GREEN AUDIT REPORT
FOR
POORNIMA COLLEGE OF ENGINEERING
ISI-6, RIICO INSTITUTIONAL AREA, GONER ROAD, SITAPURA, JAIPUR - 302022

Carried For
Academic Session
(2019-2020)

Carried Out By

ELION TECHNOLOGIES & CONSULTING PVT LTD

307, 3rd Floor Local Shopping Centre, Lal Market,
H Block, Vikas Puri, New Delhi - 110018
Tel: +91-11-28531884, +91-11-28541888
Web: www.elion.co.in, Email: safety@elion.co.in

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Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

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1. <u>INTRODUCTION</u>

Poornima College of Engineering, the pioneer institute of Poornima Group was established in 2000 with the aim of imparting pragmatic technical education. In its magnificent journey of 20 years, PCE has set benchmarks and reached new pinnacles in engineering education with dedication, perseverance and devotion. With student strength of approx. 2,400 studying six specializations of engineering (CSE, ECE, EE, ME, Civil & IT), more than 3.5 Lacs square feet of built up area, highly qualified faculties, state of the art infrastructure, good placements and industry-led curriculum, PCE is marching ahead of others with tremendous growth since its inception.

PCE is spearheading its outstanding voyage with the motto 'Success is not a destination, it's a journey'. NBA Accreditation in CE, EE & ECE department established PCE as a leading institution of National repute. Poornima College of Engineering, Jaipur has been ranked 2nd out of approx. 144 Engineering Colleges in QIV Ranking of Rajasthan Technical University, Kota. The QIV Ranking is based primarily upon Academics, University results, Placements & Alumni.

Vision
To create knowledge based society with scientific temper, team spirit and dignity of labour to face the global competitive challenges

Mission
To evolve and develop skill based systems for effective delivery of knowledge so as to equip young professional &commitment to excellence in all spheres of life.

Quality Policy
To provide quality education through faculty development, updating of facilities and continual improvement meeting university norms and keeping stakeholders satisfied.

Campus Information

List of Course Offered by the institute
1. B. Tech Computer Engineering
2. B. Tech Information Technology

3. B. Tech Civil Engineering
4. B. tech Mechanical Engineering
5. B. tech Electronics & Communication Engineering
6. B. Tech Electrical Engineering

Details of the infrastructure of Poornima College of Engineering is as per below:

Total Area: 6 acre
Green Area: 30000 sq feet approx.

Building Name	Areas (m^2)	Number of Floors
Admin Block	10355	5
Central Block	9751	5
Admission Block	1028	2
1st year Block	6400	5
Boys Hostel 1	2240	4
Boys Hostel 2	5326	6
Boys Hostel 3	2149	6
Boys Hostel 4(Guest House)	2240	5
Girls Hostel 1	2100	5
Girls Hostel 2	2880	5

During Audit, ELION team interacted with following stakeholders:

Name	Designation
Mr. Pankaj Dhemla	Vice Principal
Mr. Girdhari	Estate in charge
Mr. Tara Chand	Executive (Infrastructure)
Mr. Amit Gupta	Chief Proctor

2. ENVIRONMENTAL SETTING

The land use around the campus is mainly mix of residential and commercial area. There are educational institutes such as Apex Polytechnic Institute, Mahatma Gandhi College, Garden and Hospital.

Poornima College of Engineering Campus

Location of Poornima College of Engineering Campus

a. GREEN AUDIT

For Green Audit following 13 major areas (including their subsections) were covered and compliance/ initiatives under these areas were verified/ validated.
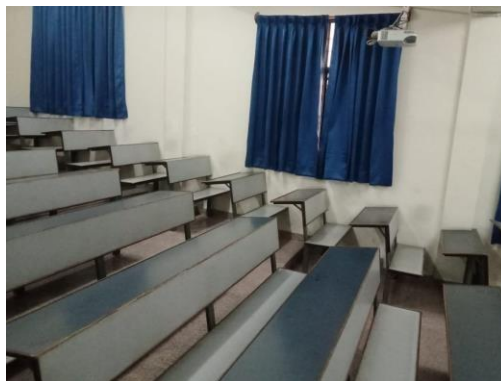
a) Good Daylight Design and Ventilation
b) Water Efficiency
c) Wastewater Management
d) Indoor Air Quality
e) Energy Efficiency
f) On-site Energy Generation
g) Temperature and Acoustic Control
h) Paper Waste Management
i) E-Waste Management
j) Canteen and Solid Waste Management
k) Universal Access and 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) Curtains are provided on some of the windows to avoid glare.
c) Laboratories are provided with exhaust fans to disperse heat, fumes and odours.
d) Stair cases receive daylight through windows provided at various levels.
e) Classrooms, Labs and Library have large windows. Windows are kept open to adequate daylight.
f) Classroom Walls, Corridors and Labs are White Washed. This enhances the daylight received.

Classroom with Curtain

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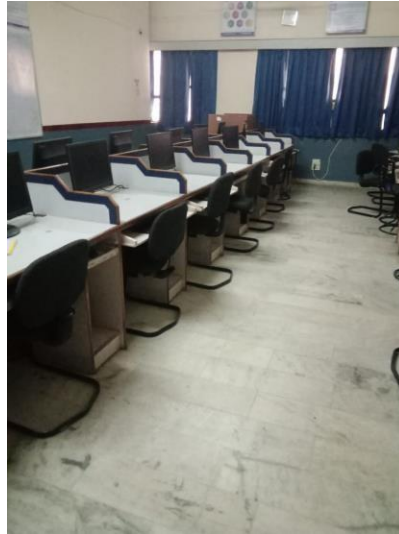
Computer Lab

Staircases which receives daylight

Library

Lab provided with exhaust fans

3.2 Water Efficiency:

a) Five numbers of Bore wells are used for water supply in the campus. Submersible pumps are used for pumping of water.

b) For drinking water from RO plants and water coolers are used at various location in the campus.

c) Rain water harvesting system is installed in the campus.

d) 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.

e) Dual flushing system are not provided in the washrooms.

f) Signage are provided in washrooms emphasizing water conservation.

g) At present, water from air conditioning unit and reject water from water purifiers is not used for other purposes.

Wash Room with Exhaust
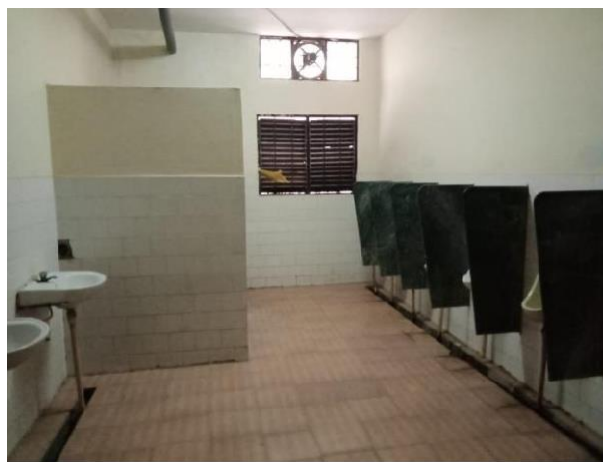
Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
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Rain Water Harvesting

Following are the list of water tanks installed with sensors:

Location	Tank Capacity (Litre)	Type Underground/Overhead
Side of Admin block	150000	RCC underground
Opposite canteen	75000	RCC underground
Behind 1st year block	40000	RCC underground
Admin block	25000	RCC overhead tank
Admin block	50000	RCC overhead tank
1st year block	90000	RCC overhead tank
Hostel 1	2000	Syntax overhead
Hostel 2	2000	Syntax overhead
Hostel 3	2000	Syntax overhead
Hostel 4	2000	Syntax overhead
Hostel 5	2000	Syntax overhead
Hostel 6	2000	Syntax overhead
Hostel 4	60000	RCC overhead tank
Hostel 6	80000	RCC overhead tank
Hostel 6	80000	RCC overhead tank
Hostel 3	1000	RO water Syntax overhead

Following are the list of water coolers installed with sensors:

Specification	Location	Capacity(L)	Number
RO plant	Admin Block	1000	1
Water cooler	Admin Block	150 Litre each	4
Water cooler	Central Block	150 Litre each	4
Water cooler	1st year block	150 Litre each	4

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B.E., M.E., Ph.D.
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Water cooler	Student canteen	150 Litre each	1
Water cooler	Hostel	150 Litre each	5
Water cooler	Mess dining hall	150 Litre each	1

3.3 Wastewater Management:

a) Wastewater/ sewage recycle is practiced in the College as grey water/ sewage treatment/recycle facility is provided.
b) Sewage Treatment plant is already provided in the campus which is a good practice.

Sewage Treatment Plan

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.
- 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 monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels.
- Carbon dioxide – Due to human respiration
- Particulate matter – Due to construction and maintenance activities

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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.
b) Green belts have been set up in campus area.
c) Split and Window ACs are used in all labs and offices.
d) 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.
e) Exhaust fans are provided only in labs.
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.
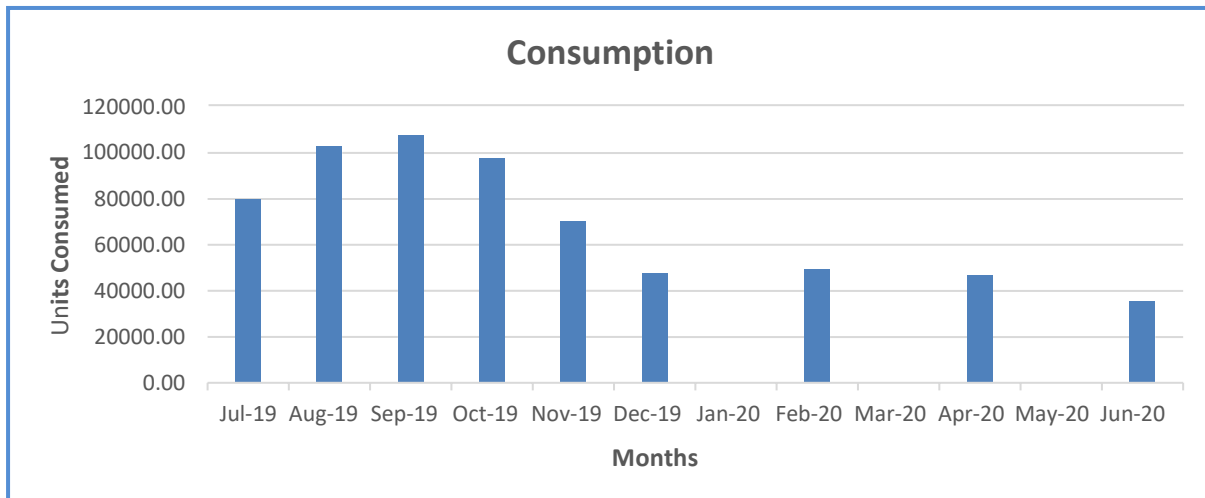g) Indoor Air Quality tests have been carried out. Same needs to be carried out at least once a year.

3.5 Energy Efficiency:

Electricity:

Power is supplied by local electricity department. The major electricity consuming equipment installed in the campus are ACs, Motors, Desktop, Printer, Fan, Tube light, CFL Bulb, LED Bulb and Street Lights.

Following is details of energy consumption:

Months	Units Consumption
Jul-19	79850
Aug-19	103010
Sep-19	107530
Oct-19	97750
Nov-19	70250
Dec-19	47810
Jan-20	-
Feb-20	49380
Mar-20	-
Apr-20	46725
May-20	-
Jun-20	35370

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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.

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

a) Back Up diesel generators of 500KVA is available.

DG set

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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.
c) PCE 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) Faculty and administration staff uses old papers and envelops for internal usages as rough work, file markers, page separators etc.
c) 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.
d) Internal notices and communications are through E-mail/SMS.

Dustbins

3.9 E-Waste Management:

a) PCE is digitalized to a large extent. This includes classrooms, library, internal mails etc.

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b)　There is no provision for E-Waste management.

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.

Dustbins

3.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

a)　College is easily accessible. Staircase is provided for staff and students.
b)　Ramps are provided for specially abled.
c)　Fire extinguishers are provided in major areas for emergency. They are inspected and serviced regularly.
d)　There is signages for emergency fire exit present. This is of crucial importance during emergency.
e)　Since the access and staircases are wide and uncluttered, it is possible to have a safe evacuation during emergency.
f)　Fire Safety Training is given to the staff regularly.

Ramps

Fire Extinguishers

3.12 Green belt/ Landscaping:

a) Large trees are planted in the premises. Plantation also helps maintaining lower temperatures of the area. .
b) Potted plants are also kept around the campus.
c) Indoor plants are kept along the corridors and entrance of the building.

3.13 Green Initiatives:

College is regularly celebrating Yoga Day, Environment Day, and Earth Day and other Cultural programs.

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a. 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) 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) 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.

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) Notices/ signages can be put up/ displayed near switches and on notice boards, informing students and staff to switch off all electrical when not in use.

h) If possible, computers should be switched off from main power connections.

i) 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.

j) 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) 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 devices such as

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pressmatic taps, tap aerators, jet sprays etc.

d) Installation of waterless urinals can be considered to reduce water consumption.

e) Dual flushing system shall be installed to minimize the overall water consumption.

f) Rejected water from AC's and water cooler shall be used for gardening purposes.

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) 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) 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) 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.

d) Paper usage shall be monitored to understand the impact of digitization in the facility.

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.

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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) 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) 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'.

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) Roof top solar power plant should be installed as alternate renewal source of energy.

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
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

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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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Elion Technologies and Consulting Pvt Ltd (Elion) team carried out remote audit of premises. The audit was carried out using online meeting platform google hangout, prior to Audit questionnaire and checklist was shared.

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the client. During the audit Elion team carried out virtual visit of entire campus i.e. classrooms, library, washrooms, staff rooms, administration department, accounts department and hostels.

Campus Information

List of Course Offered by the institute
1. B. Tech Computer Engineering
2. B. Tech Computer Engineering (Regional course)
3. B. Tech Information Technology
4. B. Tech Civil Engineering
5. B. tech Mechanical Engineering
6. B. tech Electronics & Communication Engineering
7. B. Tech Electrical Engineering
8. B. tech Computer science and Engineering(Artificial Intelligence)
9. B. tech Computer science and Engineering(Artificial Intelligence and Data Science)
10. B. tech Computer science and Engineering (Cyber Security

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Poornima College of Engineering Campus

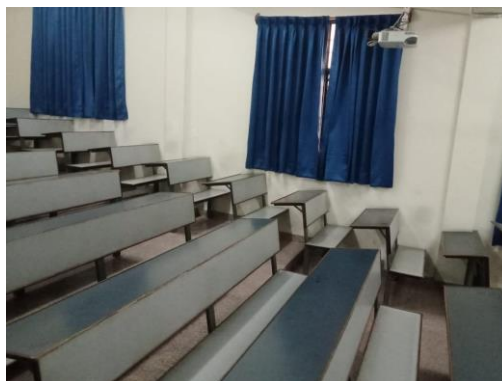**Location of Poornima College of Engineering Campus**

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3.1 Good Daylight Design and Ventilation

a) Corridors are wide with good ceiling height. All the corridors receive good daylight.
b) Curtains are provided in all the lecture hall window to avoid glare on white board.
c) Laboratories are provided with exhaust fans to disperse heat, fumes and odours.
d) Stair cases receive daylight through windows provided at various levels.
e) Classrooms, Labs and Library have large windows. Windows are kept open to adequate daylight.
f) Classroom Walls, Corridors and Labs are White Washed. This enhances the daylight received.

Classroom with Curtain

Computer Lab

Staircases which receives daylight

Library

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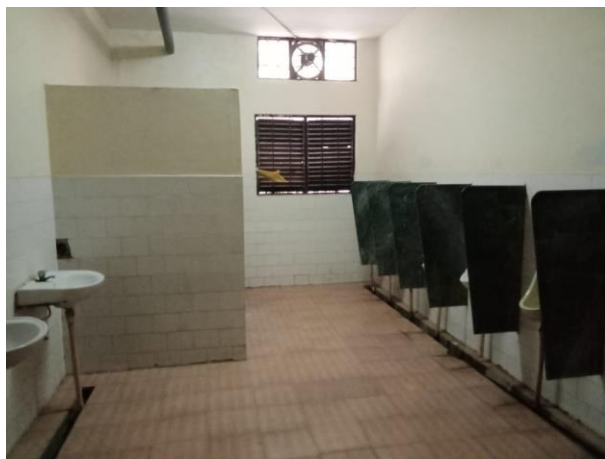ISI-6, RIICO Institutional Area
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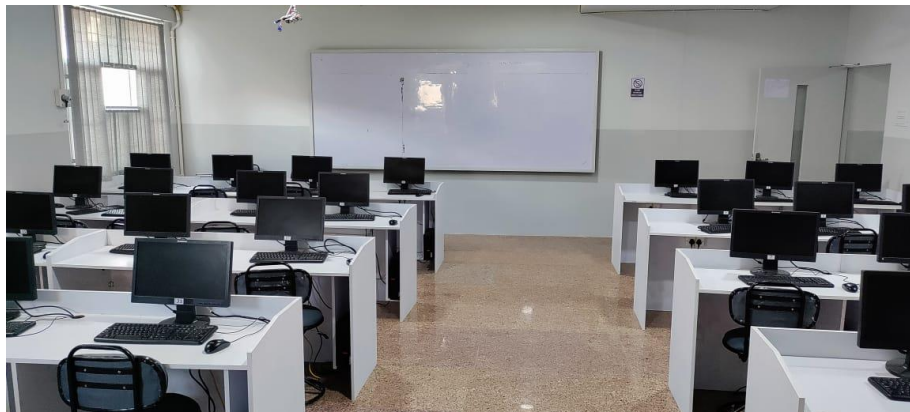
Corridor receives daylight

Lab provided with exhaust fans

3.2 Water Efficiency:

a) Five numbers of Bore wells are used for water supply in the campus.
b) For drinking water RO plants and water coolers are used at various location in the   campus.
c) Rain water harvesting system is installed in all the campus.
d) 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.
e) Dual flushing system are not provided in the washrooms.
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Hostel 4	60000	RCC overhead tank
Hostel 6	80000	RCC overhead tank
Hostel 6	80000	RCC overhead tank
Admin block	2000	RO water Syntax overhead
Hostel 3	1000	RO water Syntax overhead

Following are the list of water coolers installed with sensors:

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RO plant	Admin Block	1000	1
Chiller	Admin Block	2000	1
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Water cooler	Student canteen	150 Litres each	1
Water cooler	Hostel	150 Litres each	5
Water cooler	Mess dining hall	150 Litres each	1

3.3 Wastewater Management:

a) Wastewater/ sewage recycle is practiced in the College as grey water/ sewage treatment/recycle facility is provided.
b) Sewage Treatment plant is already provided in the campus which is a good practice.

Sewage Treatment Plan

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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:

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- 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 monoxide – Sources of carbon monoxide are incomplete combustion of fossil fuels.
- 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.
b) Green belts have been set up in campus area.
c) Split and Window ACs are used in all labs and offices.
d) 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.
e) Exhaust fans are provided in toilets, laboratories, mess etc.
f) Indoor Air Quality tests have been carried out. Same needs to be carried out at least once a year.
g) IAQ awareness signage provided in the college which is a good practice.

## 3.5 Energy Efficiency:

Electricity:

Power is supplied by local electricity department. The major electricity consuming equipment installed in the campus are ACs, Motors, Desktop, Printer, Fan, Tube light, CFL Bulb, LED Bulb and Street Lights.

- Notice/signage are displayed at various locations informing students and staff to switch off all electrical when not in use.

Dr. Mahesh Bundele
B.E, M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

- Every classroom and lab with central switch board have "T" and "F" sticker is placed on corresponding switches. This will ensure that correct fitting is switched on/ off and can save time & unnecessary operation.

Following is details of energy consumption:

Month	KWH	KVAH	Total Amount Payable
Aug-21	28411	28718	405915
Sep-21	14210	15270	291905
Oct-21	20815	14965	358176
Nov-21	11600	18760	264485
Dec-21	11895	12235	261775
Jan-22	23680	23930	368241
Feb-22	22295	22580	352934
Mar-22	21400	21510	369351
Apr-22	28975	29305	425466
May-22	36335	36650	499835
Jun-22	60870	61485	658067
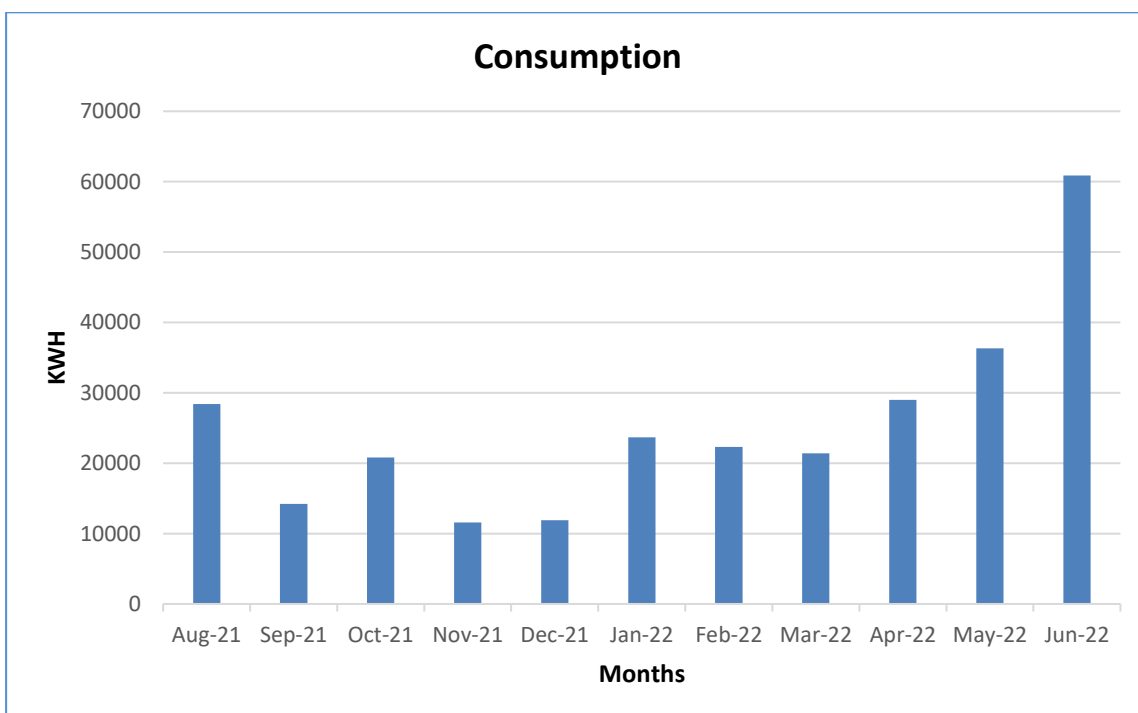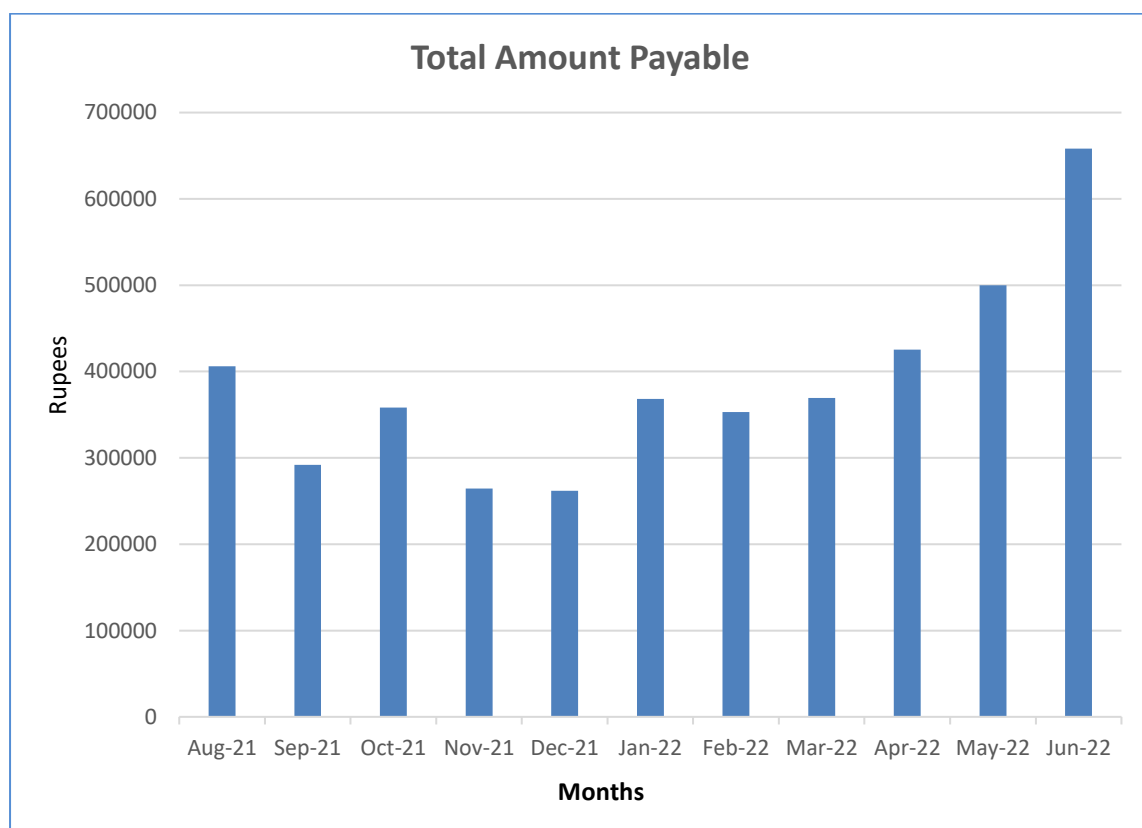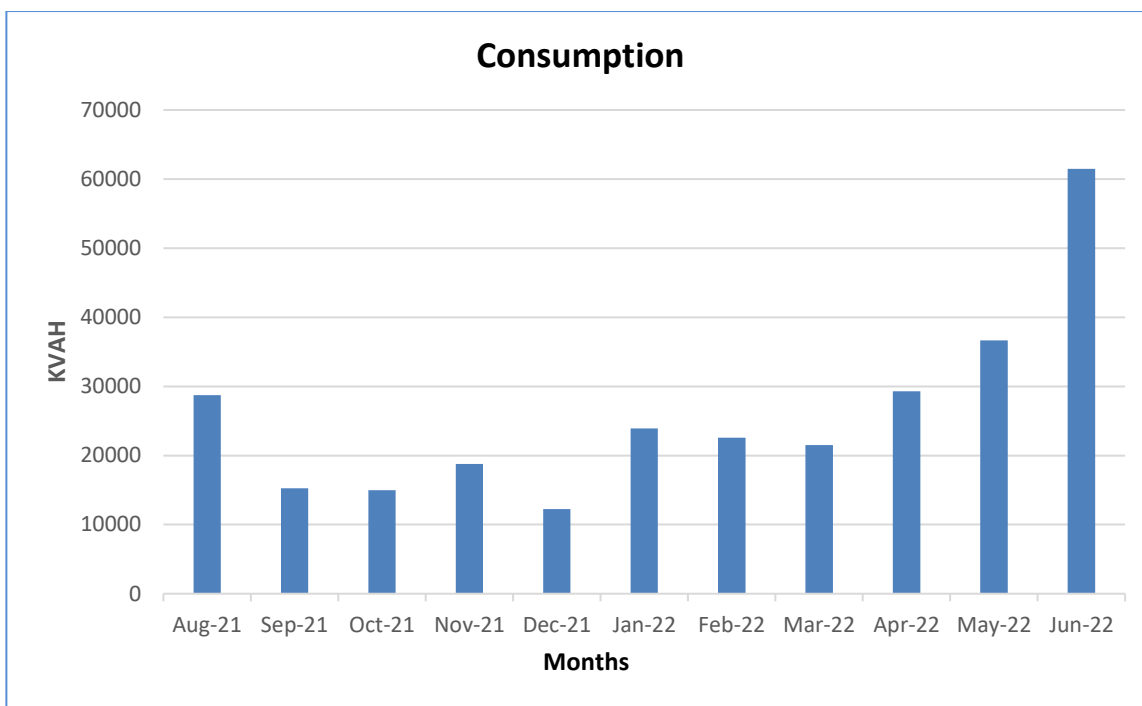
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Consumption

Total Amount Payable

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)   Installation of 184KW Solar Power Plant.

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

a)   Back Up diesel generators of 500KVA is available.
b)   Solar Power plant of capacity 184KW is provided in the college.

DG set

Solar Plant

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.

c) PCE has done tree plantation all around the building which helps in reducing temperature.

d) Roof top solar plant provide shade on roof thus helps in reduction of 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:

- Kitchen waste and left over is collected by a company and compost is given by the company which is used to enrich soil of plants and garden.
- Dry waste is collected by a vendor who recycle the paper waste and give recycled stationary that is used by students and staff.
- Prints and photocopies are made on both sides of the page to save paper. Instead of photocopying, digitalization (scanning) is used.
- Faculty and administrative personnel use old papers and envelopes for internal purposes such as rough work, file markers, page separators, and so on.
- Internal notices and communication among faculty and students are through email and Microsoft teams.
- 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.

3.9 E-Waste Management:

a) PCE is digitalized to a large extent. This includes classrooms, library, internal mails etc.

b) E – Waste is given to a recycling vendor.

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.

b) Helping hand club is formed in the campus who is organizing activities to distribute books, cloths etc. to needy people in the society.

Dustbins

3.11 Universal Access and Efficient Operation and Maintenance of Building:

It was observed that:

a) College is easily accessible. Staircase is provided for staff and students.
b) Ramps are provided for specially abled.
c) Fire extinguishers are provided in major areas for emergency. They are inspected and serviced regularly.
d) There is signages for emergency fire exit present. This is of crucial importance during emergency.
e) Since the access and staircases are wide and uncluttered, it is possible to have a safe evacuation during emergency.
f) Fire Safety Training is given to the staff regularly.

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Ramps

Fire Extinguishers

3.12 Green belt/ Landscaping:

a) Large trees are planted in the premises. Plantation also helps maintaining lower temperatures of the area. .
b) Potted plants are also kept around the campus.
c) Indoor plants are kept along the corridors and entrance of the building.

3.13 Green Initiatives:

College is regularly celebrating Yoga Day, Environment Day, and Earth Day and other Cultural programs.

Dr. Mahesh Bundele
B.E. M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

4. RECOMMENDATIONS/ SUGGESTIONS

4.1 For Improving Energy Consumption:

a) Installation of automatic lights with sensors can be considered.

b) 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.

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) 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) 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.

h) 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) 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) Dual flushing system shall be installed to minimize the overall water consumption.

f) 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.

g) 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) 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.

c) Paper usage shall be monitored to understand the impact of digitization in the facility.

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.

4.4 Others:

- An environmental advisory committee could be established. Discussions/information sharing among departments can generate a lot of ideas and raise awareness about green issues.

- Because each student uses the computer lab, screen savers can be configured to raise environmental awareness. (Ergonomics, water conservation, and so on). When a computer is in standby mode, a short 30 second pop up can be displayed. Wallpapers informing students about environmental protection can also be created.

- Keep minutes of environmental committee meetings; assess the effectiveness of the institutes' various environmental programmes. Set annual targets for Green Initiatives and closely monitor them. Make 'Green Champions'.

- Adopt an environmentally responsible purchasing policy and work to develop and implement a strategy to reduce the environmental impacts of its purchasing decisions.

Dr. Mahesh Bundele
B.E., M.E., Ph.D.
Director
Poornima College of Engineering
ISI-6, RIICO Institutional Area
Sitapura, JAIPUR

- Consider a thorough energy and water audit (energy consumption, thermal emissions, visual comfort).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
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