

## Certificate

This is to certify that Green Audit was carried out at Nagindas Khandwala College of Commerce, Arts & Mgmt. Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S V Road, Malad West, Mumbai 400 064 during the month of April 2022.

The scope, coverage, findings and recommendations are submitted vide our report SCPL-PR-816-190422 dated April 19, 2022.

For **SENERGY CONSULTANTS PVT LTD**



**Tushar Kamble**  
**(Project coordinator)**

*Helping You to Conserve Energy*

## Certificate

This is to certify that Energy Audit was carried out at Nagindas Khandwala College of Commerce, Arts & Mgmt. Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S V Road, Malad West, Mumbai 400 064 during the month of April 2022.

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For **SENERGY CONSULTANTS PVT LTD**



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# Report

On

## Green, Energy & Environment Audit

For

**Nagindas Khandwala College of Commerce, Arts & Mgmt.  
Studies & Shantaben Nagindas Khandwala College of  
Science  
Mumbai 400 064**

Prepared

By

**Senergy Consultants Pvt Ltd  
Mumbai 400 088**

**April 2022**

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# Contents

<b>Sr. No</b>	<b>Description</b>	<b>Page</b>
I	Introduction	3
II	Executive Summary	4
III	Electrical System	6
IV	Environmental System	12
V	Water Management	14
VI	Waste Generation & Management	16
VII	Infrastructure & Safety	18
VIII	Green Culture	23
IX	Renewable Energy	25

# I Introduction

Nagindas Khandwala College of Commerce, Arts & Mgmt. Studies and Shantaben Nagindas Khandwala College of Science, Bhavishya Bharat Campus, S V Road, Malad West, Mumbai 400 064 during the month of April 2022.

The organization is very keen to promote green culture wherever possible, as a commitment towards better environment and conservation of energy. A lot of efforts have already been put up to bring down the carbon footprint. To further optimize consumption and identify saving opportunities, M/s Senergy Consultants was assigned to carry out Green & Environment Audit of the premises.

This Audit Report presents the analysis of the data collected, observations made at the facility and is governed by the objectives, scope of work, methodology etc. discussed in the ensuing paragraphs.

## **Team:**

The team members of the audit study.

- Mr Ravindra Datar
- Mr Siddhesh Pagare

## **Acknowledgment:**

We wish to express our gratitude towards Dr Ancy Jose (Director) and Dr Moushumi Datta (Incharge Principal) for having given us the opportunity for conducting the study and the support provided during the study.

We are also thankful to Prof Ashish Modi for extending the necessary help and co-operation from their side.

## II

# Executive Summary

The premises were evaluated against the various criteria laid down by the National Assessment and Accreditation Council (NAAC). The major observations are.

### Renewable Energy:

- The college has installed Roof-top Solar Photovoltaic System of 2 kW capacity with Net metering facility to partially meet the electricity consumption.
- The quantity of plate waste (organic waste with higher starch contents) is negligible, consequently, there is no potential for biogas generation. The college has already installed compost pit.

### Green Campus Initiative:

- The movement of vehicle inside the campus is restricted with vehicles of Special Dignitaries and VIP Guests are allowed to enter the campus.
- There is a completely ban plastic usage inside the campus.
- The campus is surrounded with a lot of greenery, trees, and proper landscaping.
- The college has formed internal committee for conservation of resources like energy, water.
- The student participation is encouraged in such activities through student clubs and activities.

### Environment & Energy Initiative:

- The activities are limited due to COVID 19 pandemic.

### Air Quality & Ventilation:

- The classrooms and other area are well ventilated to ensure proper air quality.
- All the class rooms are air conditioned and are without ceiling fans. The possibility of provide ceiling fans for better circulation of air may be assessed.
- The outdoor plants have also been provided to improve the environment.
- The air conditioned rooms are provided with proper ventilation and fresh air.

### Lighting System:

- The usage of natural light is optimized through well designed structure and windows.
- The toilets are provided with sensor based automation for switching of lamps, which may be extended to common areas.
- Almost all the light fitting are provided with high efficiency LED lamps.

### Water Quality & Conservation:

- The water is supplied by the Municipal Corporation, which is a common practice in Mumbai, Thane & Navi Mumbai.
- Water purifiers & coolers are provided at convenient locations and on each floor.
- The distribution network and piping are more or less satisfactory and adequate.
- The toilets are provided with water efficient (low usage) fittings
- The rain water harvesting pit is provided for ground water recharge.

### Waste Management:

- Most of the effluent water is treated in the Gray Water Treatment Plant and used for toilet flushing and gardening.
- The organic waste is segregated and disposed through municipal system; which may be converted in to manure by installing composting pits / waste collector machine.
- There is no hazardous or medical waste generated in the college.
- The electronic gadgets / waste is either donated if useful or handed over to appropriate waste collectors.
- The general solid waste is disposed through municipal corporation.

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**Air Conditioning System:**

- The Air Conditioners are operated as required with manual control. The operation is minimal consequently automation may not be economical.
- The room temperature is maintained at 23 to 25 °C, which is well within the recommended values.
- The Air Conditioners are serviced regularly and properly maintained.
- Most of the Air Conditioners units are energy efficient with star rating of 3 and above.
- The air conditioned space is properly sealed to prevent air ingress / cold air loss.
- There is no solar heat ingress through window panes.

**Infrastructure usage:**

- Ramps are provided on the ground floor to address the needs of differently abled persons.
- The elevators are provided for staff and differently abled persons.
- The separate toilets are available on each floor to address the needs of differently abled persons.
- The on-campus movement is distributed with multiple entrances as well as staircases.
- The fire extinguishers are provided at key areas.
- The draining system for washrooms is efficient and effective.
- There were no seepages observed in the building premises.

**Green IT culture:**

- The Energy efficient computers and laptops have been procured.
- The electronic communication is encouraged to minimize usage of papers.
- Most of the papers are reused for doubled sided printing to further minimize usage of paper.

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## III Electrical System

### Gadget List

#### Lamps:

Location	LED		Operation	
	15 W	20 W	Hr/D	D/M
<b>E-Wing</b>				
<b>Ground Floor</b>				
Admin Office	12		10	25
<b>First Floor</b>				
Class Room 11		10	10	25
Class Room 12		10	10	25
Class Room 13		9	10	25
Class Room 14		8	10	25
Class Room 14A		4	10	25
Staff Room	15		10	25
Class Room 16		6	10	25
Class Room 17		8	10	25
Class Room 18		5	10	25
<b>Second Floor</b>				
Class Room 21		11	10	25
Class Room 22		13	10	25
Class Room 23		10	10	25
Class Room 24		9	10	25
Class Room 24 A		3	10	25
Class Room 25		9	10	25
Class Room 26		9	10	25
Class Room 27		10	10	25
Class Room 28		5	10	25
<b>Third Floor</b>				
Class Room 31		6	10	25
Class Room 32		2	10	25
Class Room 33		6	10	25
Class Room 34		6	10	25
Class Room 36		10	10	25
Class Room 37		5	10	25
Class Room 38		6	10	25
Class Room 39		6	10	25
Class Room 40		6	10	25
Class Room 41		6	10	25

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NK College of Commerce, Arts & Mgmt. Studies and SNK College of Science

Location	LED		Operation	
	15 W	20 W	Hr/D	D/M
<b>Fourth Floor</b>				
Class Room 42		3	10	25
Class Room 43		6	10	25
Class Room 44		6	10	25
<b>F-Wing</b>				
<b>Fifth Floor</b>				
Class Room 51		6	10	25
Class Room 52		6	10	25
Class Room 53		4	10	25
<b>Sixth Floor</b>				
Class Room 61		6	10	25
Class Room 62		6	10	25
Class Room 63		4	10	25
<b>Seventh Floor</b>				
Class Room 71		6	10	25
Class Room 72		6	10	25
<b>D-Wing</b>				
<b>Fourth Floor</b>				
Class Room 401		6	10	25
Class Room 402		6	10	25
Class Room 403		6	10	25
Class Room 404		6	10	25
Computer Lab	9		10	25
<b>Fifth Floor</b>				
Class Room 501		4	10	25
Class Room 502		6	10	25
Class Room 503		6	10	25
Class Room 504		6	10	25
Class Room 505		6	10	25
Class Room 506		9	10	25
<b>Total</b>	36	318		

#### Observations & Suggestions:

- All the light fittings are provided with LED lamps.

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**Air Conditioning Units:**

Sr No	Location/Department	Category	Quantity	Capacity	Star Rating
<b>E-Wing</b>					
<b>Ground Floor</b>					
1	Principal Room	Split AC	1	1.5	3
2	Vice	Split AC	1	1.5	3
3	Registrar	Split AC	1	1.5	3
4	Board Room	Split AC	1	1.5	3
5	Staff Room	Split AC	2	1.5	3
<b>First Floor</b>					
1	Class Room 11	Centralized AC	2		
2	Class Room 12	Centralized AC	2		
3	Class Room 13	Centralized AC	2		
4	Class Room 14	Centralized AC	2		
5	Class Room 14A	Centralized AC	2		
6	Staff Room	Centralized AC	4		
7	Class Room 16	Centralized AC	2		
8	Class Room 17	Centralized AC	2		
9	Class Room 18	Centralized AC	2		
<b>Second Floor</b>					
1	Counseling	Split AC	1	1.5	3
2	Class Room 21	Centralized AC	2		
3	Class Room 22	Centralized AC	2		
4	Class Room 23	Centralized AC	2		
5	Class Room 24	Centralized AC	2		
6	Class Room 24 A	Centralized AC	2		
7	Class Room 25	Centralized AC	2		
8	Class Room 26	Centralized AC	2		
9	Class Room 27	Centralized AC	2		
10	Class Room 28	Centralized AC	2		
<b>Third Floor</b>					
1	Class Room 31	Centralized AC	2		
2	Class Room 32	Centralized AC	2		
3	Class Room 33	Centralized AC	2		
4	Class Room 34	Centralized AC	2		
5	Class Room 36	Centralized AC	2		
6	Class Room 37	Centralized AC	2		
7	Class Room 38	Centralized AC	2		
8	Class Room 39	Centralized AC	2		
9	Class Room 40	Centralized AC	2		
<b>Fourth Floor</b>					
1	Class Room 41	Centralized AC	2		
2	Class Room 42	Centralized AC	2		

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Sr No	Location/Department	Category	Quantity	Capacity	Star Rating
3	Class Room 43	Centralized AC	2		
4	Class Room 44	Centralized AC	2		
<b>F-Wing</b>					
<b>Fifth Floor</b>					
1	Class Room 51	Centralized AC	2		
2	Class Room 52	Centralized AC	2		
3	Class Room 53	Centralized AC	2		
<b>Sixth Floor</b>					
1	Class Room 61	Centralized AC	2		
2	Class Room 62	Centralized AC	2		
3	Class Room 63	Centralized AC	2		
<b>Seventh Floor</b>					
1	Class Room 71	Centralized AC	2		
2	Class Room 72	Centralized AC	2		
<b>D-Wing</b>					
<b>Fourth Floor</b>					
1	Management	Split AC	2	1.5	3
2	Class Room 401	Centralized AC	2		
3	Class Room 402	Centralized AC	2		
4	Class Room 403	Centralized AC	2		
5	Class Room 404	Centralized AC	2		
6	Computer Lab	Centralized AC	4		
<b>Fifth Floor</b>					
1	Class Room 501	Centralized AC	2		
2	Class Room 502	Centralized AC	2		
3	Class Room 503	Centralized AC	2		
4	Class Room 504	Centralized AC	2		
5	Class Room 505	Centralized AC	2		
6	Class Room 506	Centralized AC	2		

#### Observations & Suggestions:

- The Air Conditioning Units are with star rating of 3 and above, which are intrinsically operate at high energy efficiency.
- The Air Conditioners are operated as required with manual control. The operation is minimal consequently automation may not be economical.
- The temperature is maintained at 23 to 25 °C for air conditioning spaces, which is within the recommended values.
- The machines are regularly serviced and maintained in good condition.
- The possibility of provide ceiling fans for better circulation of air may be assessed.

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**Water Coolers:**

Sr No	Location	Quantity
<b>E-Wing</b>		
1	Ground Floor	1
2	First Floor	1
3	Second Floor	1
4	Third Floor	1
5	Fourth Floor	2
<b>F-Wing</b>		
6	Fifth Floor	1
7	Sixth Floor	1
8	Seventh Floor	1
<b>D-Wing</b>		
1	Ground Floor	1
2	Fourth Floor	1
3	Fifth Floor	1
<b>Total</b>		<b>12</b>

**Observations & Suggestions:**

- The machines are regularly serviced and maintained in good condition.

**Water Filters:**

Sr No	Location	Quantity
<b>E-Wing</b>		
1	Ground Floor	1
2	First Floor	1
3	Second Floor	1
4	Third Floor	1
5	Fourth Floor	2
<b>F-Wing</b>		
6	Fifth Floor	1
7	Sixth Floor	1
8	Seventh Floor	1
<b>D-Wing</b>		
9	Ground Floor	1
10	Fourth Floor	1
11	Fifth Floor	1
<b>Total</b>		<b>12</b>

**Observations & Suggestions:**

- The machines are regularly serviced and maintained in good condition.

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**Computers:**

Almost all the computers are with energy efficient LCD / LED monitors.

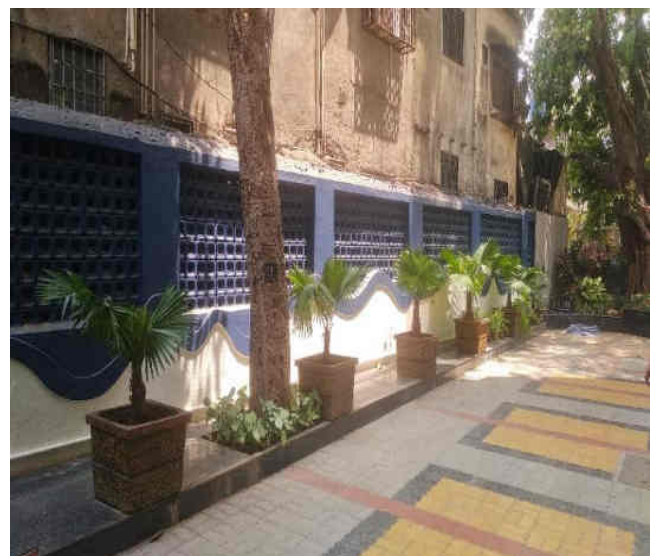
The battery / power management system may be incorporated for more efficient operation.

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## V Environmental System

### Ventilation & Air Quality:

- Several outdoor plants have been installed to improve air quality.



- The air ventilation is adequate.
- It has been a general practice to switch off the lamps & AC in an unoccupied area.
- The air conditioned rooms are provided with proper ventilation and fresh air.

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**Illumination**

- The usage of natural light has been optimized.





## V

# Water Management

The water supplied by the municipal corporation is used for drinking and other requirements. The incoming water from the municipal corporation is metered.



### Water Purifiers & Coolers:

#### Water Coolers:

Sr No	Location	Quantity
<b>E-Wing</b>		
1	Ground Floor	1
2	First Floor	1
3	Second Floor	1
4	Third Floor	1
5	Fourth Floor	2
<b>F-Wing</b>		
6	Fifth Floor	1
7	Sixth Floor	1
8	Seventh Floor	1
<b>D-Wing</b>		
1	Ground Floor	1
2	Fourth Floor	1
3	Fifth Floor	1
<b>Total</b>		<b>12</b>

### Observations & Suggestions:

- The machines are regularly serviced and maintained in good condition.

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**Water Filters:**

Sr No	Location	Quantity
<b>E-Wing</b>		
1	Ground Floor	1
2	First Floor	1
3	Second Floor	1
4	Third Floor	1
5	Fourth Floor	2
<b>F-Wing</b>		
6	Fifth Floor	1
7	Sixth Floor	1
8	Seventh Floor	1
<b>D-Wing</b>		
9	Ground Floor	1
10	Fourth Floor	1
11	Fifth Floor	1
<b>Total</b>		<b>12</b>

**Observations & Suggestions:**

- The machines are regularly serviced and maintained in good condition.

**Water Distribution System:**

The distribution network and piping are more or less satisfactory and adequate.

**Rainwater Harvesting:**

The rainwater is fed to the rainwater harvesting pit for ground water recharge.

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## VI Waste Generation & Management

### Solid Waste:

- The organic waste is segregated in the college premises. The organic waste is fed to the composting pit and converted in manure, used for inhouse plantation.

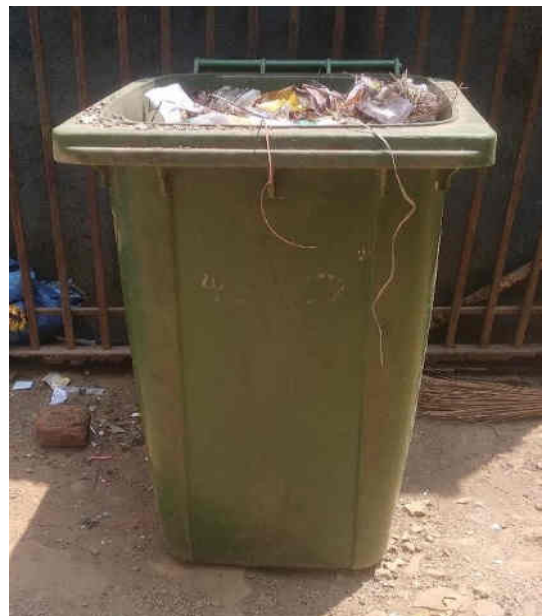


**Compose Pit**

- There is no generation of hazardous or biomedical waste in the premises.
- Each Floor is provided is with segregated dustbin for Recyclable waste and Non-Recyclable Waste



**Wet Garbage**



**Dry Garbage**

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- The electronic gadgets with residual life are donated while the electronic waste is properly segregated and handed over to appropriate scrap collector.
- The general solid waste is disposed through municipal corporation.

**Sewage & Wastewater:**

- Most of the gray / sewage water is treated in the Gray Water Treatment Plant.
- The treated water is recycled and used for toilet flushing and gardening.
- There is no generation of harmful or hazardous effluent.



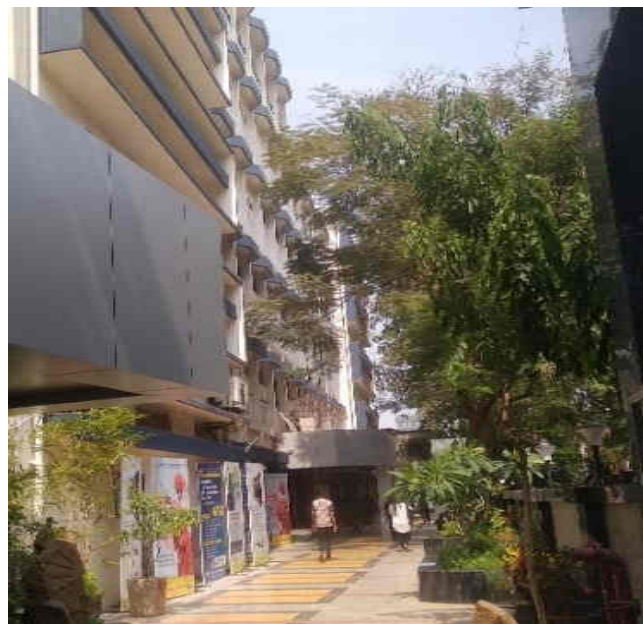
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## VII Infrastructure & Safety

### Observations:

- The premises are provided with multiple staircases with necessary entrances to ensure quick and effective movement in normal as well as emergency conditions.



- The movement of vehicle inside the campus is restricted with vehicles of Special Dignitaries and VIP Guests are allowed to enter the campus.
- There is complete ban on plastic usage inside the campus.

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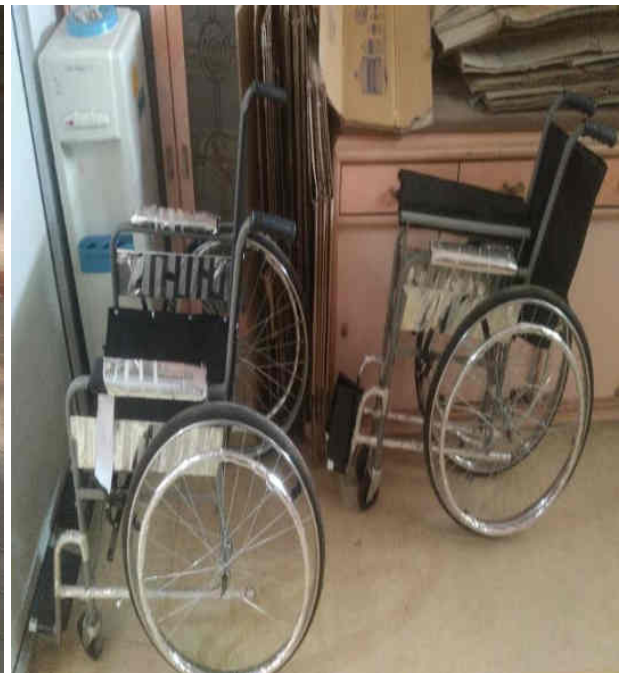
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- There is adequate parking space for vehicles / four wheelers for staff.



**Parking ( For Staff Members Only)**

- Almost all the students and many of the faculty members avail public transport system which is very convenient due to proximity to railway station and bus services.
- Ramps are provided on the ground floor to address the needs of differently abled persons.



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NK College of Commerce, Arts & Mgmt. Studies and SNK College of Science**

- The elevators are provided for staff and differently abled persons.



**Draining system:**

- The drains from the washrooms are connected to the municipal drainage, which is a common practice in the colleges in and around Mumbai.

**Seepage in the building:**

- The premise was visually inspected for seepages. No seepages were observed in any of the places.

**Firefighting & fire escape system:**

**Fire Extinguishers:**

Sr No	Location	Type	Quantity
<b>E-Wing</b>			
1	Ground Floor	Hydrant Main Pump	3
2	Ground Floor	Booster Pump	1
3	Ground Floor	Automatic Sprinkler System	10
4	Ground Floor	Hydrant wet Riser	4
5	Ground Floor	Hose Box complete with canvas hose pipe and branch pipe	1
6	Ground Floor	Fire Alarm	1
7	Ground Floor	Smoke Detector	3
8	Ground Floor	Powder Type Fire Extinguisher	1
9	First Floor	Hose Box complete with canvas hose pipe and branch pipe	1
10	First Floor	Fire Alarm	1
11	First Floor	Smoke Detector	3
12	First Floor	Powder Type Fire Extinguisher	1
13	Second Floor	Hose Box complete with canvas hose pipe and branch pipe	1
14	Second Floor	Fire Alarm	1

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Sr No	Location	Type	Quantity
15	Second Floor	Smoke Detector	3
16	Second Floor	Powder Type Fire Extinguisher	1
17	Third Floor	Hose Box complete with canvas hose pipe and branch pipe	1
18	Third Floor	Fire Alarm	1
19	Third Floor	Smoke Detector	3
20	Third Floor	Powder Type Fire Extinguisher	1
21	Fourth Floor	Hose Box complete with canvas hose pipe and branch pipe	1
22	Fourth Floor	Fire Alarm	1
23	Fourth Floor	Smoke Detector	4
24	Fourth Floor	Powder Type Fire Extinguisher	1
<b>F-Wing</b>			
25	Fifth Floor	Hose Box complete with canvas hose pipe and branch pipe	1
26	Fifth Floor	Fire Alarm	1
27	Fifth Floor	Smoke Detector	3
28	Fifth Floor	Powder Type Fire Extinguisher	1
29	Sixth Floor	Hose Box complete with canvas hose pipe and branch pipe	1
30	Sixth Floor	Fire Alarm	1
31	Sixth Floor	Smoke Detector	2
32	Sixth Floor	Powder Type Fire Extinguisher	1
33	Seventh Floor	Hose Box complete with canvas hose pipe and branch pipe	1
34	Seventh Floor	Fire Alarm	1
35	Seventh Floor	Smoke Detector	2
36	Seventh Floor	Powder Type Fire Extinguisher	1
<b>D-Wing</b>			
1	Fourth Floor	Hose Box complete with canvas hose pipe and branch pipe	1
2	Fourth Floor	Fire Alarm	1
3	Fourth Floor	Smoke Detector	2
4	Fourth Floor	Powder Type Fire Extinguisher	1
5	Fifth Floor	Hose Box complete with canvas hose pipe and branch pipe	1
6	Fifth Floor	Fire Alarm	1
7	Fifth Floor	Smoke Detector	2
8	Fifth Floor	Powder Type Fire Extinguisher	1

**Observations & Suggestions:**

- The machines are regularly serviced and maintained in good condition.
- The fire extinguishers in the premises, which are checked / refilled as per the stipulated frequency.





**Fire Alarm**



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## VIII Green Culture



### Observations & Suggestions:

- The LED / LCD monitors & Laptops has been procured, which are energy efficient.
- These monitors are not only energy efficient but also generate minimal heat and cut down on air conditioning load.
- The electronic communication is encouraged to minimize usage of papers.
- Most of the papers are reused for doubled sided printing to further minimize usage of paper.
- The major internal as well as external communication is through electronic medium.

The following steps may be initiated to further enhance efficiency of the systems.

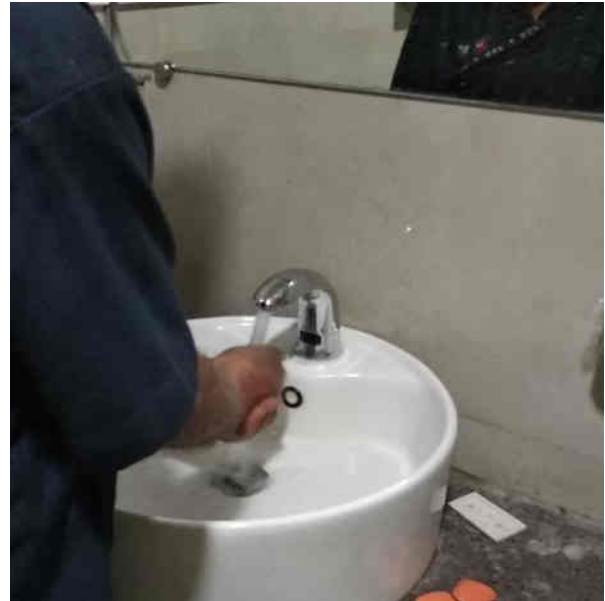
1. An efficient power management system may be incorporated to
  - a. Switch off the display if not in use.
  - b. Put the computer in Sleep mode / switching off the machines, if not used for prolonged period.
2. Optimize brightness of the screen.
3. Discourage use of screen savers, which has similar power consumption.

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**Sensor based Automation:**



Sensor based Bulbs in washroom



Sensor based taps on washroom

## IX Renewable Energy

### Solar Photovoltaic:

- The college has installed Roof-top Solar Photovoltaic System of 2 kW capacity with Net metering facility to partially meet the electricity consumption.



### Solar PV meter



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**NK College of Commerce, Arts & Mgmt. Studies and SNK College of Science**

**Solar Thermal:**

There is no application of solar thermal system and does not find attractive in this case.

**Biogas Plant:**

There is no possibility of installing biogas plant for cooking as the quantity of plate waste is negligible.