extension activities through NSS team.
b) The institute has published special issues such as 'Pani Visheshank', 'Sustainable Development' etc. in their college magazine.
c) Sustainable source such as rain water harvesting is practised in college institute which has helped in replenishing of bore well water.
d) The institution is involved in tree plantation activity through NSS in collaboration with the Forest Department which is implemented on and off the campus.
e) The institution has shown deep concern and actively involved in imbibing environmental consciousness among the stake holders in accordance with National Environmental Policy (NEP) by undertaking tree plantation drive, lake/pond/well cleaning activities with involvement of stakeholders and organises seminars of expert speakers for students & stakeholders for environmental concerns.
f) The college arranged special drive to clean the campus and the nearest slum area, on occasion of Swaccha Bharat Campaign in 2016.
g) The institute is planning to install solar panels at hostel building and college office to promote use of renewable energy in FY 2017-2018.
h) Wide range of activities such as student camps, poster competition, film shows, field visit/survey , seminars, projects, environment campaign, water awareness conservation and harvesting and wall poster competition, essay competition are organised to inculcate ecological awareness among the students.
i) Car/bike pooling is being practised by staff members or students which is a sustainable initiative which reduces the air pollutions and fuel conservation etc.

Seminars on environmental concerns

Tree Plantation drive

Swacch Bharat Campeign

Well cleaning activity

4 RECOMMENDATIONS/ SUGGESTIONS:

4.1 For Improving Energy Consumption:

a) Every classroom and lab with central switch board should have a diagram linking place of 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) Conduct energy audit and determine the lux levels within institute. Based on which reduction in number of light fittings in the institute could be considered.
d) Standard Operation Procedures (SOPs) should be prepared and followed for green purchasing wherein equipments with star rating; those using eco-friendly materials; those with safe disposal policy or return to supplier after defunctioning, can be considered.
e) 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.
f) Usage of light reflectors is recommended as the reflectors can spread light to relatively large areas.
g) If possible, computers should be switched off from main power connections.
h) Notices/ signage can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all electricals when not in use
i) Use of renewable energy should be considered.

4.2 Water Conservation:

a) Encourage efficient water use and reporting by installing water meters at key locations. Provide information on water usage and savings to students/ staff through notices, screen savers in computer labs.
b) Minimize/ reduce water usage by installing water saving faucets such as tap pressmatic taps, tap aerators, jet sprays etc.
c) Dual flushing system can be installed for toilet flushing which saves considerable amount of water.

d) Grey water/ sewage recycling system can be installed for flushing toilets. This will reduce the fresh water footprint of DSMC.
e) Installation of waterless urinals can be considered to reduce water consumption.
f) 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. Encourage efficient water use.

4.3 Paper and other Solid Waste Reduction:

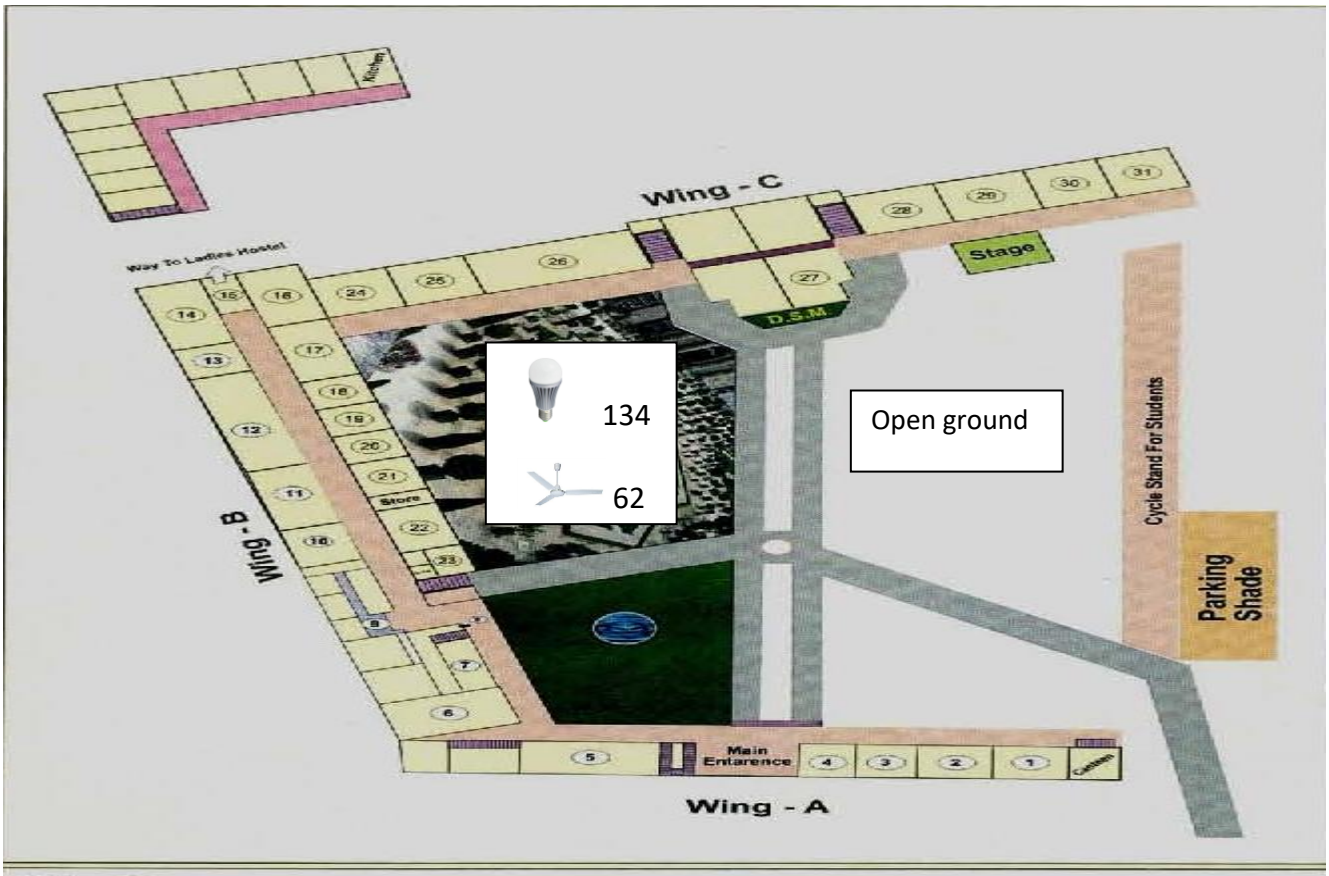
a) Inventories of all solid waste generated in the premises must be maintained.
b) There should be waste segregation practices at source by providing separate bins.
c) Enhance recycling. This can be done by creating a group where students can recycle books, personal clothes and other material to needy students. This can be an initiative under green program.
d) Standard Operating Procedures (SOP) for Solid and E-waste management and for recycling of waste should be prepared & practised. 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.
e) 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. Biodegradable waste from canteen can be used for composting. (Refer **Annexure 5** for details)
f) Plastic bottles to be handed over to PET recyclers.
g) The college can introduce online medium/ app, which can be useful for conducting internal exams, assignment/ reports submission. This system can also be used for displaying important notices, timetables.
h) Paper usage shall be monitored to understand the impact of digitisation in the facility.

4.4 Others:

a) Environmental advisory committee could be formed. The discussions/ information sharing among different departments can generate lot of ideas and awareness on green issues.
b) 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'.
c) 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.
d) Consider detailed energy audit (energy consumption, thermal emission, visual comfort) and water audit.
e) Adopt environmentally responsible purchasing policy, and work towards creating and implementing a strategy to reduce environmental impact of its purchasing decision.
f) Small composting facility can be provided for canteen to treat the biodegradable waste. Compost generated can be utilised for plants near compound wall.
g) Vertical gardening can be done using indoor plants. Hydroponic garden can be an option where in small space also plants can be planted. Drip irrigation system can be provided for plants.
h) Indoor air quality can be monitored to ensure safe and healthy environment.

ANNEXURE 1: DSM Institute Floor Plan

Ground Floor



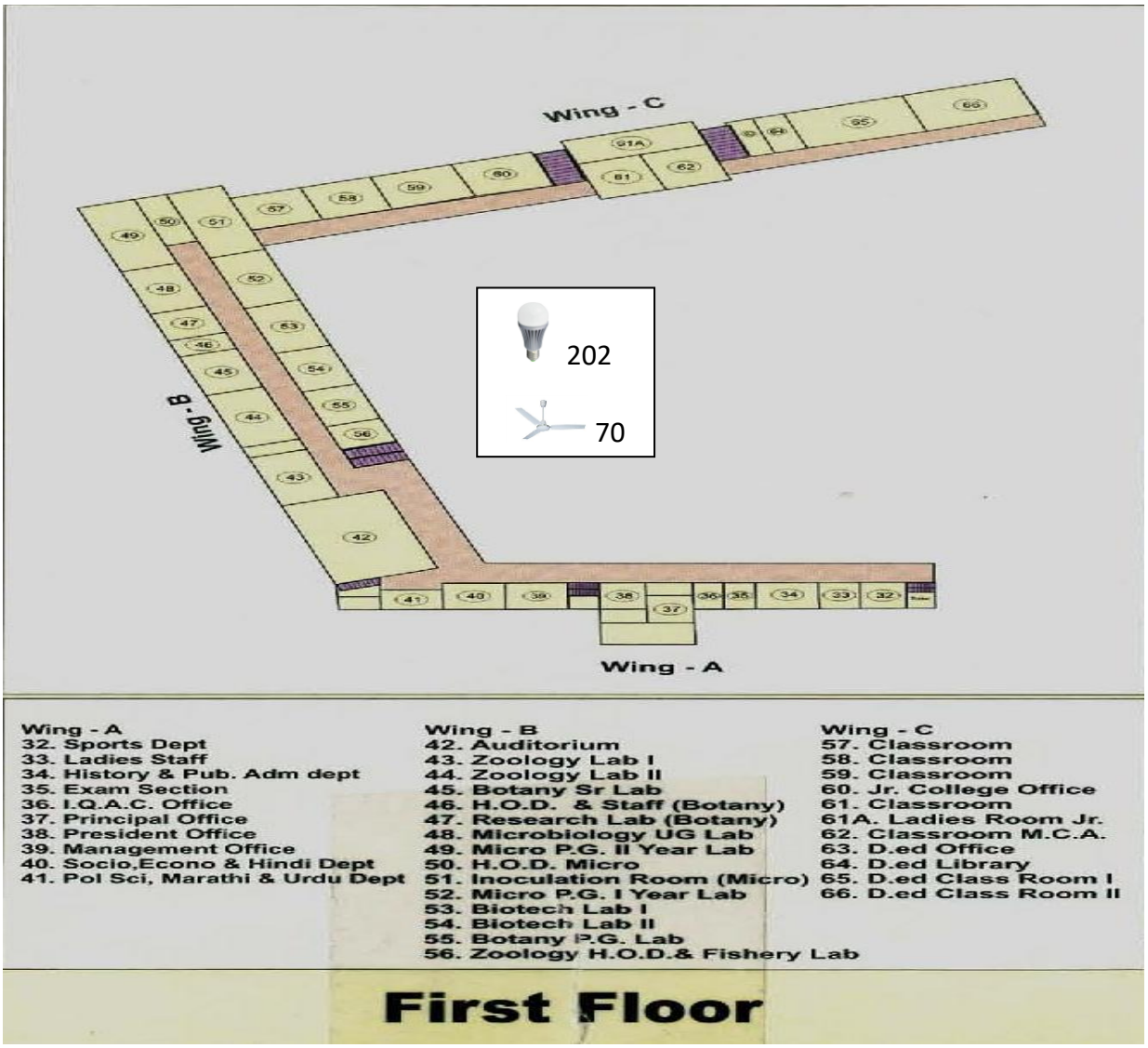
Wing - A
1. Ladies Room
2. Account Section
3. Co-opertive Store
4. MCVC Office
5. Office

Wing - B
6. English Department
7. Record Room
8. Computer Lab Under Ground
9. Computer Lab & Dept
10. Physics Lab
11. Electronics Lab
12. Chemistry PG Lab
13. Preparation Lab
14. Jr. Lab Chem
15. Sr. Lab Chem
16. Research Lab Chem
17. Staff Room & H.O.D. Chem
18. Demo Room Chem
19. Store Room Chem
20. Instrumental Lab Chem
21. Jr. Physics Lab - I

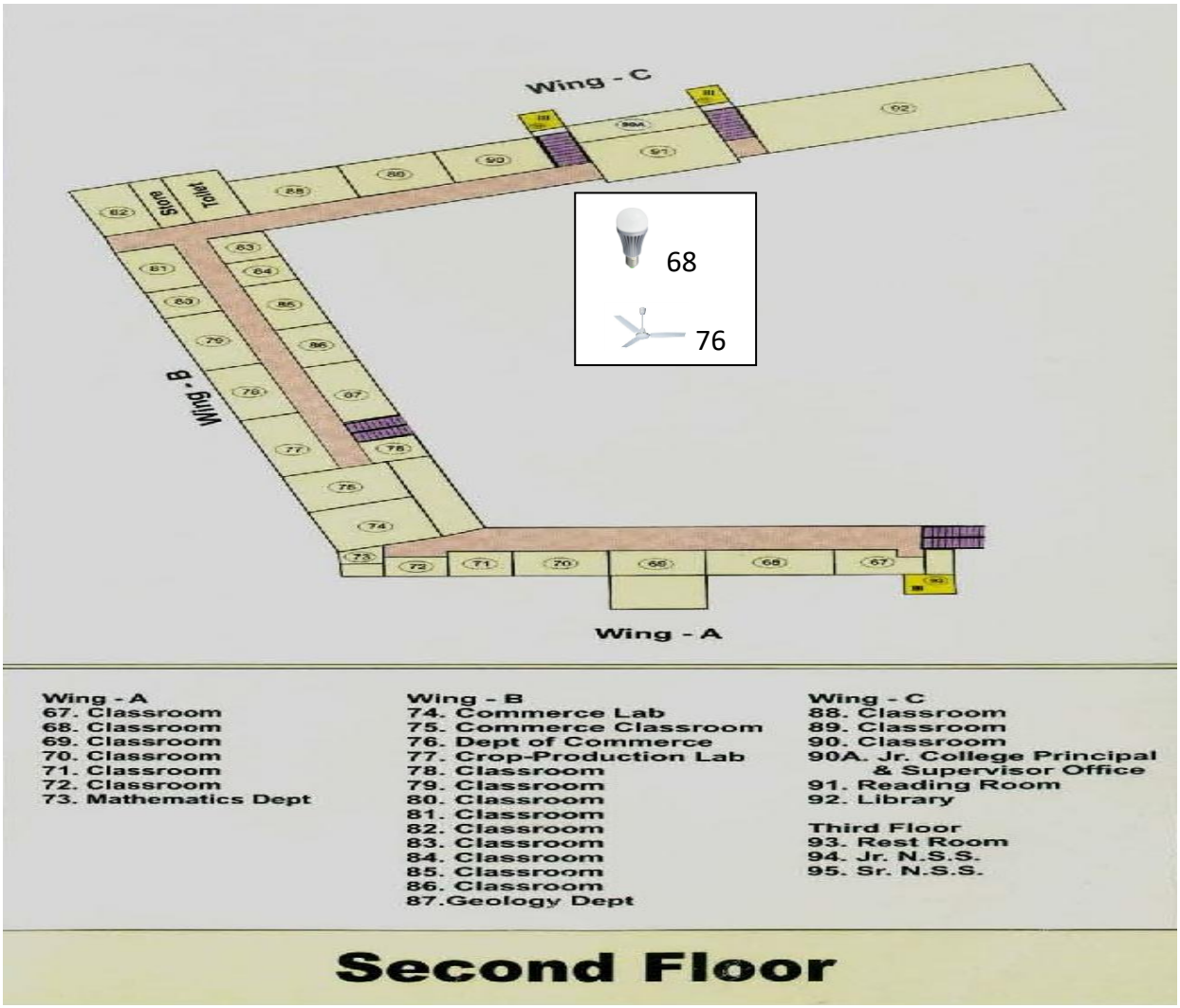
Wing - C
22. Jr. Physics Lab - II
23. Physics H.O.D. & Staff
24. Classroom
25. Classroom
26. Classroom
27. M.C.A. Dept
28. M.C.A. Office
29. Classroom
30. Classroom
31. Classroom

Ground Floor

First Floor


Wing - C
Wing - B
Wing - A
202
70
Wing - A
32. Sports Dept
33. Ladies Staff
34. History & Pub. Adm dept
35. Exam Section
36. I.Q.A.C. Office
37. Principal Office
38. President Office
39. Management Office
40. Socio,Econo & Hindi Dept
41. Pol Sci, Marathi & Urdu Dept
Wing - B
42. Auditorium
43. Zoology Lab I
44. Zoology Lab II
45. Botany Sr Lab
46. H.O.D. & Staff (Botany)
47. Research Lab (Botany)
48. Microbiology UG Lab
49. Micro P.G. II Year Lab
50. H.O.D. Micro
51. Inoculation Room (Micro)
52. Micro P.G. I Year Lab
53. Biotech Lab I
54. Biotech Lab II
55. Botany P.G. Lab
56. Zoology H.O.D.& Fishery Lab
Wing - C
57. Classroom
58. Classroom
59. Classroom
60. Jr. College Office
61. Classroom
61A. Ladies Room Jr.
62. Classroom M.C.A.
63. D.ed Office
64. D.ed Library
65. D.ed Class Room I
66. D.ed Class Room II
First Floor

Second Floor



Wing - A
67. Classroom
68. Classroom
69. Classroom
70. Classroom
71. Classroom
72. Classroom
73. Mathematics Dept

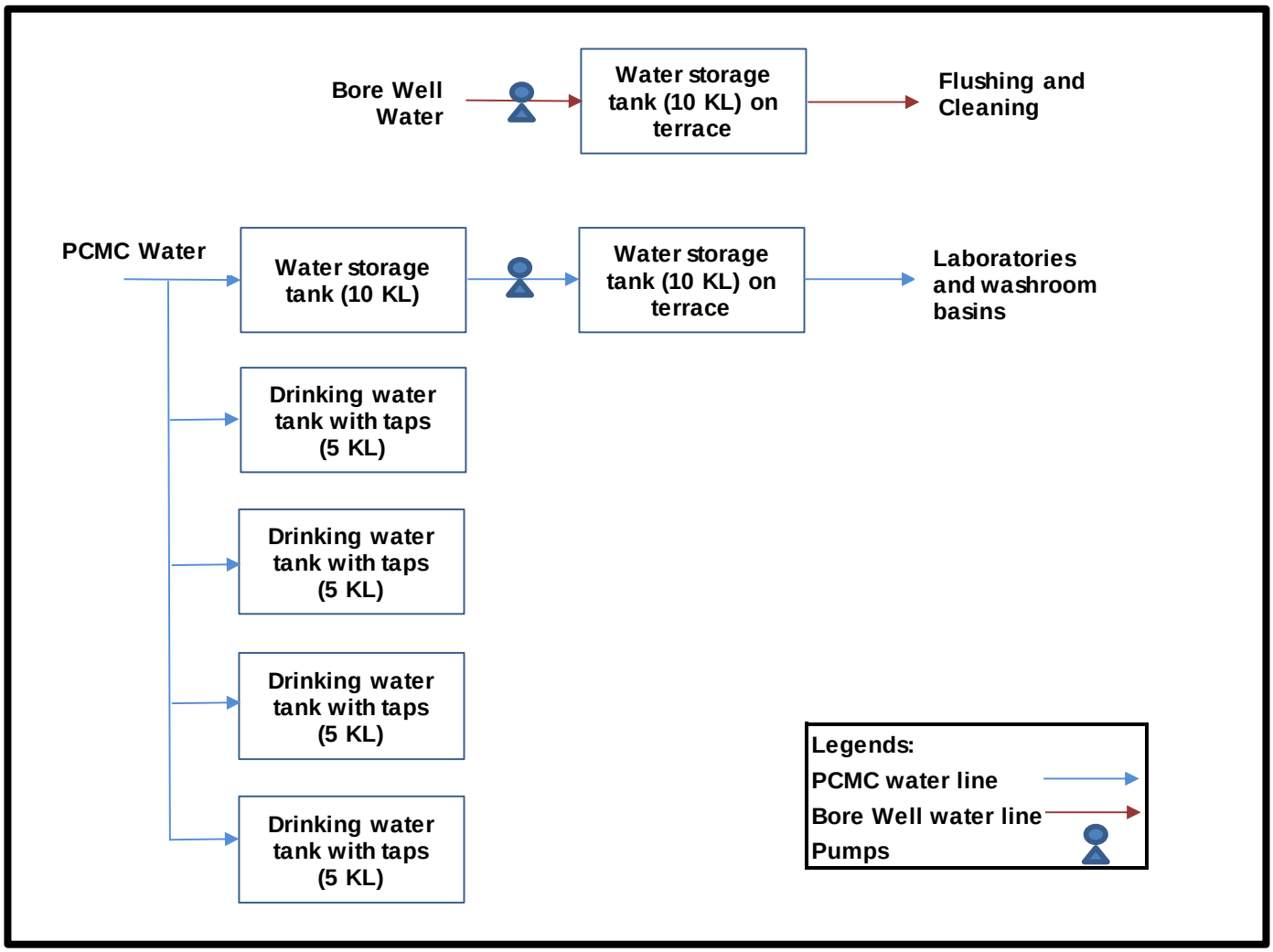
Wing - B
74. Commerce Lab
75. Commerce Classroom
76. Dept of Commerce
77. Crop-Production Lab
78. Classroom
79. Classroom
80. Classroom
81. Classroom
82. Classroom
83. Classroom
84. Classroom
85. Classroom
86. Classroom
87.Geology Dept

Wing - C
88. Classroom
89. Classroom
90. Classroom
90A. Jr. College Principal & Supervisor Office
91. Reading Room
92. Library

Third Floor
93. Rest Room
94. Jr. N.S.S.
95. Sr. N.S.S.

Second Floor

Annexure 2: Water Distribution Diagram



Annexure 3: Indoor Gardening Details

Indoor plants are commonly used for their aesthetics benefits but they also have vital role reducing airborne pollution. The right choice of plants can be an excellent way of improving indoor air quality and general health. Local landscape contractor can be contacted for supply and rotation of these plants.

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, paneling 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

Annexure 4: List of Electrical Instruments and Energy Intensive Areas

Sr. No.	Facility	Details of Provisions
1.	Total Classrooms - 22 Nos.	Computers and Projectors
2.	Staff Rooms -24 Nos.	Computers
3	Seminar Halls-1 No.	Seminar Hall
4	Central Library	Computers
5	Department of Computer Sci.- 6 Labs, one Store and Server room	65 Computers, Server room, AC and Online UPS/ Inverter facility
6	Department of Physics- 04 Labs	The facility of GM Counter and Microwave bench is available. The lab has 04 computers and facilities of online UPS/Inverter.
7	Department of Electronics 01 Room for Lab	Online UPS/ Inverter, Digital Cathode Ray Oscilloscope (CRO), 4CROs, Storage CRO, microcontroller kit, Function Generator, 2 Digital Cameras and T.V. are also available.
8	Department of Chemistry 06 Labs	The important instruments include Rotary Vacuum Evaporator, Polarimeter, Conductometer, Potentiometer, pH meter, UV-Visible spectrophotometer, FTIR Spectrophotometer
9	Department of Zoology 03 Labs	Compound Microscope-15, Simple Microscope - 30, Binocular Microscope- 1, Research Microscope -1, Phase Contrast Microscope - 1, Hand Lens - 30, Clinical Centrifuge-1, Micrometer, Camera Lucida- 17, Haemoglobinometer -12, Haemocytometer- 15, BOD Incubator-1
10	Department of Fishery Sci. - 01 Lab.	The lab is equipped with museum specimens, BOD Incubator, aquarium.
11	Department of Botany- 03 Labs	Well - Laminar Air Flow Chambers, Seed Germinator unit, BOD incubator, Phase Contrast Microscope, Electrophoretic Apparatus, Fully equipped Tissue Culture Lab with air conditioned culture room and shaker.
12	Department of Microbiology 04 Labs for UG and PG	Mechanically Stirred Glass Fermenter (Bioreactor), UV-VIS Spectrophotometer, Microbiology lab with BOD incubator, bacteriological incubator, Electronic Microscope- 12 nos., Trinocular Research microscope, Hot Air Oven- 2 nos., Water Quality testing facility (for academic purpose only)
13	Department of Biotechnology 02 Labs	PCR, Spectrophotometer, Cooling centrifuge, Incubator, Ultracentrifuge, Hot Air Oven, Water Bath.
14	Department of Geology (02 Labs)	5 PCs and Projector, environmental dust sampler,

15	Department of Commerce and Management- 03 Labs, 01 staff room and 01 Lab for B.VOC. Retail	44 PCs and 2 Projectors with interactive Pan-boards are also installed. Television unit and online UPS and Inverter
16	Department of Mathematics 01 Lab	8 PCs and Projector.
17	Department of Statistics 01 Lab	6 PCs and Projector.
18	Department of English and Language lab- 01 Room and 01 as	22 Computers
19	Department of Hindi 01 Room	2 Computers
20	Department of Marathi 01 Room	1 Computer
21	Department of Urdu 01 Room	1 Computer
22	Department of Economics 01 Room	2 Computers, UPS and Inverter are also available.
23	Department of Sociology 01 Room	2 Computers
24	Department of Political Sci. 01 Room	1 Computer
25	Department of History 01 Room 01 Room for Photo Gallery	2 Computer, Digital SLR Camera
26	Department of Public Administration 01 Room	1 Computer
27	Physical Education and Sports 01 Room	BMI indicator, BP apparatus, Pulse-rate measuring equipment, digital camera. It is also provided the computer and printer.

Annexure 5: Composting

After Compost generation:

1 tonne of mixed waste gives 60 - 70 Kg of composts

Urban farming- Milk crate farming could be an option

Annexure 6: Green Audit Checklist

Good Daylight Design & Ventilation

Sr. No.	Design Feature	Status	Remarks (If any)
1	Broad door opening	✓	
2	Clerestories (High windows)	✓	
3	Rectangular building so that sunlight can reach all areas	✓	
4	Double or triple glazing on windows/ Sun protecting film on windows	X	
5	Enough illumination from natural light	✓	
6	Light coloured fabric curtain or blind for window covering	✓	
7	Operable/ openable windows	✓	
8	Use of glass as facilitator of natural light	✓	
9	High ceiling	✓	
10	Wide corridors	✓	
11	Use of exhaust fans	✓	Exhaust fans are provided in washrooms and chemistry lab.

Water Efficiency & Wastewater Management

Sr. No.	Design Feature	Status	Remarks (If any)
1	Aerators to water taps	X	
2	Automatic toilet faucets	X	
3	Dual flush toilet with cistern	X	
4	Efficient plumbing system from maintenance & operation point	✓	
5	Use of low flow/ flow control water equipment or gadget	X	
6	Water free urinals (No flush urinals/Zero flush urinals/Water less urinals/air based flushing system these save water used in toilet)	X	
7	Drip irrigation (This refers to plant watering system)	X	
8	Water distribution diagram/water network/Water balance diagram	X	This would be useful for monitoring & reducing water consumption.
9	Sewage treatment plant for treated sewage recycle	X	This will be useful for recycling water after treatment.
10	Rainwater harvesting	✓	
11	Display of signboards at appropriate places for water conservation	X	
12	Use of bore-well water in the toilet for flushing	✓	We should discourage use of ground water

Indoor Air Quality

Sr. No.	Design Feature	Status	Remarks (If any)
1	Installation of HVAC	X	As the building has open ventilation, there is no need for an HVAC system.
2	Monitoring of HVAC system	X	
3	Maintenance of HVAC system	X	
4	Installation smoke detectors	X	This will be useful from safety point of view.
5	Indoor air quality monitoring	X	
6	Indoor Air Quality (IAQ) awareness programs	X	

Energy Efficiency and On-site Energy Generation Mechanism

Sr. No.	Design Feature	Status	Remarks (If any)
1	Use of natural day light	✓	
2	Use of energy efficient equipments	✓	
3	Use of energy saving bulbs (LED lights)	X	Installation of LED lights have been proposed in the entire institute however at the entrance CFL lights are installed.
4	On-site energy generation	X	
5	Photocell occupancy sensor for automatic light control	X	
6	Regular maintenance of electrical system	✓	
7	Computerized monitoring of electrical system	X	
8	Solar panel	X	The institute is planning Installation of solar panels in FY 2017- 2018
9	Display of signboards at appropriate places for energy conservation	X	

Temperature and Acoustic Control

Sr. No.	Design Feature	Status	Remarks (If any)
1	Use of daylight design (Building is constructed in such a way that diffused sunlight allows light but not the heat)	✓	
2	Special walls for temperature control and noise barrier (Thick/ Double/ Composite/ Acoustic control)	X	
3	Earth air tunnel (cools air in summer and heat it in winter)	X	
4	Roof with reflective glass	X	
5	Use of cool roofing material during construction (mineral wool, rock wool, vermiculite, foams, expanded polystyrene, extruded polystyrene etc.)	X	
6	Use of insulation material (e.g. autoclaved aerated blocks, hollow blocks etc.	X	

7	Use of water bodies/fountain	X	
8	Use of landscaping as sound barrier	✓	

Waste Management

Sr. No.	Design Feature	Status	Remarks (If any)
1	Segregation of dry and wet waste	X	Segregation will help in waste management.
2	Use of coloured bins with code to collect garbage	X	
3	Setting up recycling area/ composing area	X	
4	Avoid use of paper by going digital (Paper)	X	
5	Printing on both sides of paper	✓	
6	Reuse of printed paper/ envelops for other applications	✓	
7	Donation of books to store or other library	X	
8	Donation of weeded books to needy students	X	
9	Donation of computers to NGO's to refurbish and give it to needy schools/people	X	
10	Creation of specified junctions for collection of E-waste(E-waste)	X	
11	Implementation of any recycling project or program	X	
12	Purchase of electronic products from company's which have after sales service for the disposal of product with take back policy	X	
13	Reusing waste to produce new sustainable products	X	
14	Hand over to the organization or recycler who knows proper disposal system	✓	Paper waste and E-waste is handed to recycler. Solid waste from canteen is handed over to PCMC.

Environmental Audit

Sr. No.	Design Feature	Status	Remarks (If any)
1	Energy audit (includes energy consumption, thermal emission, visual comfort)	X	Would be useful to identify the reasons for increased electricity consumption.
2	Fire Safety audit	X	
3	Water and waste audit (includes water quality, solid waste generation, solid waste disposal process)	X	

Universal Access and Efficient Operation and Maintenance of Building

Sr. No.	Design Feature	Status	Remarks (If any)
1	Easy access to the main entrance of the building	✓	
2	Provision of Lift/Elevators	X	
3	Ramp/ stairs with handrails on at least one side	X	
4	Restrooms (toilets) in common areas	✓	
5	Uniformity in floor level	✓	
6	Follow standard procedures for commissioning of electrical/ plumbing system	X	
7	Regular maintenance of building	✓	
8	Use of safer cleaning solutions	✓	
9	Preferred car park spaces for specially abled	X	
10	Visual warning signage in common and exterior areas for safety	X	
11	Availability of wheel chair	✓	
12			
13			

Green Program

Sr. No.	Design Feature	Status	Remarks (If any)
1	Green education to improve environmental awareness	✓	
2	Outreach relationships with local groups interested in environmental concern and satisfy their information needs	✓	
3	Reduce, Reuse and recycle the products such as books, electronic appliances etc. (e.g. At the time of de-selection and disposal of library material)	✓	
4	Digitization of majority of processes	✓	
5	E-archiving	X	
6	E-resources : E books, Online Journals, membership of consortium	✓	
7	Subscription to databases	✓	
8	Contribute library information on sustainability resources to a institute publication, blog or website	X	
9	Selection of material content of which informs and assesses green practices (green computing, energy conservation etc.)	X	
10	Use of eco-friendly reading material	X	
11	Creation of “Green Team” in the institution	X	
12	Recycling beyond paper i.e. Plastic, e-waste	X	

13	Disseminating expert advice about sustainability to other colleges to make their own college greener	X	
14	E Publishing reviews of new green resources in the newsletter or news	X	