ENERGY AUDIT REPORT

CONSULTATION REPORT

KURUKSHETRA UNIVERSITY, KURUKSHETRA

(Established by the State legislature act XII of 1956)

Thanesar, Haryana 136119

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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(2020-21)

CONTENT

ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Kurukshetra University Kurukshetra Haryana** for giving us an opportunity to conduct energy audit for the university.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.

Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
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Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

ENERGY IS LIFE
BEE
CONSERVE IT

BUREAU OF ENERGY EFFICIENCY

Examination Registration No.: EA- 7271

Accreditation Registration No.: AEA-284

Certificate of Accreditation

This is to certify that Mr./Ms. Shri. Rajesh Kumar Singadiya having its trade/registered office at ..... has been given accreditation as accredited energy auditor. The certificate shall be effective from 9th day of May, 2018

The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. 284 in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this 5th day of October, 2018

Secretary,
Bureau of Energy Efficiency
New Delhi

EXECUTIVE SUMMARY

The executive summary of the energy audit report furnished in this section briefly gives the identified energy conservation measures and other recommendation during the project that can be implemented in a phased manner to conserve energy, increase productivity inside the University campus.

INITIATIVES TAKEN BY UNIVERSITY FOR THE ENERGY MANAGEMENT

SOLAR ENERGY: -

- **600 kWp SOLAR PHOTOVOLTAIC ROOFTOP INSTALLATION:**

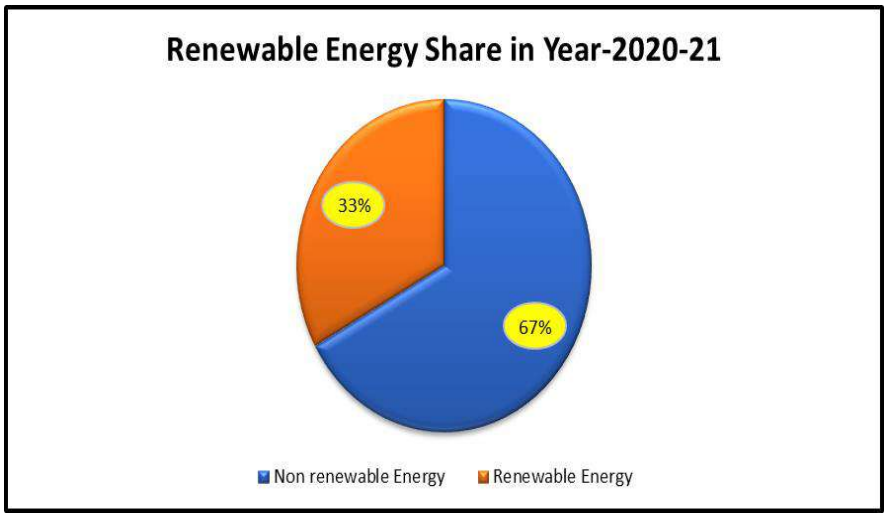
University has installed 600 kWp solar photovoltaic roof top grid connected system in Year-March-2018.

- **1000 kWp SOLAR PHOTOVOLTAIC ROOFTOP INSTALLATION:**

University has installed 1000 kWp solar photovoltaic roof top grid connected system in Year-October -2019.

- Total Solar units generated from the installation to Dec-2021 are 53,51,340 units. It is about 33 % of the total energy consumed of the University in Year-2020-21

Sr. No	Year	Units Generation
1	2018-2019	4,33,622
2	2019-2020	11,30,701
3	2020-2021	20,27,515
4	2021-2022	17,59,502
	Total	**53,51,340**



LIGHTING SYSTEM: -

Energy efficient LED lighting system: - The University has been replaced convectional inefficient lighting system by energy efficient LED lighting. Details of lighting fixtures replaced by University are given in table: -

Table :- Details of lighting fixtures replaced by University

Year	Convectional Lighting System	Replacement by LED Fixture	Quantity
2016	250 Watt (Sodium Vapour Lamp)	LED Street LIGHT (60 W)	325
	400 Watt (Sodium Vapour Lamp)	LED Street LIGHT (90 W)	80
2017	150 Watt (Sodium Vapour Lamp)	LED Street LIGHT (30 W)	375
	250 Watt (Sodium Vapour Lamp)	LED Street LIGHT (60 W)	300
	400 Watt (Sodium Vapour Lamp)	LED Street LIGHT (90 W)	265
2018	40 Watt (FTL Type)	LED Tube light (20 W)	1500
	150 Watt (Sodium Vapour Lamp)	LED Street LIGHT (30 W)	240
	80 Watt (CFL Square Feet)	Square Fitting Fixture (2 X 2) 36 Watt	200
2019	80 Watt (CFL Square Feet)	LED (1 X 4) 40 Watt	68
	40 Watt (FTL Type)	LED Tube light (20 W)	2000
	80 Watt (CFL Square Feet)	Square Fitting (2 X 2) 20 Watt	1850
	400 Watt (Sodium Vapour Lamp)	LED Street light (90 W)	56
2020	40 Watt (FTL Type)	LED Tube light (18 W)	2500
	250 Watt (Sodium Vapour Lamp)	LED Street LIGHT (60 W)	50
	400 Watt (Sodium Vapour Lamp)	LED Street LIGHT (90 W)	65
2021	80 Watt (CFL Square Feet)	Square Fitting (2 X 2) 36 Watt	299
	150 Watt (Sodium Vapour Lamp)	LED Street LIGHT (30 W)	1500
	150 Watt (Sodium Vapour Lamp)	LED Street LIGHT (30 W)	70
	250 Watt (Sodium Vapour Lamp)	LED Street LIGHT (60 W)	50
	400 Watt (Sodium Vapour Lamp)	LED Street LIGHT (90 W)	90

- **TIMER CONTROLLED STREET LIGHTS:-** University has installed "Timer control on high mast and street lighting" in University campus. **It is Appreciable.**
- **INSTALLATION OF CAPACITOR BANK: -** The University has already installed capacitor banks at 20 no of transformer to maintain the power factor of the system. The total capacity of the bank is 3120 kVAr. **It is Appreciable.**
- **MOTION SENSOR: -** The University is going to install 25 no of motion sensor for VC office, Registrar office, Committee room, finance officer room, Institute of environment director office and UIET Director office to optimize energy consumption of the building. **It is Appreciable.**

- **STAND ALONE SYSTEM ON STREET LIGHT: -** The University has installed 130 no Solar stand-alone system for Street light with 20 Watt. **It is Appreciable.**

AREA OF IMPROVEMENT

CEILING FAN AND EXHAUST FAN:

- It is recommended to Replace "conventional ceiling fan (80 Watt)" by energy efficient star rated BLDC based i.e. energy efficient fan (28 Watt) in "admin building, Faculty cabin" etc. It has great potential for energy saving.
- Replacement of "conventional exhaust fan (150 to 180 Watt)" by energy efficient star rated fan or BLDC based energy efficient Fan (20 to 40 Watt) in all building class rooms, and faculties cabin etc. It has great potential for energy saving.

AIR CONDITIONER (WINDOW AND SPLIT)

- Replacement of "Window and Split AC (1500 to 2000 Watt)" by energy efficient 5 star rated AC (750 to 560 Watt) in all building, Guest house, class rooms, and faculties cabin etc. It has great potential of energy saving.

IOT BASED ENERGY MONITORING SYSTEM AT TRANSFORMERS: -

- Installation of "Cloud based (IoT based) energy monitoring system" including harmonic measurement (total voltage and current harmonic distortion %) in power house and distribution transformers will be good initiative for energy monitoring as well as student demo project for management. Expected energy saving potential is about 2 to 4%.
- Installation of energy meters between transformer and main PCC panel with IoT system will monitor line losses of the system. It will give real time measurement of power factor and line losses from the cable.

SYNCHRONIZATION OF DG SET WITH SOLAR SYSTEM

- Installation of "Cloud based fuel and unit generation monitoring system" in DG set will help to monitor specific unit generation by DG set failure of the grid power.
- It was observed that during the power failure of the grid, solar units generation also stops. Synchronization of the solar system with DG set increases the utilization capacity of the solar system.

Energy Management Workshop and Training:

- Develop energy management policies for university. Establish a procurement policy that is energy saving and eco-friendly.
- Conduct awareness and training programs for faculty, student and non-teaching staffs. Conduct seminars, workshops and exhibitions on energy management education.
- Involve All Stakeholders - Encourage involvement of government, founder members, and industry for supporting interdisciplinary research, education, policy formation, and information exchange in energy management system.

ENERGY CONSERVATION MEASURES FOR ELECTRICAL SYSTEM

Case Study	Section	Identification	Observation	Recommendation	Annual energy saving (kWh)	Annual cost saving(Rs.)	Investment (Rs.)	Simple paybac k Period (Year)
01	Power House-01 (DS Connection)	Potential forsolar projectas per Net Meteringpolicy	2500 kVA connection 100 % electricity taken from grid	2000 kWp grid connected solar rooftop system.	29,20,000 kWh Generation annual	1,86,88,000	7,00,00,000/	3.75
02	STP Plant	Potential forsolar projectas per Net Meteringpolicy	250 kVA connection 100 % electricity taken from grid	175 kWp grid connected system	2,55,500 kWh Generation	16,35,200	61,25,000	3.75
03	Celling Fan	Potential for replacement of Existing fan (80 Watt) by energy efficient fan (28 Watt)	Present Existing fan are operating (80 Watt)	Replacement Existing Fan (80 Watt) by energy efficient fan (28 Watt	10,54,227 kWh	67,47,052	2,28,07,800	3.38
Total					**42,29,727 kWh**	**2,70,70,252**	**9,89,32,800**	**3.65**

Note: - Energy saving depends on the operation hour per day and load factor of the systems.

CHAPTER-1
INTRODUCTION

1.1 About University

Kurukshetra University is one of the premier educational institutions of India. Established in 1956, the University is providing higher education to over half a million students on the campus and its affiliated colleges. By virtue of its commitment to excellence, the University has been awarded A^+Grade by NAAC and has been placed at 8^{th} position amongst the State Universities of the country in Category-I by the Ministry of Human Resource Development (MHRD) and has also been granted academic autonomy. Located on the southern bank of famed Brahm Sarovar, Kurukshetra University has a sprawling campus spread over 473 acres. In addition to providing quality education to the students, Kurukshetra University embodies the values of Yogastha Kuru Karmani, enshrined in Bhagwadgita, which means performing one's activities while remaining steadfast in Yoga.

The University is in the rapid process of transformation to an institution of excellence. In this process, digitalization of the University is being done to develop an efficient and transparent system that would further facilitate a learner's experience in the University.

The University programmes combine the enduring value of a liberal arts education with the skills and experience offered by professional departments. The University offers 175 courses on the campus in 47 Departments/institutes through a highly qualified faculty. The University also plays an important role in providing higher education to the youth of the State through its 282 affiliated colleges and institutes in seven districts of Haryana.

The campus of the University has often been rated as one of the most beautiful campuses in India. It resembles a large, self-contained educational village with lecture theatres, smart class rooms, Wi-Fi campus, 24 hrs library facility, laboratories, on campus hostel accommodation, cafeterias, canteens, market, swimming pool, gymnasia, bank, ATM's, post office and world-class sports facilities. The most remarkable feature of the campus is a seamless interconnection of nature and the built environment. There are a number of lush green gardens, water fountains and sidewalks which provide an ideal environment on the campus for study and leisure.

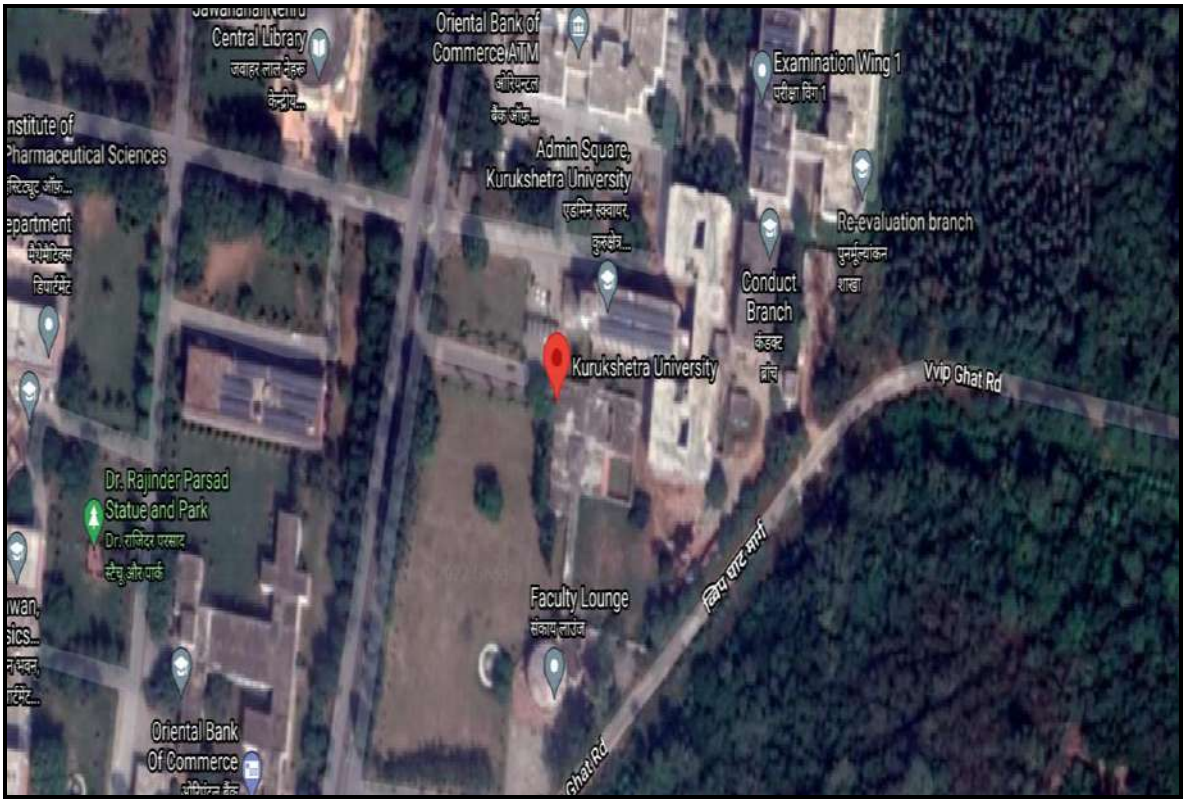


Figure :- Image of KUK from Google map

University Faculties:-

- Faculty of Arts & Languages
- Faculty of Social Sciences
- Faculty of Life Sciences
- Faculty of Science
- Faculty of Education
- Faculty of Indic Studies
- Faculty of Engg. & Technology
- Faculty of Law
- Faculty of Commerce & Management

1.2 About University Campus:

Kurukshetra University, Kurukshetra (KUK) is a University established on 11 January 1956 in Kurukshetra, in the Indian state of Haryana, 160 kilometres (99 mi) from the capital, Delhi. It is a member of Association of Commonwealth Universities.

Kurukshetra University spread over 473 acres (1.91 km^2), the KUK campus is located on the western bank of Brahma Sarovar in the Hindu holy city of Kurukshetra

Colleges and schools in Kurukshetra University

The University has these colleges, schools and institutes

- University Senior Secondary Model School
- Institute of Integrated and Honours Studies (Formerly University College)
- University College of Education
- Institute of Environmental studies
- Department of Law
- Department of Geophysics
- University School of Management
- University Institute of Engineering and Technology
- Institute of Management Studies
- Institute of Mass Communication & Media Technology

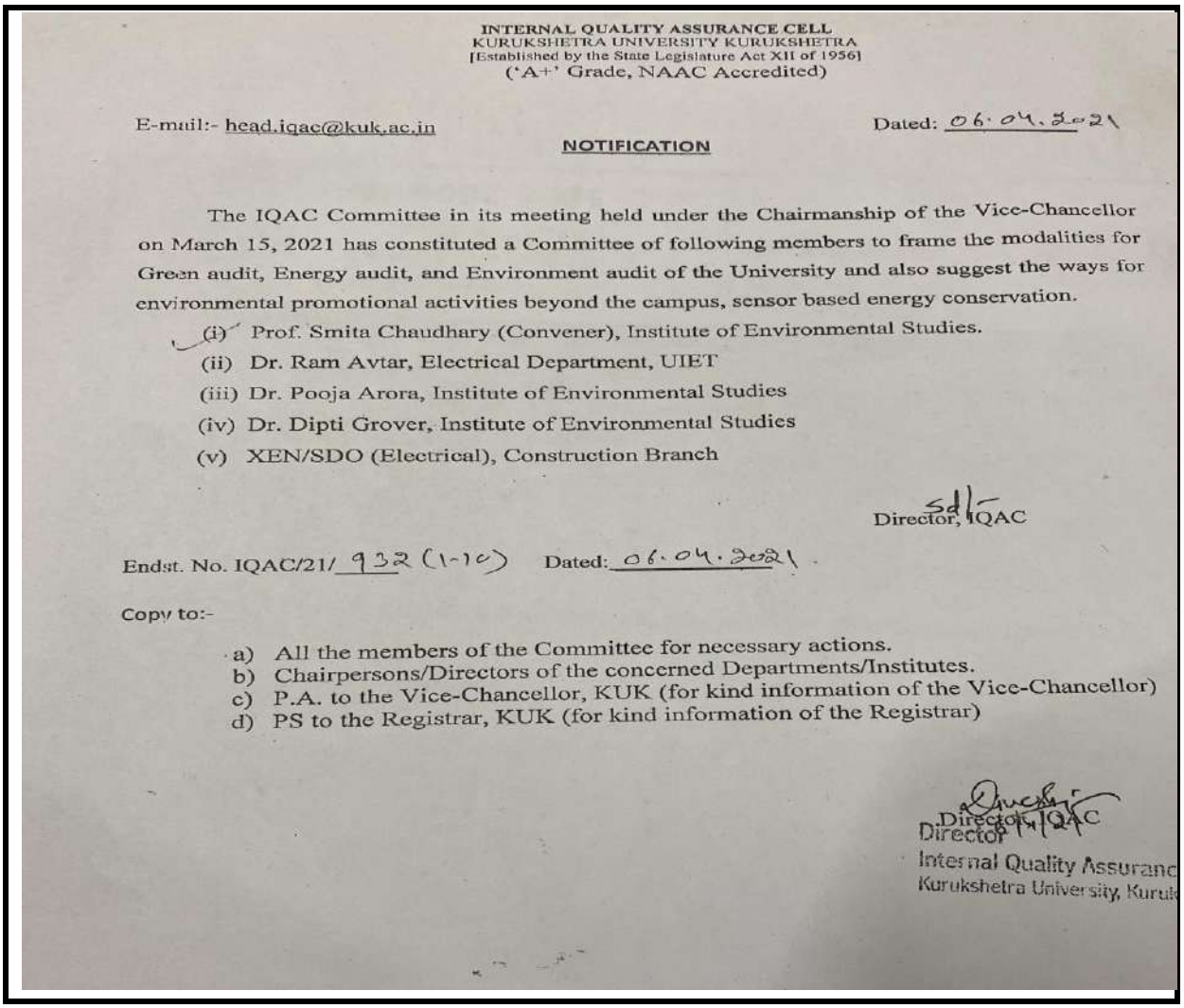
Sr. No	Administration
1	Office of Vice Chancellor
2	Office of the Registrar
Important Functionaries	
1	Deans
2	Other Offices
3	Chairpersons/Directors
4	Teaching Department
5	Deputy Registrar/Assistant Registrar/Admin. Officers
6	Office of the Dean Academic Affairs
7	Office of Dean Faculty of Science
8	Office of Dean Student Welfare
Accounts Departments	
1	Main Accounts
2	Bill Section
3	Cash and Fee
4	Income
5	Pension Cell
6	Fee Section
7	PF Section
8	Planning Section
9	Cheque Section
10	Audit Internal
11	State Govt (Audit)
12	Establishment Branch (Teaching)
13	Establishment Branch (Non-Teaching)
14	Academic Branch
15	Syllabus Branch
16	Scholarship Branch
17	Registration Branch
18	PH.D Branch
19	General Branch
20	Colleges Branch
Examination-1	
1	Confidential Cell
2	Conduct Branch (Theory)
3	Conduct Branch (Practical)
4	UMC
5	PH.D
6	Re-Evaluation Branch
7	Secrecy Branch

Examination-2	
1	Examination Branch -2
2	Result Branch-1
3	Result Branch-2
4	Computer Lab
5	Result Branch -3
6	Certification Section
7	Construction Branch
University Teaching Department/Institute	
1	AIH-Culture & Archaeology
2	Bio-Chemistry
3	Bio-Technology
4	Botany
5	Chemistry
6	Commerce
7	Computer Science & Application
8	Economics
9	Education
10	Electronic Science
11	English
12	Fine Arts
13	Foreign languages
14	Geography
15	Geology
16	Geo-Physics
17	Hindi
18	History
19	Home Science
20	Instrumentation
21	Inst.of Environmental Studies
22	Inst. Of Pharmaceutical Sciences
23	Inst.of Law
24	Inst. of Mass communication & Media Technology
25	Inst. of Management Studies
26	Law
27	Library and Information Science
28	Mathematics
29	Micro-Biology
30	Music and Dance
31	Punjabi
32	Philosophy
33	Physical Education
34	Psychology

35	Public Administration
36	Physics
37	Political Science
38	Sanskrit, Pali & Prakriti
39	Sanskrit and Indological Studies
40	Social Work
41	Sociology
42	Statistics and O R
43	Tourism and Hotel Management
44	University Institute of Eng. & Technology
45	University School of Management
46	Women's Study Research Centre
47	UIT Building
48	Public Administration department
49	ION Beam Centre
50	Zoology
College/School at the Campus	
1	Institute of Integrated Honours Studies
2	Institute of Teacher Training and Research
3	University Sr. Sec.Model School
Directorates Centres	
1	Directorate of Distance Education
2	UGC Human Resource Dev Centre
3	Computer Centre
4	Mahatma Gandhi Coaching Centre
5	Dr. B. R Ambedkar Studies Centre
6	Gulzari Lal Nanda Centre of Ethics & Philosophy
7	University Health Centre
Hostels Office	
1	Chief Warden (Boys)
2	Chief Warden (Girls)
Hostel (Boys)	
1	Ambedkar Bhawan
2	Arjun Bhawan
3	Ch. Devi Lal Bhawan
4	Harsh Bhawan
5	Narhari Bhawan
6	Pratap Bhawan
7	Ch. Ranbir Singh Bhawan
8	Shaheed Bhagat Singh Bhawan
9	Swami Vivekanand Bhawan
10	Subhash Bhawan
11	Bheema Bhawan
12	Tagore Bhawan
13	International Bhawan

Hostel (Girls)	
1	Ahilaya Bhawan
2	Bharti Bhawan
3	Devyani Bhawan
4	Ganga Bhawan
5	Gargi Bhawan
6	Kasturba Bhawan
7	Kalpana Chawla Bhawan
8	Laxmi Bai Bhawan
9	Meera Bhawan
10	Sarswati Bhawan
11	Subhadra Bhawan
12	Uttara Bhawan
13	Yamuna Bhawan
Services / Facilities	
1	Jawahar Lal Nehru Library
2	Public Relations Office
3	Dharuhera Haryana Museum
4	Youth & Cultural Affairs
5	University Printing & Publications Bureau
6	NSS
7	NCC
8	Directorate of Sports
9	Land & Farming Department
10	Horticulture Department
11	Security Department
12	Employment Bureau (University)
Associations	
1	Kurukshetra University Teaching 'Association (KUTA)
2	Kurukshetra University Nonteaching Employees
3	Association (KUNTEA)
General	
1	Post Office and Banks on Campus
2	NIT Kurukshetra
3	District Administration
3	Doctors (On University Penal of Kurukshetra)
4	Press Correspondents/Journalists/Print Media
5	Electronic Media
6	Sport education building
7	Non-Teaching club
8	Senior Modal School
9	Construction Branch
10	University Market

1.3 Green Monitoring Committee:-



INTERNAL QUALITY ASSURANCE CELL
KURUKSHETRA UNIVERSITY KURUKSHETRA
[Established by the State Legislature Act XII of 1956]
('A+' Grade, NAAC Accredited)

E-mail:- head.iqac@kuk.ac.in

Dated: 06.04.2021

NOTIFICATION

The IQAC Committee in its meeting held under the Chairmanship of the Vice-Chancellor on March 15, 2021 has constituted a Committee of following members to frame the modalities for Green audit, Energy audit, and Environment audit of the University and also suggest the ways for environmental promotional activities beyond the campus, sensor based energy conservation.

(i) Prof. Smita Chaudhary (Convener), Institute of Environmental Studies.
(ii) Dr. Ram Avtar, Electrical Department, UIET
(iii) Dr. Pooja Arora, Institute of Environmental Studies
(iv) Dr. Dipti Grover, Institute of Environmental Studies
(v) XEN/SDO (Electrical), Construction Branch

Sd/-
Director, IQAC

Endst. No. IQAC/21/ 932 (1-10) Dated: 06.04.2021

Copy to:-

a) All the members of the Committee for necessary actions.
b) Chairpersons/Directors of the concerned Departments/Institutes.
c) P.A. to the Vice-Chancellor, KUK (for kind information of the Vice-Chancellor)
d) PS to the Registrar, KUK (for kind information of the Registrar)

Director, IQAC
Director
Internal Quality Assuranc
Kurukshetra University, Kuruk

1. 4 Energy Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- **Er. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- **Mr. Rakesh Pathak**, [Director]
- **Dr. Suresh Soni** [Reviewer]
- **Mr. Sachin Kumawat** [Project Engineer]
- **Mrs. Laxmi Raikwar Singadiya**, [Energy Engineer]
- **Mr. Ajay Nahra ,** [Site Engineer]
- **Mr. Akash Kumar,** [Site Engineer]
- **Mr. Purushottam Bhade** [Site Engineer]

1.5 About Energy Audit

Energy audit helps to understand more about the ways energy is used in any plant and helps in identifying areas where waste may occur and scope for improvement exists. The overall energy efficiency from generation to final consumer becomes 50%. Hence one unit saved in the end user is equivalent to two units generated in the power plant.

Energy audit is the most efficient way to identify the strength and weakness of energy management practices and to find a way to solve problems. Energy audit is a professional approach in utilizing economic, financial, and social and natural resources responsibility. Energy audits "adds value" to management control and is a way of evaluating the system.

Empirical Exergy Private Limited (EEPL), Indore M.P. carried out the "Energy Audit" at the site to find gaps in the energy consumption pattern for **KUK University, Haryana**. A technical report is prepared as per the need and the requirement of the project.

1.6 Objectives of Energy Auditing

An energy audit provides vital information base for overall energy conservation program covering essentially energy utilization analysis and evaluation of energy conservation measures. It aims at:

- Identifying the quality and cost of various energy inputs.
- Assessing present pattern of energy consumption in different cost centers of operations.
- Relating energy inputs and production output.
- Identifying potential areas of thermal and electrical energy economy.
- Highlighting wastage in major areas.
- Fixing of energy saving potential targets for individual cost centers.
- Implementation of measures for energy conservation & realization of savings.

1.7 Methodology:

Methodology adopted for achieving the desired objectives viz.: Assessment of the current operational status and energy savings include the following:

- Discussions with the concerned officials for identification of major areas of focus and other related systems.
- Team of engineers visited the site and had discussions with the concerned officials / supervisors to collected data / information on the operations and load distribution within the plant and same for the overall premises. The data was analyzed to arrive at a base line energy consumption pattern.
- Measurements and monitoring with the help of appropriate instruments including continuous and / or time-lapse recording, as appropriate and visual observations were made to identify the energy usage pattern and losses in the system.
- Trend analysis of costs and consumptions.
- Capacity and efficiency test of major utility equipment's, wherever applicable.
- Estimation of various losses
- Computation and **in-depth analysis** of the collected data, including utilization of computerized analysis and other techniques as appropriate were done to draw inferences and to evolve suitable energy conservation plan/s for improvements/ reduction in specific energy consumption.

1.8 KUK Present Energy Scenario:

KUK University uses energy in the form of electricity purchased from UHBVNL grid and 1600 KWp solar grid connected system. The electricity bill is based on the UHBVNL, 11 KV, and Tariff Category BULK (NDS and DS) on 11 kV. The University has 02 feeder one is NDS with sectioned load 2500 KW and another is DS with sectioned load 2000 KW. Total sectioned load of 4500 kW.

Total billing amount of electricity bill of **KUK University Kurukshetra** has been found to be about **INR 3, 10,97,873 /-** for 12 months analysis period from Jan-2021 to Dec-2021. KUK University has 1600 kWp grid connected roof top solar plant on various building. Total unit generation of the plant from Mar-2021 to Jan-2022 is 20, 27,515 units.

CHAPTER- 2
POWER SUPPLY SYSTEM

2.1 Power Station & Transformer:

The power supply of the KUK is supplied from UHBVNL with the help of 11 kV feeders under and Tariff Category BULK (NDS and DS). The NDS Feeder has 2000 KW and DS feeder has 2500 kW sectioned load, respectively. There are 27 no Step down transformers with different capacity. The details are given in tables.

Table 2.1: - Name plate details of transformer near C Type house

Sr. No.	Items	Technical Details Transformer TR-01	Technical Details Transformer TR-02
1	Make	Jay BEE industry	Kirloskar -
2	Location	Near C Type House -01	Near C Type House -02
3	Year	2018	2013
4	Rating (kVA)	315	315
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	16.53/420	16.53/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.5	4.5
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	5	7
12	Ideal Tap Potion	3	5

Figure: - 315 kVA Transformer near C- Type Quarter

Table2.2:- Name plate details of transformer near D-94 Back and Distance education

Sr. No.	Items	Technical Details Transformer TR-03	Technical Details Transformer TR-04
1	Make	Jay BEE industry	Jay BEE industry
2	Location	Near D-94 Back	Distance Education
3	Year	2016	2016
4	Rating (KVA)	315	315
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	16.53/420	16.53/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.5	4.5
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	5	5
12	Ideal Tap Potion	3	3

(i) (ii)

Figure :- Two transformers of 315 kVA (i) D-94 Back Side and (ii) Distance Education

Table 2.3: - Name plate details of transformer Near Quarter E-17 And E-28

Sr. No.	Items	Technical Details Transformer TR-05	Technical Details Transformer TR-06
1	Make	Jay BEE industry	Jay BEE industry
2	Location	Near Quarter E-17	Near Quarter E-28
3	Year	2016	2016
4	Rating (kVA)	315	315
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	16.53/420	16.53/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.5	4.5
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	5	5
12	Ideal Tap Potion	3	3

Figure :- Two 315 k transformers- one is near E-17 and second is near E-28

Table2.4:- Name plate details of transformer Near Girls Hostel -13 And Near E-51

Sr. No.	Items	Technical Details Transformer TR-07	Technical Details Transformer TR-08
1	Make	Jay BEE industry	Jay BEE industry
2	Location	Girls Hostel -13	Near -51
3	Year	2016	2016
4	Rating (kVA)	315	315
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	16.53/420	16.53/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.5	4.5
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	5	5
12	Ideal Tap Potion	3	3

(i) **(ii)**

Figure :- Two 315 kVA Transformers- (i) near Girls Hostel-13 and (ii) near E-51

Table2.5:- Name plate details of transformer near NIT Gate and Old Library

Sr. No.	Items	Technical Details Transformer TR-09	Technical Details Transformer TR-10
1	Make	Jay BEE industry	Kirloskar
2	Location	Near NIT Gate	Old Library
3	Year	2016	2011
4	Rating (kVA)	315	315
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	16.53/420	16.53/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.5	4.5
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	5	7
12	Ideal Tap Potion	3	5

(i) (ii)

Figure :- Two 315 KVA Transformers (i) near NIT gate and (ii) near old Library

Table 2.6:- Name plate details of transformer Near Power House No-5 and R.K.Sadan

Sr. No.	Items	Technical Details Transformer TR-11	Technical Details Transformer TR-12
1	Make	Kirloskar	Kirloskar
2	Location	Power House -5	R.K Sadan
3	Year	2007	2011
4	Rating (kVA)	1000	200
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	52.48/420	10.50/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	5.25	4.64
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	7	7
12	Ideal Tap Potion	5	5

(i) **(ii)**

Figure :- Transformers (i) 100 kVA near Power house -05 and (ii) 200 kVA Near RK sadan

Table 2.7: - Name plate details of transformer Near Power House No-2 (TR 1 and 2)

Sr. No.	Items	Technical Details Transformer TR-13	Technical Details Transformer TR-14
1	Make	Kirloskar	Kirloskar
2	Location	Power House -2 TR-1	Power House -2 TR-2
3	Year	2006	2004
4	Rating (kVA)	1000	1000
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	52.48/420	52.48/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	5.25	5.25
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	7	7
12	Ideal Tap Potion	5	5

(i) (ii)

Figure :- Two 1000 kVA Transformers at Power house -02 (i)TR-1 and (ii) TR-2

Table 2.8: - Name plate details of transformer Near Power House No -3 (TR-1 and TR-2)

Sr. No.	Items	Technical Details Transformer TR-15	Technical Details Transformer TR-16
1	Make	The Indian	The Indian
2	Location	Power house -3 TR-1	Power House -3 TR-2
3	Year	1990	1990
4	Rating (kVA)	1000	1000
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	52.49/420	52.49/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.97	4.97
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	5	5
12	Ideal Tap Potion	3	3

(i) **(ii)**

Figure :- Two 1000 kVA Transformers at Power house -03 (i) TR-1 and TR-2

Table 2.9: - Name plate details of transformer Near S.T.P. Plant and Teacher Club

Sr. No.	Items	Technical Details Transformer TR-17	Technical Details Transformer TR-18
1	Make	Kirloskar	Jay Bee Industry
2	Location	S.T.P. Plant	Teacher Club
3	Year	2015	2016
4	Rating (kVA)	315	315
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	16.5/420	16.53/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.36	4.5
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	7	5
12	Ideal Tap Potion	5	3

(i) **(ii)**

Figure :- Two 315 KVA Transformers – (i) near STP plant and (ii) near Techer club

Table 2.10: - Name plate details of transformers of Near UIET Mechanical and University Market

Sr. No.	Items	Technical Details Transformer TR-19	Technical Details Transformer TR-20
1	Make	Jay Bee Industry	Kirloskar
2	Location	U.I.E.T Mechanical	University Market
3	Year	2015	2005
4	Rating (kVA)	315	1000
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	16.5/420	52.48/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.5	5.32
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	5	7
12	Ideal Tap Potion	3	5

(i) (ii)

Figure :- (i) 315 kVA TR near UIET Meachanical and (ii) 1000 kVA TR Near University market

Table2.11:- Name plate details of transformer Near V.C. Residence and Vivekanand Hostel

Sr. No.	Items	Technical Details Transformer TR-21	Technical Details Transformer TR-22
1	Make	Kirloskar	Kirloskar
2	Location	V.C Residence	Vivekananda Hostel
3	Year	2011	2012
4	Rating (kVA)	200	315
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	10.20/420	16.53/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.47	4.38
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	7	7
12	Ideal Tap Potion	5	5

(i) (ii)

Figure :- (i) 200 kVA TR near Vivekananda hostel and (ii) 315 kVA TR Near VC Resedencey

Table2.12:- Name plate details of transformer Near IIE TR-1 And TR-2

Sr. No.	Items	Technical Details Transformer TR-23	Technical Details Transformer TR-24
1	Make	Kirloskar	Kirloskar
2	Location	Chemistry	Environment And biotech.
3	Year	2014	2014
4	Rating (kVA)	315	250
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	16.5/420	13.1/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.5	4.75
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	7	7
12	Ideal Tap Potion	5	5

Figure :- 315 kVA and 250 kVA TRs installed Near IIE Building (Chemistry and Environment)

Table2.14: - Name plate details of transformer Near Power House-4 and New Library

Sr. No.	Items	Technical Details Transformer TR-25	Technical Details Transformer TR-26
1	Make	Kirloskar	Kirloskar
2	Location	Power House No-4	New Library
3	Year	2002	2011
4	Rating (kVA)	750	315
5	Voltage (HV/ LV)	11000/433	11000/433
6	Current Rating (HV/ LV)	39.36/420	16.50/420
7	Frequency (Hz)	50	50
8	Impedance at 75°C	4.67	4.35
9	Vector group	DYN-11	DYN-11
10	Type of cooling	ONAN	ONAN
11	Total no of Tap	7	7
12	Ideal Tap Potion	5	5

Power House No-4

Figure :- 750 kVA TR at Power House no-04 and 315 kVA TR at Library .

Transformer Load Survey: Energy audit team carried out load survey on the transformer based operating loads at the site. Loadings on the transformers are below

Table 2.15: Calculated Transformers Loading % (Dated 11-02-2022)

Sr. No	Transformer Location	Design Capacity	Volt	Ampere	Operating Load	Transformer Loading %
1	Power House No. 2, Transformer-1	1000	447	180	139.36	13.94
2	Power House No. 2, Transformer-2	1000	414	150	107.56	10.76
3	Power House No. 4	750	455	25.6	20.17	2.69
4	University Market	1000	441	114.4	87.38	8.74
5	Main Library Transformer-1	315	443	10	7.67	2.44
6	Main Library Transformer-2	315	**Under Maintenance.**			0.00
7	Near IIE, (Chemistry Department)	315	432	6.8	5.09	1.62
8	Near IIE, (Environment Department)	250	436	27.9	21.07	8.43
9	Vice-Chancellor Residence	200	420	37	26.92	13.46
10	UIET Mechanical	315	441	37.2	28.41	9.02
11	R.K. Sedan	200	436	36.8	27.79	13.89
12	Teacher Club	315	438	70.3	53.33	16.93
13	Near Quarter E-17	325	439	23.5	17.87	5.50
14	Near Quarter E-28	315	435	23.5	17.71	5.62
15	DDE	315	447	40.9	31.66	10.05
16	Power House No. 3, Transformer-1	1000	441	68	51.94	5.19
17	Power House No. 3, Transformer-2	1000	440	45	34.29	3.43
18	Power House No. 5	1000	423	160	117.22	11.72
19	Near NIT Gate	315	429	40	29.72	9.44
20	Near E-51	315	435	33	24.86	7.89
21	Near D-94 back	315	440	68	51.82	16.45
22	Near C-type houses	315	414	30.6	21.94	6.97
23	Near Swami Vivekanand Hostel	315	432	62	46.39	14.73
24	S.T. P	315	436	52.8	39.87	12.66
25	Near Girls Hostel No. 13	315	437	63.1	47.76	15.16
26	Moveable Trolly Transformer	250	**Stand By (Mobile Type).**			0.00

Observation: -

It was observed that most of the transformers were operating under loaded. As per discussion with concern departments and team, loadings of the transformer are maintained 50 to 65 % in summer session. Loading of the transformer is maintained by University's requirement of heavy cooling load (Fan Cooler and HVAC System).

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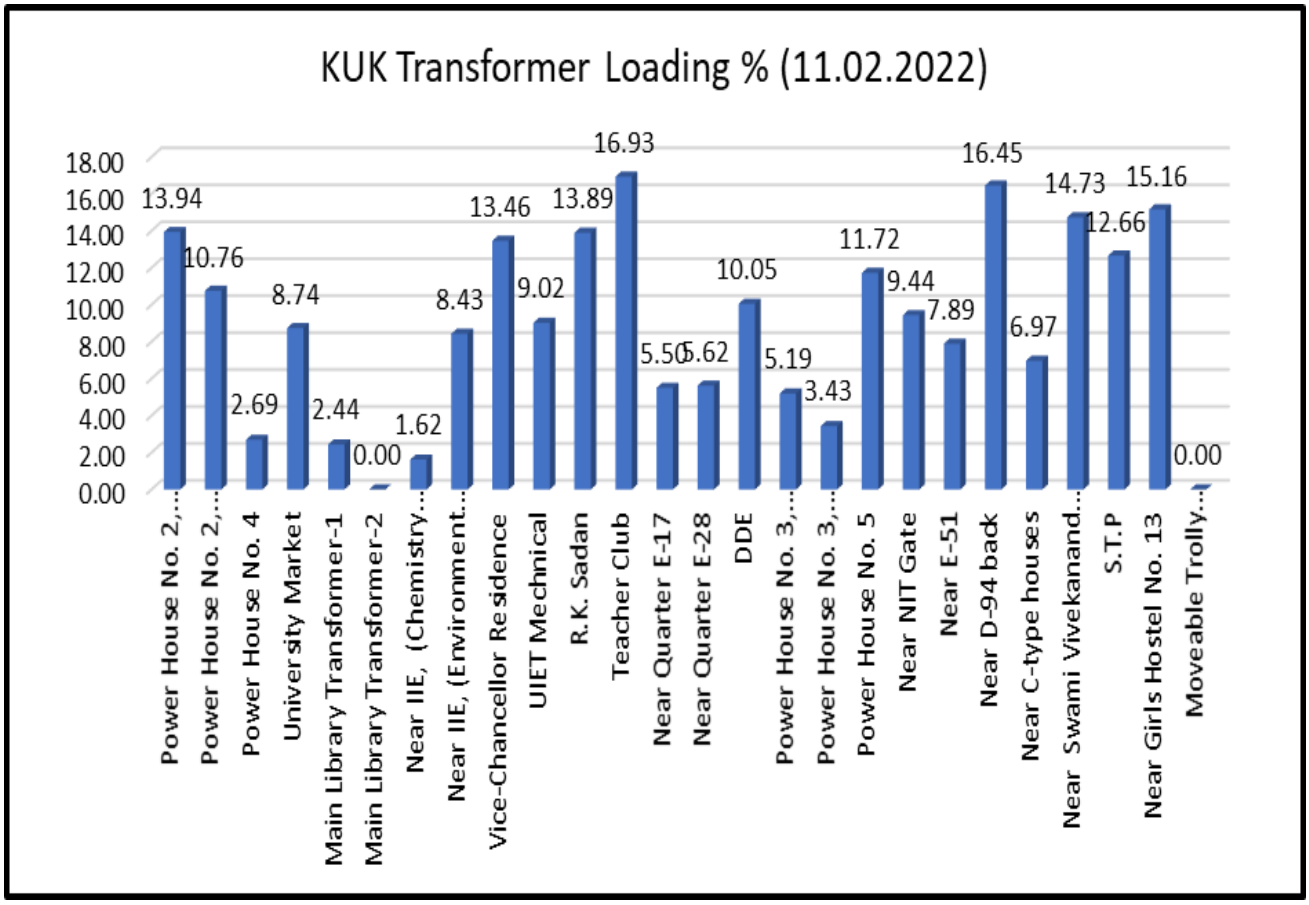


Fig 2.2: Graphical presentation of Transformers loadings on Date 11/02/2022

Observation: -

It was observed that loadings of the transformers were in the range of 1.62 % to 16.93 %. Those were under loaded due to winter session.

2.2 DG Set: -

There are 46 DG sets at KUK. DG sets are used for emergencey power supply whenever grid power failures. Details of the DG Sets are given in table.

Table – 2.16 Name Plate Details of Diesel Generators Geophysics and Health Centre

Sr. No.	Parameter	Technical Specification DG Set-01	Technical Specification DG Set-02
1	Make	Kirloskar	Kirloskar
2	Location	Geophysics New	Health Centre
3	Capacity (kVA)	15	25
4	Rated Voltage (V)	415	415
5	Full load current (A)	20.9	34.8
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Figure: - DG-sets for Geophysics at KUK

Table -2.17 Name Plate Details of Diesel Generators Botany and B. Pharmacy

Sr. No.	Parameter	Technical Specification DG Set-03	Technical Specification DG Set-04
1	Make	Kirloskar	Kirloskar
2	Location	Botany	B Pharmacy
3	Capacity (kVA)	50	63
4	Rated Voltage (V)	415	415
5	Full load current (A)	69.6	87.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Figure: - DG-set for Botany at KUK

Table -2.18 Name Plate Details of Diesel Generators Zoology/Maths and PH-2 Gen.-2 Geeta Sadan

Sr. No.	Parameter	Technical Specification DG Set-05	Technical Specification DG Set-06
1	Make	Kirloskar	Kirloskar
2	Location	Zoology and Maths	PH-2 Gen-2 G. Sadan
3	Capacity (kVA)	100	40
4	Rated Voltage (V)	415	415
5	Full load current (A)	139.1	55.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.19 Name Plate Details of Diesel Generators UIET Old Building and Correspondence Dept.

Sr. No.	Parameter	Technical Specification DG Set-07	Technical Specification DG Set-08
1	Make	Kirloskar	Kirloskar
2	Location	UIET Old Building	Correspondence Dept.
3	Capacity (kVA)	125	160
4	Rated Voltage (V)	415	415
5	Full load current (A)	173.5	232.5
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.20 Name Plate Details of Diesel Generators Chemistry and New STP

Sr. No.	Parameter	Technical Specification DG Set-09	Technical Specification DG Set-10
1	Make	Kirloskar	Kirloskar
2	Location	Chemistry	New STP
3	Capacity (kVA)	63	250
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	348
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.21 Name Plate Details of Diesel Generators Electronics Science and Power House-2 Gen.1 Geeta Sadan

Sr. No.	Parameter	Technical Specification DG Set-011	Technical Specification DG Set-12
1	Make	Kirloskar	Kirloskar
2	Location	Electronics Science	PH-2 Gen.-1 G.Sadan
3	Capacity (kVA)	63	200
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	278
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.22 Name Plate Details of Diesel Generators Bio-Chemistry and Main Library

Sr. No.	Parameter	Technical Specification DG Set-13	Technical Specification DG Set-14
1	Make	Kirloskar	Kirloskar
2	Location	Bio.-Chemistry	Main Library
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.23 Name Plate Details of Diesel Generators Community Centre and New Examination -2

Sr. No.	Parameter	Technical Specification DG Set-15	Technical Specification DG Set-16
1	Make	Kirloskar	Kirloskar
2	Location	Community Centre	New Examination -2
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.24 Name Plate Details of Diesel Generators Animal House and USIC/IIE

Sr. No.	Parameter	Technical Specification DG Set-17	Technical Specification DG Set-18
1	Make	Kirloskar	Kirloskar
2	Location	Animal House	USIC /IIE
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.25 Name Plate details of Diesel Generators V.C. Office and Ion Building of Physics Dept.

Sr. No.	Parameter	Technical Specification DG Set-19	Technical Specification DG Set-20
1	Make	Kirloskar	Kirloskar
2	Location	V.C. Office	Ion Building of phys.dep
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.26 Name Plate details of Diesel Generators B.Ed. /R.K Sadan and International Guest House

Sr. No.	Parameter	Technical Specification DG Set-21	Technical Specification DG Set-22
1	Make	Kirloskar	Kirloskar
2	Location	B.Ed. /R.K Sadan	Inter. Guest House
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.27 Name Plate details of Diesel Generators Art Faculty Old and Dean Building

Sr. No.	Parameter	Technical Specification DG Set-23	Technical Specification DG Set-24
1	Make	Kirolskar	Kirloskar
2	Location	Art Faculty Old	Dean Building
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.28 Name Plate Details of Diesel Generators Tourism and Adam Block

Sr. No.	Parameter	Technical Specification DG Set-25	Technical Specification DG Set-26
1	Make	Kirolskar	Crompton
2	Location	Tourism	Adam Block
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.29 Name Plate Details of Diesel Generators UIET Building and Dharohar

Sr. No.	Parameter	Technical Specification DG Set-27	Technical Specification DG Set-28
1	Make	Kirloskar	Kirloskar
2	Location	UIET Mechanical	Dharohar
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.30 Name Plate details of Diesel Generators Physics and Environment

Sr. No.	Parameter	Technical Specification DG Set-29	Technical Specification DG Set-30
1	Make	Kirloskar	Crompton
2	Location	Physics	Environment. Deptt.
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.31 Name Plate details of Diesel Generators V.C. Residence and Girls Hostel No-13

Sr. No.	Parameter	Technical Specification DG Set-31	Technical Specification DG Set-32
1	Make	Kirloskar	Crompton
2	Location	V.C Residence	Girls Hostel No.-13
3	Capacity (kVA)	63	100
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	139.1
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.32 Name Plate details of Diesel Generators V.I.P Guest House And M.B.A Second Year

Sr. No.	Parameter	Technical Specification DG Set-33	Technical Specification DG Set-34
1	Make	Kirloskar	Kirloskar
2	Location	V.I.P Guest House -1	M.B.A Second Year
3	Capacity (kVA)	63	63
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	87.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.33 Name Plate Details of Diesel Generator Academic Staff College and Geophysics

Sr. No.	Parameter	Technical Specification DG Set-35	Technical Specification DG Set-36
1	Make	Kirloskar	Kirloskar
2	Location	Academic Staff College	Geophysics Old
3	Capacity (kVA)	63	63
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	87.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table 2.34 Name Plate details of Diesel Generators University Press and University Model Sen. Sec. School

Sr. No.	Parameter	Technical Specification DG Set-37	Technical Specification DG Set-38
1	Make	Kirloskar	Kirloskar
2	Location	University Press	Uni. Model Sen. School
3	Capacity (kVA)	63	63
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	87.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.35 Name Plate Details of Diesel Generators Tube well No-2 and No-4

Sr. No.	Parameter	Technical Specification DG Set-39	Technical Specification DG Set-40
1	Make	Kirloskar	Kirloskar
2	Location	Tube well No-2	Tube well no-4
3	Capacity (kVA)	63	63
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	87.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.36 Name Plate details of Diesel Generators Tube well No.-5 And No.-7

Sr. No.	Parameter	Technical Specification DG Set-41	Technical Specification DG Set-42
1	Make	Kirloskar	Kirloskar
2	Location	Tubewell-5	Tube well No-7
3	Capacity (kVA)	63	63
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	87.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.37 Name Plate Details of Diesel Generators Old Disposal Pump and University College

Sr. No.	Parameter	Technical Specification DG Set-43	Technical Specification DG Set-44
1	Make	Kirloskar	Kirloskar
2	Location	Old Disposal Pump	University College
3	Capacity (kVA)	63	160
4	Rated Voltage (V)	415	415
5	Full load current (A)	87.6	232.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Table -2.38 Name Plate Details of Diesel Generators Construction Branch Physics Education Department

Sr. No.	Parameter	Technical Specification DG Set-45	Technical Specification DG Set-46
1	Make	Kirloskar	Crompton
2	Location	Construction branch	Physical Edu.Dept.
3	Capacity (kVA)	15	160
4	Rated Voltage (V)	415	415
5	Full load current (A)	20.9	232.6
6	Frequency	50 Hz	50 Hz
7	Power factor	0.80	0.80
8	RPM	1500	1500
9	Phase	3	3

Observations & Suggestions:

- DG set use only in case of grid power failures.
- Details of diesel consumption are given in table. The unit generation from the DG sets are not available.
- It is recommended to install cloud based fuel and unit monitoring system for each DG set. It will help to maintain data based (fuel and unit generation) and find out specific fuel consumption of DG sets.

2.3 Capacitor Bank and System power factor

Management team has installed capacitor bank at 20 no of transformer to maintain power factor of the system. The total capacity of the bank is 3125 kVAr.

Table: 2.39 Capacitor bank and Power factor

Sr. No.	Name of Department	Capacity of Transformer (kVA)	Capacity of Capacitor (kVAr)	Power Factor at the side
1	Distance Education Department	315 kVA	100	0.997
2	Power House No.5	1000 kVA	250	0.997
3	Power House No.5	1000 kVA	250	0.997
4	Near NIT Gate	315 kVA	75	0.997
5	Near E-51 House	315 kVA	75	0.998
6	Near D-95 House	315 kVA	75	0.998
7	Near Boys Hostel Market	1000 kVA	250	0.998
8	Power House No.3	1000 kVA	250	0.998
9	Power House No.3	1000 kVA	250	0.997
10	STP Plant	315 kVA	100	0.996
11	Power House No.2	1000 kVA	250	0.996
12	Power House No.2	1000 kVA	250	0.995
13	Power House No.4	750 kVA	250	0.995
14	Library	315 kVA	100	0.998
15	New Library	315 kVA	100	0.997
16	VC Residence	200 kVA	100	0.995
17	UIET Mechanical	315 kVA	100	0.996
18	Community Centre	200 kVA	100	0.996
19	Environment Department	315 kVA	100	0.997
20	Chemistry Department	315 kVA	100	0.997
		Total	**3125**	

Observation: - It was observed that installation of capacitor bank with above transformers is a good practise to maintain power factor of the system at operating load.

Recommendation: - It was observed that operating power factor is 0.80 at C-Type residency TR and Swami Vivekananda Hostel TR. It is recommended to install capacitor bank for above transformer to maintain the power factor on the System**.**

2.4 Grid Connected Solar Photovoltaic System (1000 + 600 =1600 kWp)

There is 1600 kWp solar photovoltaic roof top grid connected systems installed on various department. System details are given below:

Table 2.40 :- Details of 1000 kW Solar system.

1000 kW Solar Power Plant on 01.09.2019 Installed by Ultimate Sun Systems Pvt. Ltd.				
Sr. No.	**Name of Building**	**No. of Inverters**	**Capacity**	**No. of Panels**
1	Academic Staff of College	1	71.28 kWp	216
2	Education Department	1	71.28 kWp	216
3	Bio-Chemistry	1	71.28 kWp	216
4	Botany	1	71.28 kWp	216
5	Electronic Science	1	71.28 kWp	216
6	Tourism Department	1	71.28 kWp	216
7	MBA Department	1	71.28 kWp	216
8	Commerce	1	98.34 kWp	160
9	University School of Management	1		138
10	Law Department	1	52.80 kWp	160
11	Examination Wing-I	1	49.50 kWp	150
12	UIET	1	50.16 kWp	152
13	University School-1	1	96.36 kWp	292
	University School-2	1		
14	B. Pharmacy	1	49.50 kWp	150
15	Administration Block	1	45.54 kWp	138
16	Environment Studies	1	29.70 kWp	90
17	USIC Department	1	29.70 kWp	90
Total = 17 Department		**18**	**1000.56 kWp**	**3032**

Sr. No	**Description**	**Technical Specification**
1	Plant Information	
1.1	Plant capacity	1000 kWp
1.2	Location	17 Buildings
1.3	Latitude & Longitude	77.47 Eº& 23.17 Nº
2	PV Panel Details	
2.1	Make	Saatvik Green Energy (P) Limited
2.2	Panel Type	Multi-Crystaline
2.3	Panel Wattage	330 Watt
2.4	No of PV Panels	3032
2.5	Panel Tilt Angle	23º
3	Inverter Information	
3.1	Make	Delta Power Solutions Pvt. Ltd.
3.2	Model	RPI M50A
3.3	No of Inverter	18

Solar Module (Panel) at Different Buildings

Solar Inverter at Different Buildings

Table: - 2.41 (600 kW Solar system Details)

600 kW Solar Power Plant on 23.03.2018 Installed by Fourth Partner Energy Pvt. Ltd.

Sr. No.	Building Name	No of Inverters	Capacity	No. of Panels
1	University College- 01	1	50 kWp	152
2	University College-02	1	50 kWp	172
3	University College-03	1	50 kWp	152
4	University College-04	1	50 kWp	152
5	University College-05	1	50 kWp	152
6	University College-06	1	50 kWp	152
7	University College-07	1	50 kWp	152
8	Public Administration – 01	1	50 kWp	160
9	Public Administration - 02	1	20 kWp	60
10	Old Library	1	30 kWp	90
11	Auditorium	1	50 kWp	152
12	Auditorium	1	50 kWp	152
13	Auditorium	1	50 kWp	152
Total = 04 Department			**600 kWp**	**1850**

Sr. No	Description	Technical Specification
1	Plant Information	
1.1	Plant capacity	600 kWp
1.2	Location	04 Buildings
1.3	Latitude & Longitude	77.47 E°& 23.17 N°
2	PV Panel Details	
2.1	Make	Vikram Solar
2.2	Panel Type	Multi-Crystalline
2.3	Panel Wattage	325 Watt
2.4	No of PV Panels	1850
2.5	Panel Tilt Angle	23°
3	Inverter Information	
3.1	Make	Delta Power Solutions Pvt.
3.2	Model	RPI M50A
3.3	No of Inverter	13

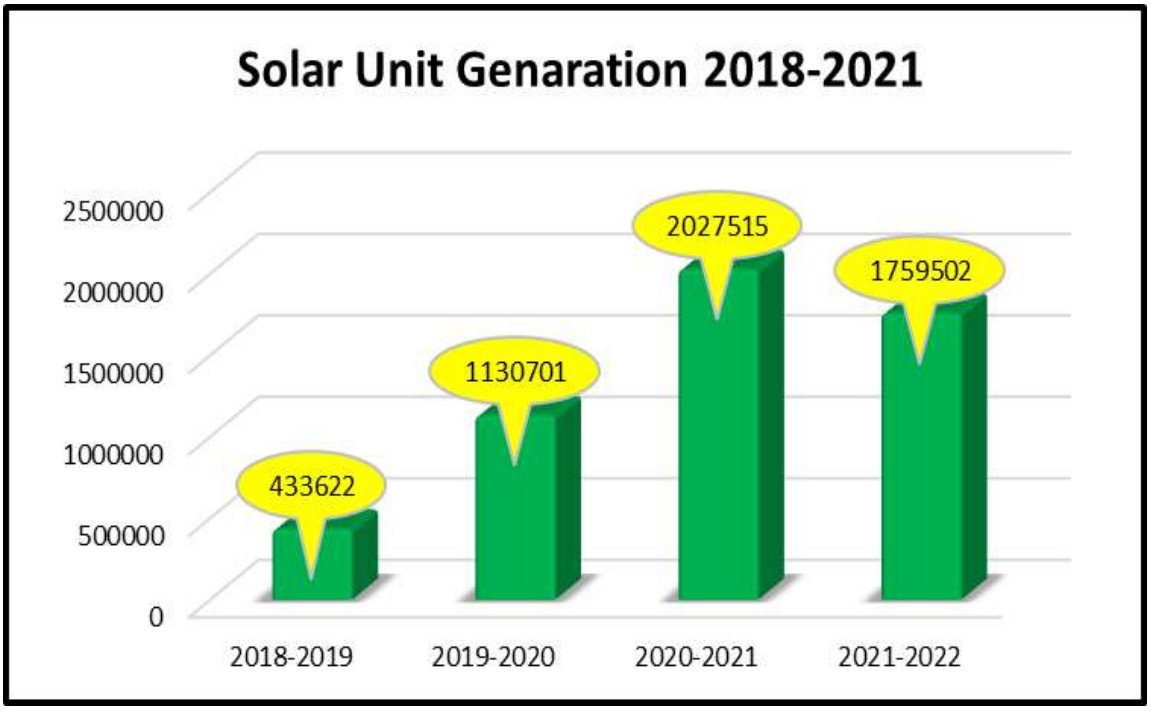
Solar Generation from July-2018 to Feb-2019 (600 (kWp)

Generation of Electricity from Solar Power Plant 600 kWP Capacity for the Financial Year 2018-19.

Date of Commissioning of Solar Power Plant 600 kWP June-2018

Table: - 2.42 (Total Solar units generation from installation date): -

Sr. No	Year	Units Generation
1	2018-2019	4,33,622
2	2019-2020	11,30,701
3	2020-2021	20,27,515
4	2021-2022	17,59,502
	Total	**53,51,340**



Observation :-

University has 1600 kWp(1000 + 600) solar photovoltaic roof top grid connected system installed on Various 21 Buildings. Power generation from July-2018 to Dec-2021 is **53,51,340** units. Total CO_2 reduction is 5137.28 ton to till date from date of installation.

Table 2.43: - Solar unit generations from Jul-2018 to feb-2019 on 600 kW

Sr. No	Month & Year	Unit Generated
1	Jul-18	54,697
2	Aug-18	57,544
3	Sep-18	61,191
4	Oct-18	68,550
5	Nov-18	43,574
6	Dec-18	46,727
7	Jan-19	50,659
8	Feb-19	50,680
	Total	**4,33,622**

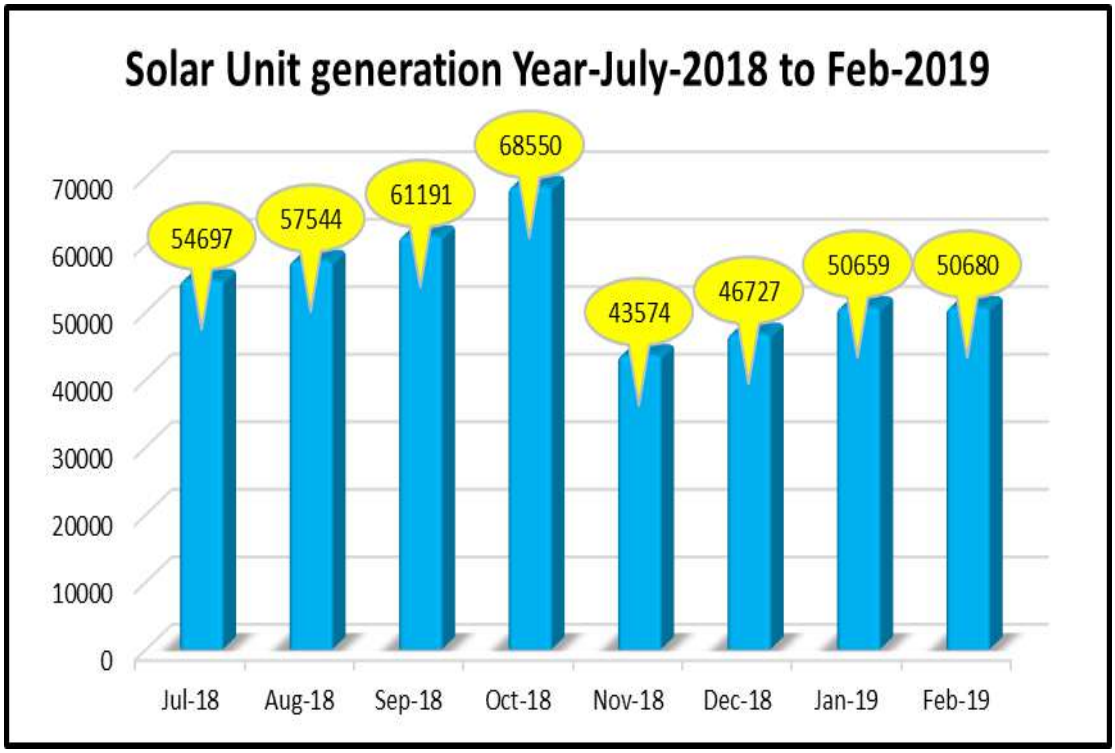


Figure:- Graphical Presentation of Solar unit generations from Jul-2018 to feb-2019

Observation:

Total unit generations from July-2020 to Feb-2019 are 4,33,622 units.

Table 2.44:- Solar Generations from Mar-2019 to Feb-2020 on 1600 kWp

Sr. No	Month	Unit Generated
1	Mar-19	79,557
2	Apr-19	76,860
3	May-19	84,982
4	Jun-19	80,510
5	Jul-19	73,078
6	Aug-19	43,910
7	Sep-19	56,910
8	Oct-19	1,55,147
9	Nov-19	1,22,120
10	Dec-19	91,788
11	Jan-20	1,06,734
12	Feb-20	1,59,105
	Total	**11,30,701**

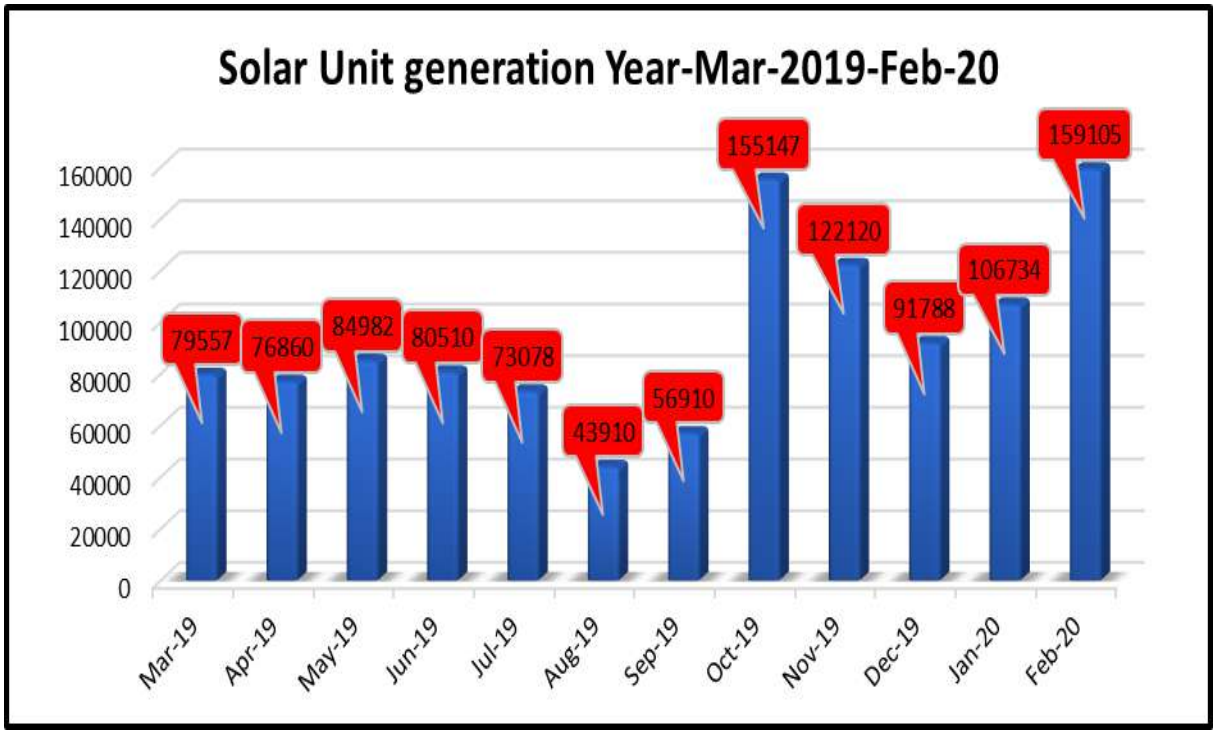


Figure:- Graphical Presentation of Solar unit generations from Mar-2019 to feb-2020

Observation:

Total unit generated from Mar-2019-2020 to Feb-2020 are 11,30,701 units.

Table 2.45:- Solar Generations from Mar-2020 to Feb-2021 on 1600 kWp

Sr. No	Month & Year	Unit Generated
1	Mar-20	1,81,497
2	Apr-20	1,81,936
3	May-20	2,06,305
4	Jun-20	1,98,702
5	Jul-20	1,83,662
6	Aug-20	1,74,201
7	Sep-20	1,96,800
8	Oct-20	1,79,919
9	Nov-20	1,37,880
10	Dec-20	1,24,939
11	Jan-21	1,05,740
12	Feb-21	1,55,934
	Total	20,27,515

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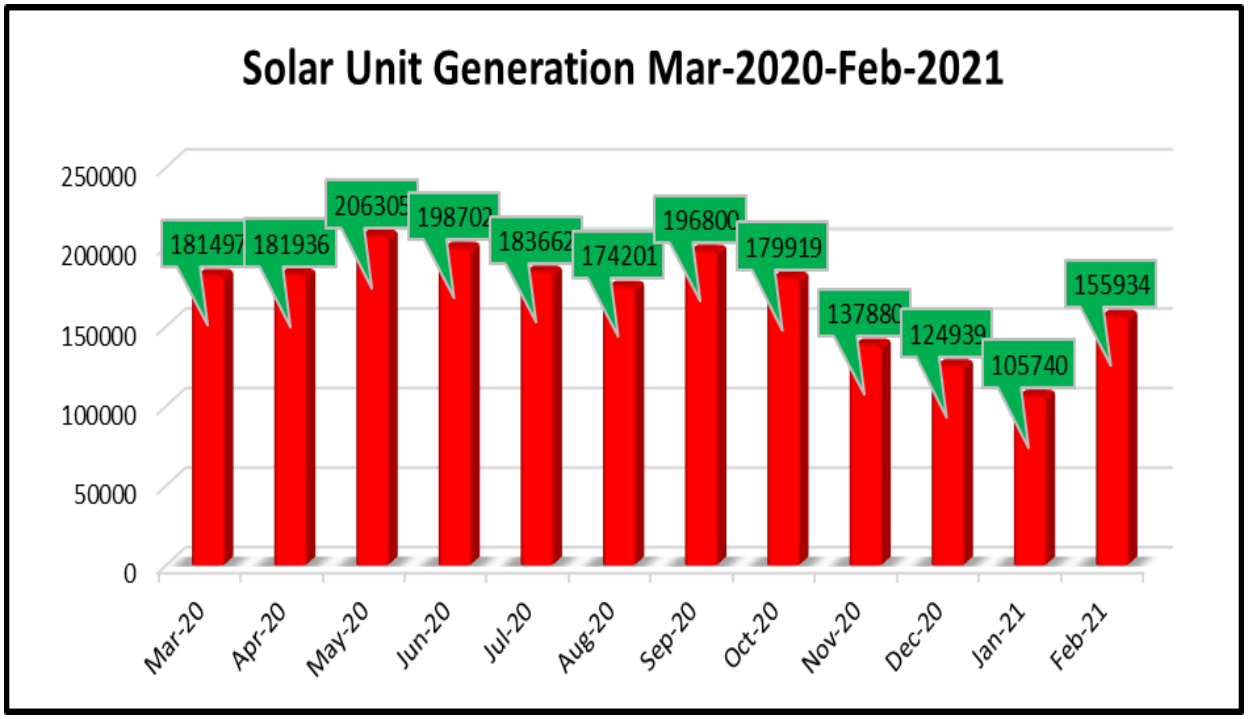

Figure: - Graphical Presentation of Solar unit generations from Mar-2020 to feb-2021

Observation:

Total unit generated from Mar-2020 to 2020 to 2021 are 20,27,515 units.

Table 2.46:- Solar Generations from Mar-2021to Jan-2021 on1600 kWp

Sr. No	Month & Year	Unit Generated
1	Mar-21	2,11,282
2	Apr-21	2,18,750
3	May-21	2,09,784
4	Jun-21	1,89.,549
5	Jul-21	1,75,180
6	Aug-21	1,81,360
7	Sep-21	1,51,239
8	Oct-21	1,68,035
9	Nov-21	1,36,468
10	Dec-21	1,17,855
	Total	**17,59,502**

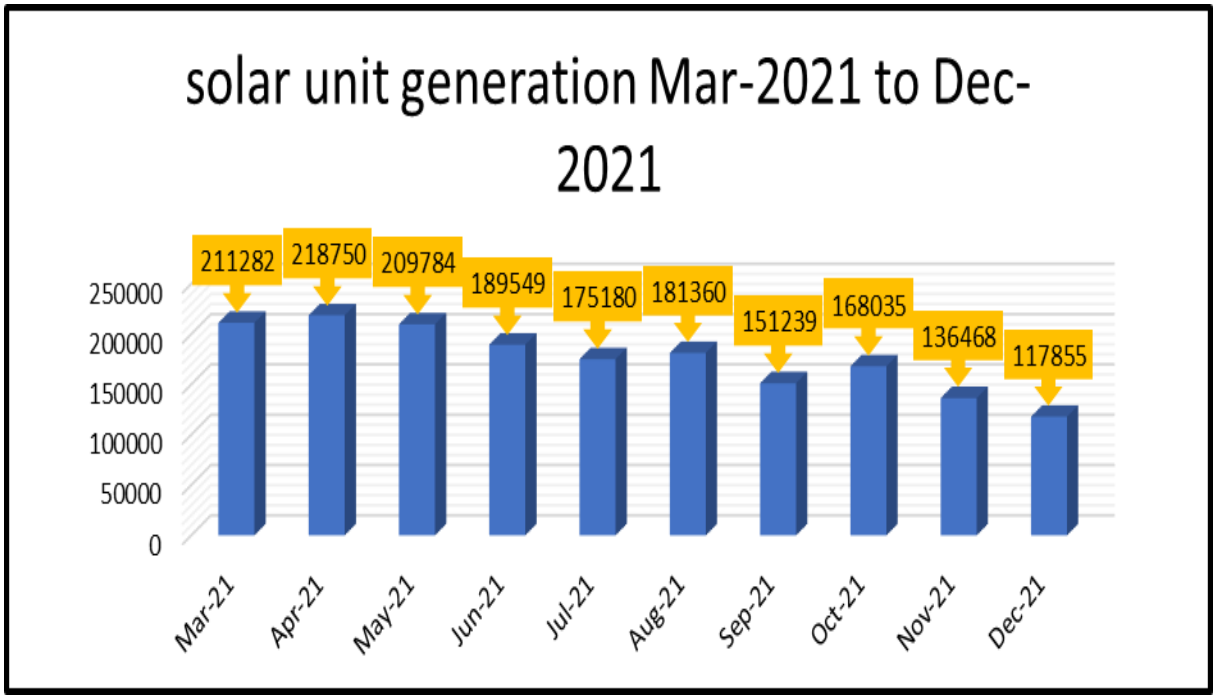

Figure:- Graphical Presentation of Solar unit generations from Mar-2021 to Dec-2021

Observation:

Total unit generated from Mar-2021to Dec-2021 are 17,59,502 units.

CHAPTER- 3
ELECTRICITY BILL ANALYSIS

3.1 Electricity Bill Analysis: (Yr. from 2017 To 2021)

Electricity bills of last Five years were analysed. Details of unit consumption and annual per unit charges are determined as follow:

Table 3.1 Annual energy consumption 2017 to 2021

Sr. No	Year	Grid Units	Solar units	Total Unit Consumption	Renewable Energy Share %
1	2017	1,04,29,975	0	1,04,29,975	0.0
2	2018	92,61,567	2,85,556	95,47,123	3.0
3	2019	85,47,344	9,21,140	94,68,484	9.7
4	2020	39,56,819	19,98,530	59,55,349	**33.6**
5	2021	41,09,600	20,28,261	61,37,861	**33.0**

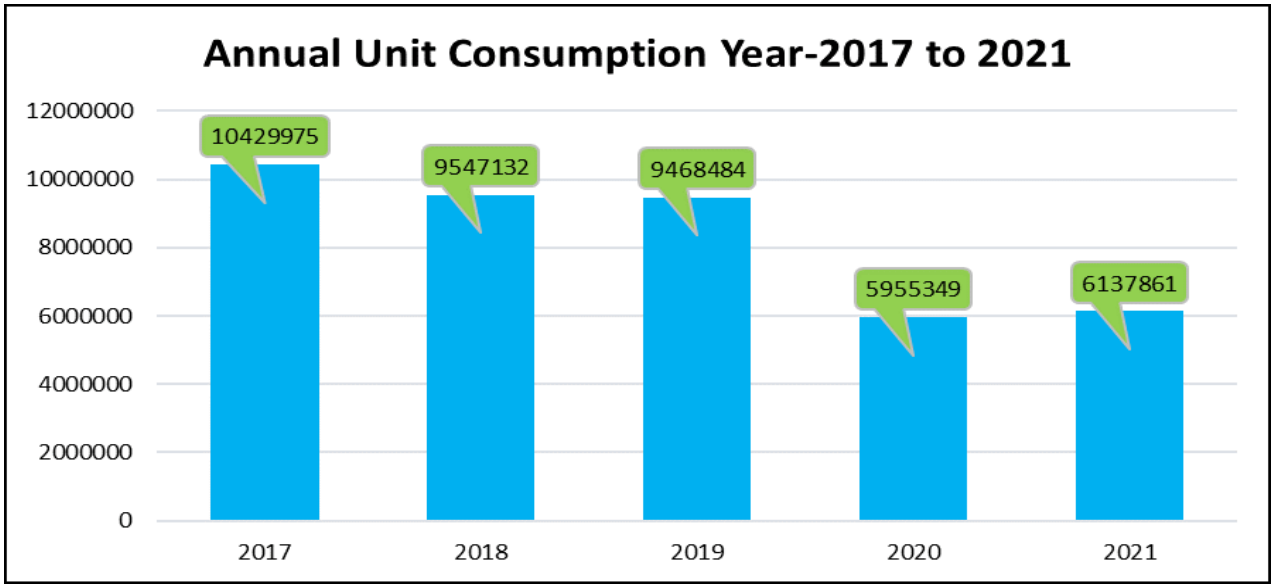

Fig: 3.1 Annual energy consumption from year 2017 to 2021

Observation: -

- University has utilized Renewable energy (Solar Energy) about 33 % of the total energy consumption of the system.
- Annual energy consumption of the University is continually decreasing in years 2018 and 2019 due to implementation of energy conservation project (Installation of LED Lighting) and installation of 1.6 MW Solar system in the university.

3.2 Monthly electrical energy consumption (2020-21):

The monthly electrical consumption for the University is given in the table.

Table 3.2 Energy consumption and billing amount (year 2020-21) on 2000 kW Feeder

Power House -01 (2500 KW)				
Sr. No.	**Month / Year**	**Unit (kWh)**	**Billing Amount**	**Rs/kWh**
1	Jan-21	2,85,300	19,21,506	6.74
2	Feb-21	1,58,889	11,30,229	7.11
3	Mar-21	1,86,961	13,13,316	7.02
4	Apr-21	2,14,963	15,15,488	7.05
5	May-21	2,54,968	18,22,606	7.15
6	Jun-21	2,92,521	21,01,839	7.19
7	Jul-21	3,54,902	24,88,484	7.01
8	Aug-21	3,22,726	24,29,317	7.53
9	Sep-21	2,93,212	19,45,767	6.64
10	Oct-21	1,89,299	12,17,834	6.43
11	Nov-21	1,58,820	10,32,201	6.50
12	Dec-21	2,97,878	19,90,629	6.68
		30,10,439	**2,09,09,216**	**6.95**

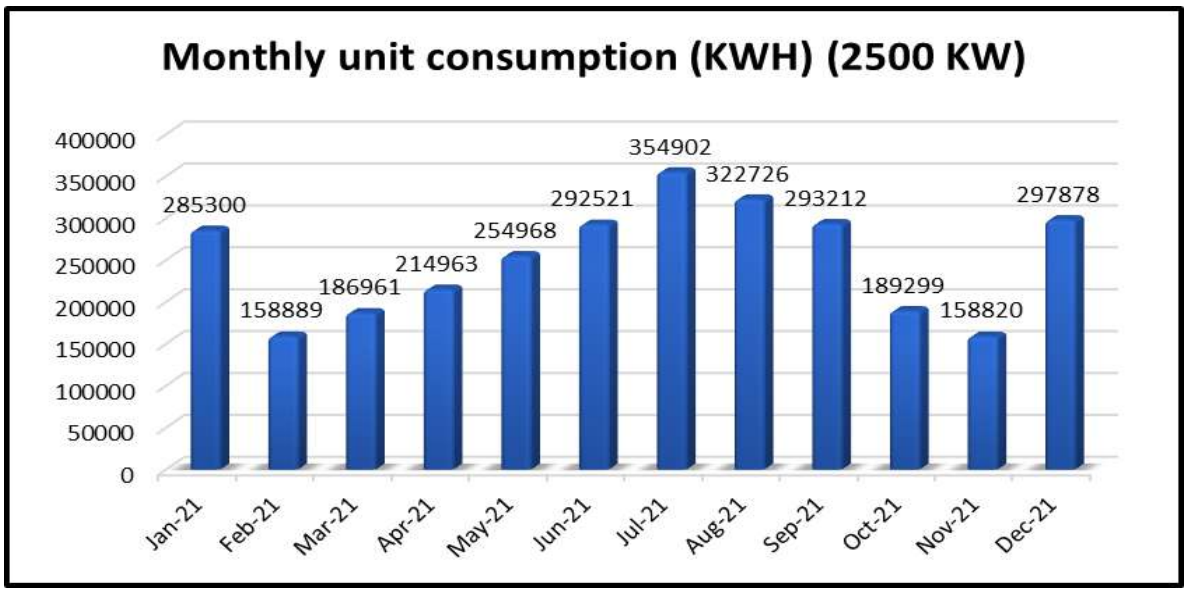

Figure3.4 Graphical presentation of Monthly unit consumption in year 2020-21 on Feeder -2500 kW

Observation:

It was found out that total energy consumption in last 12 month was 3010439/- units on 2500 kVA Feeder. Average annual energy charges is Rs 6.96 /kWh.

Table 3.3 Energy consumption and billing amount (year 2020-21) on 2000 kW Feeder

Power house -02 (2000 KVA)				
Sr. No.	**Month / Year**	**Unit (kWh)**	**Billing Amt**	**Rs/kWh**
1	Jan-21	151650	1370721	9.04
2	Feb-21	16470	414813	25.19
3	Mar-21	0	333530	0.00
4	Apr-21	172161	344769	2.00
5	May-21	0	322771	0.00
6	Jun-21	25920	499366	19.27
7	Jul-21	156450	1423266	9.10
8	Aug-21	179550	1538884	8.57
9	Sep-21	171420	1457596	8.50
10	Oct-21	64890	763006	11.76
11	Nov-21	58800	711817	12.11
12	Dec-21	101850	1008118	9.90

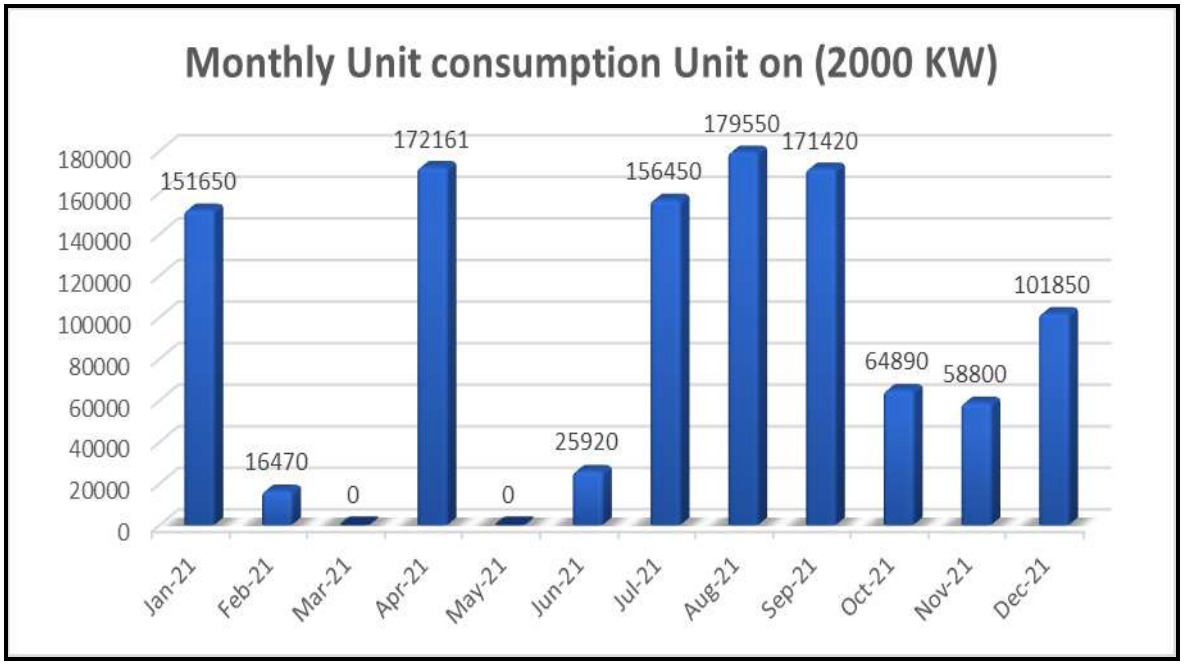

Figure3.4 Graphical presentation of Monthly unit consumption in year 2020-21 on Feeder -2000 kW

Observation:

It was found out that total energy consumption in last 12 month was 10, 99,161/- units on 2000 kVA Feeder. An average annual energy charge is Rs 9.62 /kWh.

3.3 Connected Load of University:

Table 3.4: - Connected load of admin Block

Connected load of Admin Block					
S.NO	**Equipment's**	**Quantity**	**Unit Watt**	**Total kW**	**Share %**
1	Fan	137	80	11.0	14.4
2	Tube	197	20	3.9	5.2
3	Exhaust Fan	12	180	2.2	2.8
4	AC	5	2500	12.5	16.4
5	LED light	4	90	0.4	0.5
6	Water Cooler	4	750	3.0	3.9
7	Desert Cooler	66	180	11.9	15.6
8	Computer	107	85	9.1	12.0
9	Printer	79	250	19.8	26.0
10	Photo Copy Machine	5	500	2.5	3.3
	Total Connected load kW			**76.1**	**100**

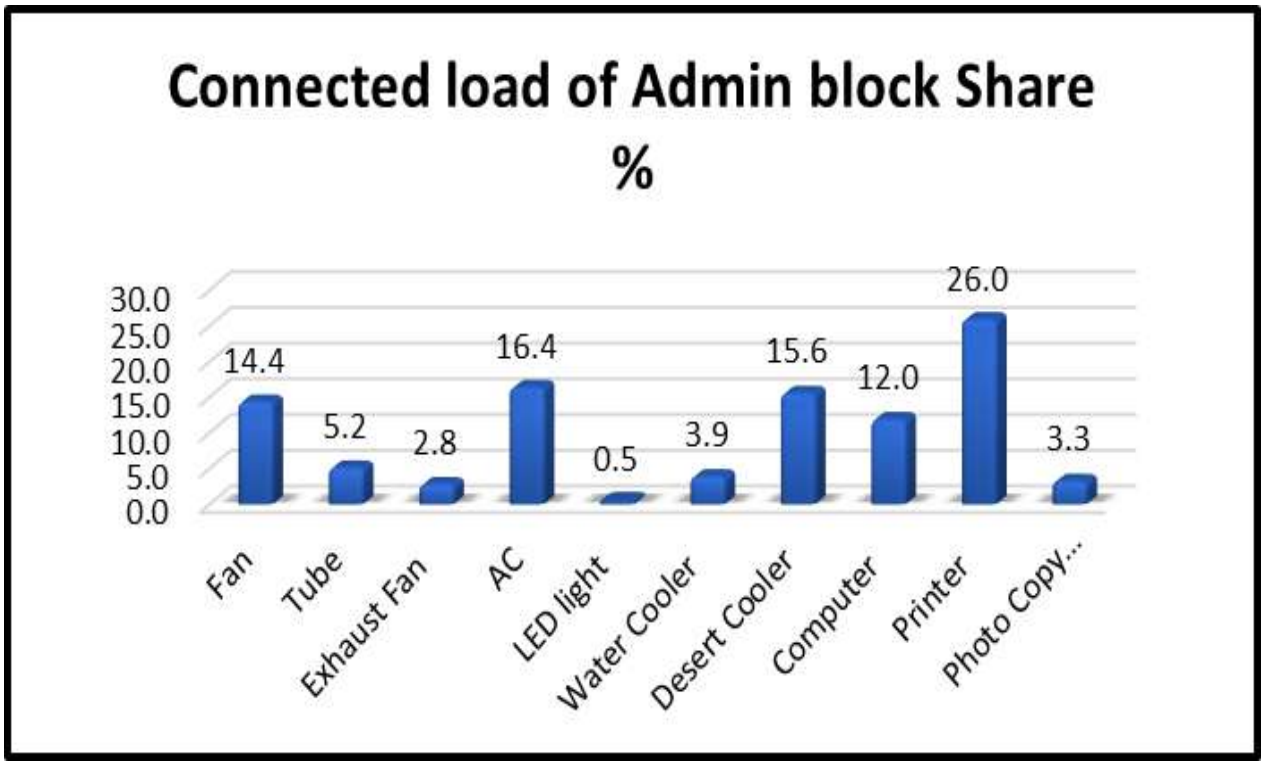

Table 3.5:- Connected load of Auditorium and Crash Hall

Sr. No	Equipment's	quantity	Unit Watt	Total kW	Share %
1	Fan	56	80	4.5	19.15
2	Tube	411	20	8.2	35.13
3	Exhaust Fan	20	80	1.6	6.84
4	AC	2	2500	5.0	21.37
5	LED light	11	90	1.0	4.23
6	Water Cooler	1	750	0.8	3.21
7	Desert Cooler	1	180	0.2	0.77
8	Computer	5	85	0.4	1.82
9	Printer	5	250	1.3	5.34
10	Photo Copy Machine	1	500	0.5	2.14
Total connected load kW				**23.4**	100.00

Table 3.6 :- Connected load of Auditorium DYCA

S.NO	Equipment's	quantity	Unit Watt	Total kW	Share %
1	Fan	12	60	0.7	10.0
2	Tube	33	20	0.7	9.2
3	Exhaust Fan	3	80	0.2	3.3
4	AC	2	2500	5.0	69.4
5	Desert Cooler	3	180	0.5	7.5
	Total Connected load kW			7.2	100.0

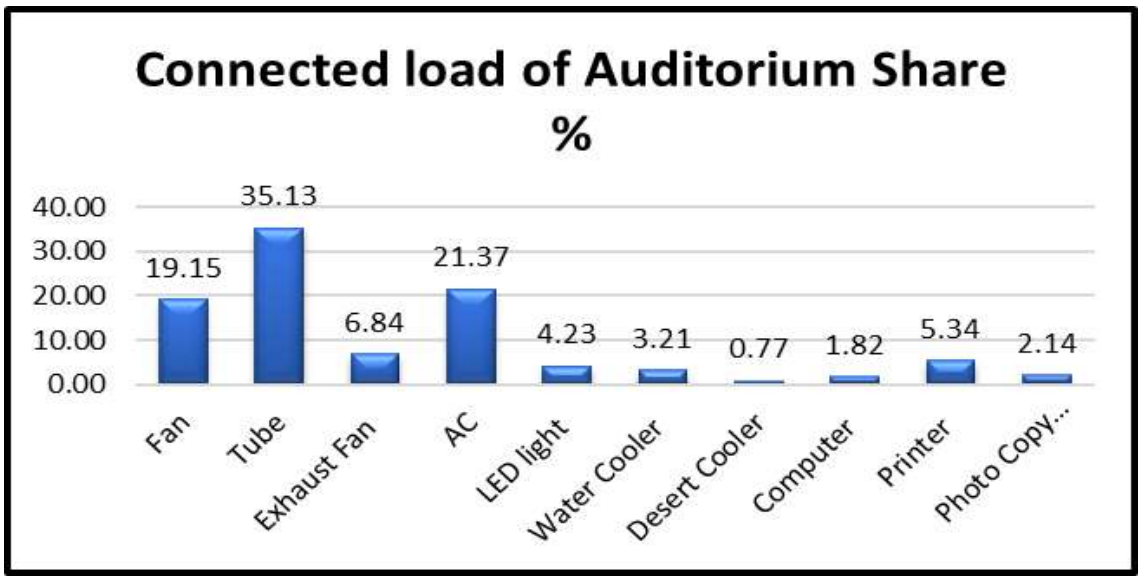

Table 3.7: - Connected load of B Pharmacy

Sr. no	Equipment's	quantity	Unit Watt	Total kW	Share %
1	Fan	242	80	19.4	20.98
2	Tube	469	40	18.8	20.33
3	Exhaust Fan	85	180	15.3	16.58
4	AC	12	2500	30.0	32.50
5	LED light	4	50	0.2	0.22
6	Water Cooler	3	180	0.5	0.59
7	Desert Cooler	5	180	0.9	0.98
8	Computer	70	85	6.0	6.45
9	Printer	3	250	0.8	0.81
10	Photo Copy Machine	1	500	0.5	0.54
	TOTAL Connected load kW			**92.3**	100.00

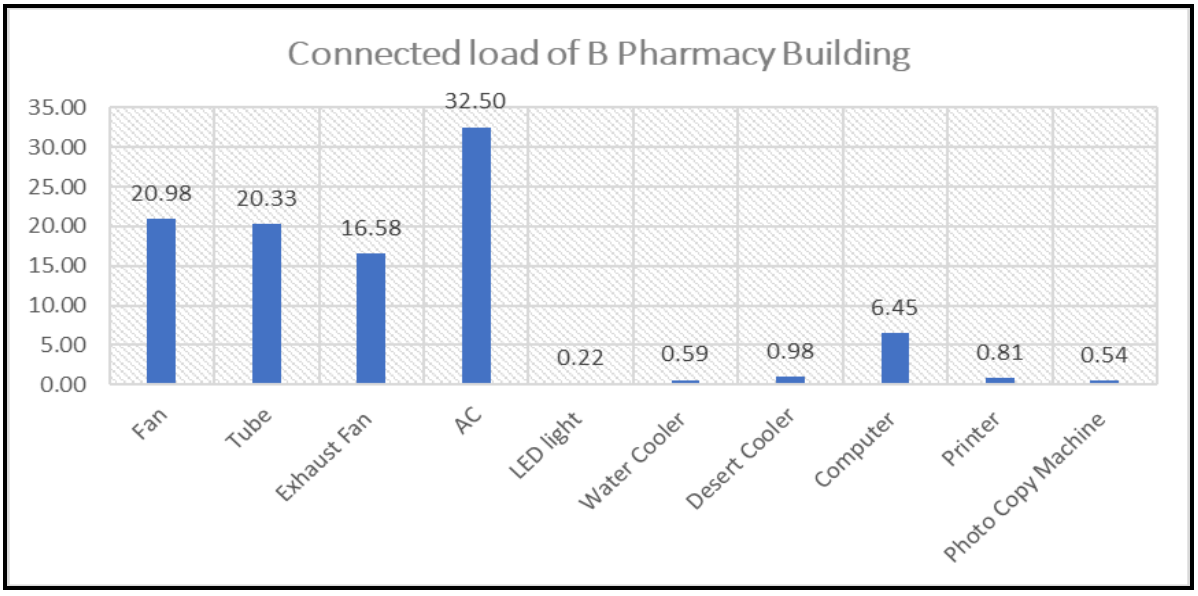

Table 3.8:- Connected load of B.Ed College

Sr. no	Equipment's	quantity	Unit Watt	Total kW	Share %
1	Fan	187	80	14.96	22.79
2	Tube	428	40	17.12	26.08
3	Exhaust Fan	7	180	1.26	1.92
4	AC	7	2500	17.50	26.66
5	LED light	30	150	4.50	6.86
6	Water Cooler	2	600	1.20	1.83
7	Desert Cooler	14	180	2.52	3.84
8	Computer	45	85	3.83	5.83
9	Printer	5	250	1.25	1.90
10	Photo Copy Machine	3	500	1.50	2.29
	Total Connected load kW			**65.64**	**100.00**

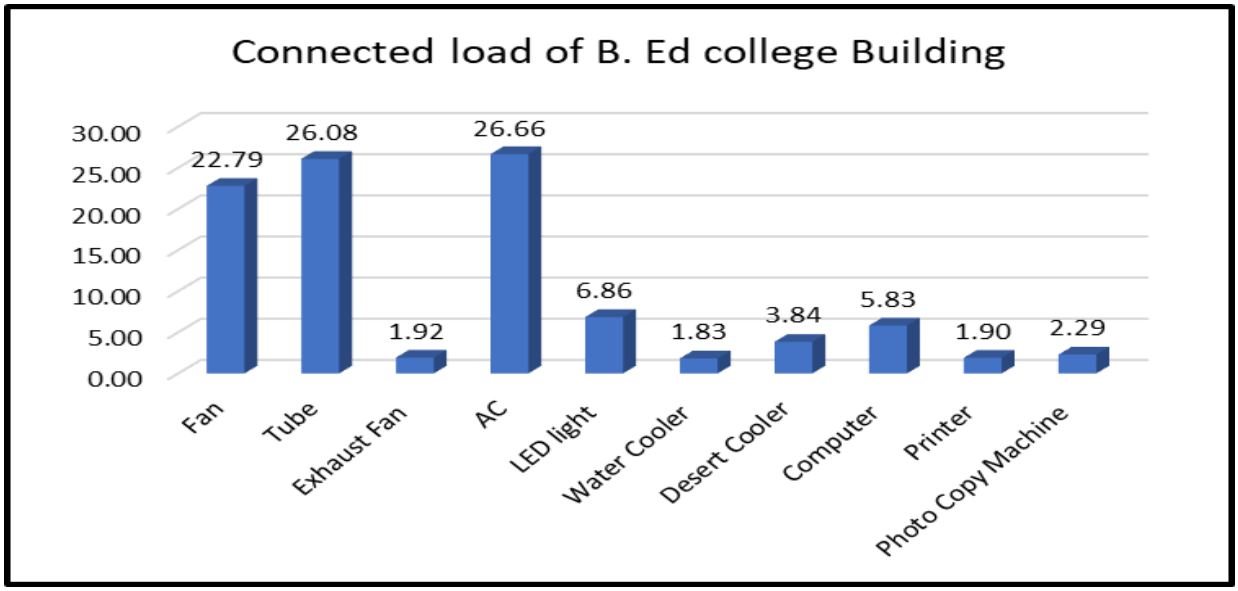

Table 3.9: - Connected load of Bio Chemical

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	45	80	3.6	15.76
2	Tube	84	40	3.36	14.71
3	Exhaust Fan	8	180	1.44	6.30
4	AC	5	2500	12.5	54.73
5	LED light	3	90	0.27	1.18
6	Computer	5	85	0.425	1.86
7	Printer	3	250	0.75	3.28
8	Photo Copy Machine	1	500	0.5	2.19
	Total Connected load KW			**22.845**	100.00

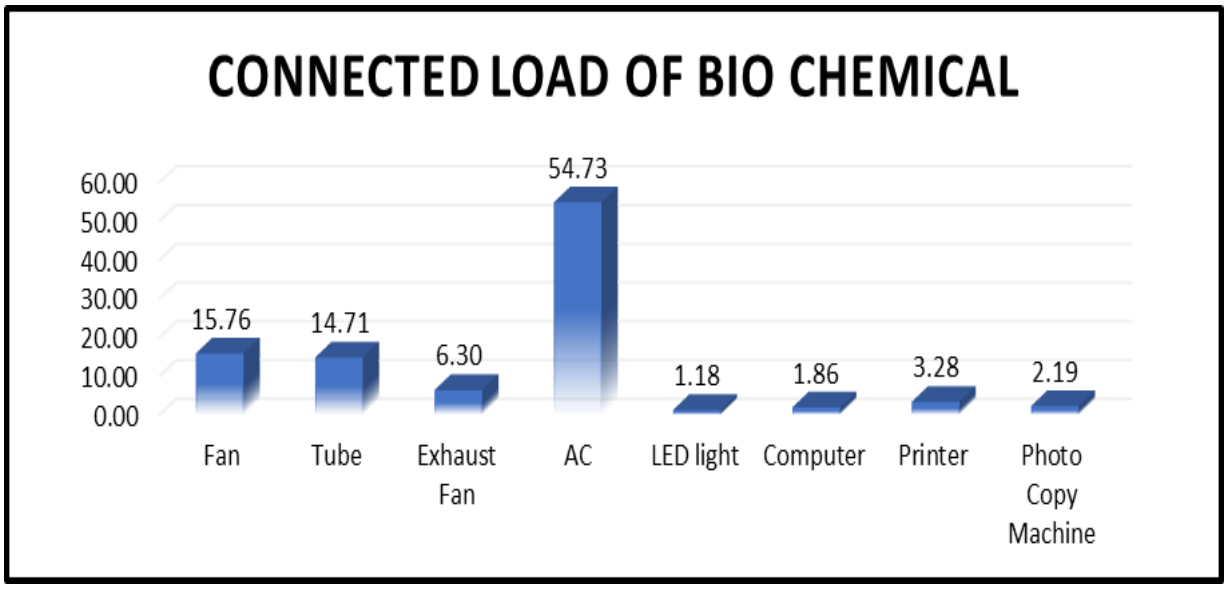

Table 3.10: - Connected load of Bio technology – G

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	48	80	3.84	6.42
2	Tube	89	40	3.56	5.95
3	Exhaust Fan	7	180	1.26	2.11
4	AC	19	2500	47.5	79.37
5	Computer	17	85	1.445	2.41
6	Printer	7	250	1.75	2.92
7	Photo Copy Machine	1	500	0.5	0.84
	Total Connected load KW			**59.855**	100.00

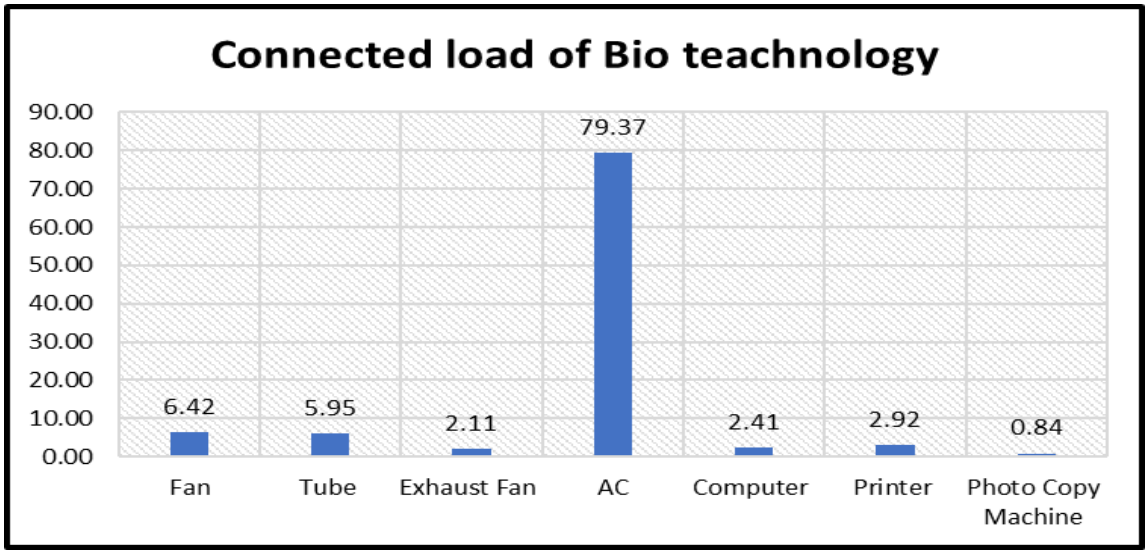

Table 3.11: - Connected load of Micro Biology

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	50	80	4	12.76
2	Tube	89	40	3.56	11.36
3	Exhaust Fan	1	180	0.18	0.57
4	AC	8	2500	20	63.80
5	Computer	19	85	1.615	5.15
6	Printer	6	250	1.5	4.78
7	Photo Copy Machine	1	500	0.5	1.59
	Total Connected load KW			**31.355**	**100.00**

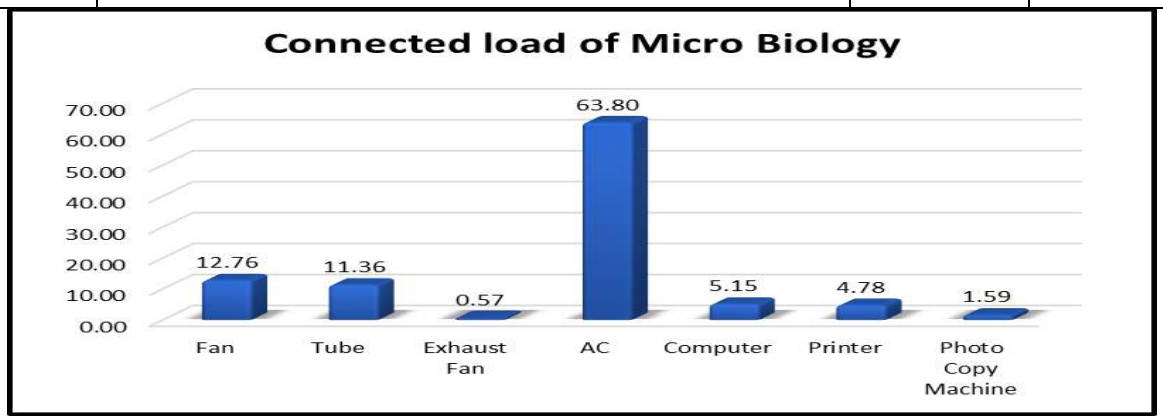

Table 3.12 Connected load of Home Science

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	60	80	4.8	40.4
2	Tube	101	40	4.04	34.0
3	Exhaust Fan	3	180	0.54	4.5
4	**AC**	1	2500	2.5	21.0
	Total Connected load KW			**11.88**	100.0

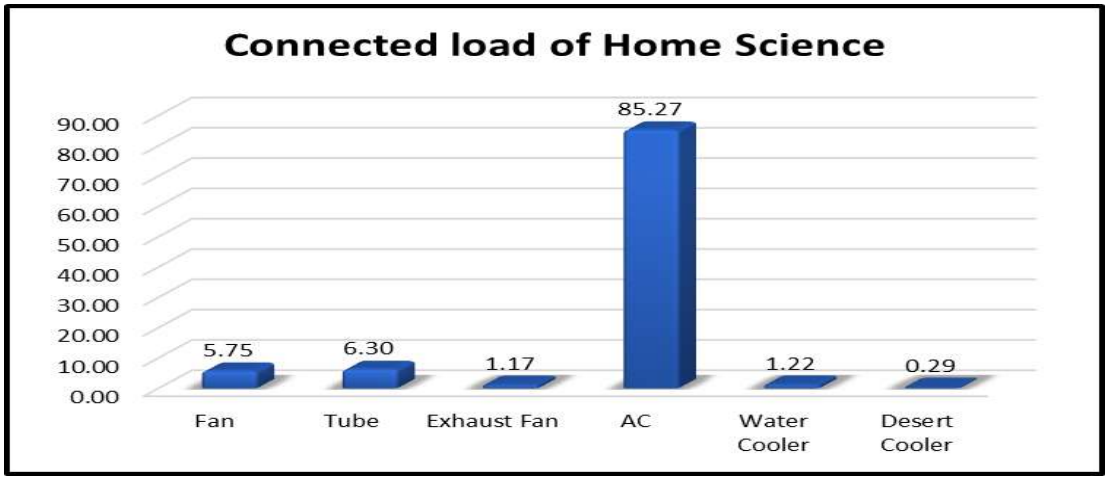

Table 3.13:- Connected load of Botany department

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	112	80	8.96	11.48
2	Tube	281	40	11.24	14.40
3	Exhaust Fan	13	180	2.34	3.00
4	AC	21	2500	52.5	67.26
5	Computer	6	85	0.51	0.65
6	Printer	6	250	1.5	1.92
7	Photo Copy Machine	2	500	1	1.28
	Total Connected load KW			**78.05**	100.00

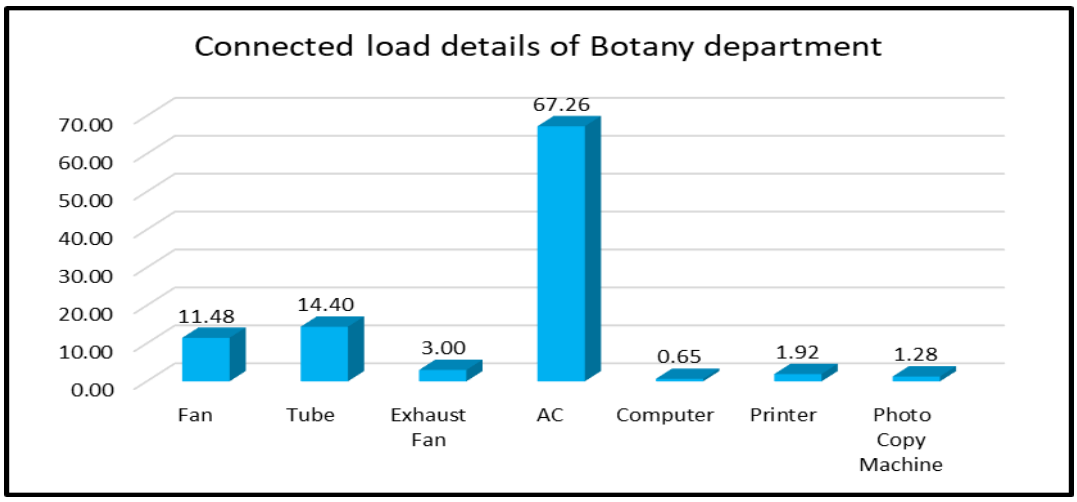

Table 3.14 :- Connected load of canteen branch :-

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	24	70	1.68	61.76
2	Tube	20	40	0.8	29.41
3	Exhaust Fan	4	60	0.24	8.82
	Total Connected load KW			**2.72**	100.00

Table 3.15: - Connected load of Centre canteen

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	14	70	0.98	13.17
2	Tube	12	40	0.48	6.45
3	Exhaust Fan	3	60	0.18	2.42
4	AC	2	2500	5	67.20
5	LED light	4	50	0.2	2.69
6	Water Cooler	1	600	0.6	8.06
	TOTAL Connected load KW			**7.44**	100.00

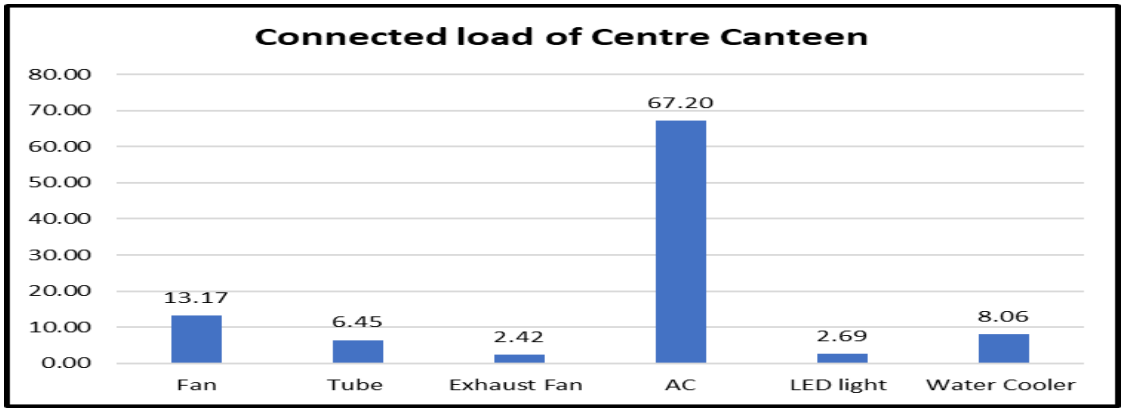

Table 3.16: - Connected load of New Chemistry department

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	101	60	6.06	28.60
2	Tube	179	40	7.16	33.79
3	Exhaust Fan	2	2500	5	23.60
4	AC	35	85	2.975	14.04
	Total Connected load KW			**21.195**	100.00

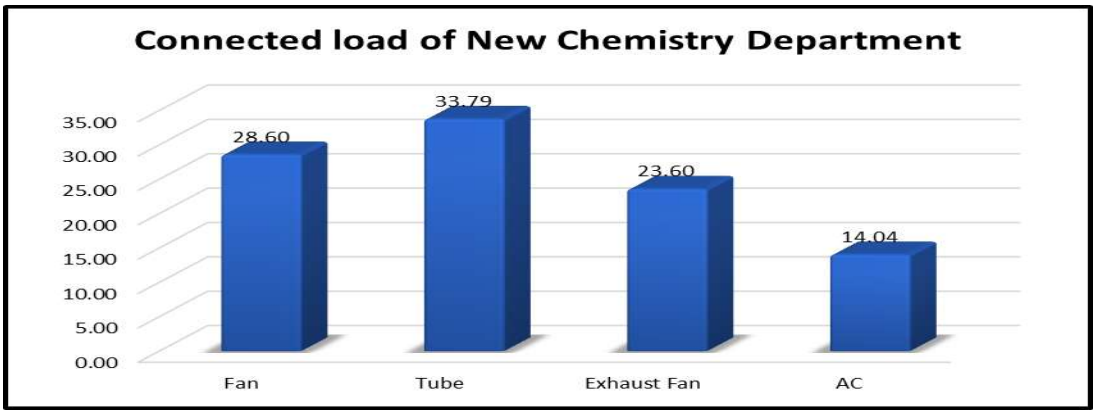

Table 3.17 Connected load of old chemistry

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	145	80	11.6	14.32
2	Tube	210	40	8.4	10.37
3	Exhaust Fan	32	60	1.92	2.37
4	AC	22	2500	55	67.90
5	Water Cooler	1	750	0.75	0.93
6	Desert Cooler	2	180	0.36	0.44
7	Computer	35	85	2.975	3.67
	Total Connected load KW			**81.005**	100.00

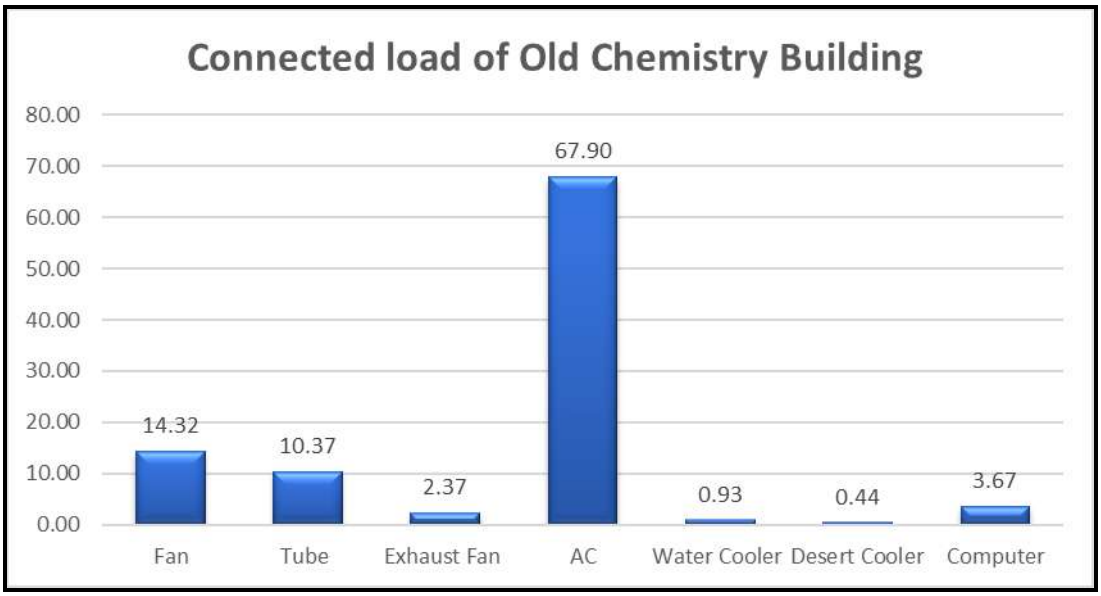

Table 3.18: - Connected load of Chief Warden office and teacher union office

Connected load of Chef Warden office. Teacher union office					
Sr. no	**Equipment's**	**quantity**	**Unit Watt**	**Total KW**	**Share %**
1	Fan	38	70	2.66	13.50
2	Tube	40	40	1.6	8.12
3	Exhaust Fan	7	60	0.42	2.13
4	AC	5	2500	12.5	63.45
5	LED light	2	90	0.18	0.91
6	Computer	4	85	0.34	1.73
7	Printer	4	250	1	5.08
8	Photo copy Machine	2	500	1	5.08
	Total Connected load KW			**19.7**	100.00

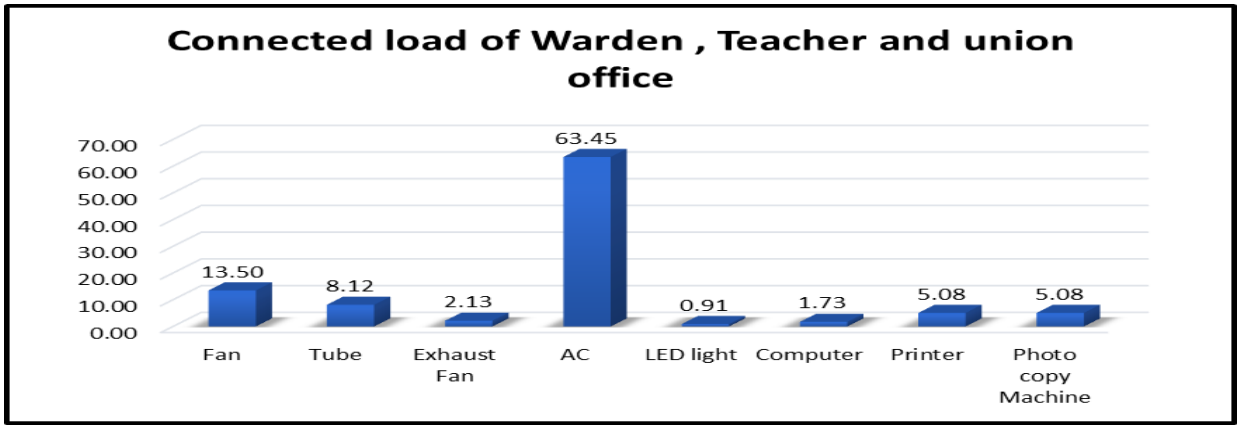

Table 3.19:- Connected load of Coffee House Canteen

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	10	70	0.7	32.71
2	Tube	15	40	0.6	28.04
3	Exhaust Fan	4	60	0.24	11.21
4	Water Cooler	1	600	0.6	28.04
	Total Connected load KW			**2.14**	100.00

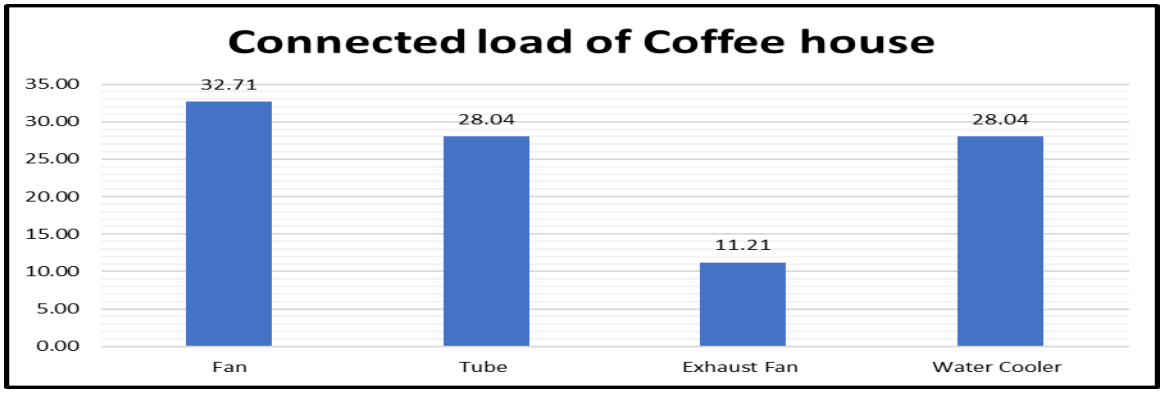

Table 3.20 :- Connected load of commerce departmen

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	92	80	7.36	25.49
2	Tube	122	40	4.88	16.90
3	AC	3	2500	7.5	25.98
4	LED light	3	90	0.27	0.94
5	Water Cooler	2	180	0.36	1.25
6	Desert Cooler	1	180	0.18	0.62
7	Computer	45	85	3.825	13.25
8	Printer	12	250	3	10.39
9	Photo Copy Machine	3	500	1.5	5.20
	Total Connected load KW			**28.875**	100.00

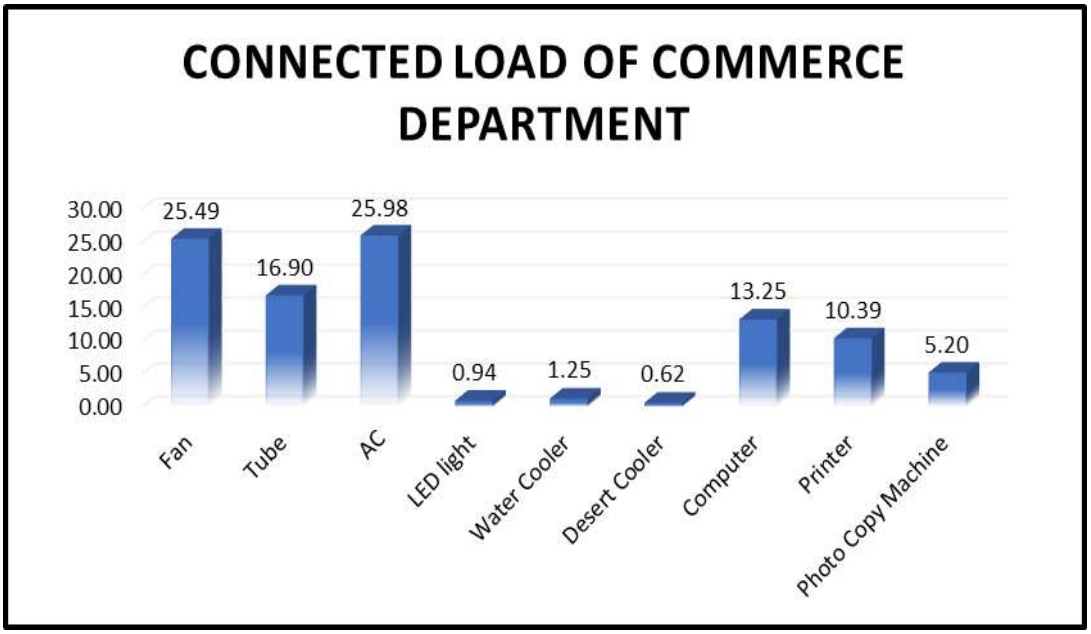

Table 3.21 :- Connected load of Community Centre

Sr. no	Equipment's	quantity	Unit Watt	Total kW	Share %
1	Fan	120	70	8.4	56.566
2	Tube	90	40	3.6	24.242
3	Exhaust Fan	14	150	**2.1**	14.141
4	Water Cooler	1	750	0.75	5.051
	Total Connected load of KW			14.85	100.00

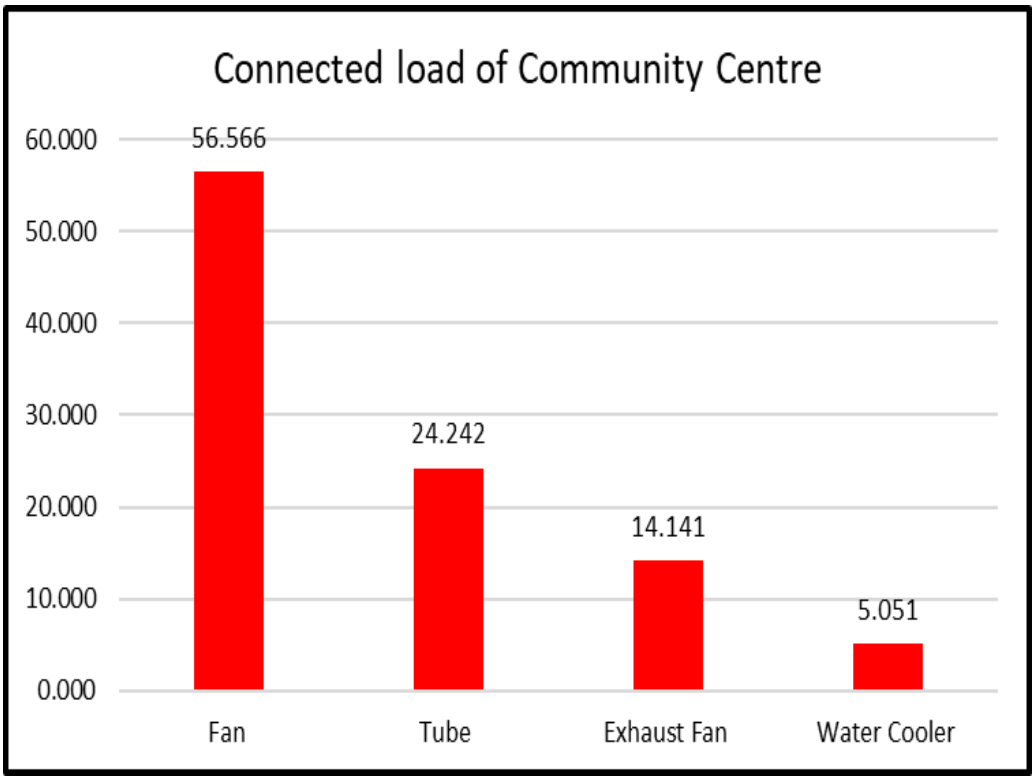

Table 3.22:- Connected load of conduct branch

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	48	80	3.84	19.00
2	Tube	49	40	1.96	9.70
3	Exhaust Fan	8	180	1.44	7.13
4	LED light	3	90	0.27	1.34
5	Water Cooler	1	600	0.6	2.97
6	Desert Cooler	10	180	1.8	8.91
7	Computer	30	85	2.55	12.62
8	Printer	27	250	6.75	33.40
9	Photo Copy Machine	2	500	1	4.95
	Total Connected load KW			**20.21**	100.00

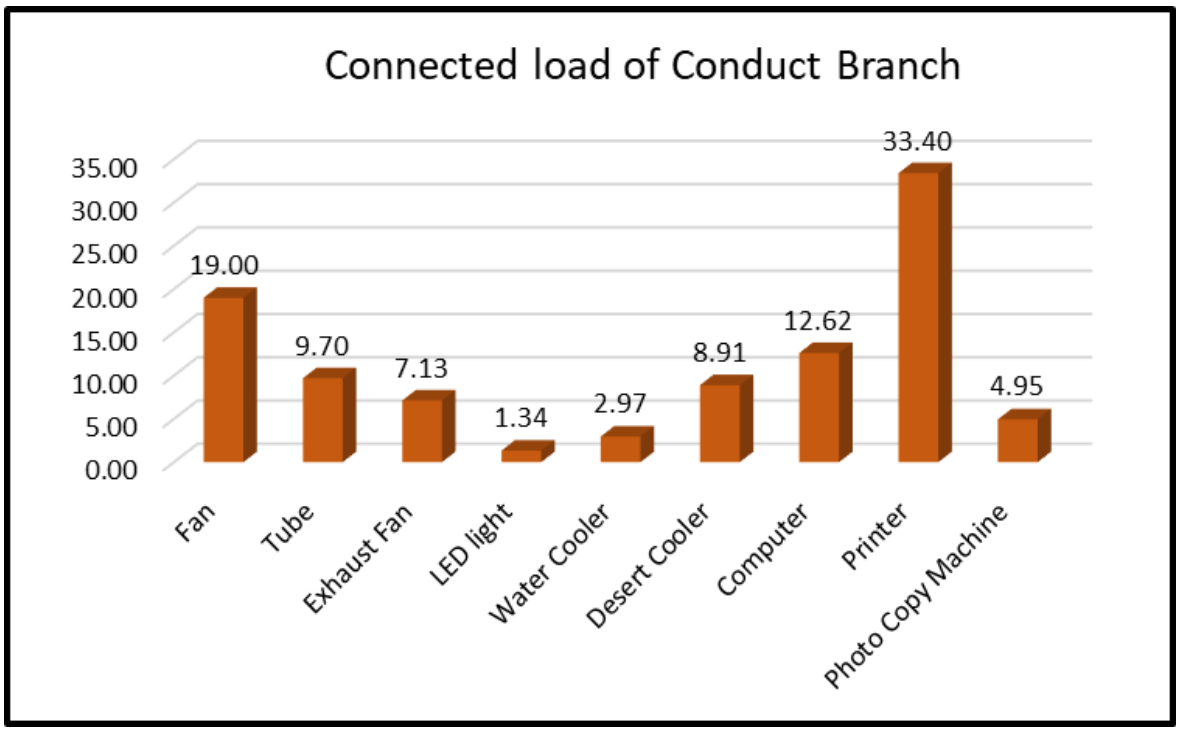

Table 3.23 :- Connected load of DRBR Ambedkar center

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	54	70	3.78	17.42
2	Tube	81	40	3.24	14.93
3	Exhaust Fan	4	60	0.24	1.11
4	AC	4	2500	10	46.08
5	LED light	4	50	0.2	0.92
6	Water Cooler	1	750	0.75	3.46
7	Desert Cooler	9	180	1.62	7.47
8	Computer	22	85	1.87	8.62
	Total Connected load KW			**21.7**	100.00

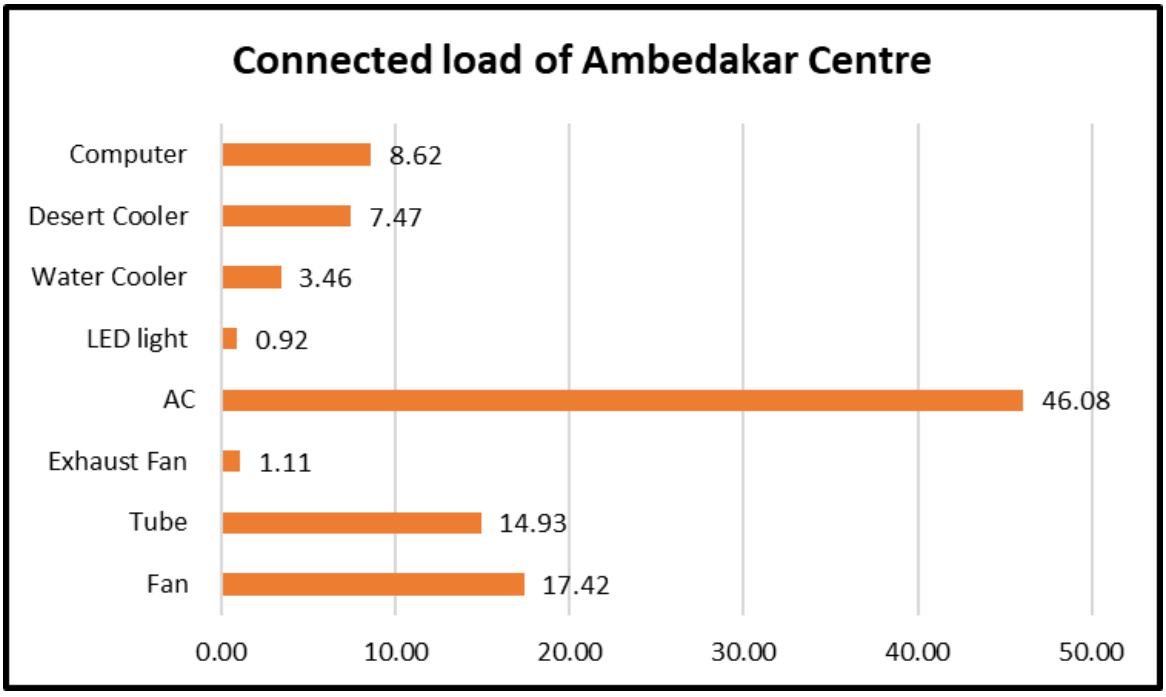

Table 3.25: - Connected load of Dean Building

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	409	80	32.72	13.36
2	Tube	534	40	21.36	8.72
3	Exhaust Fan	16	180	2.88	1.18
4	AC	57	2500	142.5	58.19
5	LED light	2	90	0.18	0.07
6	LED light	2	30	0.06	0.02
7	Water Cooler	7	750	5.25	2.14
8	Desert Cooler	8	180	1.44	0.59
9	Computer	347	85	29.495	12.04
10	Printer	36	250	9	3.68
	Total Connected load KW			**244.885**	100.00

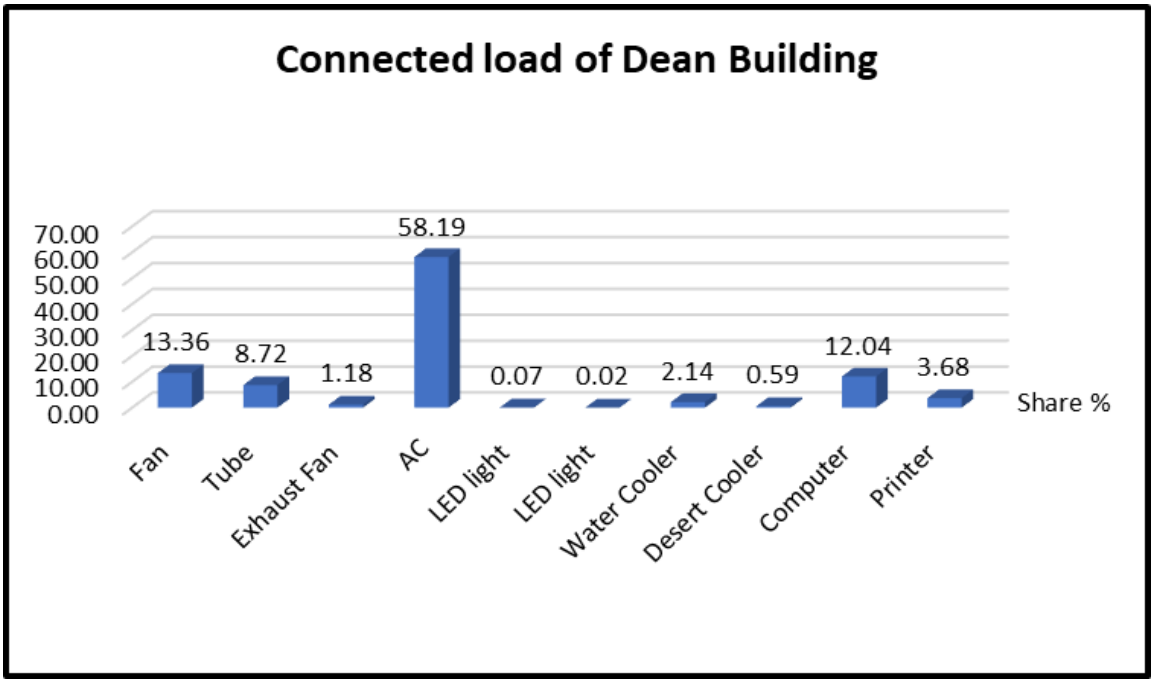

Table 3.27: - Connected load of Dharohar Building

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	53	80	4.24	13.07
2	Tube	267	40	10.68	32.91
3	Exhaust Fan	10	60	0.6	1.85
4	AC	5	2500	12.5	38.52
5	LED light	2	250	0.5	1.54
6	LED light	11	150	1.65	5.08
7	Water Cooler	1	600	0.6	1.85
8	Computer	8	85	0.68	2.10
9	Printer	2	250	0.5	1.54
10	Photo Copy Machine	1	500	0.5	1.54
	Total Connected load KW			**32.45**	100.00

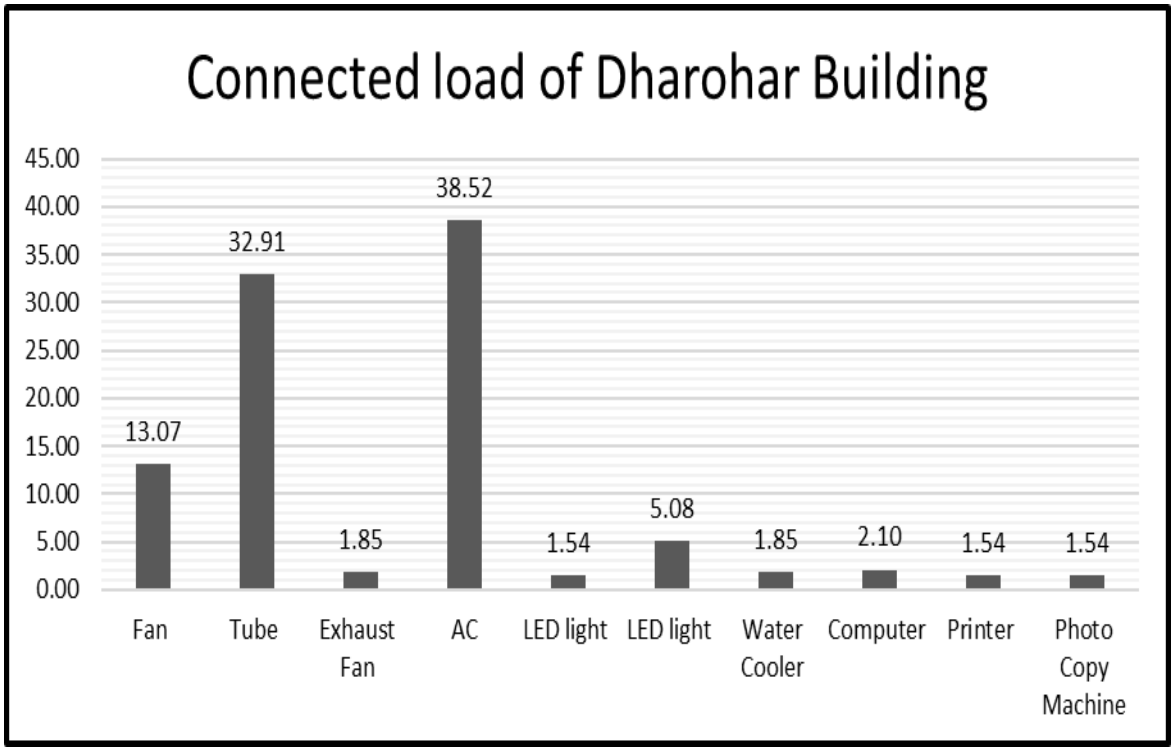

Table 3.28: - Connected load of Economics Department: -

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	121	80	9.68	22.70
2	Tube	133	40	5.32	12.48
3	Exhaust Fan	4	180	0.72	1.69
4	AC	9	2500	22.5	52.77
5	Water Cooler	1	750	0.75	1.76
6	Desert Cooler	4	180	0.72	1.69
7	Computer	23	85	1.955	4.58
8	Printer	2	250	0.5	1.17
9	Photo Copy Machine	1	500	0.5	1.17
	Total Connected load KW			**42.645**	**100.00**

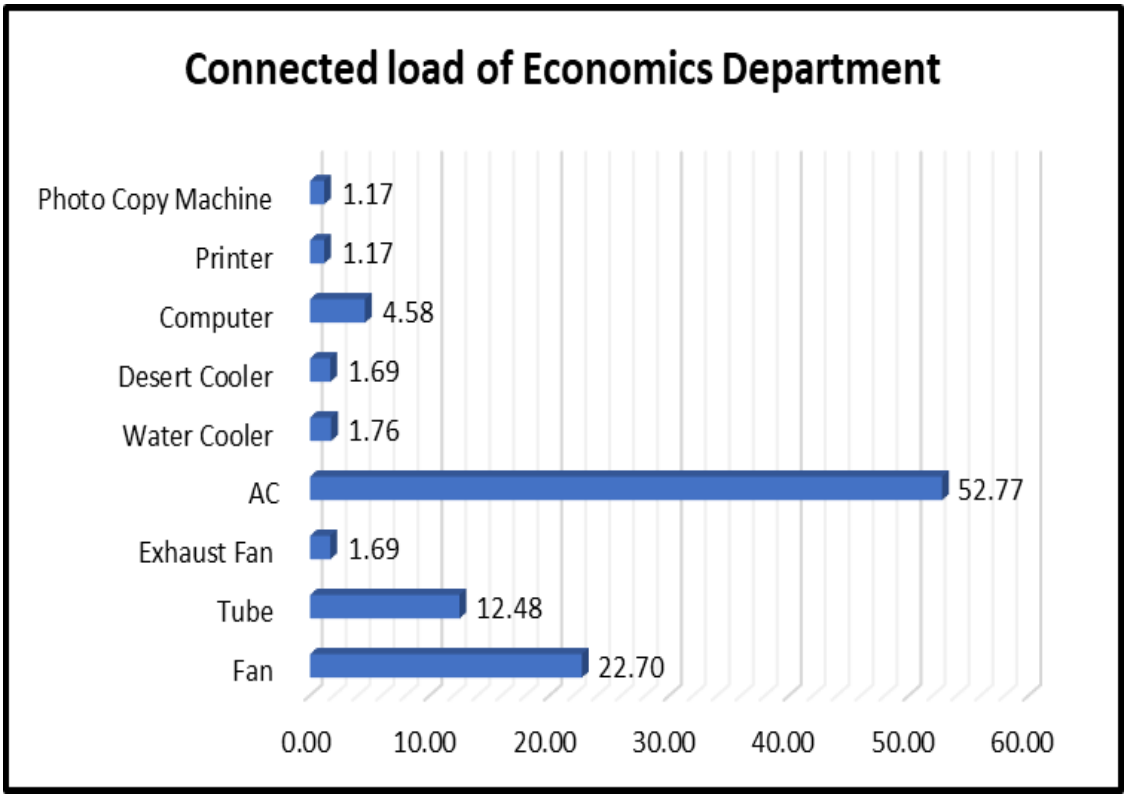

Table 3.29: - Connected load of Education, Philosophy, Sanskrit and AIH Department

Sr. no	Equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	144	80	11.52	13.93
2	Tube	281	40	11.24	13.59
3	Exhaust Fan	10	60	0.6	0.73
4	AC	12	2500	30	36.28
5	Led light	18	250	4.5	5.44
6	Led light	4	150	0.6	0.73
7	Water Cooler	3	600	1.8	2.18
8	Computer	67	85	5.695	6.89
9	Printer	43	250	10.75	13.00
10	Photocopy Machine	12	500	6	7.26
	Total Connected load KW			**82.705**	100.00

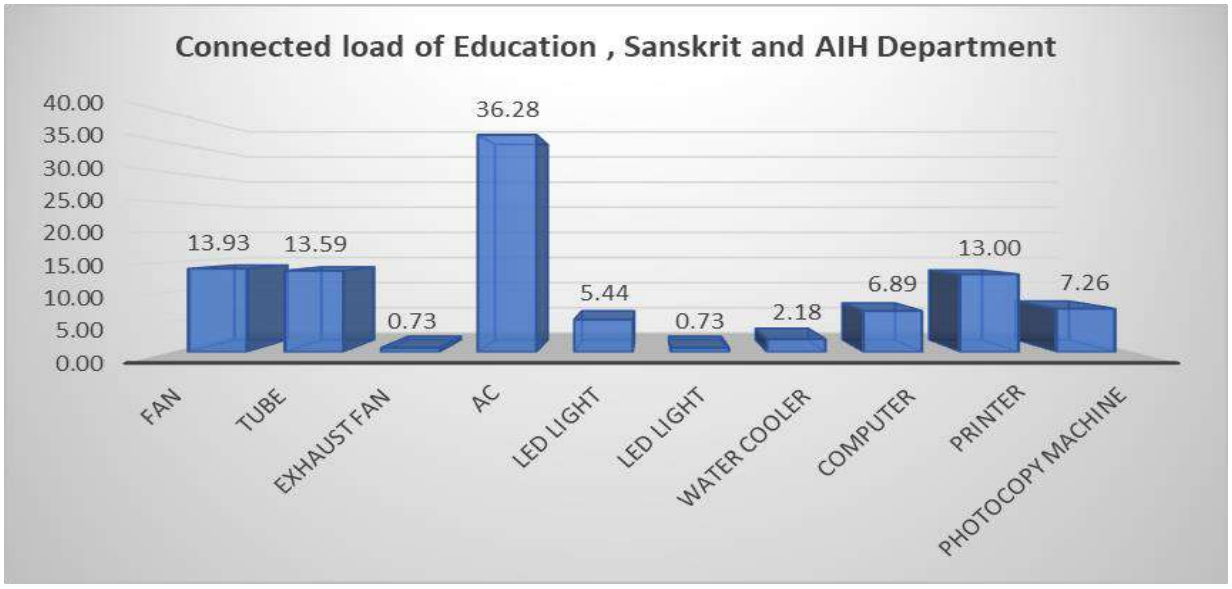

Table 3.30 :-Connected load of Electronics Department

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	129	80	10.32	14.48
2	Tube	208	40	8.32	11.67
3	Exhaust Fan	6	150	0.9	1.26
4	AC	15	2500	37.5	52.61
5	Computer	94	85	7.99	11.21
6	Printer	23	250	5.75	8.07
7	Photo Copy Machine	1	500	0.5	0.70
	Total Connected load KW			**71.28**	100.00

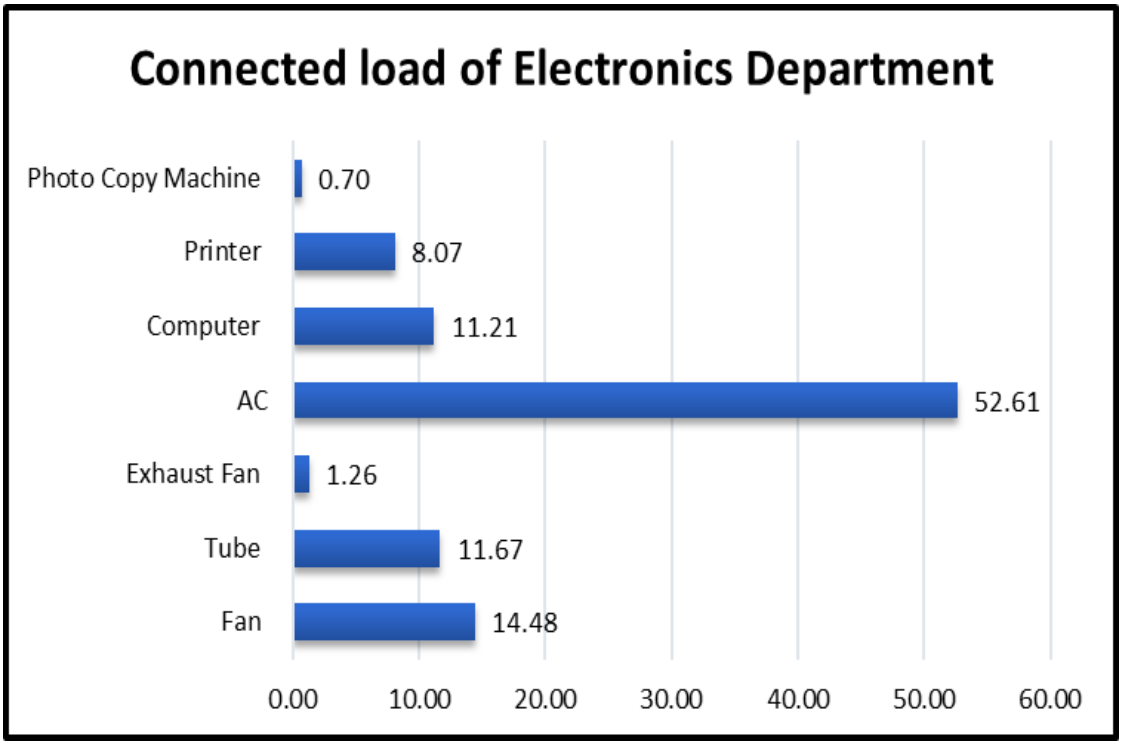

Table 3.31: - Connected load of Geology Department

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	42	80	3.36	13.97
2	Tube	74	40	2.96	12.31
3	Exhaust Fan	4	2500	10	41.58
4	Computer	38	85	3.23	13.43
5	Printer	16	250	4	16.63
6	Photo Copy Machine	1	500	0.5	2.08
	Total Connected load KW			**24.05**	100.00

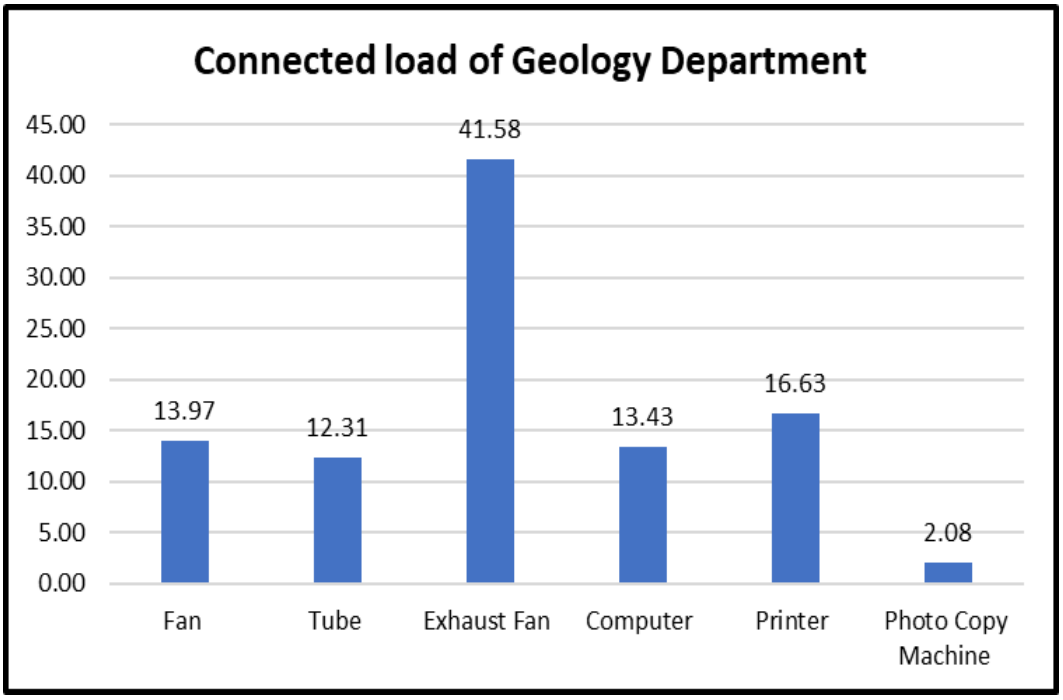

Table 3.32:- Connected load of Electronics Science

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	112	80	8.96	14.09
2	Tube	202	40	8.08	12.71
3	Exhaust Fan	6	60	0.36	0.57
4	AC	17	2500	42.5	66.83
5	LED light	3	250	0.75	1.18
6	Water Cooler	1	600	0.6	0.94
7	Desert Cooler	13	180	2.34	3.68
	Total Connected load KW			63.59	100

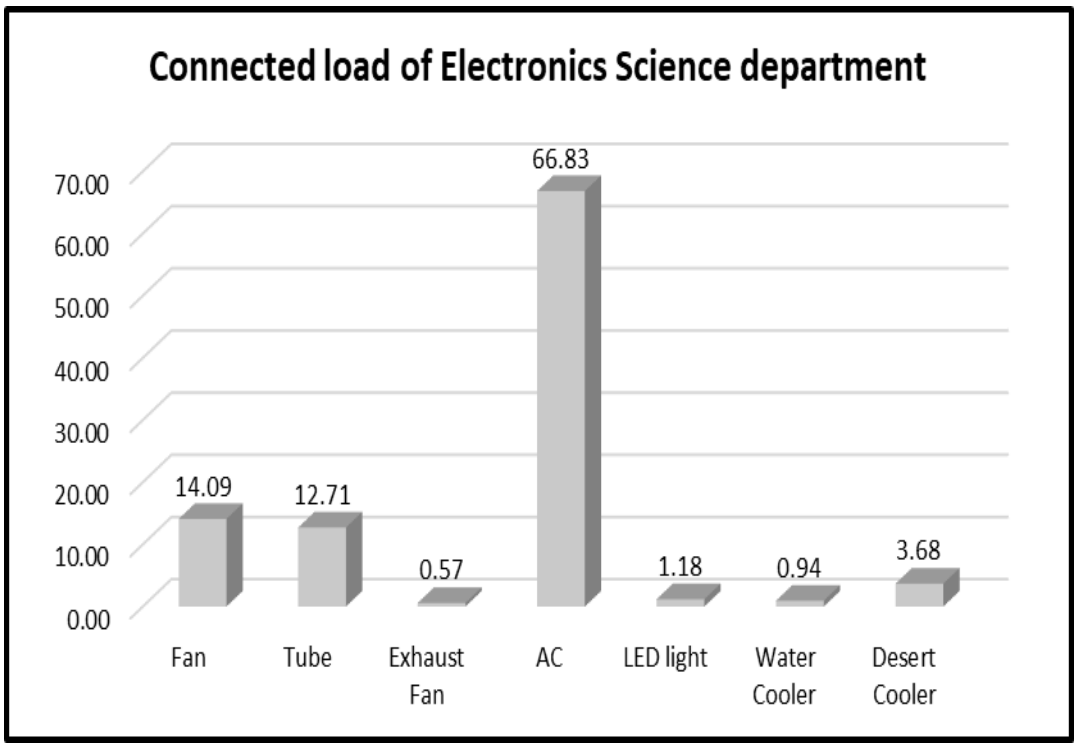

Table 3.33: - Connected load of Employment

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	31	80	2.48	25.20
2	Tube	71	40	2.84	28.86
3	Exhaust Fan	1	60	0.06	0.61
4	AC	1	2500	2.5	25.41
5	LED light	4	250	1	10.16
6	Water Cooler	1	600	0.6	6.10
7	Desert Cooler	2	180	0.36	3.66
	Total Connected load KW			**9.84**	100.00

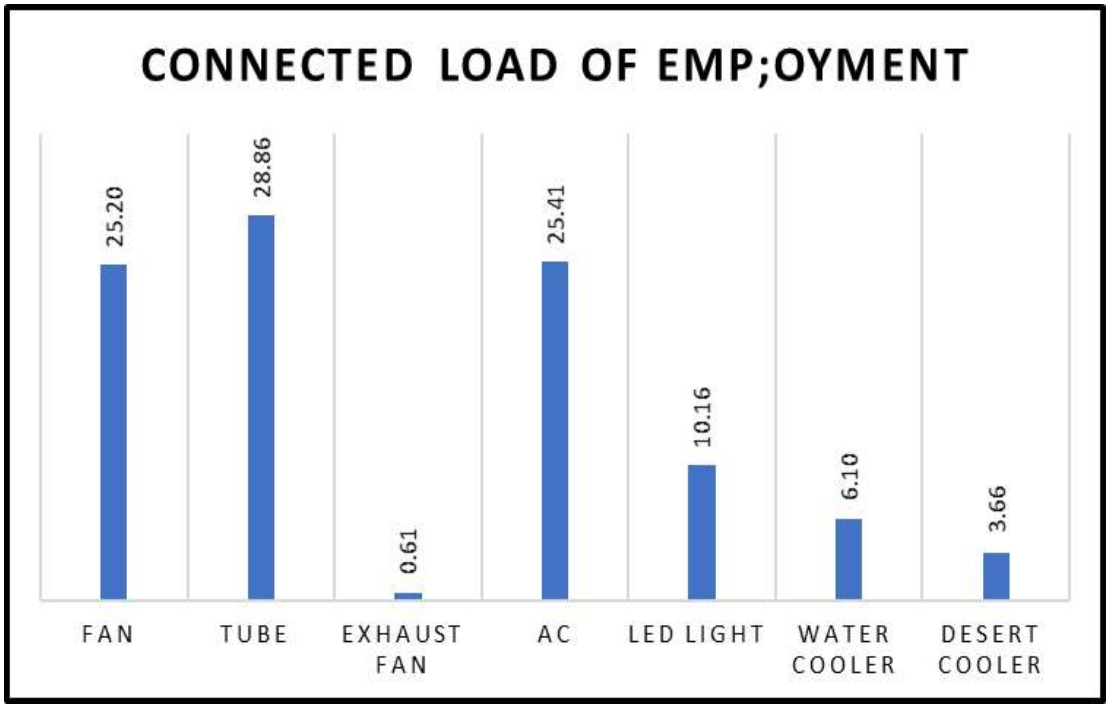

Table 3.34: - Connected load of English Department

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	79	80	6.32	18.81
2	Tube	187	40	7.48	22.26
3	Exhaust Fan	4	180	0.72	2.14
4	AC	6	2500	15	44.64
5	Water Cooler	1	600	0.6	1.79
6	Desert Cooler	11	180	1.98	5.89
	Computer	3	85	0.255	0.76
	Printer	3	250	0.75	2.23
	Photo Copy Machine	1	500	0.5	1.49
	Total Connected load of KW			33.605	100.00

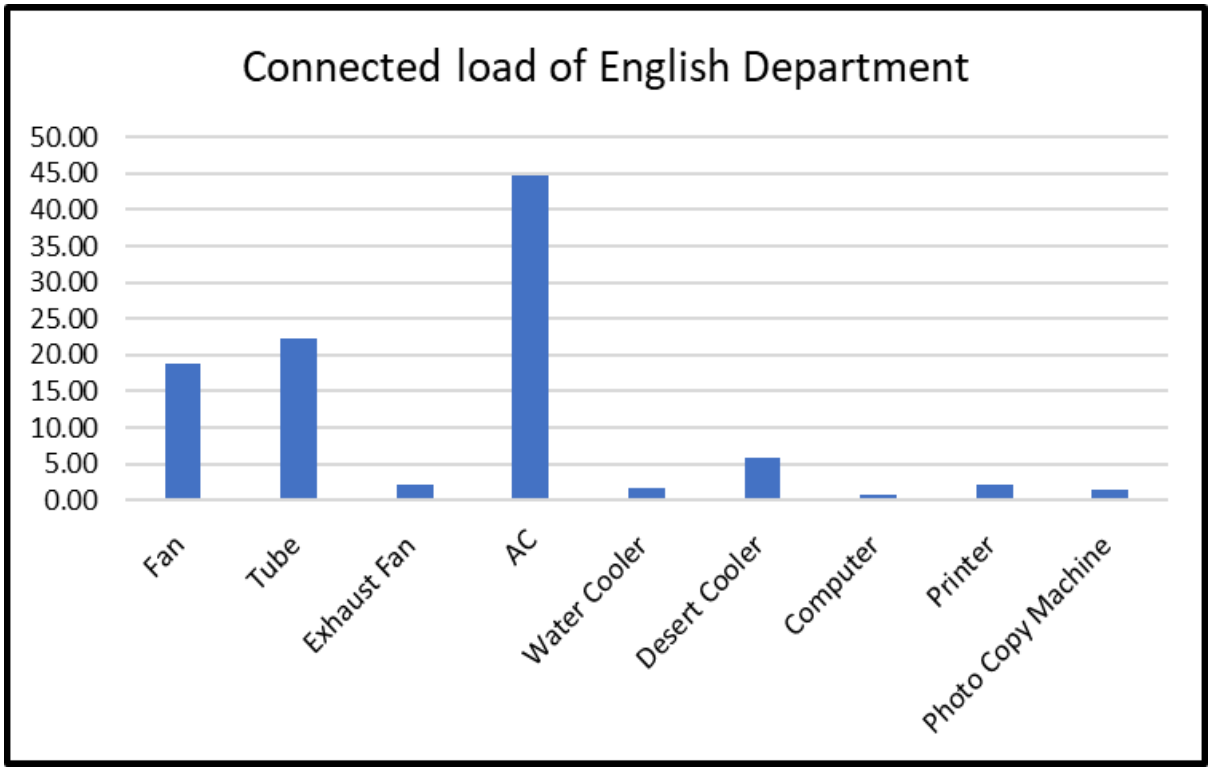

Table 3.35 :- Connected load of Exam Branch New-III

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	257	80	20.56	39.95
2	Tube	376	40	15.04	29.23
3	Exhaust Fan	95	60	5.7	11.08
4	AC	2	2500	5	9.72
5	LED light	4	50	0.2	0.39
6	Water Cooler	2	600	1.2	2.33
7	Desert Cooler	6	180	1.08	2.10
8	Computer	8	85	0.68	1.32
9	Printer	4	250	1	1.94
10	Photo Copy Machine	2	500	1	1.94
	Total Connected load KW			**51.46**	100.00

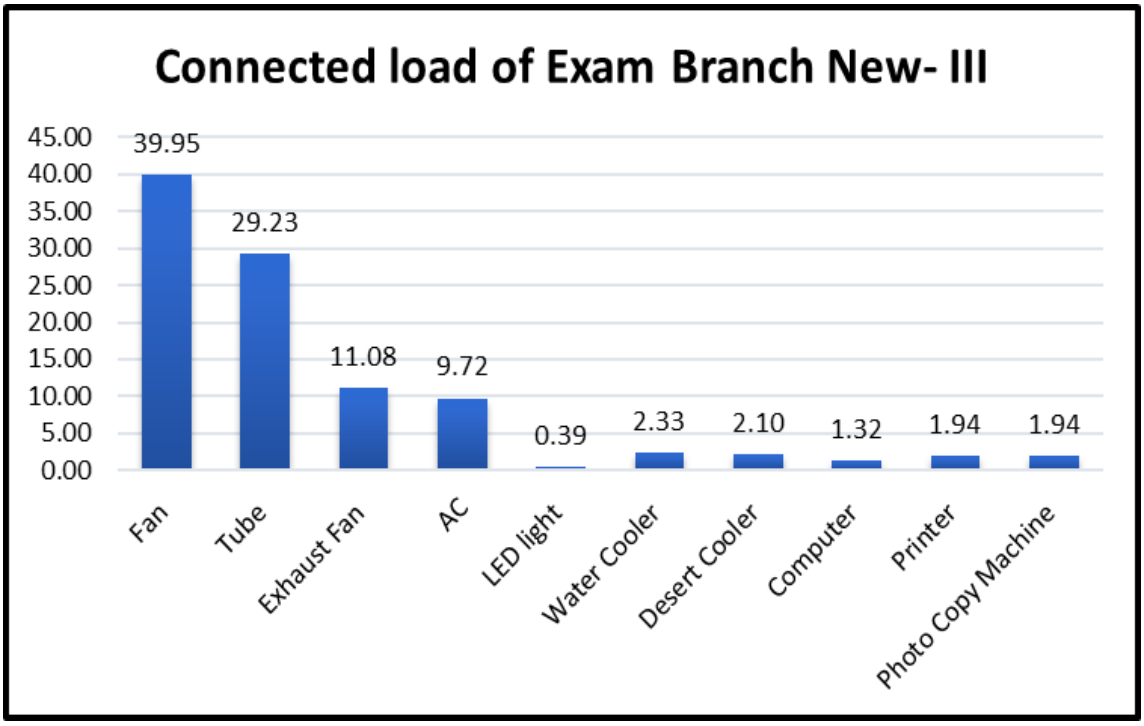

Table :- 3.36 Connected load of Fine Art

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	163	80	13.04	35.16
2	Tube	226	40	9.04	24.37
3	Exhaust Fan	4	60	0.24	0.65
4	AC	4	2500	10	26.96
5	LED Light	8	90	0.72	1.94
6	Water Cooler	2	600	1.2	3.24
7	Computer	10	85	0.85	2.29
8	Printer	4	250	1	2.70
9	Photo Copy Machine	2	500	1	2.70
	Total Connected load KW			**37.09**	100.00

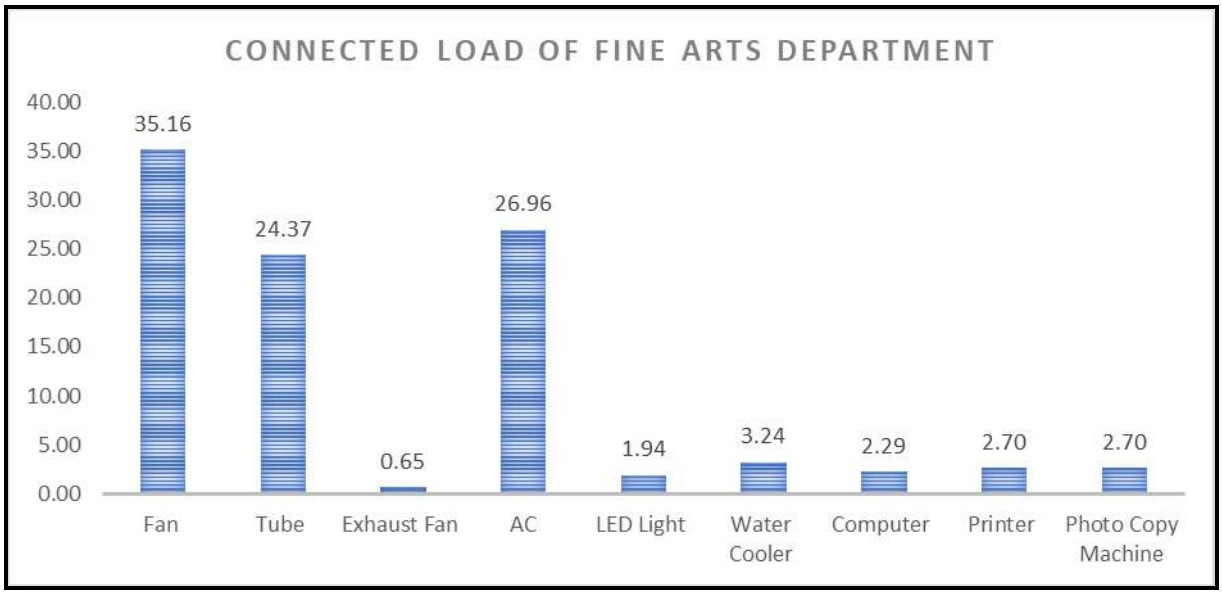

Table 3.36:- Connected load of Geography :-

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	54	80	4.32	12.84
2	Tube	82	40	3.28	9.75
3	AC	7	2500	17.5	52.02
4	Water Cooler	1	600	0.6	1.78
5	Desert Cooler	9	180	1.62	4.82
6	Computer	42	85	3.57	10.61
7	Printer	9	250	2.25	6.69
8	Photo Copy Machine	1	500	0.5	1.49
	Total Connected load KW			33.64	100.00

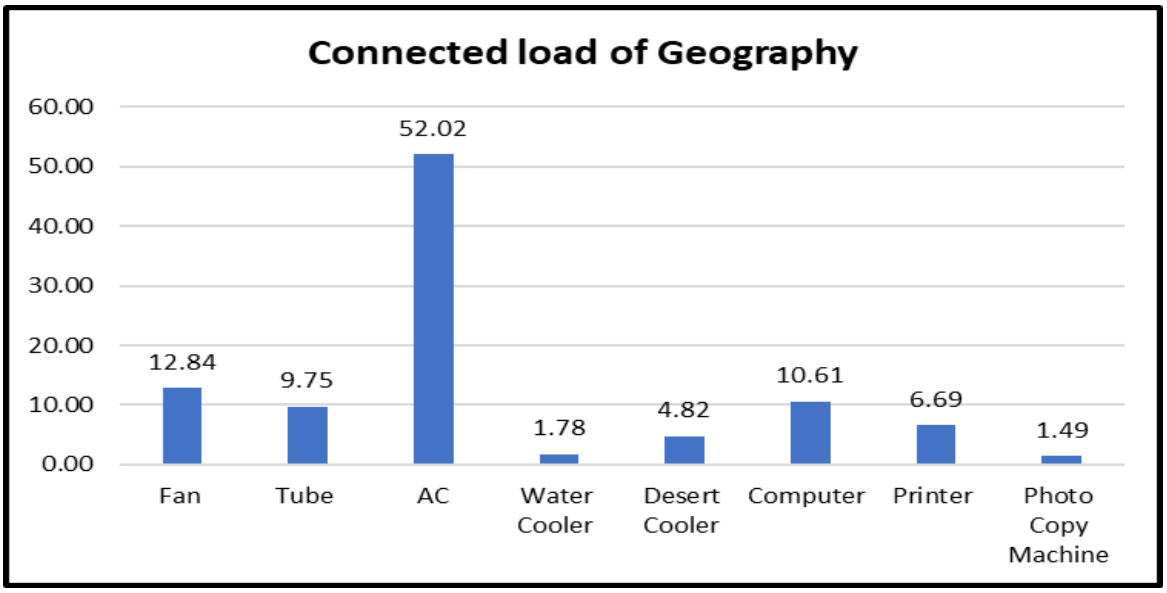

Table 3.37 :- Connected load of Geology Department

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	63	70	4.41	20.33
2	Tube	107	40	4.28	19.73
3	Exhaust Fan	2	60	0.12	0.55
4	AC	4	2500	10	46.10
5	Desert Cooler	16	180	2.88	13.28
	Total Connected load KW			**21.69**	100.00

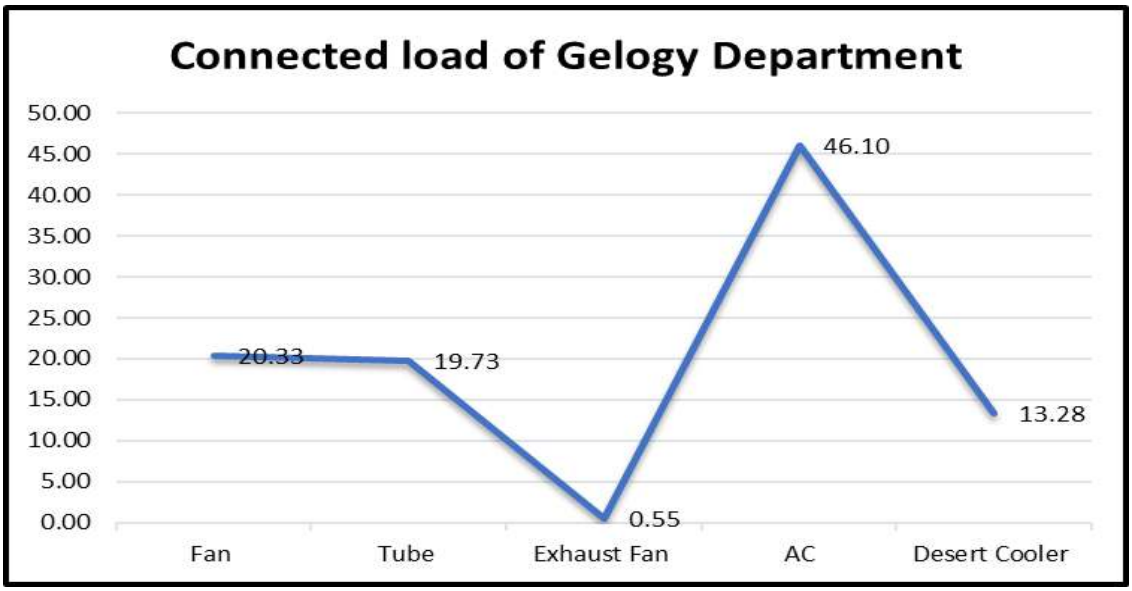

Table 3.38:- Connected load of Geophysics New Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	26	80	2.08	16.20
2	Tube	44	40	1.76	13.71
3	Exhaust Fan	10	60	0.6	4.67
4	AC	3	2500	7.5	58.41
5	LED light	2	60	0.12	0.93
6	Water Cooler	1	600	0.6	4.67
7	Desert Cooler	1	180	0.18	1.40
	Total Connected load KW			12.84	100.00

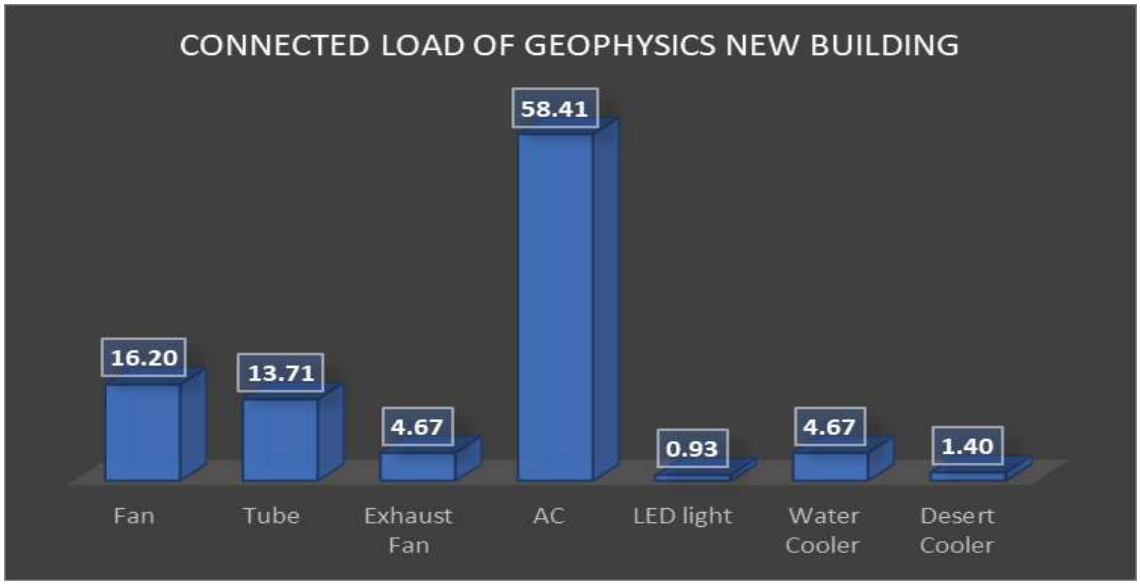

Table 3.39:- Connected load of Old Geophysics Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	51	80	4.08	17.16
2	Tube	90	40	3.6	15.15
3	Exhaust Fan	1	60	0.06	0.25
4	AC	2	2500	5	21.03
5	LED light	3	90	0.27	1.14
6	Water Cooler	1	600	0.6	2.52
7	Computer	49	85	4.165	17.52
8	Printer	20	250	5	21.03
9	Photo Copy Machine	2	500	1	4.21
	Total Connected load KW			23.775	100.00

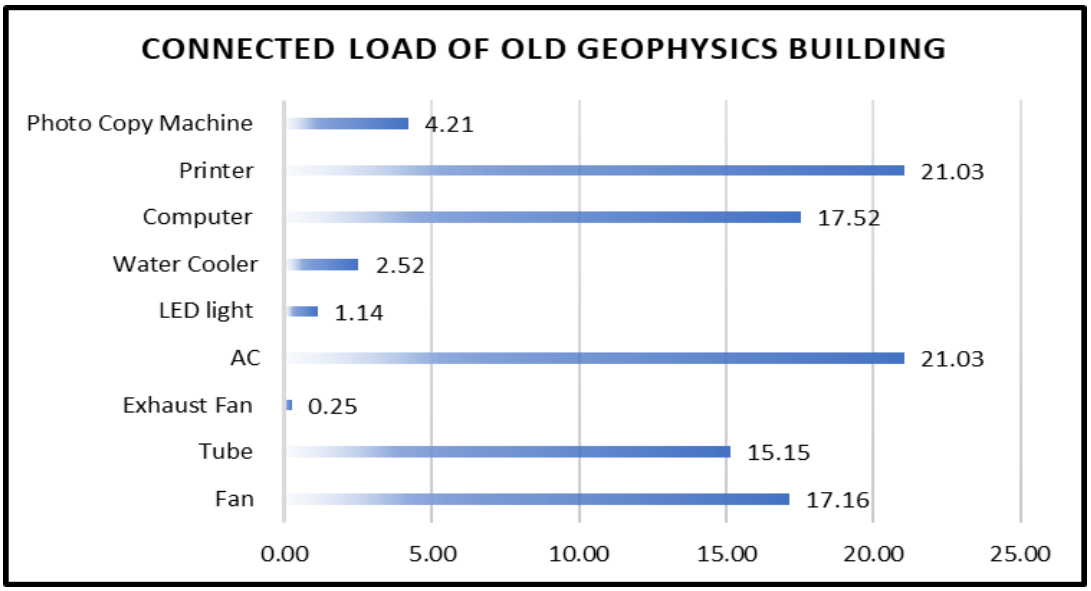

Table 3.40 :- Connected load of H, Resources Development Centre

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	62	80	4.96	11.55
2	Tube	97	40	3.88	9.03
3	Exhaust Fan	2	60	0.12	0.28
4	AC	13	2500	32.5	75.65
5	Water cooler	1	600	0.6	1.40
6	Desert Cooler	5	180	0.9	2.09
	Total Connected load KW			42.96	100.00

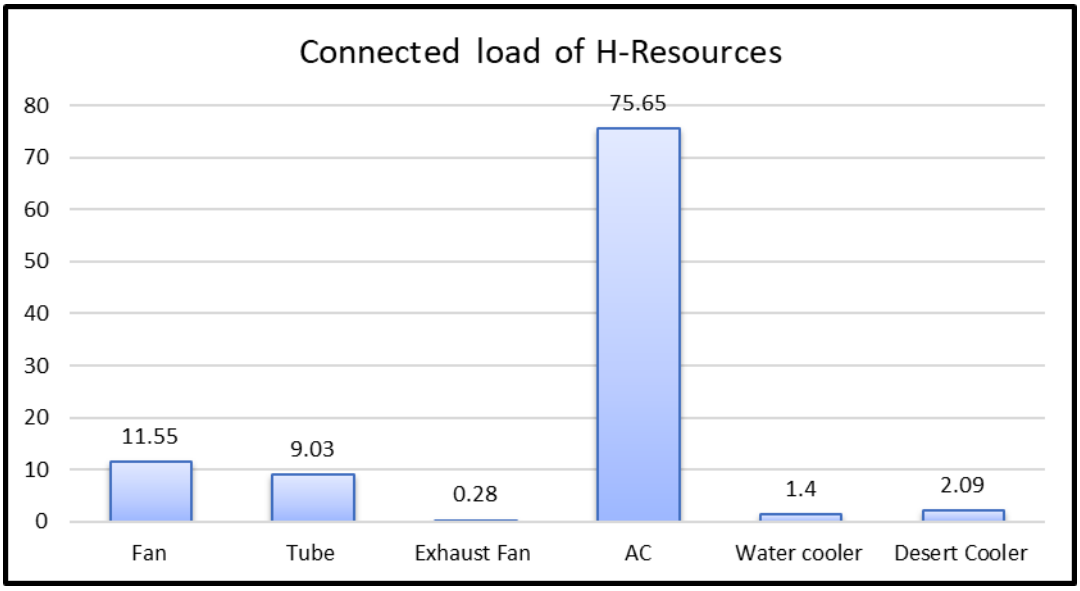

Table 3.41:- Connected load of IIE Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	62	80	4.96	6.53
2	Tube	217	40	8.68	11.44
3	Exhaust Fan	3	60	0.18	0.24
4	AC	19	2500	47.5	62.58
5	LED Light	2	250	0.5	0.66
6	Water Cooler	1	600	0.6	0.79
7	Computer	141	85	11.985	15.79
8	Printer	4	250	1	1.32
9	Photo Copy Machine	1	500	0.5	0.66
	Total Connected load KW			**75.905**	100.00

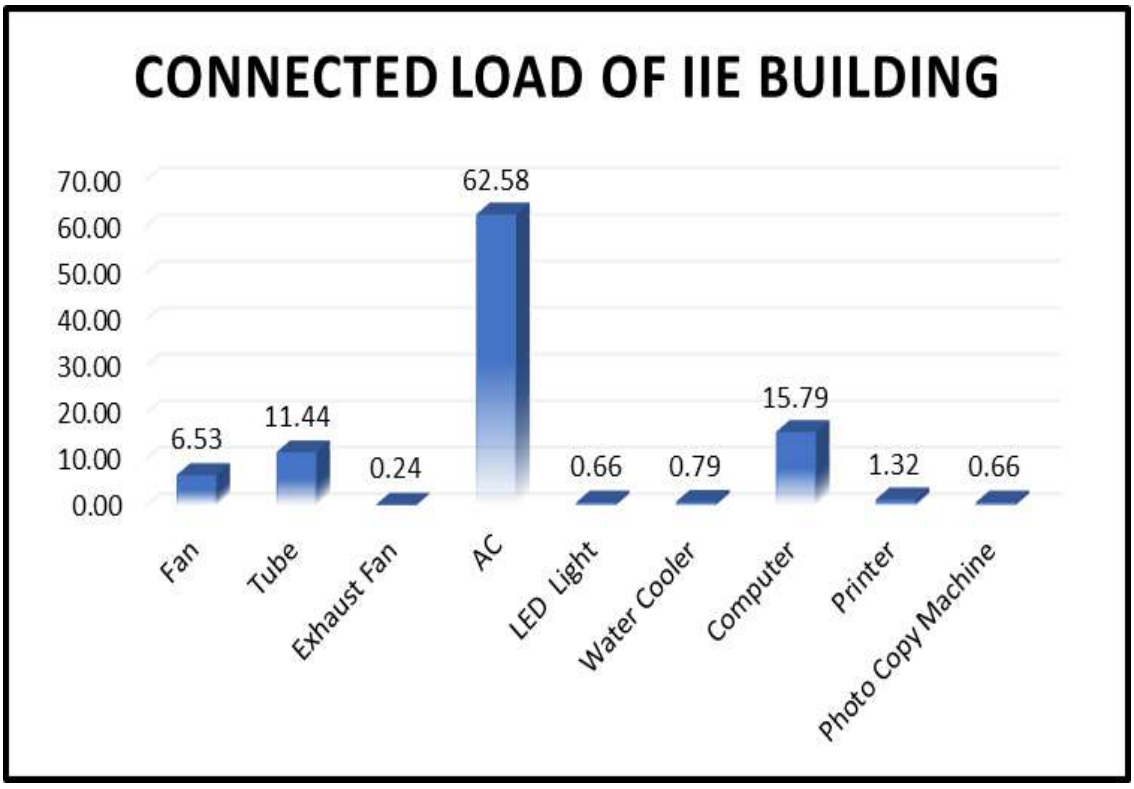

Table 3.42 :- Connected load of LAW-05 Year Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	282	70	19.74	27.94
2	Tube	549	40	21.96	31.08
3	Exhaust Fan	18	60	1.08	1.53
4	AC	5	2500	12.5	17.69
5	LED light	4	150	0.6	0.85
6	LED light	1	90	0.09	0.13
7	Water Cooler	6	600	3.6	5.10
8	Desert Cooler	4	180	0.72	1.02
9	Computer	66	85	5.61	7.94
10	Printer	15	250	3.75	5.31
11	Photo Copy Machine	2	500	1	1.42
	Total Connected load KW			70.65	100.00

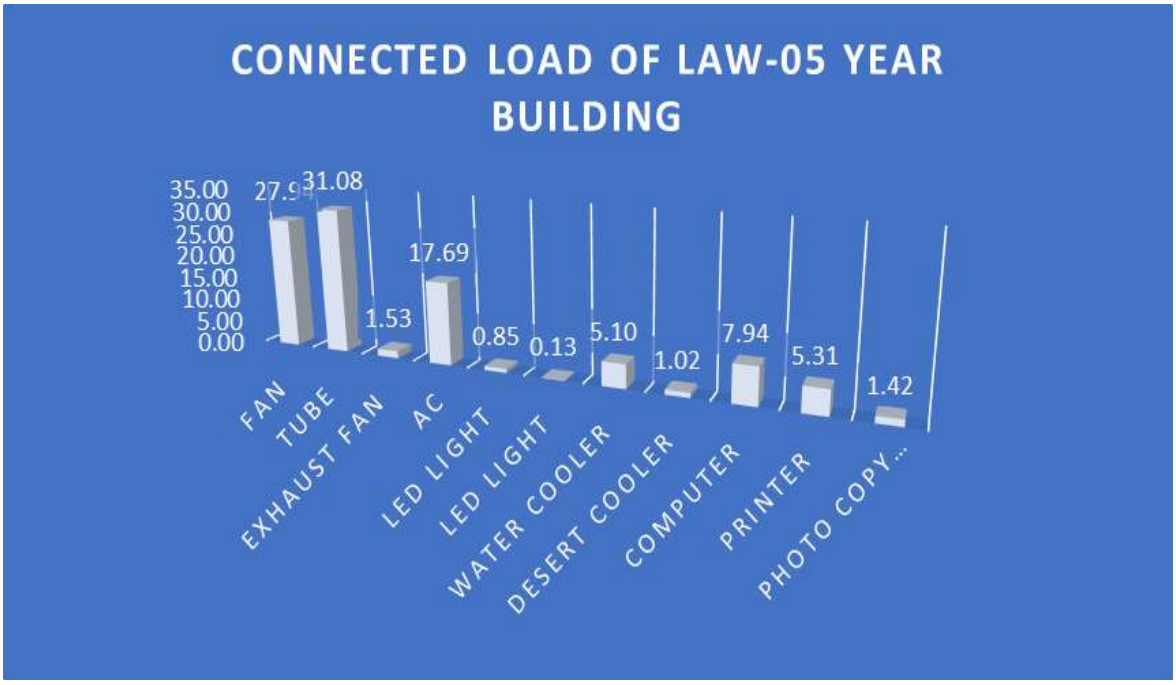

Table 3.43 :- Connected load of New Library

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	175	80	14	24.45
2	Tube	680	40	27.2	47.49
3	Exhaust Fan	10	180	1.8	3.14
4	LED light	2	90	0.18	0.31
5	LED light	1	90	0.09	0.16
6	Water Cooler	5	400	2	3.49
7	Computer	50	85	4.25	7.42
8	Printer	19	250	4.75	8.29
9	Photo Copy Machine	6	500	3	5.24
	Total Connected load KW			57.27	100.00

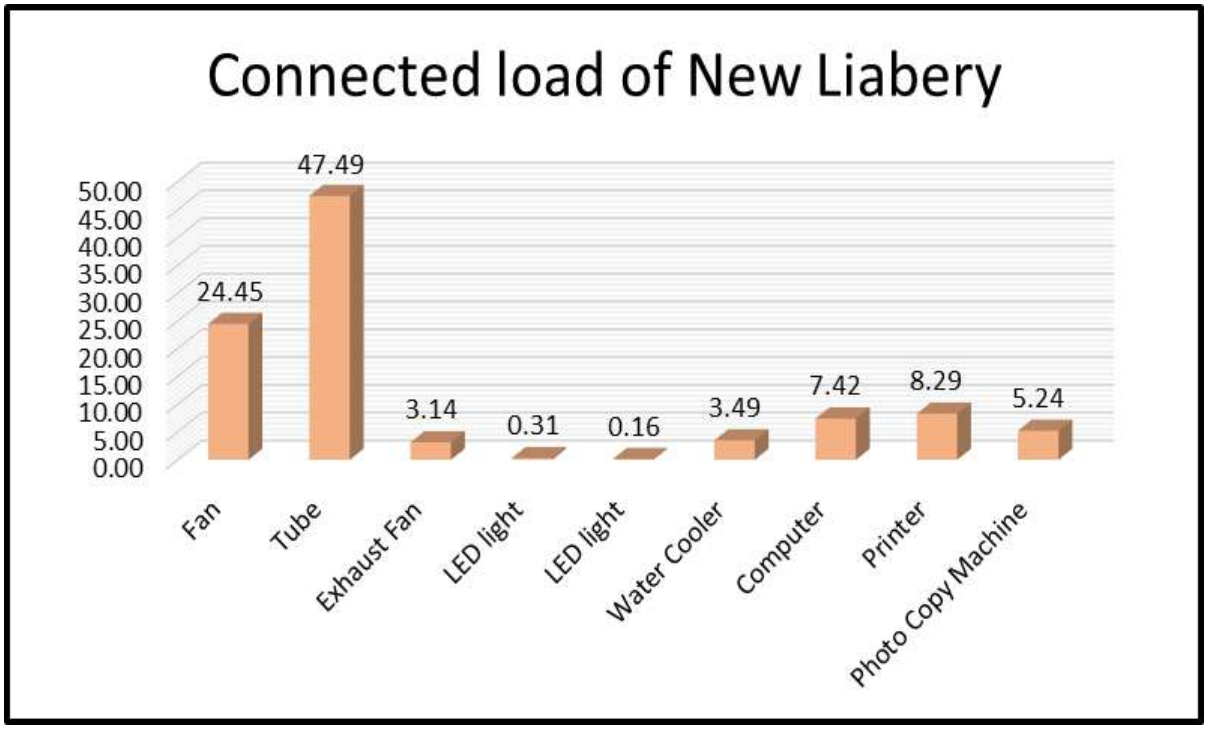

Table 3.44 :- Connected load of MBA 5 Year

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	105	80	8.4	18.47
2	Tube	184	40	7.36	16.19
3	Exhaust Fan	9	60	0.54	1.19
4	AC	8	2500	20	43.99
5	LED light	4	250	1	2.20
6	Water Cooler	1	600	0.6	1.32
7	Desert Cooler	5	180	0.9	1.98
8	Computer	52	85	4.42	9.72
9	Printer	3	250	0.75	1.65
10	Photo Copy Machine	3	500	1.5	3.30
	Total Connected load KW			**45.47**	100.00

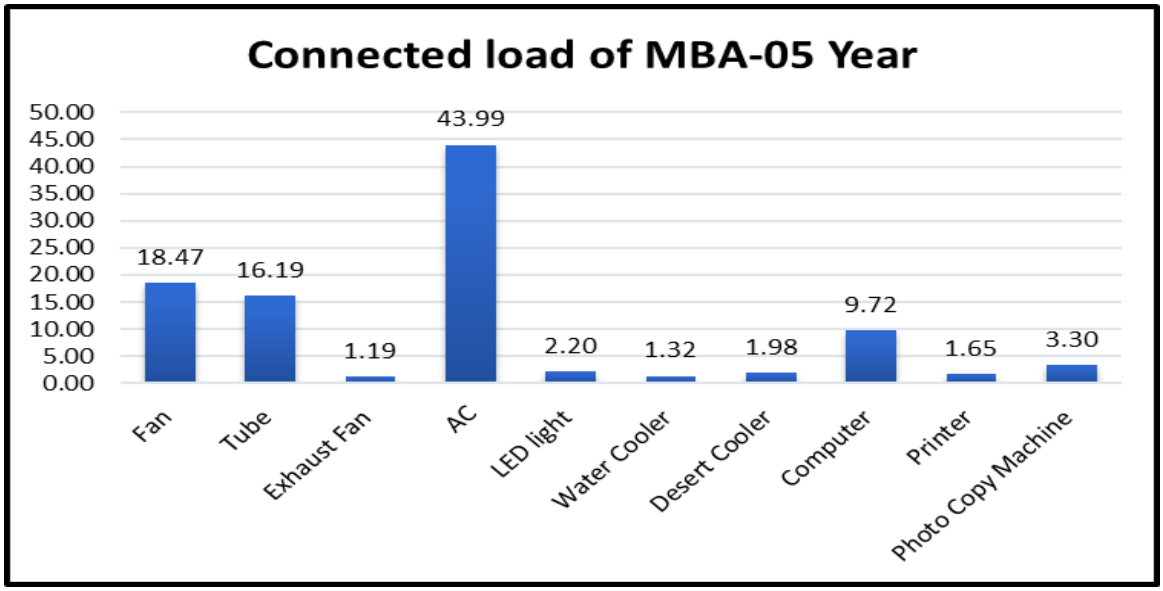

Table 3.45:- Connected load of Geography Department

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	66	80	5.28	20.61
2	Tube	142	20	2.84	11.09
3	AC	7	2500	17.5	68.31
	Total Connected load KW			25.62	100.00

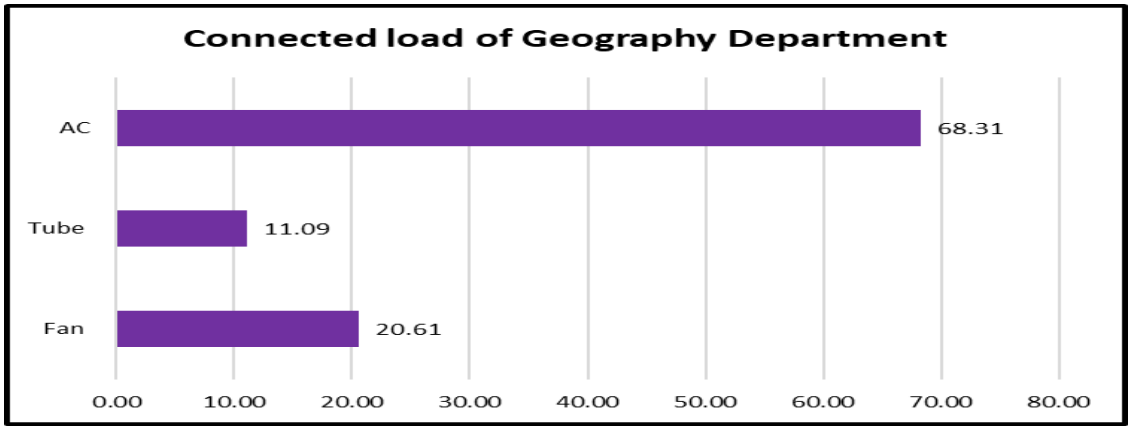

Table 3.46 :- Connected load of Maths Department

1	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	61	80	4.88	12.78
2	Tube	92	20	1.84	4.82
3	AC	8	2500	20	52.40
4	Computer	120	85	10.2	26.72
5	Printer	3	250	0.75	1.96
6	Photo Copy Machine	1	500	0.5	1.31
	Total Connected load KW			38.17	100

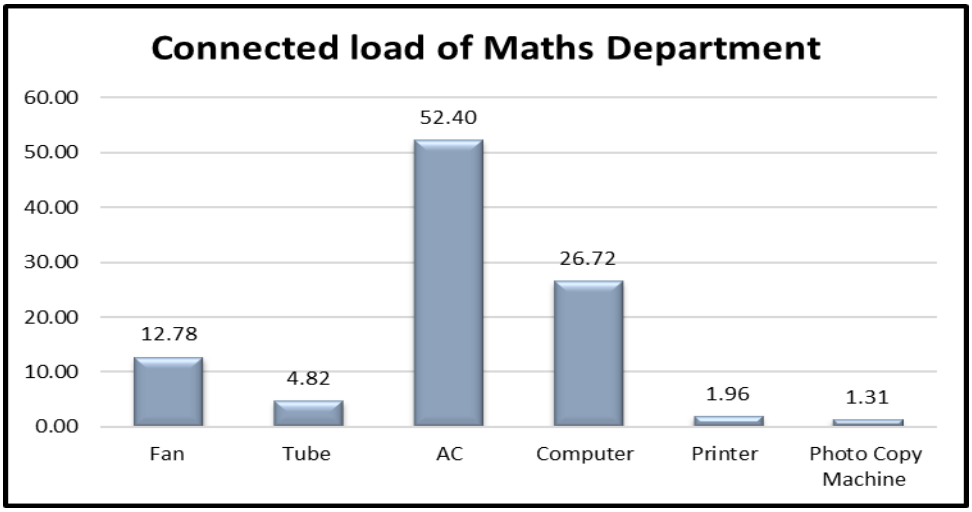

Table 3.47 :- Connected load of Animal House

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	29	80	2.32	5.27
2	Tube	92	20	1.84	4.18
3	Exhaust Fan	16	150	2.4	5.45
4	AC	15	2500	37.5	85.11
	Total Connected load KW			**44.06**	100.00

Table 3.48:- Connected load of Mathematics

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	69	80	5.52	17.40
2	Tube	96	20	1.92	6.05
3	AC	9	2500	22.5	70.93
4	Water Cooler	1	700	0.7	2.21
5	Desert Cooler	6	180	1.08	3.40
	Total Connected load KW			31.72	100.00

Table 3.49:- Connected load of Microbiology

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	48	80	3.84	26.12
2	Tube	88	20	1.76	11.97
3	AC	3	2500	7.5	51.02
4	Water Cooler	1	700	0.7	4.76
5	Desert Cooler	5	180	0.9	6.12
	Total Connected load KW			14.7	100.00

Table 3.50 :- Connected load of New Environment

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	145	80	11.6	20.12
2	Tube	362	20	7.24	12.56
3	Exhaust Fan	20	180	3.6	6.25
4	AC	10	2500	25	43.37
5	LED light	5	90	0.45	0.78
6	Water Cooler	3	700	2.1	3.64
7	Computer	43	85	3.655	6.34
8	Printer	12	250	3	5.20
9	Photo Copy Machine	2	500	1	1.73
	Total Connected load KW			57.645	100.00

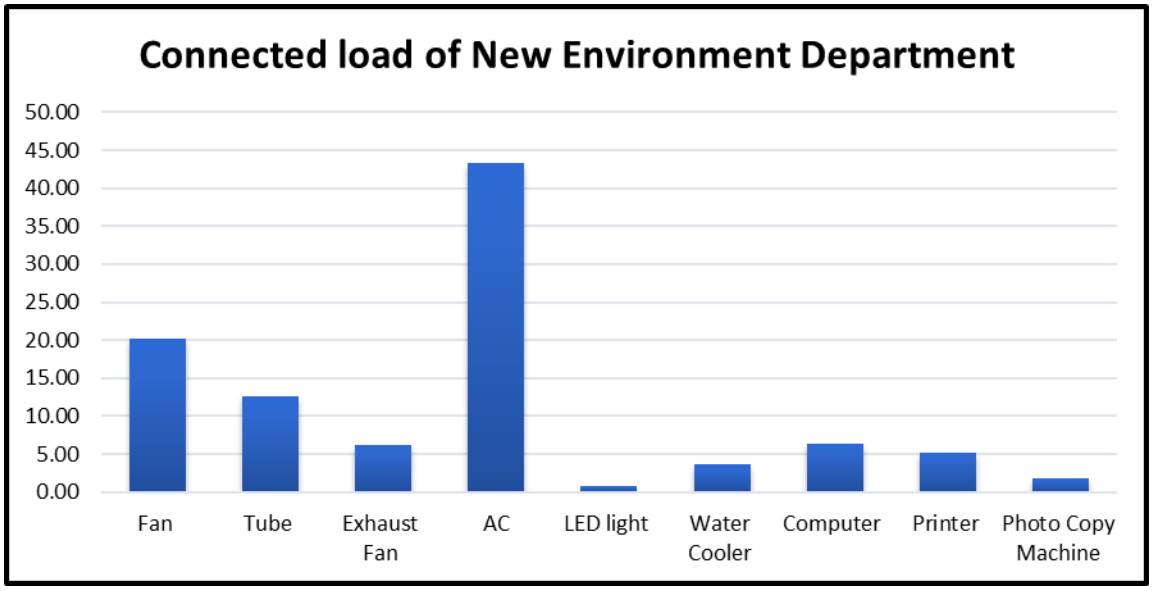

Table 3.51 :- Connected load of New Exam-II

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	205	80	16.4	20.43
2	Tube	443	20	8.86	11.04
3	Exhaust Fan	21	60	1.26	1.57
4	AC	11	2500	27.5	34.26
5	LED light	3	150	0.45	0.56
6	Water Cooler	4	700	2.8	3.49
7	Desert Cooler	27	180	4.86	6.05
8	Computer	90	85	7.65	9.53
9	Printer	34	250	8.5	10.59
10	Photo Copy Machine	4	500	2	2.49
	Total Connected load KW			80.28	100.00

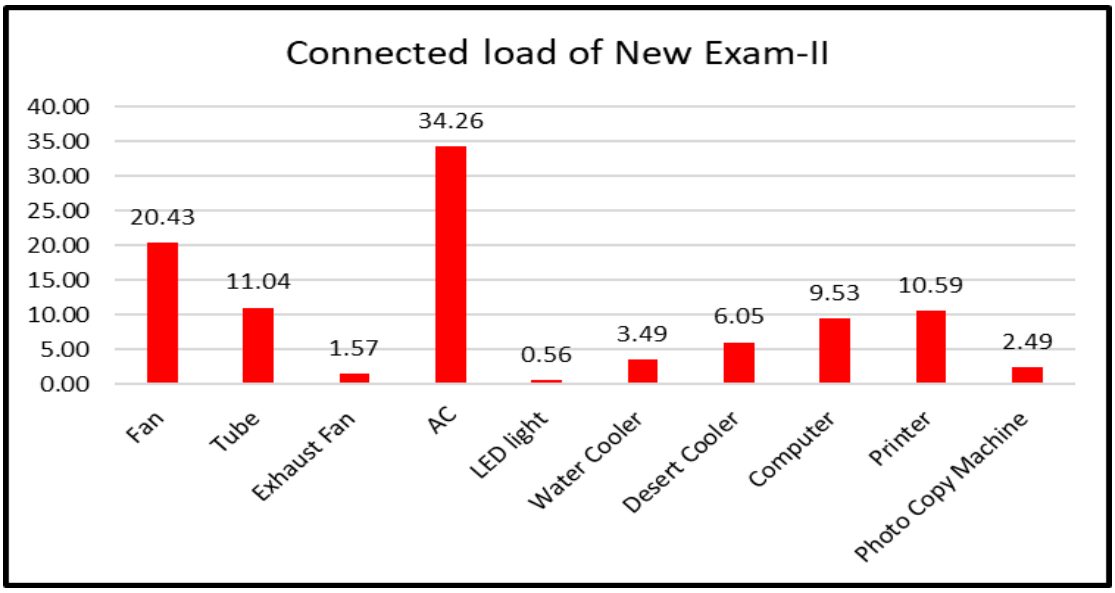

Table 3.52 :- Connected load of Old art Faculty

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	120	80	9.6	41.08
2	Tube	140	20	2.8	11.98
3	Exhaust Fan	5	180	0.9	3.85
4	AC	3	2500	7.5	32.09
5	LED light	5	90	0.45	1.93
6	Water Cooler	2	700	1.4	5.99
7	Desert Cooler	4	180	0.72	3.08
	Total Connected load KW			23.37	100.00

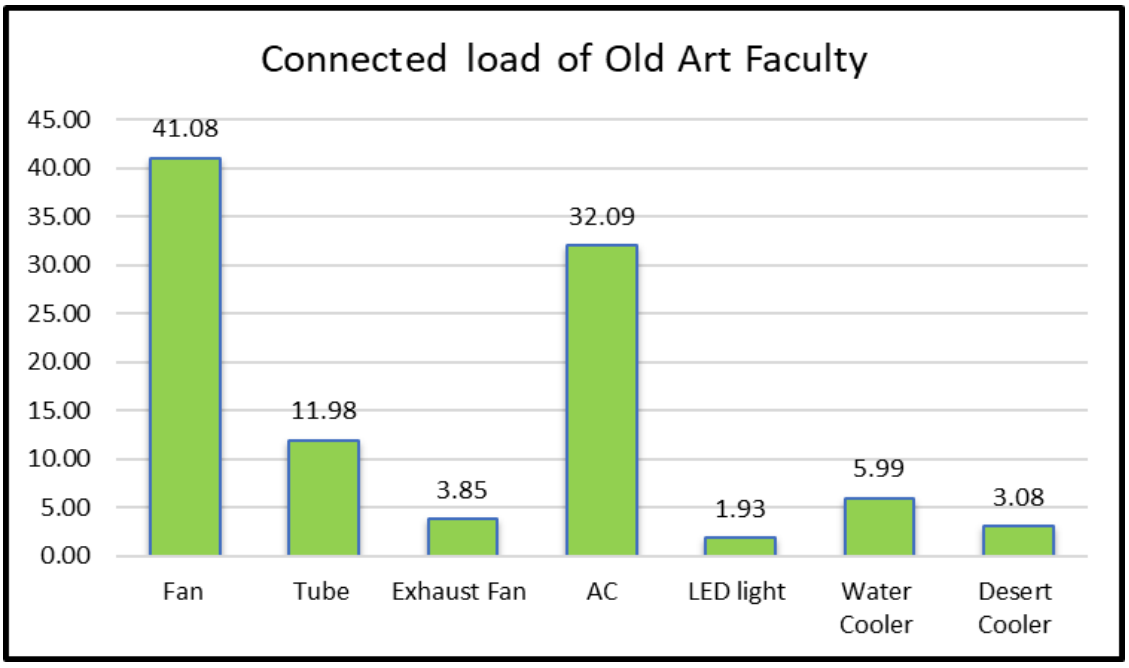

Table 3.53 :- Connected load of University college :-

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	517	80	41.36	27.69
2	Tube	786	20	15.72	10.52
3	Exhaust Fan	66	180	11.88	7.95
4	AC	26	2500	65	43.51
5	LED light	11	250	2.75	1.84
6	Water Cooler	7	400	2.8	1.87
7	Desert Cooler	10	180	1.8	1.20
8	Computer	95	85	8.075	5.41
	Total Connected load KW			**149.385**	100.00

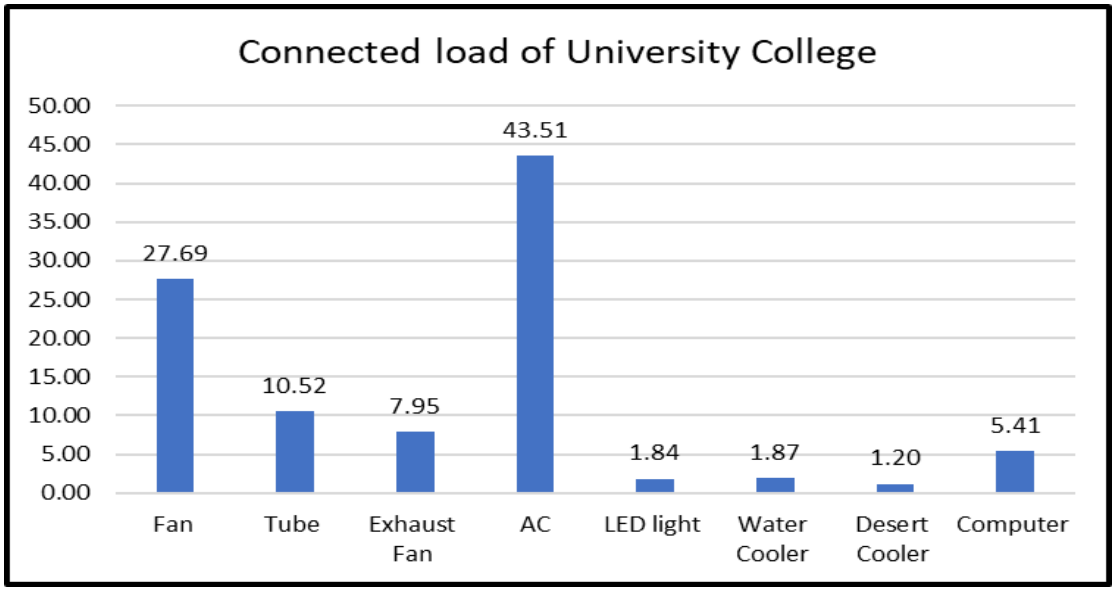

Table 3.54: - Connected load of Old Library

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	190	60	11.4	28.76
2	Tube	292	40	11.68	29.47
3	Exhaust Fan	7	60	0.42	1.06
4	AC	2	2500	5	12.61
5	LED light	4	250	1	2.52
6	Water Cooler	3	400	1.2	3.03
7	Desert Cooler	8	180	1.44	3.63
8	Photo Copy Machine	5	500	2.5	6.31
9	3 PHASE MOTRER	1	5000	5	12.61
	Total Connected load KW			**39.64**	100.00

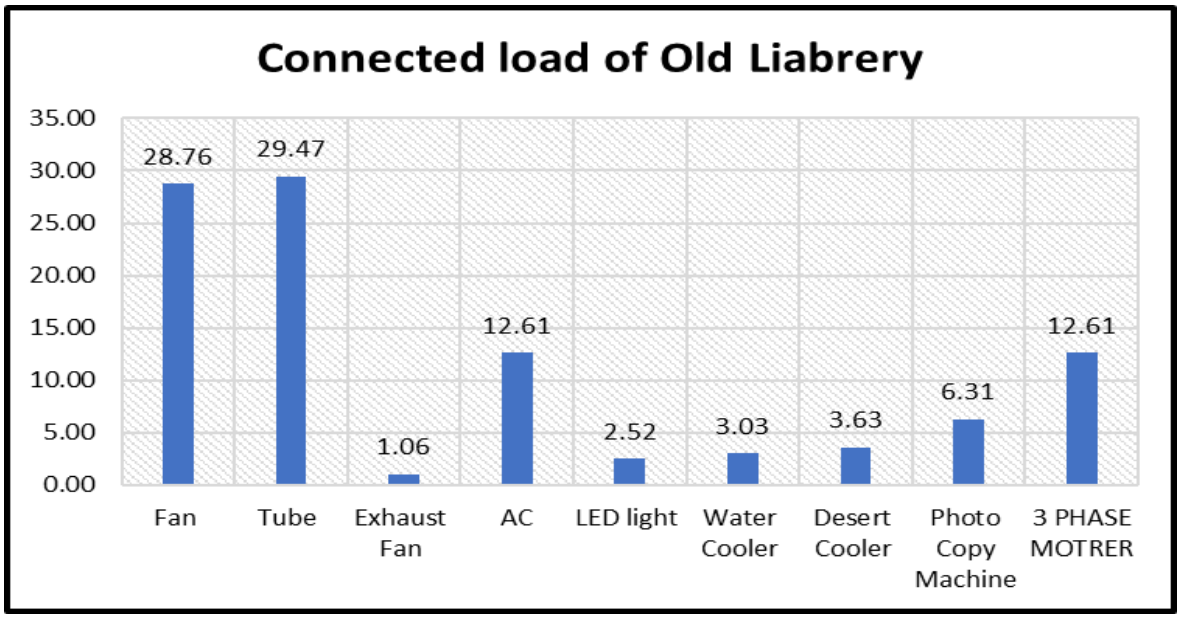

Table 3.55: - Connected load of Pension Cell: -

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	24	80	1.92	14.35
2	Tube	28	20	0.56	4.19
3	Exhaust Fan	6	60	0.36	2.69
4	AC	4	2500	10	74.74
5	Desert Cooler	3	180	0.54	4.04
	Total Connected load KW			**13.38**	100.00

Table 3.56 :- Connected load of Physics Department

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	134	60	8.04	11.24
2	Tube	205	40	8.2	11.47
3	Exhaust Fan	13	60	0.78	1.09
4	AC	14	2500	35	48.95
5	LED light	2	90	0.18	0.25
6	Water Cooler	3	700	2.1	2.94
7	Desert Cooler	3	180	0.54	0.76
8	Computer	99	85	8.415	11.77
9	Printer	31	250	7.75	10.84
10	Photo Copy Machine	1	500	0.5	0.70
	Total Connected load KW			71.505	100.00

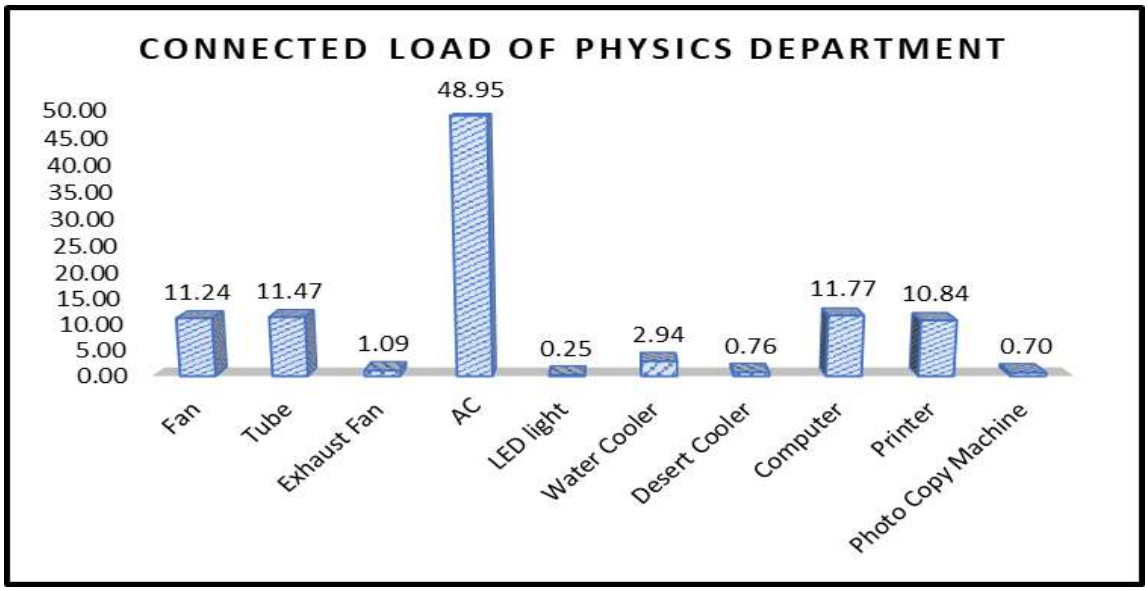

Table 3.57 :- Connected load of Power house

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	8	80	0.64	16.24
2	Tube	20	20	0.4	10.15
3	Exhaust Fan	8	180	1.44	36.55
4	LED light	8	50	0.4	10.15
5	Water Cooler	1	700	0.7	17.77
6	Desert Cooler	2	180	0.36	9.14
	Total Connected load KW			**3.94**	100.00

Table 3.58:- Connected load of Psychology

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	41	80	3.28	18.02
2	Tube	85	20	1.7	9.34
3	Exhaust Fan	1	180	0.18	0.99
4	AC	4	2500	10	54.95
5	LED light	2	90	0.18	0.99
6	Water Cooler	1	700	0.7	3.85
7	Desert Cooler	12	180	2.16	11.87
	Total Connected load KW			**18.2**	100.00

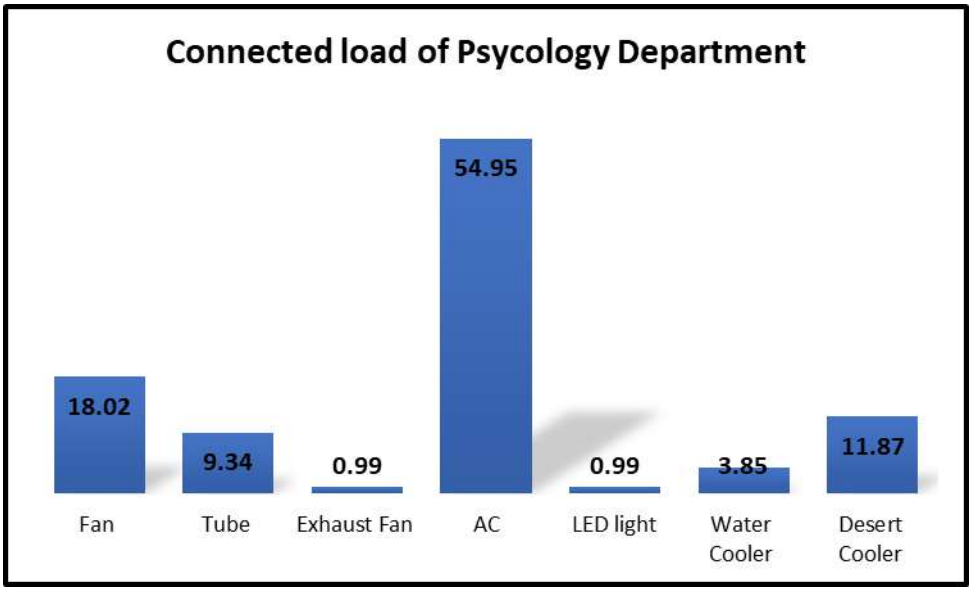

Table 3.59 :- Connected load of Rest House

Sr. no	equipment	quantity	Unit Watt	Total KW	Share %
1	Fan	209	80	16.72	8.51
2	Tube	587	20	11.74	5.97
3	Exhaust Fan	22	180	3.96	2.01
4	AC	63	2500	157.5	80.12
5	LED light	43	90	3.87	1.97
6	Water Cooler	4	700	2.8	1.42
	Connected load KW			196.59	100.00

Table 3.60 :- Connected load of RK sadan

Sr. no	Equipment	quantity	Unit Watt	Total KW	Share %
1	Tube	72	40	2.88	76.19
2	Exhaust Fan	6	60	0.36	9.52
3	LED light	6	90	0.54	14.29
	Total Connected load KW			**3.78**	100.00

Table 3.61:- Connected load of Senate Hall

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	22	60	1.32	12.13
2	Tube	201	20	4.02	36.95
3	Exhaust Fan	3	180	0.54	4.96
4	AC	2	2500	5	45.96
	Total Connected load KW			**10.88**	100.00

Table 3.62: - Connected load of Social Work

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	47	80	3.76	13.34
2	Tube	75	20	1.5	5.32
3	Exhaust Fan	7	180	1.26	4.47
4	AC	6	2500	15	53.23
5	Water Cooler	1	700	0.7	2.48
6	Desert Cooler	7	180	1.26	4.47
7	Computer	20	85	1.7	6.03
8	Printer	8	250	2	7.10
9	Photo Copy Machine	2	500	1	3.55
	Total Connected load KW			28.18	100.00

Table 3.63 :- Connected load od Static Department

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	58	80	4.64	11.18
2	Tube	55	20	1.1	2.65
3	Exhaust Fan	4	180	0.72	1.74
4	AC	10	2500	25	60.26
5	LED light	4	90	0.36	0.87
6	Water Cooler	1	700	0.7	1.69
7	Desert Cooler	11	180	1.98	4.77
8	Computer	44	85	3.74	9.01
9	Printer	9	250	2.25	5.42
10	Photo Copy Machine	2	500	1	2.41
	Total Connected load KW			**41.49**	100.00

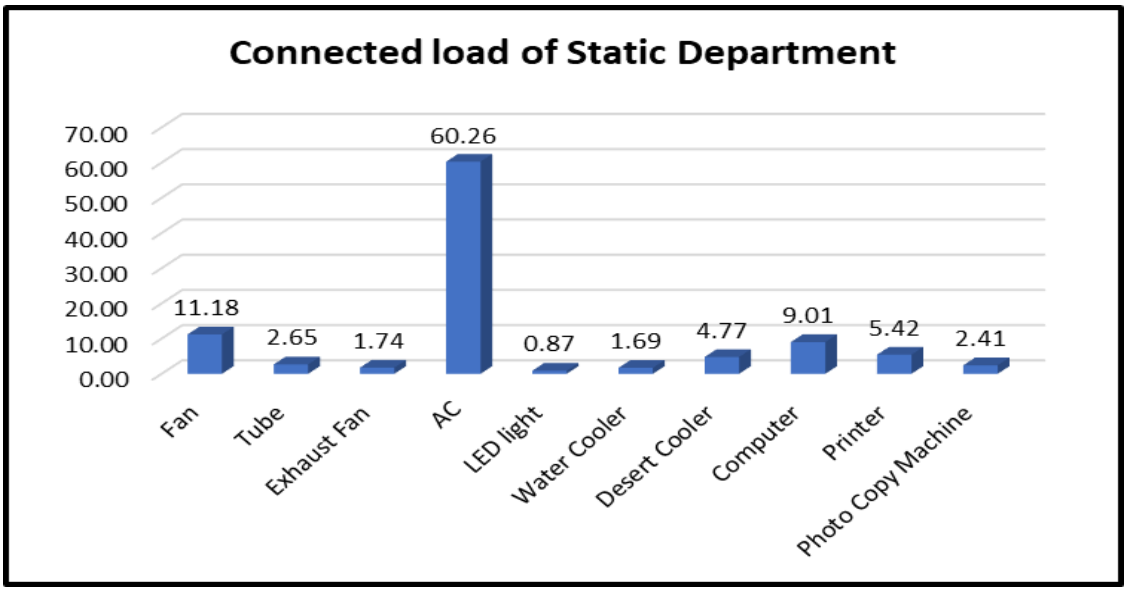

Table 3.64 :- Connected load of Teacher Club

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	17	60	1.02	3.50
2	Tube	39	40	1.56	5.35
3	Exhaust Fan	7	60	0.42	1.44
4	AC	10	2500	25	85.76
5	LED LIGHT	3	90	0.27	0.93
6	LED LIGHT	2	90	0.18	0.62
7	Water Cooler	1	700	0.7	2.40
	Total Connected load KW			**29.15**	100.00

Table 3.65:- Connected load of Telephone **Exchange**

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	5	80	0.4	6.58
2	Tube	8	40	0.32	5.26
3	Exhaust Fan	2	180	0.36	5.92
4	AC	2	2500	5	82.24
	Total Connected load KW			**6.08**	100.00

Table 3.66 :- Connected load of Tourism and Hotel management

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	85	80	6.8	18.60
2	Tube	146	20	2.92	7.99
3	Exhaust Fan	7	180	1.26	3.45
4	AC	8	2500	20	54.70
5	LED light	6	90	0.54	1.48
6	Water Cooler	2	600	1.2	3.28
7	Desert Cooler	11	180	1.98	5.42
8	Computer	16	85	1.36	3.72
9	Printer	2	250	0.5	1.37
	Total Connected load KW			**36.56**	100.00

Table 3.67 :- Connected load of UIET Ground Floor Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	231	80	18.48	22.82
2	Tube	367	20	7.34	9.07
3	Exhaust Fan	15	180	2.7	3.33
4	AC	13	2500	32.5	40.14
5	Computer	120	85	10.2	12.60
6	Printer	35	250	8.75	10.81
7	Photo copy machine	2	500	1	1.24
	Connected load KW			**80.97**	100.00

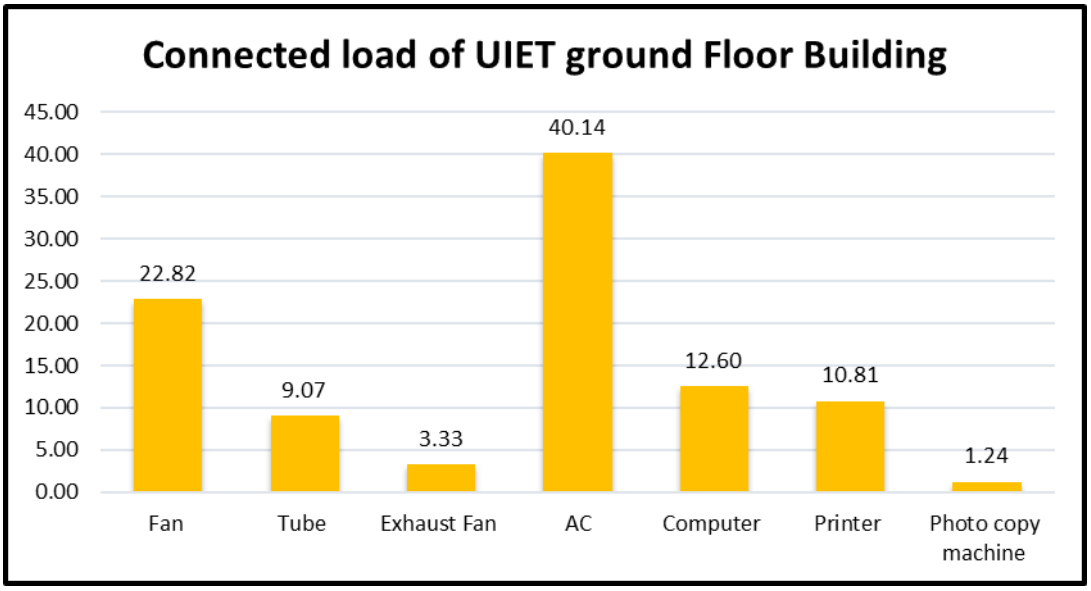

Table 3.68 :- Connected load of UIET First Floor Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	244	80	19.52	20.83
2	Tube	382	20	7.64	8.15
3	Exhaust fan	10	180	1.8	1.92
4	AC	17	2500	42.5	45.34
5	Computer	165	85	14.025	14.96
6	Printer	25	250	6.25	6.67
7	Photo copy machine	4	500	2	2.13
	Total Connected load KW			**93.735**	100.00

Table 3.69 :- Connected load of UIET Second Floor Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	195	80	15.6	22.66
2	Tube	310	20	6.2	9.01
3	Exhaust fan	7	180	1.26	1.83
4	AC	13	2500	32.5	47.22
5	Computer	115	85	9.775	14.20
6	Printer	10	250	2.5	3.63
7	Photo copy machine	2	500	1	1.45
	Connected load KW			**68.835**	100

Table 3.70 :- Connected load of UIET New Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	247	80	19.76	42.51
2	Tube	596	20	11.92	25.65
3	AC	5	2500	12.5	26.89
4	LED light	4	250	1	2.15
5	Water Cooler	2	650	1.3	2.80
	Total Connected load KW			**46.48**	100.00

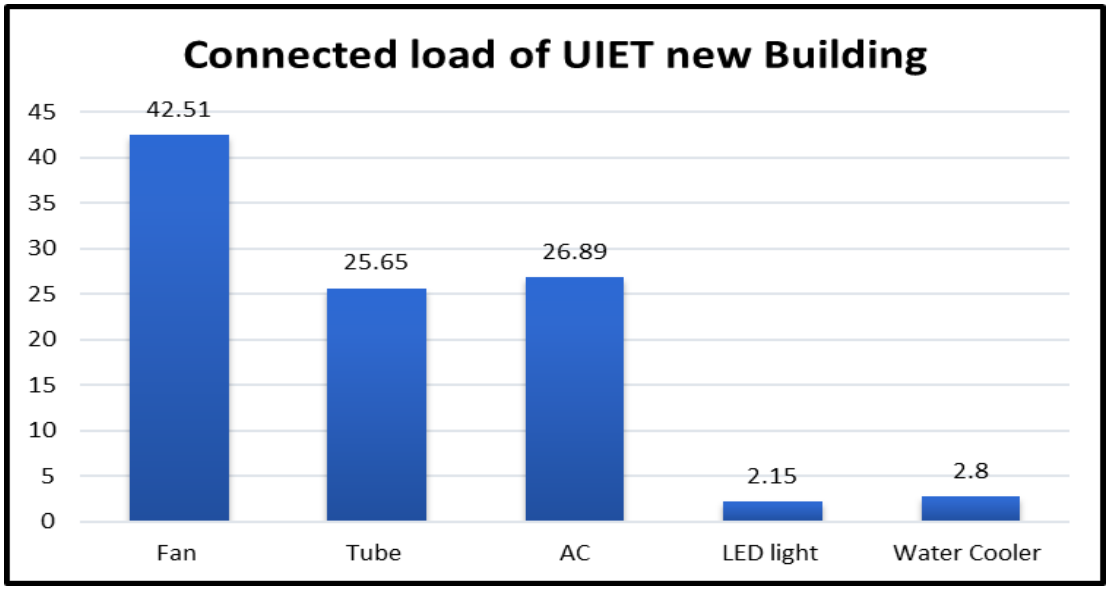

Table 3.71 :-Connected load of University School of Management

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	132	60	7.92	12.91
2	Tube	191	20	3.82	6.23
3	Exhaust Fan	8	60	0.48	0.78
4	AC	13	2500	32.5	52.97
5	LED light	5	90	0.45	0.73
6	Water Cooler	3	400	1.2	1.96
7	Desert Cooler	3	180	0.54	0.88
8	Computer	120	85	10.2	16.62
9	Printer	13	250	3.25	5.30
10	Photo copy machine	2	500	1	1.63
	Total Connected load KW			**61.36**	100.00

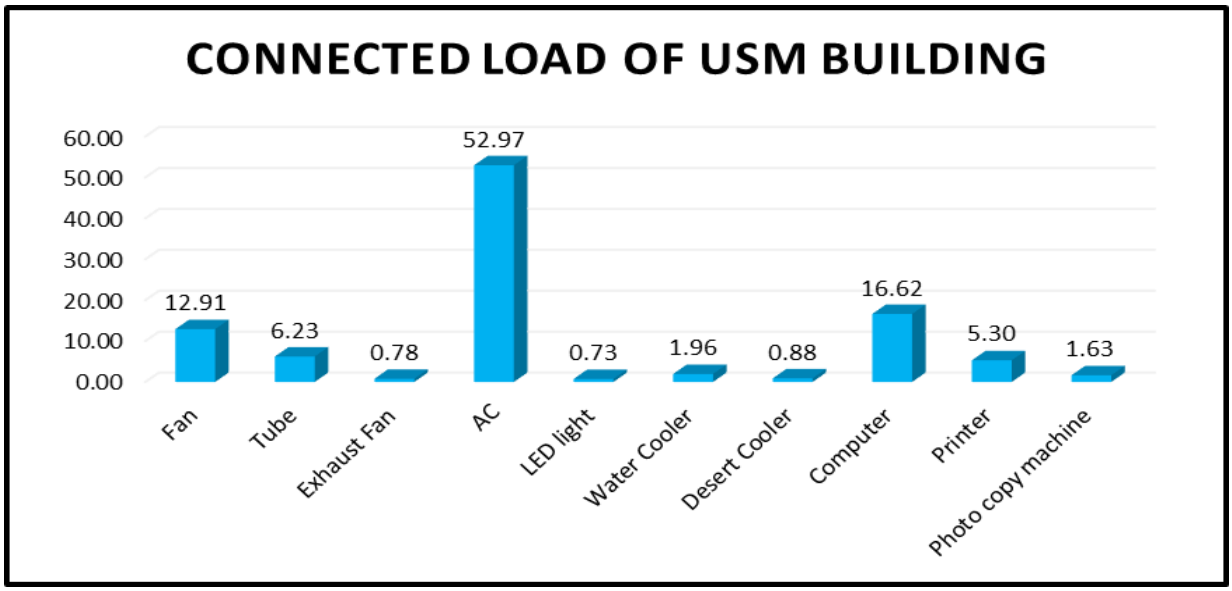

Table 3.72 :- Connected load of USIC Building

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	86	80	6.88	14.10
2	Tube	134	20	2.68	5.49
3	Exhaust Fan	4	180	0.72	1.48
4	AC	12	2500	30	61.50
5	Computer	100	85	8.5	17.43
	Total Connected load KW			**48.78**	100.00

Table 3.73 :- Connected load of USIC Building -02

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	94	80	7.52	17.15
2	Tube	139	20	2.78	6.34
3	Exhaust Fan	16	180	2.88	6.57
4	AC	10	2500	25	57.00
5	LED light	1	90	0.09	0.21
6	Water Cooler	1	700	0.7	1.60
7	Desert Cooler	8	180	1.44	3.28
8	Computer	23	85	1.955	4.46
9	Printer	4	250	1	2.28
10	Photo copy Machine	1	500	0.5	1.14
	Total Connected load KW			**43.865**	100.00

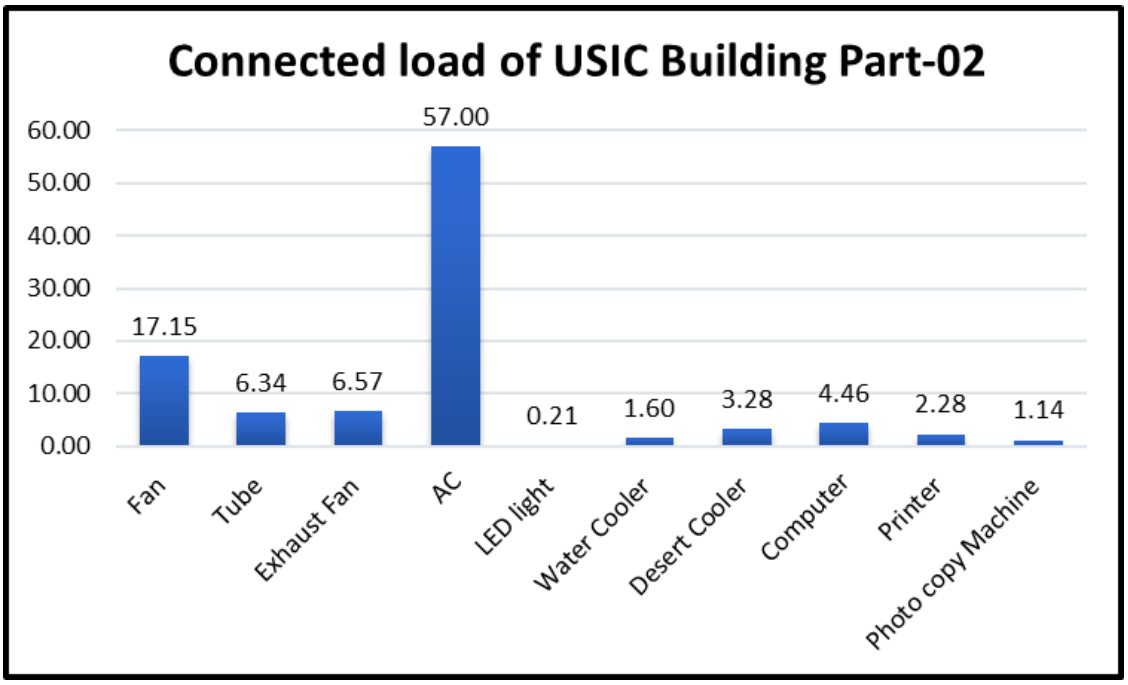

Table 3.74 :- Connected load of Zoology department

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	51	80	4.08	13.68
2	Tube	72	20	1.44	4.83
3	Exhaust Fan	4	180	0.72	2.41
4	AC	8	2500	20	67.07
5	Water Cooler	1	700	0.7	2.35
6	Desert Cooler	1	180	0.18	0.60
7	Computer	20	85	1.7	5.70
8	Photo copy machine	2	500	1	3.35
	Total Connected load KW			**29.82**	100.00

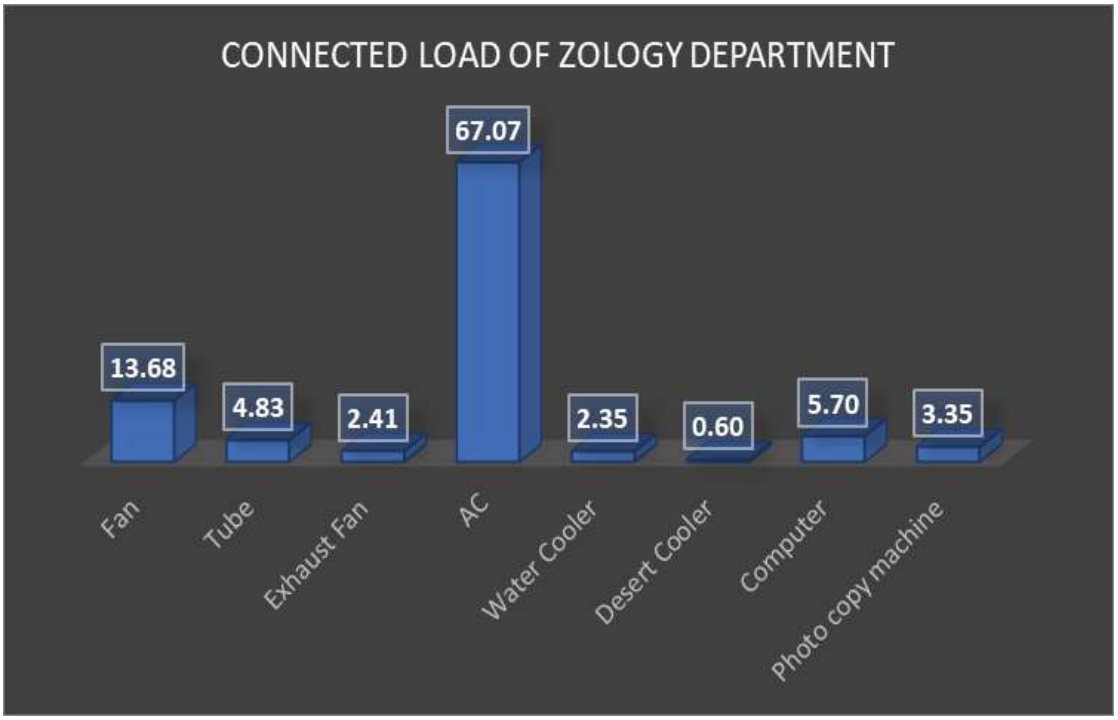

Table 3.75 :- Connected load of CV Office / Register Office

Sr. no	equipment's	quantity	Unit Watt	Total KW	Share %
1	Fan	28	80	2.24	4.760
2	Tube	75	20	1.5	3.187
3	Exhaust Fan	12	180	2.16	4.590
4	AC	15	2500	37.5	79.686
5	LED light	3	90	0.27	0.574
6	Water Cooler	1	700	0.7	1.487
7	Desert Cooler	1	180	0.18	0.382
8	Computer	6	85	0.51	1.084
9	Printer	6	250	1.5	3.187
10	Photo copy machine	1	500	0.5	1.062
	Total Connected load KW			**47.06**	100.000

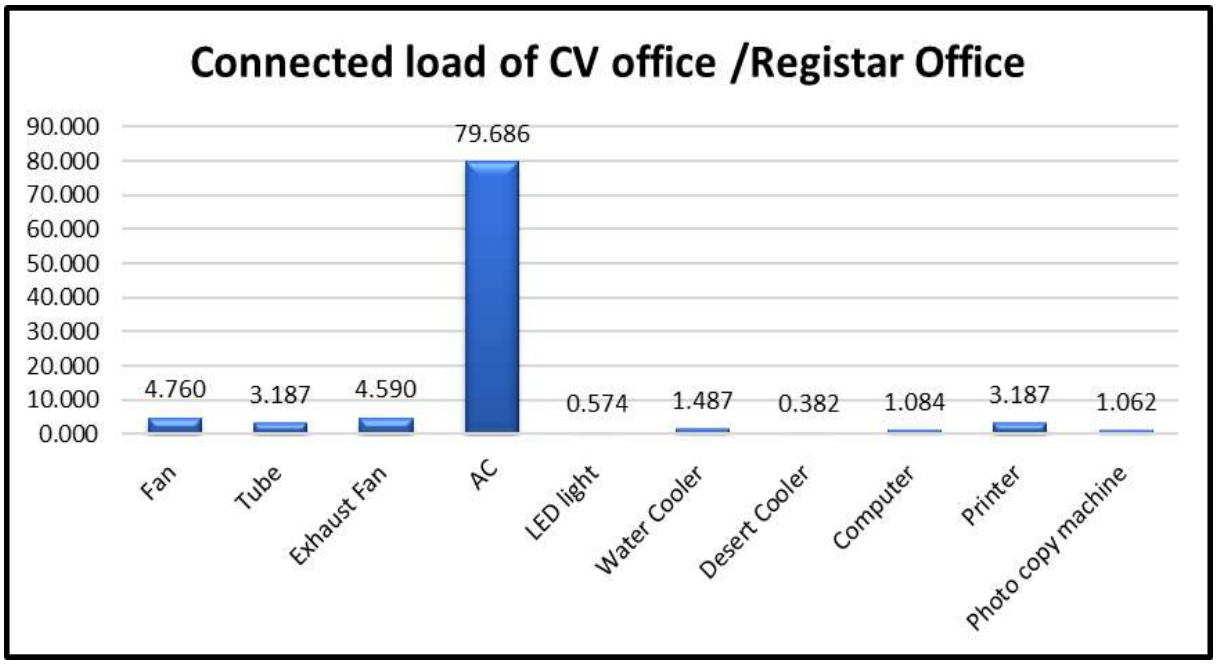

Table 3.76 :- Details of connected load of all Boys Hostel

Sr. No.	Building Name (Boys Hostel)	Ceiling Fan 80W	LED Tube Light 18W	Exhaust Fan 18" Size	Exhaust Fan 15" Size	LED 30W	LED 60W	LED 90W	Exhaust Fan 12" Size	Water Cooler 150 Litre. Capacity	Geyser 2 KW
1	Bheem Bhawan	170	200	0	10	0	6	0	0	3	14
2	Dr. B.R. Ambedkar Bhawan	80	120	0	9	0	2	0	0	2	6
3	Subhash Bhawan	36	50	0	0	0	0	3	0	1	19
4	Pratap Bhawan	290	355	25	0	3	5	0	0	3	18
5	Ch. Ranbir Singh Hostel	235	203	0	11	0	2	0	6	3	13
6	Narhari Bhawan	290	355	25	0	4	5	0	0	3	17
7	Ch. Devilal Bhawan	153	181	0	5	0	4	0	6	2	7
8	Shaheed Bhagat Singh Bhawan	423	560	25	0	0	10	0	0	5	17
9	Tagore Bhawan	207	280	0	20	2	5	0	0	3	12
10	Arjun Bhawan	150	160	4	12	0	0	0	0	2	15
11	Vivekanand Bhawan	180	211	0	10	0	0	4	2	2	7
12	Harsh Bhawan	322	385	22	0	2	12	0	0	5	17
	Total	**2536**	**3060**	**101**	**77**	**11**	**51**	**7**	**14**	**34**	**162**

Table 3.77 :- Connected load of All Boys Hostel with Equipment's load share

Sr. No	Equipment's	Unit watt (Watt)	Quantity	Total Watt	Load Share %
1	Ceiling Fan 80W	80	2536	202880	31.29
2	LED Tube Light 18W	18	3060	55080	8.50
3	Exhaust Fan 18" Size	380	101	38380	5.92
4	Exhaust Fan 15" Size	240	77	18480	2.85
5	LED 30W	30	11	330	0.05
6	LED 60W	60	51	3060	0.47
7	LED 90W	90	7	630	0.10
8	Exhaust Fan 12" Size	150	14	2100	0.32
9	Water Cooler 150 Ltr. Capacity	100	34	3400	0.52
10	Geyser 2 KW	2000	162	324000	49.97
	Total Connected load of Boys Hostels			**648340**	**100.00**

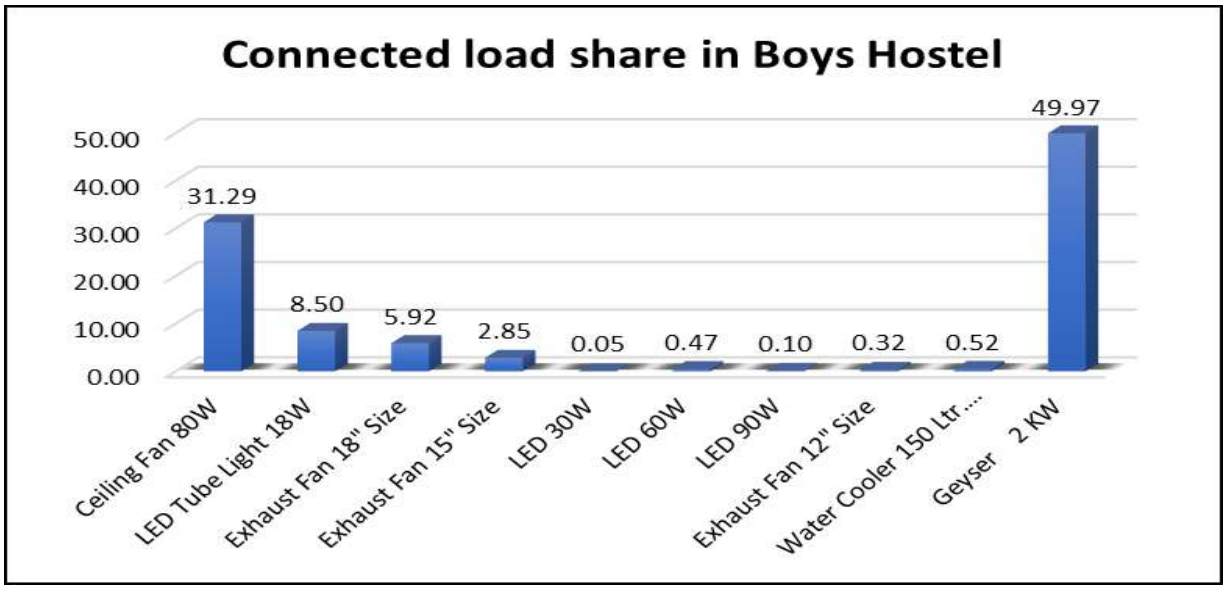

Figure: - Graphical Presentation of Connected load of All Boys Hostel in Year 2020-21

Table 3.78 :- Details of connected load of all Girls Hostel

Sr. No.	Building Name (All Girls Hostel)	Ceiling Fan 80W	LED Tube Light 18W	Exhaust Fan 18" Size	Exhaust Fan 15" Size	LED 30W	LED 60W	LED 90W	LED 240W	Exhaust Fan 12" Size	Water Cooler 150 Ltr. Capacity	Geyser 2 KW
1	Girls Hostel-1 (Saraswati Bhawan)	130	186	4	0	6	3	2	0	6	3	19
2	Girls Hostel-2 (Meera Bhawan)	130	205	4	0	2	3	2	0	6	3	19
3	Girls Hostel-3 (Kasturba Bhawan)	130	186	4	0	2	0	0	0	6	3	20
4	Girls Hostel-4 (Bharti Bhawan)	133	180	4	0	4	2	0	0	6	3	19
5	Girls Hostel-5 (Gargi Bhawan)	135	190	14	0	3	1	0	0	6	3	19
6	Girls Hostel-6 (Subhadra Bhawan)	130	190	2	0	1	5	0	0	0	3	13
7	Girls Hostel-7 (Ahilya Bhawan)	55	100	10	0	0	4	0	0	0	2	19
8	Girls Hostel-8 (Ganga Bhawan)	85	140	0	4	0	5	0	0	0	3	5
9	Girls Hostel-9 (Uttra Bhawan)	250	480	32	0	0	0	13	0	0	12	25
10	Girls Hostel-10 (Devyani Bhawan)	345	290	35	0	0	7	0	0	0	4	20
11	Girls Hostel-11 (Kalpana Chawla)	200	280	20	0	0	10	0	0	0	4	11
12	Girls Hostel-12 (Laxmi Bai)	290	450	18	0	0	0	8	0	0	4	13
13	Girls Hostel-13 (Yamuna Bhawan)	554	914	0	23	0	4	2	4	12	7	35
	Total	**2567**	**3791**	**147**	**27**	**18**	**44**	**27**	**4**	**42**	**54**	**237**

Table 3.79 :- Connected load of All Girls Hostel with Equipment's load share

Sr. No	Equipment's	Unit Watt	Quantity	Total Watt	Load Share %
1	Ceiling Fan 80W	80	2567	205360	24.796
2	LED Tube Light 18W	18	3791	68238	8.239
3	Exhaust Fan 18" Size	380	147	55860	6.745
4	Exhaust Fan 15" Size	240	27	6480	0.782
5	LED 30W	30	18	540	0.065
6	LED 60W	60	44	2640	0.319
7	LED 90W	90	27	2430	0.293
8	LED 240W	240	4	960	0.116
9	Exhaust Fan 12" Size	150	42	6300	0.761
10	Water Cooler 150 Ltr. Capacity	100	54	5400	0.652
11	Geyser 2 KW	2000	237	474000	57.232
Connected load detail of All girls Hostel				828208	100.000

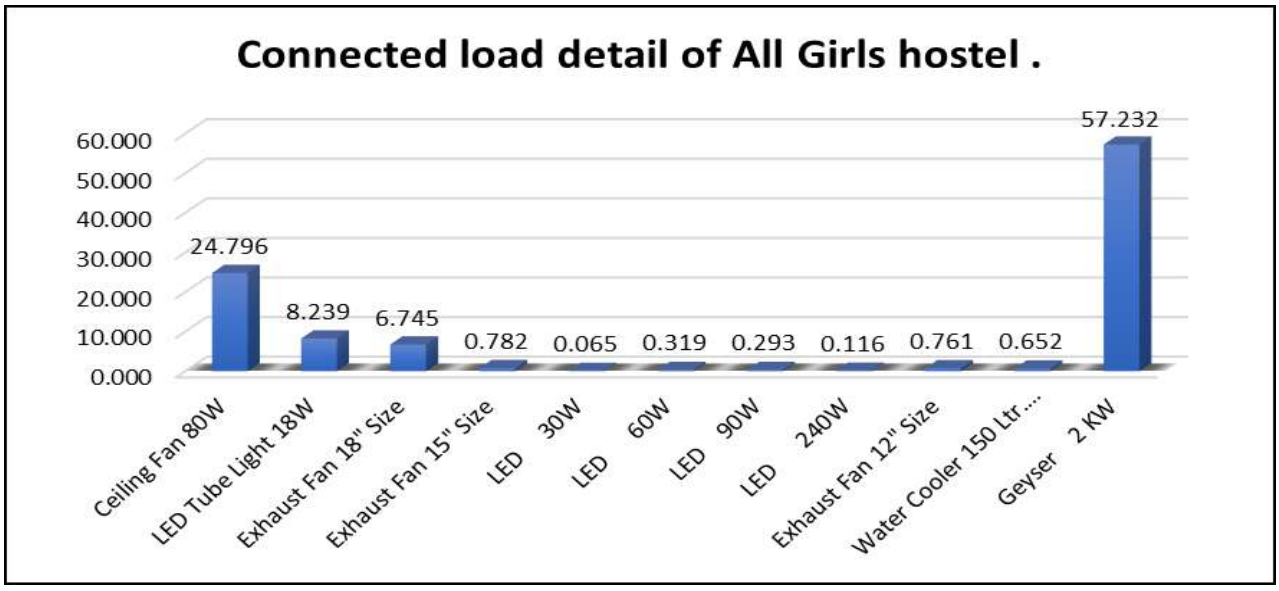

Figure: - Graphical Presentation of Connected load of All Girls Hostel in Year 2020-21

Table 3.80 :- Connected load of Water Cooler in KUK

Sr. NO	Name of Departments	Water Cooler Capacity 150 Ltr.	Water Cooler Capacity 90 Ltr.	Water Cooler Capacity 80 Ltr.	Water Cooler Capacity 50 Ltr.
1	Dean Building	6	0	0	0
2	Administrative Block	4	0	0	0
3	Exam Wing-I	4	0	0	0
4	Exam Wing-II	4	0	0	0
5	Exam Wing-III	2	0	0	0
6	Conduct Branch	1	0	0	0
7	Hotel Management	0	1	0	0
8	Social Work	0	1	0	0
9	MBA 5 Year	1	0	0	0
10	Ambedkar Study Centre	1	0	0	0
11	Department of Fine Art	1	1	0	0
12	Dharohar	2	0	0	0
13	Department of Commerce	2	0	0	0
14	MBA 2 Year	1	0	0	0
15	UIET	5	0	0	0
16	B.Ed.	2	0	0	0
17	Law Department	4	0	0	0
18	Botonny Department + Home Science Department	1	0	1	0
19	Animal House	0	0	0	0
20	Department of Electronics Science	0	0	0	0
21	Department of Geology	0	0	0	0
22	Department of Bio-Chemistry	1	0	0	0
23	Department of Bio-Technology	0	1	0	0
24	Department of Micro Biology	1	0	0	0
25	Department of Environment	3	0	0	0
26	University Health Centre	0	1	0	0
27	Construction Branch	0	1	0	0
28	DYCA	0	0	0	0
29	Committee Room	0	0	0	0
30	Sports Department	1	0	0	0
31	Department of Physical Education	2	0	0	0
32	University Model Sr. Sec. School	3	0	0	1
33	University Press	1	0	0	0
34	University College	2	1	0	0
35	Employment Office	1	0	0	0
36	Main Library	3	0	0	0

37	New Library	5	0	0	0
38	New USIC	1	0	0	0
39	ION Beam Centre	1	0	0	0
40	Old USIC	0	0	1	0
41	Physics Department	3	0	0	0
42	Department of Chemistry	3	0	0	0
43	Chief Warden Boys	0	0	0	0
44	Chief Warden Girls	0	0	0	0
45	Indian Coffee House	1	0	0	0
46	Department of Zoology	1	0	0	0
47	Department of Math	1	0	0	0
48	Department of Public Administration	1	0	0	0
49	Department of English	1	0	0	0
50	Department of Statics	1	0	0	0
51	Department of Geo-Physics	1	0	0	0
52	Women Study Centre	1	0	0	0
53	Department of Phycology	1	0	0	0
54	Department of Sociology	1	0	0	0
55	Department of Music & Dance	2	0	0	0
56	Department of Education	1	0	0	0
57	Department of AIH	1	0	0	0
58	Department of Sanskrit	1	0	0	0
59	Department of Philosophy	1	0	0	0
60	Department of Old Art Faculty	2	0	0	0
61	Department of KUTA	0	0	0	0
62	Department of Mass Communication	2	0	0	0
63	Department of DCC	5	0	0	0
64	Teachers Club	0	0	1	0
65	Main Store	1	0	0	0
66	Girls Hostel	0	0	0	0
67	Boys Hostel	0	0	0	0
68	New Building Above Environment	2	0	0	0
69	Power House No.1	1	0	0	0
70	Power House No.2	1	0	0	0
71	Crush Hall	1	0	0	0
72	Tub-Well No.5	1	0	0	0
73	Department of Geography	1	0	0	0
74	Department of Pharmacy	3	0	0	0
75	University Market	1	0	0	0
76	Non-Teaching Club	1	0	0	0

77	Girls Hostel No.1	3	0	0	0
78	Girls Hostel No.2	3	0	0	0
79	Girls Hostel No.3	3	0	0	0
80	Girls Hostel No.4	3	0	0	0
81	Girls Hostel No.5	3	0	0	0
82	Girls Hostel No.6	3	0	0	0
83	Girls Hostel No.7	2	0	0	0
84	Girls Hostel No.8	3	0	0	0
85	Girls Hostel No.9	12	0	0	0
86	Girls Hostel No.10	4	0	0	0
87	Girls Hostel No.11	4	0	0	0
88	Girls Hostel No.12	4	0	0	0
89	Girls Hostel No.13	7	0	0	0
90	Girls Hostel main Gate Security Office	1	0	0	0
91	Subhash Hostel	1	0	0	0
92	Ambedkar Hostel	2	0	0	0
93	Bheem Hostel	3	0	0	0
94	Saheed Bhagat Singh Hostel	4	0	0	0
95	Tagore Hostel	3	0	0	0
96	Arjun Hostel	2	0	0	0
97	Devi Lal Hostel	3	0	0	0
98	Ranbir Hostel	4	0	0	0
99	Pratap Hostel	3	0	0	0
100	Narhari Hostel	3	0	0	0
101	Vivekananda Hostel	2	0	0	0
102	Harsh Bhawan	5	0	0	0
103	1857 Musicum	0	0	0	0
	Total	**200**	**7**	**3**	**1**

Table 3.81 :- Connected load of Street light in KUK :-

Sr. No.	Description of Site	LED 30-Watt Capacity	LED 60-Watt Capacity	LED 90-Watt Capacity	LED 160-Watt Capacity	LED 240-Watt Capacity	LED 9-Watt Capacity
1	Power House No. 1,3,5 Area (Domestic Connection)	280	188	28	12	36	0
2	Power House No. 2 & 4 Area (Non-Domestic Connection)	215	235	320	0	18	48
	Total	**495**	**423**	**348**	**12**	**54**	**48**

Sr. No	Street lights in KUK	Unit Watt	Quantity	Total Watt	Load Share %
1	LED 30 Watt	30	495	14850	17.10
2	LED 60 Watt	60	423	25380	29.22
3	LED 90 Watt	90	348	31320	36.06
4	LED 160 Watt	160	12	1920	2.21
5	LED 240 Watt	240	54	12960	14.92
6	LED 9 Watt	9	48	432	0.50
	Total Connected load of Strat light in KUK			**86862**	**100.00**

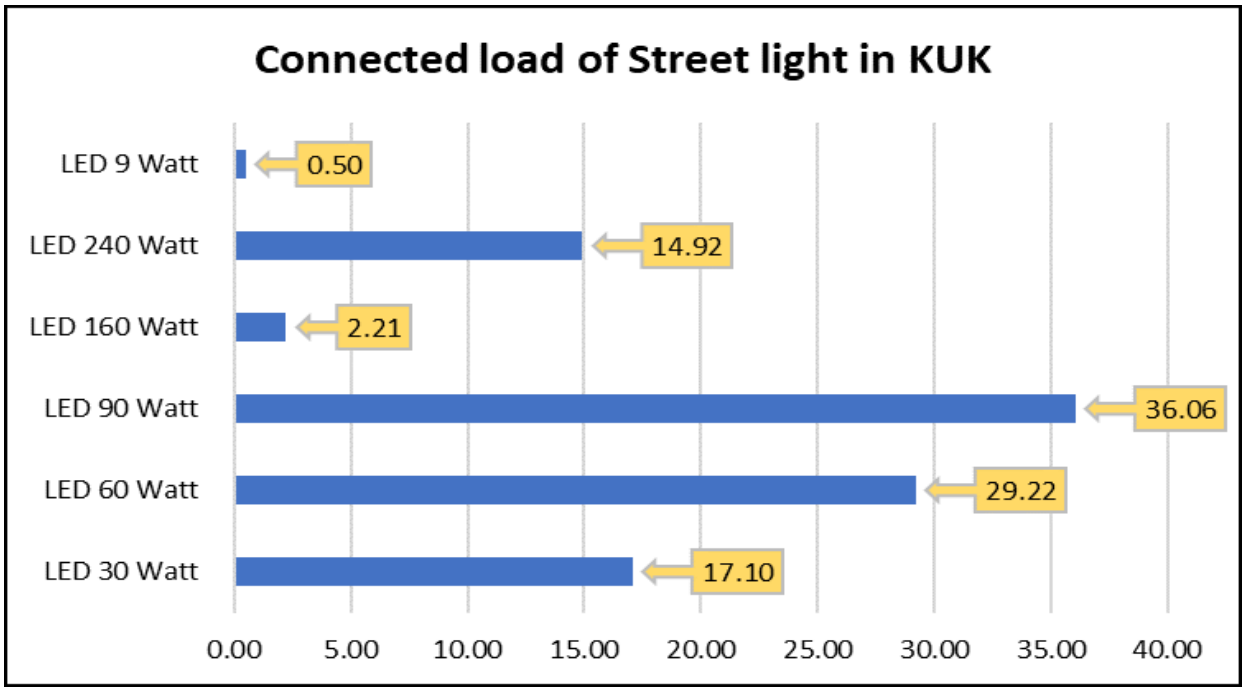

Figure: - Graphical Presentation of Connected load of All Street light in KUK Year 2020-21

Table 3.82 :- Connected load on AHU in KUK.

Sr. No.	Name of Area	Capacity (kW)	Quantity	Total Capacity (kW)
1	AHU Installed in Auditorium AC Plant	18.5	2	37
2	AHU Installed in R.K. Sadan AC Plant	2.6	5	13
3	AHU Installed in Faculty Lounge AC Plant	2.6	2	5.2
4	AHU Installed in Old Library AC Plant	2.6	7	18.2
5	AHU Installed in Directorate of Distance Education AC Plant	2.6	4	10.4
		Total	**20**	**83.8**

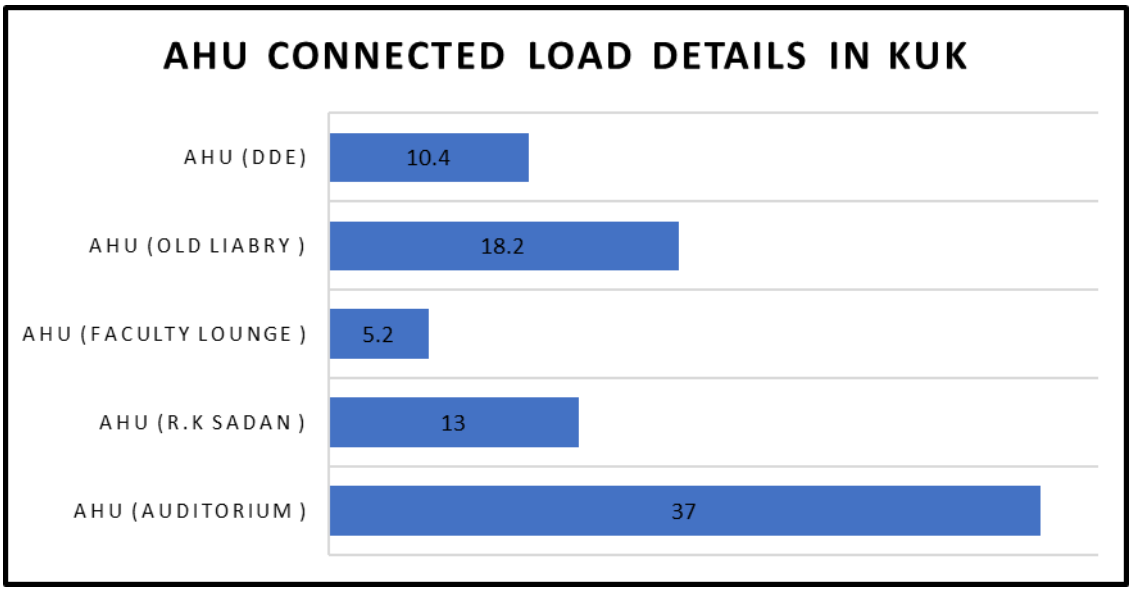

Figure: - Graphical Presentation of Connected load of AHU in KUK Year 2020-21

3.4 On Site Power Measurement:

Sr. No.	Location	Total Amp	Volt	Power Factor	Operating KW
	Old Faculty				
1	Punjabi Department	51.8	424	0.963	36.67
2	Economics Department				
3	Political Science				
4	Library Science				
5	History Department				
6	Education Department	11.88	434	0.976	8.72
7	Sanskrit Department				
8	Indology Department				
9	AIH	188.3	412	0.954	128.19
10	Jawahar Lal Nehru Library	48.9	398	0.976	32.90
11	Maths Department	50.3	412	0.978	35.12
12	Holography Department				
13	University College	76.1	410	0.976	52.74
14	B. Pharmacy	32	416	0.962	22.18
15	Public Administration	111.6	442	0.923	78.86
16	Geophysics	107.2	421	0.932	72.85
17	Student Home	28.02	435	0.943	19.91
18	Law Department	51.9	432	0.921	35.77
	Examination Wing -2 Building				
19	Examination Branch -02	106.4	434	0.954	76.30
20	Result Branch-01				
21	Result Branch-02				
22	Computer lab				
23	Result Branch -03				
24	Certification Section				
25	Construction Branch				
	Examination Wing -1 Building				
26	Confidential Cell	63.3	438	0.953	45.76
27	Construction Branch (Theory)				
28	Conduct Branch (Practical)				
29	UMC				
30	PH. D				
31	Re- Evaluation Branch				
32	Secrecy Branch				
33	Conduct Branch	22.2	422	0.954	15.48

	Admin Building				
34	Admin Block	111.8	420	0.965	78.48
35	Main Account				
36	Bill section				
37	Cash and Fee				
38	Income				
39	Pension Cell				
40	Fee Section				
41	PF Section				
42	Planning Section				
43	Cheque Section				
44	Audit Internal				
45	State Gov. (Audit)				
46	Establishment Branch (Teaching)				
47	Establishment Branch (Non -Teaching)				
48	Academic Branch				
49	Syllabus Branch				
50	Scholarship branch				
51	Registration Branch				
52	PH. D branch				
53	General Branch				
54	College's branch				
55	Dean Building	84.3	398	0.987	57.36
56	Other Offices				
57	Chairpersons/Directors				
58	Teaching Department				
59	Office of the Dean Academic Affairs				
60	Office of Dean Faculty of Science				
61	Office of Dean Student Welfare				
62	Computer Science				
63	College Branch				
64	V.C. Office	44.2	420	0.965	31.03
65	Registrar Office				
66	General Branch	44	420	0.978	31.30
67	Chemistry Old	58	440	0.956	42.26
68	Chemistry New	37	433	0.965	26.78
69	Physics	35	432	0.984	25.77

70	IIE And USIC Building	48	423	0.954	33.55
71	Zoology And Geography	50	429	0.976	36.26
72	Environment Studies	18.5	420	0.954	12.84
73	Bio-Tech	105	427	0.965	74.94
74	Bio chemistry				
75	Microbiology				
76	Electronics Department	130	436	0.965	94.73
77	Botany Department	132	436	0.943	94.00
78	Home Science Department				
79	University Institute of Management	15	411	0.954	10.19
80	University College	70	430	0.964	50.26
81	Bheem Bhawan	23.3	442	0.954	17.02
82	Dr. B.R. Ambedkar Bhawan	29.2	438	0.964	21.35
83	Subhash Bhawan	83.1	439	0.943	59.58
84	Pratap Bhawan	36	436	0.932	25.34
85	Ch. Ranbir Singh Hostel	50.4	438	0.943	36.05
86	Narhari Bhawan	39.4	442	0.967	29.17
87	Ch. Devilal Bhawan	31.5	440	0.963	23.12
88	Shaheed Bhagat Singh Bhawan	27.3	447	0.986	20.84
89	Tagore Bhawan	78.4	438	0.965	57.39
90	Arjun Bhawan	23.3	440	0.972	17.26
91	Vivekanand Bhawan	36.5	438	0.964	26.69
92	Harsh Bhawan	19.6	439	0.965	14.38
93	Girls Hostel-1 (Saraswati Bhawan)	31.1	431	0.945	21.94
94	Girls Hostel-2 (Meera Bhawan)	27.5	428	0.954	19.45
95	Girls Hostel-3 (Kasturba Bhawan)	36	438	0.976	26.65
96	Girls Hostel-4 (Bharti Bhawan)	102.4	436	0.954	73.77
97	Girls Hostel-5 (Gargi Bhawan)	36.3	432	0.945	25.67
98	Girls Hostel-6 (Subhadra Bhawan)	47.7	429	0.965	34.2
99	Girls Hostel-7 (Ahilya Bhawan)	41.9	438	0.976	31.02
100	Girls Hostel-8 (Ganga Bhawan)	19.5	432	0.965	14.08
101	Girls Hostel-9 (Uttara Bhawan)	57.2	438	0.975	42.31
102	Girls Hostel-10 (Devyani Bhawan)	47.7	428	0.976	34.51
103	Girls Hostel-11 (Kalpana Chawla)	30.4	442	0.976	22.71
104	Girls Hostel-12 (Laxmi Bai)	22.6	435	0.965	16.43
105	Girls Hostel-13 (Yamuna Bhawan)	68	431	0.986	50.05
106	Dispensary Building & Gym. Hall	6	438	0.934	4.25

107	Public Relations Office	8	432	0.965	5.78
108	Dharohar Haryana Museum	24	438	0.945	17.21
109	Youth & Cultural Affairs	5	435	0.967	3.64
110	University Printing & Publications Bureau	16	440	0.965	11.77
111	NSS	12	423	0.945	8.31
112	NCC	8	432	0.945	5.66
113	Directorate of Sports	4	426	0.967	2.85
114	Land & Farming Department	5	425	0.965	3.55
115	Horticulture Department	12	442	0.956	8.78
116	Security Department	4.23	436	0.968	3.09
117	Employment Bureau (University)	3.99	423	0.954	2.79
118	Post Office and Banks on Campus	11.24	435	0.965	8.17
119	District Administration	4.32	423	0.945	2.99
120	Doctors (On University Penal of Kurukshetra)	3.23	432	0.954	2.31
121	Press Correspondents/Journalists/Print Media	12.56	433	0.976	9.19
122	Electronic Media	5.8	425	0.954	4.07
123	Sport education building	4.43	423	0.945	3.07
124	Non-Teaching club	12.42	432	0.956	8.88
125	Senior Modal School	23.62	423	0.943	16.32
126	ION Beam Centre	36	443	0.965	26.66
127	University School of Management	14	420	0.965	9.83
128	Women's Study Research Centre	8	432	0.987	5.91
	Total Operating Load				**2297.23**

CHAPTER- 4
ENERGY CONSERVATION MEASURES

Case Study No. 1:-

Installation 2 MWp Grid Connected Solar Roof Top System on DS Feeder. (2500 KW)

Observation: -

It is observed that there is good potential for installation of solar roof top grid connected system on 2500 kW (DS Feeder) college building and take the advantage of Net Metering Policy of Haryana Government at present collage is taking 100 % Energy from grid.

Recommendation: Installation 2 MWp Solar Photovoltaic Grid

Connected System. Solar unit (Energy) Generation calculation: -

Recommended capacity of solar PV system	= 2000 kWp
Expected Annual energy generation @ 04 Unit /day /KWp	=2000 kWp x 4 kWh / days x 365 days = 29,20,000 kWh
Total Expected monetary saving potential @ Rs 6.40 per unit	= Rs 1,86,88,000 /-
Total Expected investment @ Rs.35 /watt	= 7,00,00,000 /-
*Simple Payback period	= 3.75 year

Note: - Energy saving depends on the operation over per day and load factor of the systems.

Case Study No. 2:-

Installation 175 kWp Grid Connected Solar Roof Top System on STP plant

Observation: -

It is observed that there is good potential for installation of solar roof top grid connected system on 250 kW (STP Feeder) on STP plant and take the advantage of Net Metering Policy of Haryana Government at present college is taking 100 % Energy from grid.

Recommendation: Installation 175 kWp Solar Photovoltaic Grid

Connected System. Solar unit (Energy) Generation calculation: -

Recommended capacity of solar PV system	= 175 kWp
Expected Annual energy generation @ 04 Unit /day /kWp	=175 kWp x 4 kWh / days x 365 days = 2,55,500 kWh
Total Expected monetary saving potential @ Rs 6.40 per unit	= Rs 16,35,200 /-
Total Expected investment @ Rs.35 /watt	= 61,25,000 /-
*Simple Payback period	= 3.74 year

Note: - Energy saving depends on the operation over per day and load factor of the systems.

Case Study No.3:

Replacement of 80W conventional ceiling fan by 28W BLDC Energy Efficient ceiling fan

Recommendation: Replacement of 80W conventional ceiling fan by 28 w energy efficient ceiling fan			
Sr. No	**Items**	**Parameters**	**Units**
1	Power Consumption by 80W	80	W
2	No of Fan	12671	No,s
3	Working Hrs/Day	8	Hrs/Day
4	Working Days/Year	200	Days/Year
5	Energy Efficient 28W	28	W
6	Expected Energy Saving	65	%
7	Expected Energy Saving	10,54,227	kWh/Year
8	Load Factor	0.9	
9	Per Unit Charges	6.40	Rs./kWh
10	Expected Money Saving	67,47,052	Rs./Year
11	Cost of New fan	1800	Rs./ Pices
12	Total Expected Investment	2,28,07,800	Rs.
14	Simple Pay Back Period	3.38	Year

Note:- Energy saving depend on the operation over per day and load factor of the systems .

END OF THE REPORT
THANKS