

**GREEN AUDIT REPORT
FOR
HANSRAJ COLLEGE
University of Delhi, Mahatma Hans Raj Marg,
Malka Ganj, Delhi - 110007**



**Carried On
29th June, 2021**

Carried Out By



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1. INTRODUCTION

One of the largest constituent Colleges of the University of Delhi - a premier institution, with highly qualified academicians imparting education in different fields, the College today enjoys a reputation for outstanding performance in academics, sports and extra-curricular activities. Rated among top ten Colleges of the country in Science, Commerce & Arts. The College ensures complete development of the body, mind and the soul while enshrining traditional Indian values in each of its students. The College was founded by the D.A.V. College Managing Committee on July 26, 1948 in the sacred memory of Mahatma Hansraj, a pioneer in the field of education. It is today one of the leading lights in the D.A.V. family of over 700 institutions and one of the largest constituent Colleges of Delhi University. More than 5000 students on its rolls interact here with a galaxy of scholars on its faculty. The College has completed 67 years in the realm of imparting higher education. It has made significant and unparalleled contribution to Society in terms of producing numerous dignitaries scholars, intellectuals and sports persons who served different domains not only in our own country but even at international levels. Over the years, the College has built up an impressive infrastructure. It includes a well-stocked Central Library, Department libraries for Science subjects and a Book Bank for needy students. The College has six Computer Labs. and 18 Science laboratories. Its sports facilities include vast playground, an Indoor Sports Complex, Playrooms, amphitheater, lift facility and the only Electronic Shooting Range in the University.

Elion Technologies and Consulting Pvt Ltd (Elion) team carried out Green audit remotely of premises in 29th June, 2021.



Campus Information

The College has an Ultra-modern air-conditioned Auditorium fitted with latest sound and light systems with a seating capacity of 500 persons and an imposing stage. Another attraction is an air-conditioned Seminar Room with a seating capacity of 120 fitted with state of the art sound and projection systems. The College has a hostel accommodating about 200 undergraduate boys and is fitted with solar geysers and 24hrs. power back up. As you enter the portals of this institution, the calm, serene atmosphere of a beautiful campus surrounded by lush green lawns and a magnificent heritage building touch your soul. For the benefit of meritorious and needy students, the College provides a number of Scholarships and Freeships. It also provided on its premises ATM and Banking facilities through a branch of Canara Bank. The College also has a Placement Cell for providing employment opportunities to graduating students through campus recruitments in the best of national and international organizations.

Following are the list of program offered:

These are B.A, B.A (Hons), B.Sc, B.Sc (Hons) and B.Com (Hons) at the UG level. And M.A, M.Sc and M.Com at the PG level. It also offers job-oriented add-on certificate courses. These include: Radio Jockeying, Anchoring & TV Journalism; Acting and Filmmaking; Mass Communication, Advertising & Marketing.

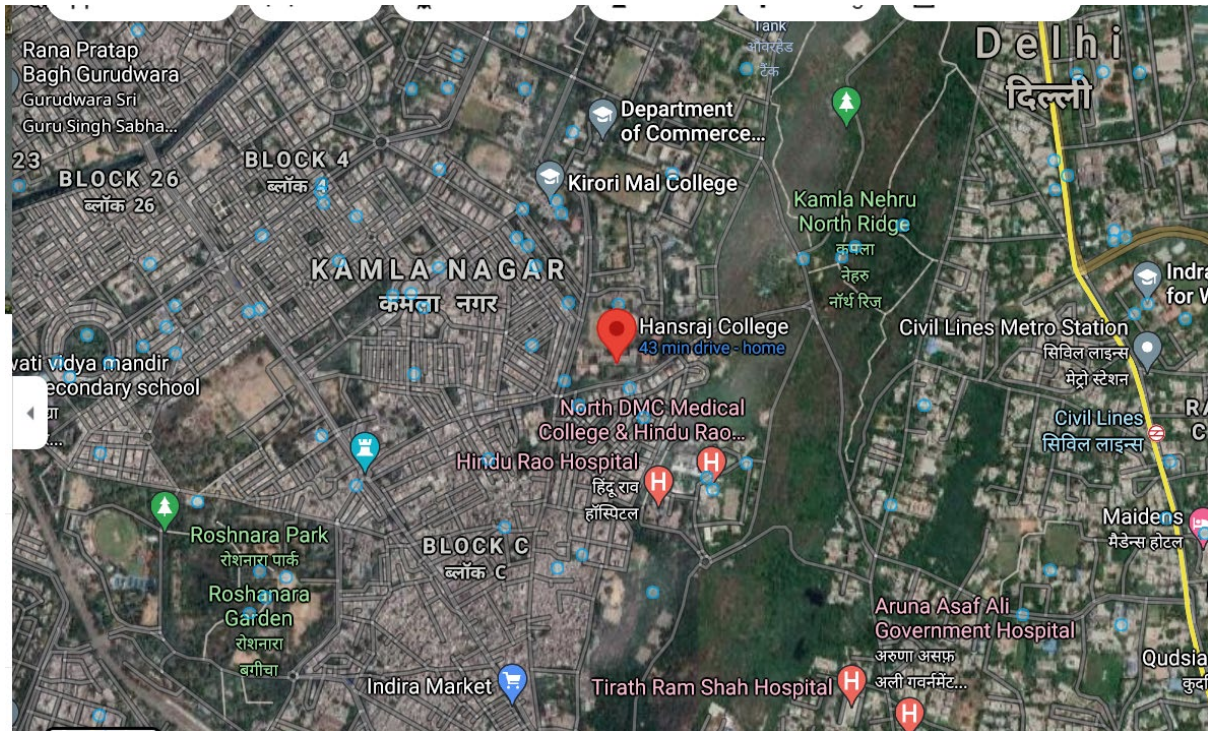
Details of the infrastructure of Hansraj college is as per below:

Total Area: 15.04 Acres

Green Area: 7.5 Acres

2. ENVIRONMENTAL SETTING

The Hansraj College is located in Delhi University and have lush green campus with surrounding areas being other colleges, restaurants, markets and residential area.



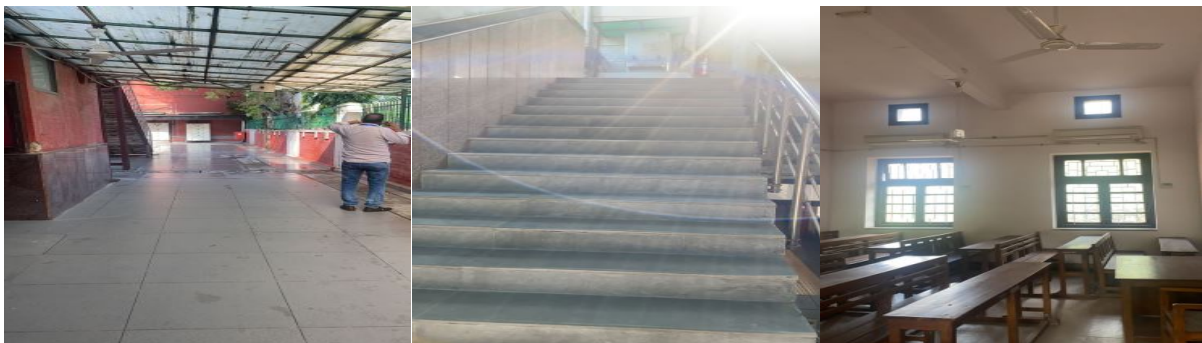
3. GREEN AUDIT

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.
- b) Classrooms, Labs and Library have large windows. Windows are kept open to adequate daylight.
- c) Classroom walls, corridors and labs are white-washed, this enhances the daylight received.
- d) Stair cases receive daylight through windows provided at various levels.





3.2 Water Efficiency:

- a) Submersible pump is used for water supply in the campus
- b) For drinking water supply water cooler are installed at various location in the campus.
- c) Currently water meter is not installed to monitor the quantity of water extracted.
- d) It is recommended water meter to be installed and daily/monthly water consumption to be recorded.
- e) Water coolers & purifiers are installed at drinking water supply points.
- f) Normally mops are used for floor cleaning and hose is used for cleaning once a week
- g) Water conservation faucets in washrooms were not seen. Installation of such faucets can save water and will help in minimizing the water footprint of the institute.
- h) Dual flushing system is not provided in the washrooms.
- i) Water from air conditioning unit and reject water from water purifiers is not used for watering plants within premises. The water may be reutilized.
- j) Rain water harvesting system is installed.

3.3 Wastewater Management:

- a) Sanitary wastewater generated from washrooms is discharged into sewage of local municipality.
- b) Wastewater/ sewage recycle is not practiced in the College 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) – 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 rooms/ labs e.g. computer labs, computer server room.
- b) Heating Ventilation and Air Conditioning (HVAC) system does not exist. Split and Windows Air conditioner are used.
- c) Exhaust fans are provided only in labs and washroom
- d) Indoor plants are not 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.
- e) Green belts have been set up in campus area.
- f) IAQ awareness signage was missing in College. Information on sources, impacts and mitigation of indoor air pollution to be displayed within College for increasing awareness about indoor air pollution.

3.5 Energy Efficiency:

Electricity:

Power is supplied by local electricity department. The major electricity consuming equipment installed in the campus are Windows and Split AC, Submersible Motor, Motors, Air Cooler, RO Plant, Desktop, Printer, Fan, Tube light, LED Bulb etc

It was observed that:

- a) LED tube lights & fans are installed in classrooms and labs. CFL and conventional tube lights are also used. College is in the process of replacing periodically the dysfunctional conventional tube lights with LED lights.
- b) College has air conditioner which are in good working condition.
- c) It was observed that reflectors are not provided for tube lights which can reduce electricity consumption.

3.6 On Site usage of LPG/ Natural Gas:

- a) Canteen facility is present in HANSRAJ College
- b) LPG is provided in the canteen for cooking.
- c) Back Up diesel generators are available.

3.7 Temperature and Acoustic Control

- a) White washed rooms & corridors and white/ off-white flooring improve the lighting conditions.
- b) The entire campus has green area



Green Campus

- c) HANSRAJ COLLEGE has done tree plantation all around the building which helps in reducing temperature



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) Prints and photocopies are taken on both sides of the pages to avoid excess paper usage. Rather than photocopy, digitalization (scanning) is practiced.
- b) Internal notices and communications are through E-mail/SMS.
- c) Faculty and administration staff uses old papers and envelopes for internal usages as rough work, file markers, page separators etc.
- d) Paper notices are displayed on the notice boards. Most of the storage is in library and staff room. After couple of years, old submissions and answer papers will be archived and stored in record room.
- e) Old papers are given to vendor in exchange of new papers, in the ratio.

3.9 E-Waste Management:

- a) HANSRAJ COLLEGE is digitalized to a large extent. This includes classrooms, library, internal mails etc.
- b) Electronic Waste is generated from various departments and administration buildings, same is stored in scrap yard inside the campus only.
- c) Policy to be drafted for disposal of e waste.

3.10 Solid Waste Management:

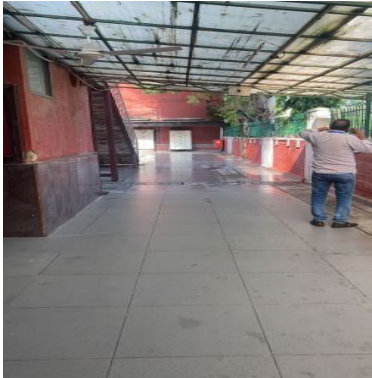
It was observed that:

- a) Wet waste and dry waste segregation are practiced in the premises. Separate bins are provided for wet biodegradable and dry recyclable waste.
- b) Non Hazardous Waste – Daily garbage, canteen waste, carton papers, plastic and civil construction waste generated from premise on regular basis. The regular collection is done by Municipal Corporation for further dispose of at dumping site.
- c) Biodegradable waste is mainly generated in canteen

3.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

- a) College is easily accessible. Staircase are provided for staff and students.
- b) Since the access and staircases are wide and uncluttered, it is possible to have a safe evacuation during emergency.
- c) Fire extinguishers and hydrant system are provided for emergency. They are inspected and serviced by fire protection service company annually.



3.12 Green belt/ Landscaping:

- a) Large trees are planted in the premises. Plantation also helps maintaining lower temperatures of the area.

3.13 Green Initiatives:

College is regularly celebrating Environment Day, and Earth Day. Solar Plant and Rain water harvesting system is available.



4. RECOMMENDATIONS/ SUGGESTIONS

4.1 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) Conduct energy audit every two or three years and determine the lux levels within College. Energy audit can help in reduction in number of light fittings/ energy usage in the College.
- d) 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.
- 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) 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.



4.2 Water Conservation:

- a) 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 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.
- 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.

4.3 Paper and other Solid Waste Reduction:

- a) Inventories of all solid waste generated in the premises must be maintained.
- b) 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.
- c) 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.
- d) Paper usage shall be monitored to understand the impact of digitization in the facility.







4.4 Others:





- a) 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'.
- b) 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.
- c) Consider detailed energy audit (energy consumption, thermal emission, visual comfort) and water audit.
- d) 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

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
 <p>Aloe Vera</p>	Formaldehyde, Trichloroethylene and Benzene	Chemical based cleaners and paints	Easy to grow with enough sunlight
 <p>Bamboo Plant</p>	Formaldehyde, Trichloroethylene and Benzene	Paints, Plastics, Wood products etc.	Thrives under low light conditions as well as easy to maintain
 <p>Chinese Evergreen</p>	Benzene	Paints	Low maintenance plant that prefers low light conditions.
 <p>English Ivy</p>	Formaldehyde, Benzene, Air borne fecal matter particles	Wood, Paper products, Air borne fecal – matter particles from pests	Easy to maintain

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

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



ANNEXURE 2

GREEN AUDIT CHECKLIST

Good Daylight Design

Sr. No.	Design Feature	
1	Broad door opening	✓
2	Clerestory/ High windows	✓
3	Openings at the eastern and southern side	✓
4	Rectangular building so that sunlight can reach all areas	✓
5	Sunshade	✓
6	Double or triple glazing on windows	P
7	Enough illumination	✓
8	Light coloured fabric curtain or blind for window covering	✓
9	Operable/ openable windows	✓
10	Ultraviolet (UV) filtering windows	P
11	Use of exterior louvers to control glare	✓
12	Use of glass as facilitator of natural light	✓
13	Use of insulated and tinted glass to filter heat gain	✓

Ventilation

Sr. No.	Design Feature	
1	Downdraft cooling system (a downward flow of air)	-
2	Ceiling height	✓
3	Self-movement ventilators in the roof	-
4	Wide corridors	✓
5	Operable windows	✓
6	Use of exhaust fans	✓



Temperature and Acoustic Control

Sr. No.	Design Feature	
1	Double roof	-
2	Earth air tunnel (cools air in summer and heat it in winter)	-
3	Green roof	-
4	Mud roof	-
5	Openings at the eastern and southern side	✓
6	Roof with reflective tile/aluminium/asbestos	-
7	Sand stone cladding outside the walls	✓
8	Special walls for temperature control (Thick/Double/cavity/fire/composite /green)	-
9	Use of cool roofing material (mineral wool, rock wool, vermiculite, foams, expanded polystyrene, extruded polystyrene etc.)	-
10	Use of daylight design (Building is constructed in such a way that diffused sunlight allows light but not the heat)	✓
11	Use of insulation material (e.g. autoclaved aerated blocks, hollow blocks, Thermocrete or higher R- value material)	-
12	Use of water bodies/fountain	-
13	Climbing creepers fitted to window in summer	-
14	Lime coating for cool roof	-
15	Retrofitting the existing roofs with cool roof technology	-
16	White wash on the roof	✓
17	Use of landscaping as sound barrier	-



Water Efficiency & Wastewater Management

Sr. No.	Measures	
1	Aerators to water taps	-
2	Automatic toilet faucets	-
3	Drip irrigation (for plant watering system)	-
4	Dual flush toilet with cistern	-
5	Efficient plumbing system	✓
6	Sewage treatment plant for sewage recycle	-
7	Rainwater harvesting	✓
8	Regular maintenance for leakage free plumbing system	✓
9	Use of low flow/flow control water equipment or gadget	-
10	Water free urinals (No flush urinals/Zero flush urinals/Water less urinals/air based flushing system these save water used in toilet)	-

Energy Efficiency and On-site Energy Generation Mechanism

Sr. No.	Measures	
1	Avoid excessive lighting	✓
2	Computerized monitoring of electrical system	-
3	Integrated energy saving design for natural cooling/heating	✓
4	On-site energy generation	✓
5	Photocell occupancy sensor for automatic light control	-
6	Regular maintenance of electrical system	✓
7	Use of day lighting system	✓
8	Use of energy efficient equipment	✓
9	Use of energy saving bulbs (Compact florescent light/LED lights)	✓
10	Solar panel	✓



Sustainable Material for Building and Interior

Sr. No.	Strategy adopted	
1	Use of biodegradable material	✓
2	Use of locally sourced material	✓
3	Use of material with low embedded energy(i.e. stabilized earth blocks, straw bales, stones, sand stone chips, fly ash)	✓
4	Use of nontoxic recycled content material and furniture	✓
5	Use of post-consumer recycled material	✓
6	Use of salvaged (Discarded or refused) material	✓
7	Use of material which can recycled at end of useful life	✓
8	Use of material which is simple to install without dangerous adhesive	✓



Waste Management

Sr. No.	Measures	
1	Avoid use of paper by going digital (Paper)	✓
2	Lessen the margins while printing	✓
3	Printing on both sides of paper	✓
4	Reuse of printed paper/ envelops	✓
5	Segregation of dry and wet waste	✓
6	Setting up recycling area/ composting area	-
7	Creation of specified junctions for collection of E-waste(E-waste)	-
8	Donation of computers to NGO's to refurbish and give it to needy people	-
9	Hand over to organization or recycler who knows proper disposal system	-
10	Implementation of any recycling project or program	-
11	Purchase of electronic products from company's which have after sales service for the disposal of product with buyback policy	-
12	Installation of bins to collect garbage	✓
13	Outsourcing recycling of garbage to agency	✓
14	Recreating in to new sustainable products	✓
15	Use of coloured bins with code to collect garbage	✓

Environmental Audit

Sr. No.	Type of audit	
1	Energy audit (includes energy consumption, thermal comfort, visual comfort)	✓
2	Sound/ Noise audit (includes indoor noise level, outdoor noise level)	-
3	Water and waste audit (includes water quality, solid waste generation, solid waste disposal process)	-



Universal Access and Efficient Operation and Maintenance of Building

Sr. No.	Design feature	
1	Easy access to the main entrance of the building	✓
2	Elevator	✓
3	Preferred car park spaces for specially abled	✓
4	Ramp/ stairs with handrails on at least one side	✓
5	Restrooms (toilets) in common areas	✓
6	Uniformity in floor level	✓
7	Audio guidance for specially abled	-
8	Personalized services by staff for differently abled	✓
9	Follow standard procedures for commissioning of electrical/plumbing system	✓
10	Purchase of standardized and quality material for repair	✓
11	Regular maintenance of building	✓
12	Use of chemical free products for cleaning	-
13	User awareness program to minimize damage of property	-



Green Program

Sr. No.	Green program	
1	Buying recycled material	-
2	Creation of “Green Team” in the institution/library	-
3	Green education i.e. to become leader in environmental awareness	-
4	College conduct graduate program by library science/Any other department	✓
5	Providing external membership to small and local libraries (MOU with other colleges, -internal collegiate library loan)	-
6	Recycling beyond books i.e. paper, aluminum, plastic, e-waste	-
7	Reduce, Reuse and recycle of the products (At the time of disposal of library material)	✓
8	Regular purchase of books/ magazines related to sustainability	✓
9	Selection of material content of which informs and assesses green practices (green computing, energy conservation, organic gardening etc.)	-
10	Contribute library information on sustainability resources to a campus publication, blog or website	-
11	Creation of topical online resource guide (on sustainability etc.)	✓
12	Disseminating expert advice about sustainability to other colleges to make their own college greener	-
13	E Publishing reviews of new green resources in the newsletter or news	P
14	Digitization	✓
15	E-archiving	P
16	E-resources : E books, Online Journals, membership of consortium	P
17	Subscription to databases	✓

✓ - Provided P - Planned