

CERTIFICATE

PRESENTED TO

JANKI DEVI MEMORIAL COLLEGE

Sir Ganga Ram Hospital Marg, Old Rajinder Nagar, Rajinder Nagar,
New Delhi, Delhi 110060

Has been assessed by EHS Alliance Services for the comprehensive study of Energy Audit on institutional working framework to fulfill the requirement of

ENERGY AUDIT

ACADEMIC YEAR 2022-23

The energy-saving initiatives carried out by the institution have been verified in the report submitted and were found to be satisfactory.

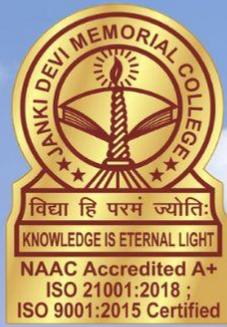
The efforts taken by management and faculty towards all types of energy used in the institution and sustainability are highly appreciated and noteworthy.



SIGNATURE



31.05.2023
DATE OF AUDIT



JANKI DEVI MEMORIAL COLLEGE

ENERGY AUDIT REPORT

2022-2023

PREPARED BY
EHS ALLIANCE SERVICES



CONTENTS

| | |
|------------------------------------|----|
| AUDIT CERTIFICATE | 2 |
| ACKNOWLEDGEMENT | 3 |
| DISCLAIMER | 4 |
| ABBREVIATION | 5 |
| INTRODUCTION OF COLLEGE | 6 |
| AUDIT PARTICIPANTS | 11 |
| EXECUTIVE SUMMARY | 12 |
| ENERGY AUDIT ANALYSIS | 12 |
| 1. ENERGY CONSUMPTION | 12 |
| 2. DIESEL CONSUMPTION | 14 |
| 3. ANALYSIS OF DG SETS | 15 |
| 4. AC SYSTEMS | 17 |
| 5. CEILING FANS ANALYSIS | 19 |
| 6. ANALYSIS OF LIGHTING SYSTEM | 22 |
| 6.1. BRIEF DESCRIPTION | 22 |
| 6.2. INVENTORY OF LIGHTING | 22 |
| 6.3. LUX MEASUREMENT | 25 |
| 7. OTHER POWER CONSUMPTION | 27 |
| 7.1 INVENTORY OF IT INFRASTRUCTURE | 27 |
| 7.2 PUMP DETAILS | 27 |
| 7.3 EXHAUST FAN DETAILS | 28 |



CERTIFICATE



CERTIFICATE

PRESENTED TO

JANKI DEVI MEMORIAL COLLEGE

Sir Ganga Ram Hospital Marg, Old Rajinder Nagar, Rajinder Nagar,
New Delhi, Delhi 110060

Has been assessed by EHS Alliance Services for the comprehensive study of Energy Audit on institutional working framework to fulfill the requirement of

ENERGY AUDIT

ACADEMIC YEAR 2022-23

The energy-saving initiatives carried out by the institution have been verified in the report submitted and were found to be satisfactory.

The efforts taken by management and faculty towards all types of energy used in the institution and sustainability are highly appreciated and noteworthy.

SIGNATURE



31.05.2023

DATE OF AUDIT

EHS ALLIANCE SERVICES, PLOT A-72, SURYA VIHAR, GURUGRAM, 122001
WWW.EHSALL.IN | BUSINESS@EHSALL.IN | EHSALLIANCE@GMAIL.COM



ACKNOWLEDGEMENT

EHS Alliance Services would like to thank the management of Janki Devi Memorial College, University of Delhi for assigning this important work of Energy Audit. We appreciate the co-operation to the teams for completion of assessment.

We would like to specially thank **Professor Swati Pal** - Principal, Janki Devi Memorial College for giving us an opportunity to evaluate the environmental performance of the campus.

We would also like to thank **Dr Deepak Rawat** - Audit Coordinator, Janki Devi Memorial College, for his continuous support and guidance, without which the completion of the project would not have been possible. We are also thankful to other staff members who were actively involved while collecting the data and conducting field measurements.

We are also thankful to

| | |
|--------------------|---|
| Ms Vandana Madan | Convener, AVANI- The Environment Club, JDMC |
| Dr Sana Rehman | Department of Environmental Studies, JDMC |
| Mr Ravinder Meena | Member, AVANI- The Environment Club, JDMC |
| Dr Kaushal Kishore | Administrative Officer, JDMC |
| Mr Surendra Kumar | Administrative Officer, JDMC |
| Mr Avinash | Assistant - Admin, JDMC |
| Mr Vijay Pratap | Junior Assistant - Admin, JDMC |



DISCLAIMER

EHS Alliance Services Energy Audit Team has prepared this Energy Audit Report for Janki Devi Memorial College, University of Delhi based on input data submitted by the representatives of college complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the conclusions are arrived following best estimates and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

If you wish to distribute copies of this report external to your organization, then all pages must be included.

EHS Alliance, its staff and agents shall keep confidential all information relating to your organization and shall not disclose any such information to any third party, except that in the public domain or required by law or relevant accreditation bodies. EHS Alliance staff, agents and accreditation bodies have signed individual confidentiality undertakings and will only receive confidential information on a 'need to know' basis.

Vijay Singh
Lead Auditor EMS & Energy



Dr. Uday Pratap
Co-Auditor EMS & Energy



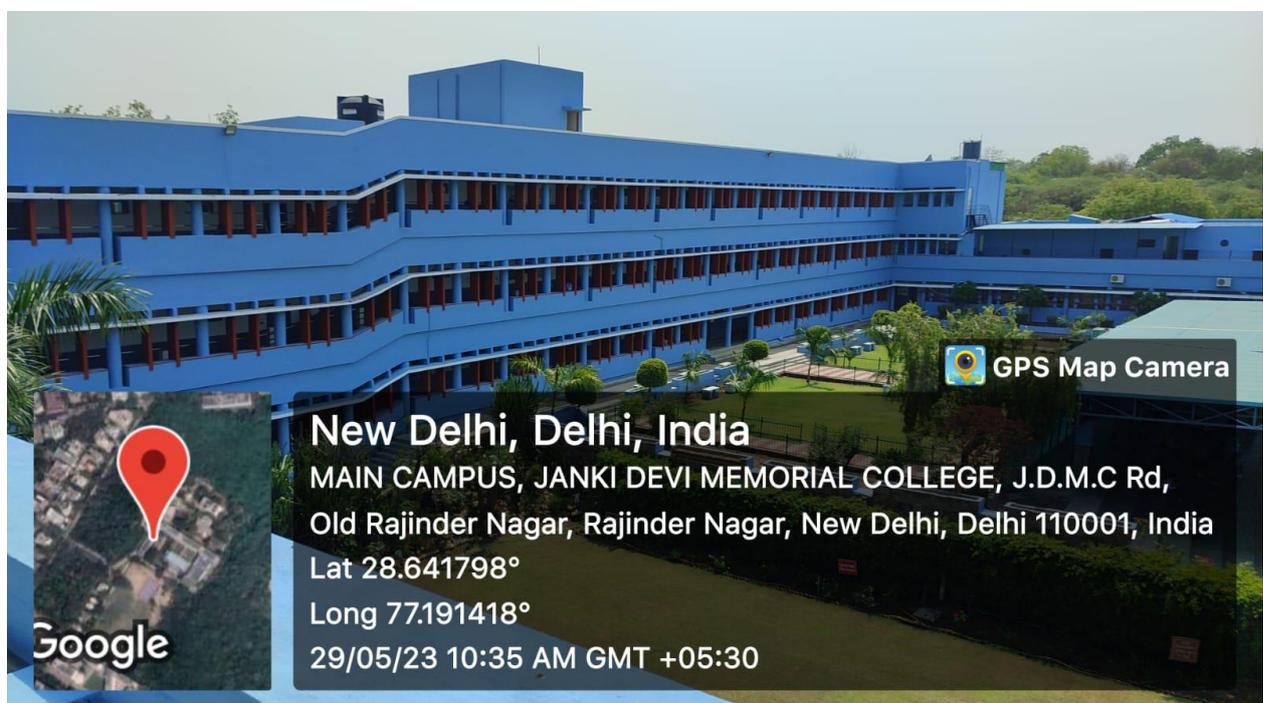
ABBREVIATION

| | |
|------------------------|--|
| A | Amps |
| AC | Air Conditioner |
| AC | Alternating Current |
| AMET | Academy of Maritime Education and Training |
| CFL | Compact fluorescent lamp |
| CIP | Comprehensive Inspection Programme |
| DC | Direct Current |
| HSD | High Speed Diesel |
| Hz | Hertz |
| kg | Kilogram |
| kVA | kilo-volt-ampere |
| kW | kilo Watts |
| kWh | kilowatt hour |
| kWp | Kilowatt peak |
| LED | Light Emitting Diode |
| LPG | Liquefied Petroleum Gas |
| MMS | Module mounting structure |
| MPPT | Maximum Power Point Tracker |
| NAAC | The National Assessment and Accreditation Council |
| SEC | Specific Energy Consumption |
| SPV | Solar Photovoltaic |
| STC | Standard Test Condition |
| TV | Television |
| V | Volts |
| W | Watts |
| W/m² | watt per square metre |



OVERVIEW OF THE COLLEGE

Janki Devi Memorial College, a premier women's college of University of Delhi was founded in 1959 by the famous Gandhian Shri Brij Krishan Chandiwala in memory of his mother Smt. Janki Devi. JDMC aims to provide quality education to young women and empower them to become economically self-reliant, have the confidence to face the vicissitudes of a challenging society, contribute meaningfully to the society at large and acquire the capability to think, lead and change the world.

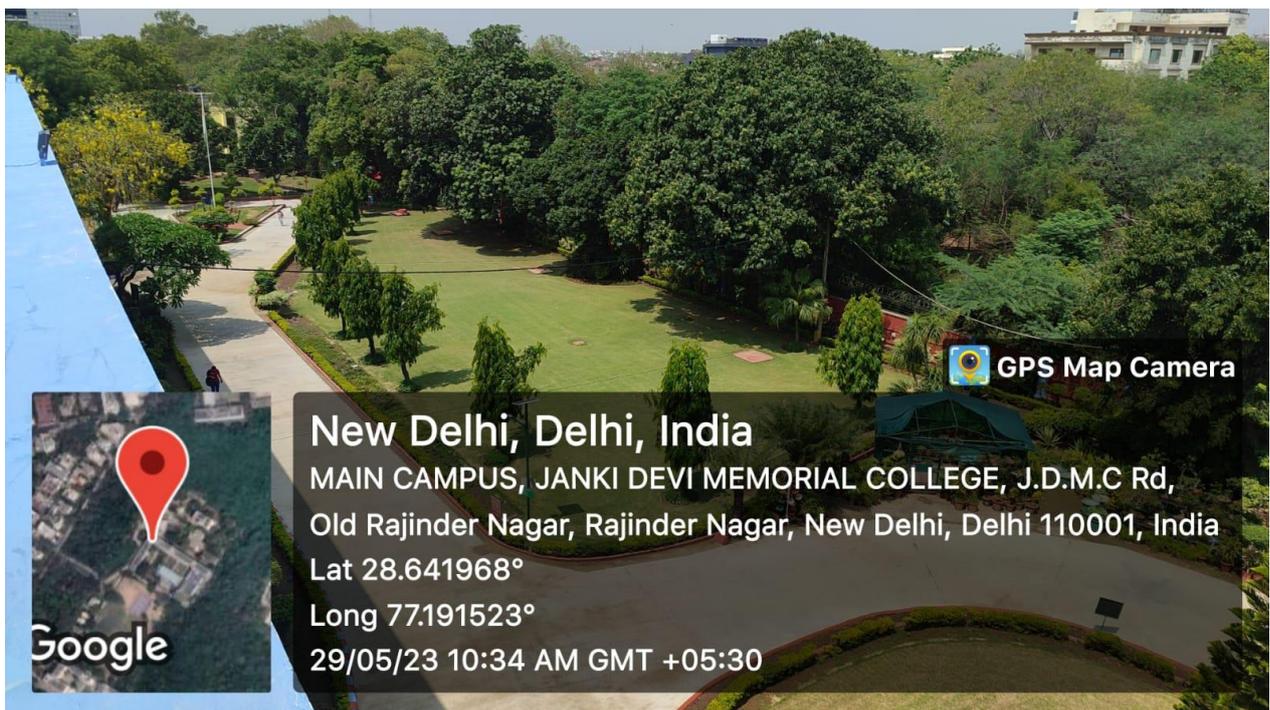


Situated in New Delhi Ridge in idyllic surroundings with its lush green lawns and imposing building, the college offers twelve under-graduate courses in Liberal Arts, Social Sciences, Mathematics and Commerce and eight post graduate courses. JDMC is the Centre for Non-Collegiate Women's Education Board (NCWEB) as well as School of Open Learning (SOL), University of Delhi. The college runs several Add-on courses/Certificate courses for students to enhance their skills. JDMC has MOUs with national and international agencies to provide the much-needed real world exposure to its students. It has more than thirty Societies/Clubs/Cells to give its students sufficient platforms to excel in various domains. The college has an extremely dedicated, committed and motivated faculty and staff.



The college offers facilities and infrastructure to create a holistic atmosphere for the pursuit of academic and extracurricular activities. JDMC has recently completed its 60-year journey in pursuit of excellence. The college has provided a nurturing environment to students from all parts of India. It has the distinction of having a disabled-friendly infrastructure along with a strong assistance system in place for the students and faculty with visual disability.

The JDMC-IQAC works in its mandated direction of internalizing and institutionalizing the quality enhancement initiatives. These initiatives encompass various stakeholders, namely students (with the aim of their integrated development), teaching staff and non-teaching staff (enhancing their capabilities and empowering them) and students' parents and Alumnae (strengthening mutually beneficial relationships).



CAMPUS

The college has an impressive building with lush green lawns, an eco-friendly campus with solar lighting and a rain-water harvesting system. The classrooms are clean, comfortable and well ventilated; the premises contain a common room and a medical

room with a sanitary napkin vending machine, an open air auditorium; a bank, a multi-cuisine and attractive cafeteria, computer laboratories; an audio-visual room; a photocopying centre as well as a Mother Dairy booth.



Library: JDMC library is a repository of over 1 lakh books and over 100 journals, both academic and general. It is among the first fully automated libraries in Delhi University and provides photocopying and free internet access facilities.



Labs: JDMC has 4 computer labs, 2 Research Rooms, and an A/V room. With 200+ systems and ICT facilities, these rooms provide a state-of-the-art teaching/learning environment to the students and faculty.



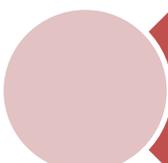
Canteen: The college has a spacious cafeteria that offers a wide variety of snacks to students and staff at reasonable rates.



Garden: The college Gardens are a source of pride for JDMC. The gardens have won many awards in different categories in the university flower show.



Smart Classroom: The college has 3-5 smart Classrooms which are ICT enabled with interactive smart boards to facilitate the teaching-learning process.



Seminar room: The Seminar Room has a seating capacity of more than 200 with a state-of-the-art audio-visual system which is updated on a regular basis. The Seminar Room functions as a multi-purpose space used to hold conferences, seminars, workshops, meetings etc.



VISION | MISSION | CORE VALUES

JDMC, a premier women's college of University of Delhi, endeavours to promote enduring knowledge which is global in its perspective and yet local in its relevance. Students are challenged & inspired to pursue excellence in liberal and performing arts, humanities, commerce and sports, in an environment which is vibrant & constantly evolving. Founded with a vision to empower women, JDMC continues to strive to help its students to develop a capacity to think, lead and change the world.

MISSION STATEMENT AND CORE VALUES

The egalitarian approach of the institution promotes the inclusion of all sections of the society. The institution is equally inclusive of all its constituencies, with their respective duties, responsibilities and achievements. The students and staff, belonging to diverse classes, castes, ethnic and religious groups cooperate in a democratic environment to take the college to newer heights of excellence. The institution besides providing education, also serves as a platform for cultural expression and excellence, constantly reminding students of the primary importance of cultural diversity, national integration and tolerance, along with the need to be in harmony with the environment

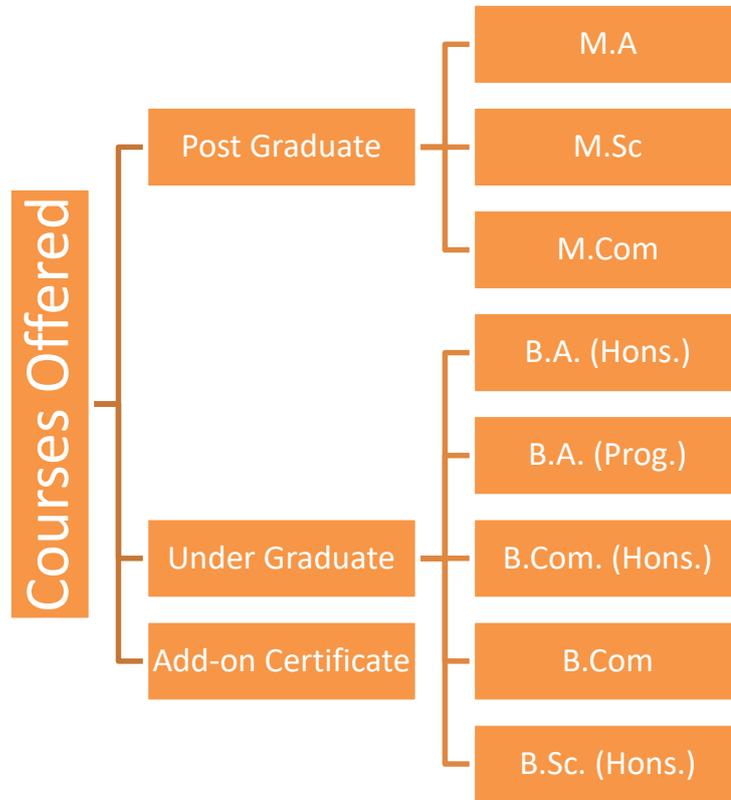
Janki Devi Memorial College is committed to the following core values:

- The foundational ideal is enshrined in the upanishadic motto of the college itself, 'Vidyahi paramam Jyoti'- Knowledge is Eternal Light
- Gandhian philosophy of responsible citizenship and empowerment of women through education
- Imparting knowledge based on traditional values, yet with modern and global significance in an evolving academic world
- Education, in combination with technological skills, empowers the students both academically and economically, and proactively contributes to their brighter future

Therefore, the college creates a motivational environment to provide holistic education and personality development of the students, resulting in a synthesis of their career growth and ethical and responsible citizenship



JDMC is providing education to undergraduates and graduates in following department.



Geo Location
Geo Coordinates from Google maps:
28.6418145, 77.190725



AUDIT PARTICIPANTS

On behalf of College

| Name | Designation |
|---------------------|--|
| Professor Swati Pal | <i>Principal, JDMC</i> |
| Ms Vandana Madan | <i>Convener, AVANI- The Environment Club, JDMC</i> |
| Dr Deepak Rawat | <i>Department of Environmental Studies, JDMC</i> |
| Dr Sana Rehman | <i>Department of Environmental Studies, JDMC</i> |
| Mr Ravinder Meena | <i>Member, AVANI- The Environment Club, JDMC</i> |
| Dr Kaushal Kishore | <i>Administrative Officer, JDMC</i> |
| Mr Avinash | <i>Assistant - Admin, JDMC</i> |
| Mr Vijay Pratap | <i>Junior Assistant - Admin, JDMC</i> |

On behalf of EHS Alliance Services

| Name | Position | Qualifications |
|------------------------|---------------------|--|
| Vijay Singh | <i>Lead Auditor</i> | <i>M.Sc. M. Tech (Environment Science & Engineering), Energy Auditor, Post Diploma in Industrial Safety Management</i> |
| Dr. Uday Pratap | <i>Co-Auditor</i> | <i>Ph.D., Lead Auditor ISO 14001:2015, PDIS, QCI – WASH</i> |





EXECUTIVE SUMMARY

The purpose of this Energy Audit was to seek opportunities to improve the energy efficiency of the Janki Devi Memorial College. Reducing the energy consumption despite improving the human comfort, health and safety were of primary concern.

Beyond just identifying the energy consumption pattern, this audit sought to detect and categorize the most energy efficient appliances. Additionally, some daily practices relating common appliances have been shared which may help reducing the energy consumption. Data collection for energy audit of the campus was carried out by the EHS Alliance Team. The Energy Audit Report accounts for the energy consumption patterns of the institution on actual survey and detailed analysis during the audit.

The work comprehends the area wise consumption traced using suitable equipment. The analysis was carried out by our team with the support of the staff members from Janki Devi Memorial College. The report provides a list of possible actions to preserve and efficiently access the available source, resources and their saving potential was also identified. We look forward towards optimization that the authorities, students and staff members would follow the recommendations in the best possible way. The report is based on certain generalizations including the approximations wherever necessary. The views conveyed may not reveal the general opinion. They merely represent the opinion of the team guided by the interviews of clients. We are happy to submit this Energy audit report to the Janki Devi Memorial College.

ENERGY AUDIT - ANALYSIS

1. ENERGY CONSUMPTION

To understand the Energy Consumption trends and for analyzing the average monthly consumption we have collected electricity energy bills from June 2022 to May 2023

The details of “**Meter Connection**” at “**Janki Devi Memorial College**” are as follows-

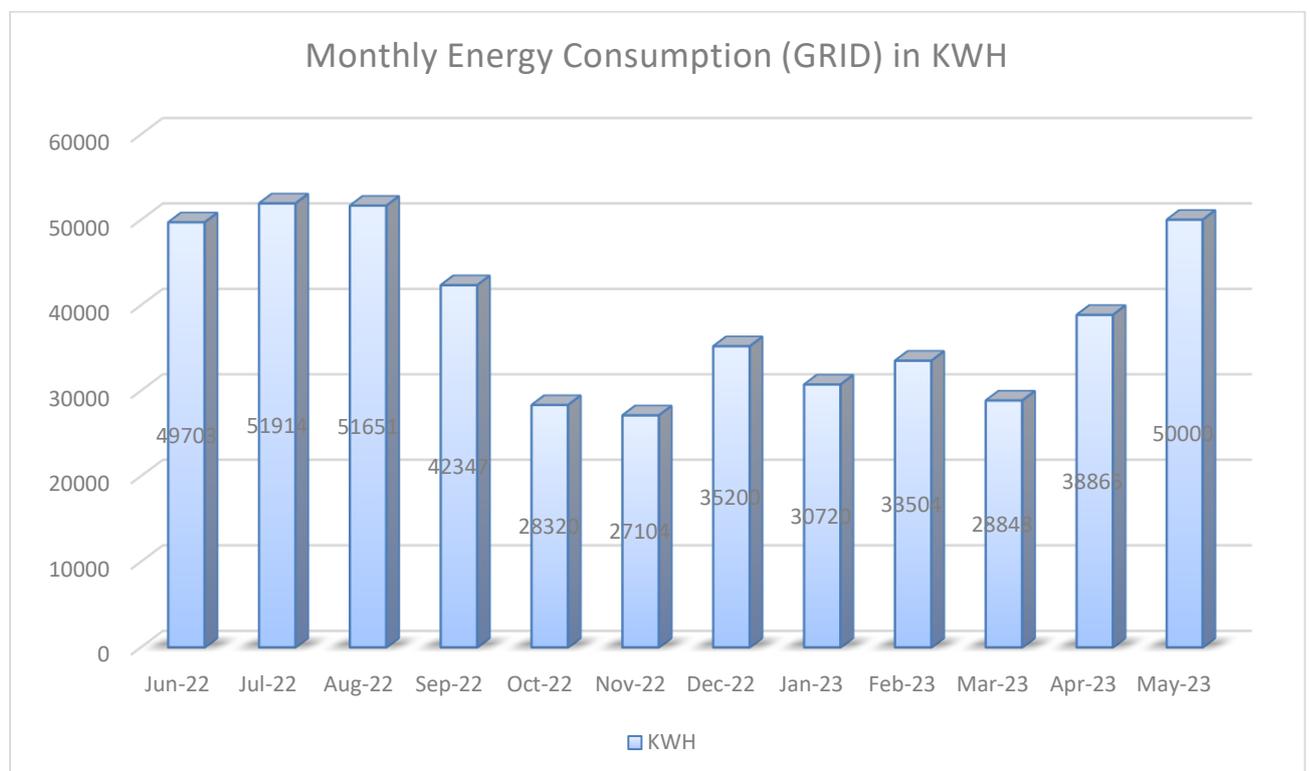
| | | |
|--------|---|---------------|
| Name | - | The Principal |
| CA No. | - | 100001930 |



1.1 Summary of Monthly Electricity Consumption and Total Bill Amount

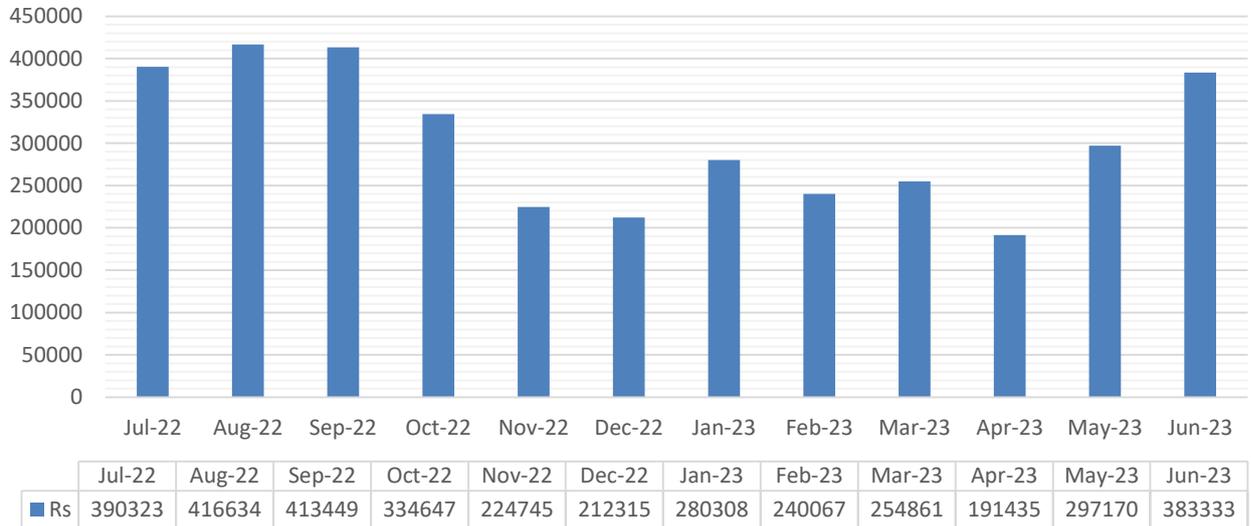
To understand the Energy consumption trend and for developing the baseline parameter we have collected monthly energy bill for the 12 months i.e. from June 2022 to May 2023

| Month | Grid Units | Amount | Solar Units | Net Metering Units | Amount |
|------------|---------------|--------|--------------|--------------------|----------------|
| Jul-22 | 49703 | 8.50 | 3,783 | 45920 | 390323 |
| Aug-22 | 51914 | 8.50 | 2,898 | 49016 | 416634 |
| Sep-22 | 51651 | 8.50 | 3,010 | 48641 | 413449 |
| Oct-22 | 42347 | 8.50 | 2,977 | 39370 | 334647 |
| Nov-22 | 28320 | 8.50 | 1,879 | 26441 | 224745 |
| Dec-22 | 27104 | 8.50 | 2,126 | 24978 | 212315 |
| Jan-23 | 35200 | 8.50 | 2,223 | 32977 | 280308 |
| Feb-23 | 30720 | 8.50 | 2,477 | 28243 | 240067 |
| Mar-23 | 33504 | 8.50 | 3,520 | 29984 | 254861 |
| Apr-23 | 28848 | 8.50 | 6,326 | 22522 | 191435 |
| May-23 | 38865 | 8.50 | 3,904 | 34961 | 297170 |
| Jun-23 | 50000 | 8.50 | 4,000 | 46000 | 391000 |
| SUM | 468176 | | 39123 | 429053 | 3646954 |





Monthly Energy Consumption - from July 2022 to June 2023



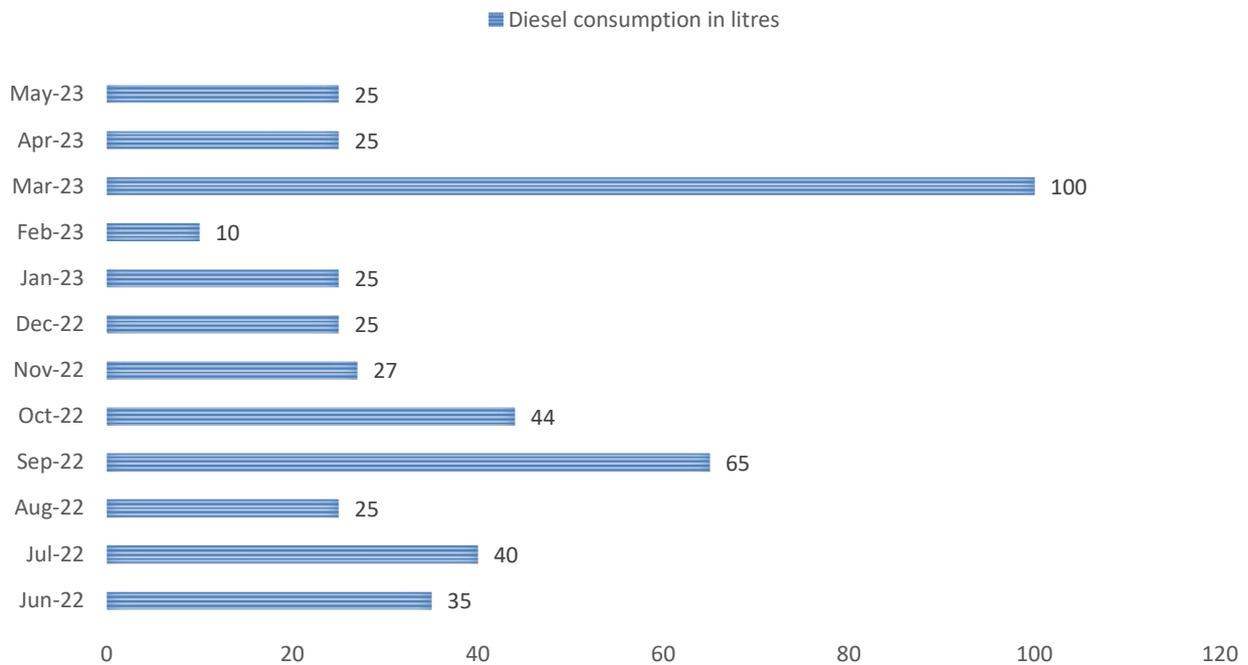
2. DIESEL CONSUMPTION

Below is the diesel consumption details in litres from from June 2022 to May 2023.

| Period | Diesel consumption (in litres) |
|--------------|--------------------------------|
| Jun-22 | 35 |
| Jul-22 | 40 |
| Aug-22 | 25 |
| Sep-22 | 65 |
| Oct-22 | 44 |
| Nov-22 | 27 |
| Dec-22 | 25 |
| Jan-23 | 25 |
| Feb-23 | 10 |
| Mar-23 | 100 |
| Apr-23 | 25 |
| May-23 | 25 |
| Total | 446 |



DIESEL CONSUMPTION (LITRES) JUNE 2022 TO MAY 2023



3. ANALYSIS OF DG SETS

In the campus, there are 3 Diesel Generator (DG) set for its electrical power needs in case of Grid power failure. DG sets capacity is 347.5 kVA.

DG Set Design Details

| Description | Unit | DG Station -1 | DG Station -2 | DG Station -3 |
|-----------------|-------|-----------------|---------------|---------------|
| Design details: | | | | |
| Rated capacity | kVA | 125 kva | 160 | 62.5 kva |
| Hz | | 50 | 50 | 50 |
| Sl No. | | 6H.3516/0801590 | 1308061708370 | 1308031807948 |
| Make | | kirloskar | Greaves | Greaves |
| Volts | Volts | 415 | 415 | 415 |
| PF | | 0.8 | 0.8 | 0.8 |
| Phase | | 3 | 3 | 3 |
| RPM | | 1500 | 1500 | 1500 |
| Amps | Amps | 173.9 | 223 | 87 |
| Mfg. | | Aug 2008 | Aug 2017 | July 2018 |

| DG Set Operation details | | |
|---------------------------------|-----------|-------|
| Operating hours during testing | Hours | 0.5 |
| % Loading | % | 62.47 |
| Energy Generation | kWh | 34.84 |
| Load | kVA | 70.41 |
| Fuel consumption during testing | Litre | 8 |
| Specific energy generation | kWh/litre | 3.27 |

Observation and Suggestions:-

Soundproof silent generators are an efficient tool to keep both noise and vibration at low levels. For the power backup of the institution, the soundproof model is installed in the institution.

As per the trial taken during the energy audit the percentage loading of DG set is 70.41% which is ok and specific energy consumption of DG Sets 3.27 kWh/Litre which is satisfactory because as per manufacturer recommendation, best practices for SEC in DG sets range from 3.0 to 3.5 kWh/Litre and above.

We recommend college to initiate stack monitoring of DG set through authorized lab.





4. AC SYSTEM

Energy Efficiency Ratio (EER): Performance of smaller chillers and rooftop units is frequently measured in EER rather than kW/ton. EER is calculated by dividing a chiller's cooling

Capacity (in Btu/h) by its power input (in watts) at full-load conditions. The higher the EER, the More efficient the unit. The cooling effect produced is quantified as tons of refrigeration (TR). The above TR is also called as air-conditioning tonnage.

There are Split ACs installed in Janki Devi Memorial College, University of Delhi in various areas of various capacity which detail is given below:-

Split AC – 35

Windows AC – 44

Total installed AC – 79

| Sl No. | Location/Identification | AC Type | Count | TR in Tons | Room Temp. (°C) | AC-Tout (°C) | AC-Tin (°C) | Room-RH (%) | Area (m2) | Air velocity (m/s) | Enthalpy Hout | Enthalpy Hin | Heat Load in TR | KW supplied | (Eff.) Power per Ton (KW /TON) | EER |
|--------|-------------------------|---------|-------|------------|-----------------|--------------|-------------|-------------|-----------|--------------------|---------------|--------------|-----------------|-------------|--------------------------------|------|
| 1 | Library | S | 4 | 1.5 | 24 | 12 | 20 | 52 | 0.03 | 2.2 | 25 | 38 | 0.32 | 0.55 | 1.72 | 2.04 |
| 2 | Library | W | 7 | 1.5 | 24 | 11 | 19 | 52 | 0.03 | 2.6 | 24 | 37 | 0.38 | 0.57 | 1.52 | 2.31 |
| 3 | GCR | W | 1 | 1.5 | 24 | 10 | 18 | 52 | 0.03 | 2.4 | 24 | 37 | 0.35 | 0.53 | 1.53 | 2.3 |
| 4 | Seminar | S | 1 | 1.5 | 23 | 12 | 20 | 52 | 0.03 | 2.3 | 25 | 38 | 0.33 | 0.55 | 1.67 | 2.11 |
| 5 | Seminar | W | 4 | 1.5 | 23 | 11 | 19 | 52 | 0.03 | 2 | 22 | 37 | 0.33 | 0.58 | 1.74 | 2.02 |
| 6 | Committee | S | 1 | 1.5 | 23 | 13 | 20 | 52 | 0.03 | 2.3 | 26 | 38 | 0.31 | 0.53 | 1.74 | 2.02 |
| 7 | Committee | W | 2 | 1.5 | 23 | 12 | 20 | 52 | 0.03 | 2.2 | 25 | 38 | 0.32 | 0.55 | 1.74 | 2.03 |
| 8 | Medical | S | 1 | 1.5 | 23 | 12 | 19 | 52 | 0.03 | 2.3 | 24 | 37 | 0.33 | 0.58 | 1.74 | 2.02 |
| 9 | Audi Control room | W | 1 | 1.5 | 24 | 12 | 20 | 52 | 0.03 | 2.2 | 25 | 38 | 0.32 | 0.55 | 1.72 | 2.04 |
| 10 | Bank | S | 2 | 1.5 | 24 | 11 | 19 | 52 | 0.03 | 2.6 | 24 | 37 | 0.38 | 0.57 | 1.52 | 2.31 |
| 11 | Union Room | W | 1 | 1.5 | 24 | 10 | 18 | 52 | 0.03 | 2.4 | 24 | 37 | 0.35 | 0.53 | 1.53 | 2.3 |
| 12 | Principal Anty Room | S | 1 | 1.5 | 23 | 12 | 20 | 52 | 0.03 | 2.3 | 25 | 38 | 0.33 | 0.55 | 1.67 | 2.11 |
| 13 | Lab II,III | S | 3 | 1.5 | 23 | 11 | 19 | 52 | 0.03 | 2 | 22 | 37 | 0.33 | 0.58 | 1.74 | 2.02 |



| | | | | | | | | | | | | | | | | |
|----|--------------------------|---|----|-----|----|----|----|----|------|-----|----|----|------|------|------|------|
| 14 | Lab II,III | W | 2 | 1.5 | 23 | 13 | 20 | 52 | 0.03 | 2.3 | 26 | 38 | 0.31 | 0.53 | 1.74 | 2.02 |
| 15 | Server room | S | 2 | 2 | 23 | 12 | 20 | 52 | 0.03 | 2.2 | 25 | 38 | 0.32 | 0.55 | 1.74 | 2.03 |
| 16 | Admin | S | 2 | 1.5 | 23 | 12 | 19 | 52 | 0.03 | 2.3 | 24 | 37 | 0.33 | 0.58 | 1.74 | 2.02 |
| 17 | AO | S | 1 | 1.5 | 24 | 12 | 20 | 52 | 0.03 | 2.2 | 25 | 38 | 0.32 | 0.55 | 1.72 | 2.04 |
| 18 | SO | S | 1 | 1.5 | 24 | 11 | 19 | 52 | 0.03 | 2.6 | 24 | 37 | 0.38 | 0.57 | 1.52 | 2.31 |
| 19 | AUDIO VIDEO ROOM | S | 2 | 2 | 24 | 10 | 18 | 52 | 0.03 | 2.4 | 24 | 37 | 0.35 | 0.53 | 1.53 | 2.3 |
| 20 | Music | S | 1 | 1.5 | 23 | 12 | 20 | 52 | 0.03 | 2.3 | 25 | 38 | 0.33 | 0.55 | 1.67 | 2.11 |
| 21 | Music | W | 1 | 1.5 | 23 | 11 | 19 | 52 | 0.03 | 2 | 22 | 37 | 0.33 | 0.58 | 1.74 | 2.02 |
| 22 | Staff Room | S | 2 | 1.5 | 23 | 13 | 20 | 52 | 0.03 | 2.3 | 26 | 38 | 0.31 | 0.53 | 1.74 | 2.02 |
| 23 | Staff Room | W | 2 | 1.5 | 24 | 12 | 20 | 52 | 0.03 | 2.2 | 25 | 38 | 0.32 | 0.55 | 1.72 | 2.04 |
| 24 | STA Room | S | 1 | 1.5 | 24 | 11 | 19 | 52 | 0.03 | 2.6 | 24 | 37 | 0.38 | 0.57 | 1.52 | 2.31 |
| 25 | PA | S | 1 | 1.5 | 24 | 10 | 18 | 52 | 0.03 | 2.4 | 24 | 37 | 0.35 | 0.53 | 1.53 | 2.3 |
| 26 | Principal Office | S | 2 | 1.5 | 23 | 12 | 20 | 52 | 0.03 | 2.3 | 25 | 38 | 0.33 | 0.55 | 1.67 | 2.11 |
| 27 | Account | S | 1 | 1.5 | 23 | 11 | 19 | 52 | 0.03 | 2 | 22 | 37 | 0.33 | 0.58 | 1.74 | 2.02 |
| 28 | Account | W | 2 | 1.5 | 23 | 13 | 20 | 52 | 0.03 | 2.3 | 26 | 38 | 0.31 | 0.53 | 1.74 | 2.02 |
| 29 | Sports | S | 1 | 1.5 | 23 | 12 | 20 | 52 | 0.03 | 2.2 | 25 | 38 | 0.32 | 0.55 | 1.74 | 2.03 |
| 30 | Sports | W | 1 | 1.5 | 23 | 12 | 19 | 52 | 0.03 | 2.3 | 24 | 37 | 0.33 | 0.58 | 1.74 | 2.02 |
| 31 | PIO | W | 1 | 1.5 | 24 | 12 | 20 | 52 | 0.03 | 2.2 | 25 | 38 | 0.32 | 0.55 | 1.72 | 2.04 |
| 32 | Department | W | 1 | 1.5 | 24 | 11 | 19 | 52 | 0.03 | 2.6 | 24 | 37 | 0.38 | 0.57 | 1.52 | 2.31 |
| 33 | Research Room Lab2 | S | 3 | 2 | 24 | 10 | 18 | 52 | 0.03 | 2.4 | 24 | 37 | 0.35 | 0.53 | 1.53 | 2.3 |
| 34 | Research Room staff room | S | 1 | 1.5 | 23 | 12 | 20 | 52 | 0.03 | 2.3 | 25 | 38 | 0.33 | 0.55 | 1.67 | 2.11 |
| 35 | Hostel | S | 5 | 1.5 | 23 | 11 | 19 | 52 | 0.03 | 2 | 22 | 37 | 0.33 | 0.58 | 1.74 | 2.02 |
| 36 | Hostel | W | 18 | 1.5 | 23 | 13 | 20 | 52 | 0.03 | 2.3 | 26 | 38 | 0.31 | 0.53 | 1.74 | 2.02 |

Remarks: - We have checked Energy Efficiency Ratio of AC's and EER of AC's is fairly OK. But in future you should purchase 5-Star rated inverter based split AC's because power consumption of Inverter based BEE 5-Star rated AC's is less than non-star rated AC's.

Also, we recommend Janki Devi Memorial College, University of Delhi to organize periodic maintenance schedule and take corrective actions for insulating of AC's refrigerant lines in order to protect energy losses.



5. FANS ANALYSIS

In the Janki Devi Memorial College, there are 344 fans installed.

Ceiling Fan (70 W) – 65

Ceiling Fan (240 W) – 279

The observation and suggestion are given below.

| Sl No. | Location/Identification | Ceiling Fan 240W | Ceiling Fan-70W |
|--------|-------------------------|------------------|-----------------|
| 1 | Seminar | 8 | |
| 2 | Staff Room | 6 | |
| 3 | Research Room | 2 | |
| 4 | Canteen | 24 | |
| 5 | Control Room (Audi) | 0 | |
| 6 | Auditorium | 24 | |
| 7 | 1 | 5 | |
| 8 | 2 | 5 | |
| 9 | 3 | 3 | |
| 10 | 4 | 3 | |
| 11 | 5 | 3 | |
| 12 | 6 | 2 | |
| 13 | 7 AV | 5 | |
| 14 | 8 | 5 | |
| 15 | 11(ncweb) | 7 | |



| | | | |
|----|--------|---|---|
| 16 | 12 | 7 | |
| 17 | 13 | 7 | |
| 18 | 13A | 2 | |
| 19 | 14 | 7 | |
| 20 | 15 A/V | 7 | |
| 21 | 16 A/V | 7 | |
| 22 | 17 | 5 | |
| 23 | 17A | 5 | |
| 24 | 18Tut | 2 | |
| 25 | 19Tut | 2 | |
| 26 | 20Tut | 2 | |
| 27 | 21Tut | 1 | |
| 28 | 22Tut | 1 | |
| 29 | 23Tut | 1 | |
| 30 | 24Tut | 1 | |
| 31 | 25Tut | 1 | |
| 32 | 26Tut | 1 | |
| 33 | 27Tut | 1 | |
| 34 | 28Tut | 1 | |
| 35 | 29Tut | 1 | |
| 36 | 30Tut | 2 | |
| 37 | 31Tut | 1 | |
| 38 | 32Tut | 1 | |
| 39 | 33Tut | 2 | |
| 40 | 34Tut | 1 | |
| 41 | 35Tut | 1 | |
| 42 | 36Tut | 3 | |
| 43 | 60Tut | 2 | |
| 44 | 38 | 2 | |
| 45 | 39A | 3 | |
| 46 | 39 | 3 | |
| 47 | 40 A/V | 7 | |
| 48 | 41A | 3 | |
| 49 | 41 | 3 | |
| 50 | 42 A/V | 5 | |
| 51 | 43 | 2 | 2 |
| 52 | 43A | 4 | 1 |
| 53 | 56 | 2 | |
| 54 | 52 | | 2 |
| 55 | 53 | 2 | 2 |



| | | | |
|----|--------------|------------|-----------|
| 56 | 54 | | 2 |
| 57 | 55 | 4 | 4 |
| 58 | NCC | 2 | |
| 59 | 57 | 2 | |
| 60 | 58 | 2 | |
| 61 | 44 | 5 | |
| 62 | 45 | 5 | |
| 63 | 46 | 5 | |
| 64 | 47 | 5 | |
| 65 | 48 | 5 | |
| 66 | 49 | 3 | |
| 67 | L1-20 | 3 | |
| 68 | L2-20 | 3 | |
| 69 | 1 | 4 | |
| 70 | 2 | 2 | |
| 71 | 3 | 2 | |
| 72 | II - | 4 | |
| 73 | III | 10 | |
| 74 | 61 | | 2 |
| 75 | 62 | | 2 |
| 76 | 63 | | 4 |
| 77 | 64 | | 4 |
| 78 | 65 | | 8 |
| 79 | 66 A/V | | 8 |
| 80 | 67 | | 8 |
| 81 | 68 A | | 8 |
| 82 | 69 | | 8 |
| | TOTAL | 279 | 65 |

Observation and Suggestions:-

In the college, old ceiling majority of fans are of 250 W but BEE 5 Star Rated of 30W Ceiling Fans are present in the market. Therefore we suggest to replace BEE 5 Star rated fans of 30W.

Note:- Energy saving will increase or decrease if operating hours of machine /equipment will be increased or decreased and payback period will also increase or decrease if cost of investment (Cost of machine/equipment/accessories of machine) will increase or decrease because cost of investment is taken on tentative basis.



ECRM-1-Energy saving by replacing 70/250 W fans with energy efficient 30W ceiling fans

| | | | |
|---|---|-------------|-------------|
| Total no of Ceiling Fans (70W) | | 65 | Nos. |
| Total no of Ceiling Fans (250W) | | 279 | Nos. |
| Total wattage of 70W Ceiling Fans | = | 4550 | Watt |
| Total wattage of 250W Ceiling Fans | = | 69750 | Watt |
| Total wattage of BEE 5 Star rated Fans (30W) | = | 10320 | Watt |
| Total saving in Wattage after replacement | = | 63980 | Watt |
| Operating hours per day | = | 8 | Hours |
| Operating days per annum | = | 180 | Days |
| Energy charges per unit in Rs. | = | 8.5 | INR |
| Saving in Rs./annum | = | 783115.20 | INR |
| Investment INR | = | 1032000 | INR |
| Payback period:- Months | = | 0.75 | YEARS |

6. ANALYSIS OF LIGHTING SYSTEM

6.1 Brief description of existing system

For assessing energy efficiency of lighting system, Inventory of the Lighting System has been noted / collected, with the aid of a lux meter, measurement and documentation of the lux levels at various locations at working level has been done.

6.2 Inventory of Lighting

| Sl. No. | Location/ Identification | 200W-LED High Mast | solar light LED | 24W LED Light | 12 W LED Round | 50W LED | 40W Tube light | 18W LED Flood | 20W LED |
|---------|--------------------------|--------------------|-----------------|---------------|----------------|---------|----------------|---------------|---------|
| 1 | 1 | | | | | | | | 4 |
| 2 | 2 | | | | | | | | 4 |
| 3 | 3 | | | | | | | | 5 |
| 4 | 4 | | | | | | | | 5 |
| 5 | 5 | | | | | | | | 5 |
| 6 | 6 | | | | | | | | 3 |
| 7 | 7 AV | | | | | | | | 7 |
| 8 | 8 | | | | | | | | 7 |
| 9 | 12 | | | | | | | | 11 |



| | | | | | | | | | |
|----|---------|--|--|--|--|--|--|--|----|
| 10 | 13 | | | | | | | | 11 |
| 11 | 13A | | | | | | | | 3 |
| 12 | 14 | | | | | | | | 11 |
| 13 | 15 A/V | | | | | | | | 11 |
| 14 | 16 A/V | | | | | | | | 11 |
| 15 | 17 | | | | | | | | 4 |
| 16 | 17A | | | | | | | | 4 |
| 17 | 18Tut | | | | | | | | 2 |
| 18 | 19Tut | | | | | | | | 2 |
| 19 | 20Tut | | | | | | | | 2 |
| 20 | 21Tut | | | | | | | | 2 |
| 21 | 22Tut | | | | | | | | 2 |
| 22 | 23Tut | | | | | | | | 2 |
| 23 | 24Tut | | | | | | | | 2 |
| 24 | 25Tut | | | | | | | | 2 |
| 25 | 26Tut | | | | | | | | 2 |
| 26 | 27Tut | | | | | | | | 2 |
| 27 | 28Tut | | | | | | | | 2 |
| 28 | 29Tut | | | | | | | | 2 |
| 29 | 30Tut | | | | | | | | 2 |
| 30 | 31Tut | | | | | | | | 2 |
| 31 | 32Tut | | | | | | | | 2 |
| 32 | 33Tut | | | | | | | | 2 |
| 33 | 34Tut | | | | | | | | 2 |
| 34 | 35Tut | | | | | | | | 2 |
| 35 | 36Tut | | | | | | | | 3 |
| 36 | 38 | | | | | | | | 2 |
| 37 | 39A | | | | | | | | 6 |
| 38 | 39 | | | | | | | | 5 |
| 39 | 40 A/V | | | | | | | | 11 |
| 40 | 41A | | | | | | | | 6 |
| 41 | 41 | | | | | | | | 6 |
| 42 | 42 A/V | | | | | | | | 8 |
| 43 | 43 | | | | | | | | 4 |
| 44 | 43A | | | | | | | | 8 |
| 45 | Admin | | | | | | | | 45 |
| 46 | Account | | | | | | | | 8 |



| | | | | | | | | | |
|----|-----------------------|--|--|--|--|--|--|--|-----|
| 47 | 52 | | | | | | | | 2 |
| 48 | 53 | | | | | | | | 2 |
| 49 | 54 | | | | | | | | 2 |
| 50 | 55 | | | | | | | | 6 |
| 51 | NCC Room | | | | | | | | 2 |
| 52 | 57 | | | | | | | | 2 |
| 53 | 58 | | | | | | | | 3 |
| 54 | 59 | | | | | | | | 4 |
| 55 | 44 | | | | | | | | 8 |
| 56 | 45 | | | | | | | | 8 |
| 57 | 46 | | | | | | | | 8 |
| 58 | 47 | | | | | | | | 8 |
| 59 | 48 | | | | | | | | 8 |
| 60 | 49 | | | | | | | | 8 |
| 61 | L1-20 | | | | | | | | 3 |
| 62 | L2-20 | | | | | | | | 3 |
| 63 | L3-20 | | | | | | | | 4 |
| 64 | L4-20 | | | | | | | | 2 |
| 65 | Corridor lib | | | | | | | | 5 |
| 66 | Computer Lab I | | | | | | | | 18 |
| 67 | Computer Lab II | | | | | | | | 9 |
| 68 | Computer Lab III - AV | | | | | | | | 16 |
| 69 | Sports Room | | | | | | | | 16 |
| 70 | Sports Changing | | | | | | | | 5 |
| 71 | 61 | | | | | | | | 4 |
| 72 | 62 | | | | | | | | 4 |
| 73 | 63 | | | | | | | | 6 |
| 74 | 64 | | | | | | | | 6 |
| 75 | 65 | | | | | | | | 12 |
| 76 | 66 A/V | | | | | | | | 12 |
| 77 | 67 | | | | | | | | 12 |
| 78 | 68 A | | | | | | | | 12 |
| 79 | 69 A/V | | | | | | | | 12 |
| 80 | Library | | | | | | | | 209 |
| 81 | Principal | | | | | | | | 4 |
| 82 | Committee | | | | | | | | 10 |
| 83 | Staff Room | | | | | | | | 53 |



| | | | | | | | | | |
|----|--------------------|-----------|-----------|----------|----------|-----------|-----------|----------|------------|
| 84 | Research room | | | | | | | | 14 |
| 85 | Prta cabin | | | | | | | | 10 |
| 86 | Corridors | | | | | | | | 49 |
| 87 | Taress | 13 | | | | | | | |
| 88 | Toilet Admin | | 3 | | | | | | |
| 89 | Audi | | | | | 12 | 12 | | |
| 90 | building back side | | | | | | | | |
| 91 | Entrance Main Road | | 7 | | | | | | |
| | Total | 13 | 10 | 0 | 0 | 12 | 12 | 0 | 835 |

6.3 Lux Measurement

| Description | Lux | Remark |
|---------------------|------------|------------|
| Class Rooms | 120 to 235 | Acceptable |
| Offices | 130 to 240 | Acceptable |
| Corridors | 35 to 90 | Acceptable |
| Washrooms | 45 to 76 | Acceptable |
| Outdoor | 36 to 95 | Acceptable |
| Computer Lab | 150 to 289 | Acceptable |
| Parking area | 45 to 94 | Acceptable |
| Canteen | 69 to 185 | Acceptable |

Observation

College has implemented LED based lighting solution in the campus. LEDs save energy, the life span is much greater and emit virtually no heat. College has installed solar lights for street lights in the campus. JDMC is doing their bit for the energy conservation. We recommend to install motion sensor-based lights in common areas such as library, washrooms, corridors, etc.

We also recommend to use solar lights for open areas like parking, ground, street lights, etc. Table below shows the performance characteristics comparison of all luminaries.



| Table - Luminous Performance Characteristics of Commonly Used Luminaries | | | | | |
|--|-------------|------|----------------------------|---|----------------|
| Type of Lamp | Lumens/Watt | | Colour Rendering Index | Typical Application | Typical Life |
| | Range | Avg. | | | |
| Incandescent | 8-18 | 14 | Excellent (100) | Homes, restaurants, general lighting emergency lighting | 1000 |
| Fluorescent lamps | 46-60 | 50 | Good w.r.t coating (67-77) | Offices, shops, hospitals, homes | 5000 |
| Compact fluorescent Lamps (CFL) | 40-70 | 60 | Very Good (85) | Hotels, shops, homes, offices | 8000-10000 |
| High pressure mercury (HPMV) | 44-57 | 50 | Fair (45) | General lighting in factories, garages, car parking. flood lighting | 5000 |
| Halogen lamps | 18-24 | 22 | Excellent (100) | Display, flood lightening, stadium exhibition grounds, construction areas | 2000 - 4000 |
| High pressure sodium (HPSV) SON | 67-121 | 90 | Fair (22) | General lighting in ware houses, factories, street lighting | 6000 - 12000 |
| Low pressure sodium (LPSV) SOX | 101-175 | 150 | Poor (10) | Roadways, tunnels, canals, street lighting | 6000 - 12000 |
| Metal halide lamps | 75-125 | 100 | Good (70) | Industrial bays, spot lighting, flood lighting, retail stores | 8000 |
| LED Lamps | 30-50 | 40 | Good (70) | Reading lights, desk lamps, night lights, spotlights, security lights, signage lights, etc. | 40000 - 100000 |



7. OTHER POWER CONSUMPTION

7.1 Inventory of IT Infrastructure

| Sl No. | Location/Identification | Desktop | Laptop | Printers | Scanners | Servers | Other |
|--------|-------------------------|------------------------------------|--------|-------------|----------|---------|-------|
| 1 | Computer Lab I | | 32 | 1 | | | |
| 2 | Computer Lab II | 49 | 14 | 2 | | | |
| 3 | Computer Lab III | 50 | | 2 | 1 | | |
| 4 | Research Room | 8 | | 1 | | | |
| 5 | Library | 9-DU HP (5- comp.3- HP=8) | 24 | 3+1+1 id | | 1 | |
| 6 | Admin | 6 | | 6 | | | |
| 7 | SO | 1 | | | | | |
| 8 | Account | 8 | | 5 | | 1 | |
| 9 | Principle Off | 1 | 2 | 1 | | | |
| 10 | Committee | 1 | | | | | |
| 11 | PA | 1 | | 1 | | | |
| 12 | AO office | 1 | | 1 | | | |
| 13 | Sports | 1 | | 1 | | | |
| 14 | Server Room | 1 | | 1 | | | 3 |
| 15 | E Resource Centre | | 43 | | | | |
| | Total | 128 | 115 | 22 | 1 | 2 | 3 |

7.2 Water pump details

| Sr. No | Description | Unit | Pump No.-1 | Pump No.-2 |
|--------|----------------------|---|------------------|-----------------------|
| 1 | Rated Power of Motor | KW | 3.5/5.0 | 0.75/1.0 |
| 2 | Motor Eff. | % | 6% | 6% |
| 3 | Discharge Head | m | 6.1/0.6 LPH | 2800-880 LPH |
| 4 | Suction Head | m | 36/52 | 18-45 |
| 5 | Pump Type | Submersible/ Monoblok/Centrifugal Etc. | submersible pump | Submersible Monoblock |



7.3 Other Loads

| Sl No. | Location/Identification | 60W Exhaust Fan | 160W Exhaust Fan | Other 3phase | Single phase 230 W | 180W- Circulating Fan | Solar panel 50.22 kilowatt capacity | Solar water heater |
|--------|--|-----------------|------------------|-----------------------|--------------------|-----------------------|-------------------------------------|-----------------------------------|
| 1 | Composting Machine | | | 415-440 Volts / 50 Hz | | | | |
| 2 | Canteen | | 3 | | -- | -- | | |
| 3 | Toilet/Library | 15 | | | | | | |
| 4 | Drinking water cooler 8 | | | | 8 | | | |
| 5 | Fridge | | | | 8 | | | |
| 6 | Water dispenser | | | | 4 | | | |
| 7 | Auditorium | | | | | 2 | | |
| 8 | Building Roof Area & Library Roof Area | | | | | | 162 Module/panel | |
| 9 | hostel room area | | | | | | | 4 tank 1000 ltr single phase 230w |

ANALYSIS: There should be regular maintenance schedule of equipment like pumps, exhaust fans, water coolers and IT equipment. Electronics such as computers, printers, scanners, etc. more than 3 year or 5 years (as per their life) should be replaced with new computers/laptops. Ideal Temperature should be maintained for all electronic appliances.

8. CAPACITOR BANK

| Sl. No. | Identification | Capacity in KVAR |
|---------|----------------|------------------|
| 1 | Substation I | 25 KVAR |

***** **END OF THE REPORT** *****