Chapter -I

Look out into the universe and contemplate the glory of God. Observe the stars, millions of them, twinkling in the night sky, all with a message of unity, part of the very nature of God.
Sai Baba

Introduction

1.1 Introduction:

Warananagar is a classic illustration of integrated rural development through co-operative movement. It is a well planned township throbbing with industrial and educational activities. It is a place named after the river Warana which originates at Prachitgad in Satara district and merges in the river Krishna at Haripur near Sangli. The length of the river Warana is 80 Km. The river Warana forms the boundary line between Sangli and Kolhapur districts. Warananagar is situated on the banks of river Warana at the foot of Panhala and Jyotiba hill ranges, at 10 Km. westwards from Kini-Wathar on National Highway No. 4. Warananagar, where Yashwantrao Chavan Warana Mahavidyalaya is situated, is a hilly and rural area, called Warana. It comprises of near about 60 townships, villages and some remote settlements. During the Freedom Movement this place provided shelter to many freedom fighters and today it is remarkably known as a successful industrial and educational center. Just six decades ago, this area was a barren tract of land, notorious for day-light robbery. Life was difficult and full of hardship. The main occupation of the people was agriculture and fortune of the farmers was tied to climatic changes, scarcity of rain and volatile market prices. People were downtrodden and ignorant. With the establishment of a co-operative sugar factory, this area has been totally transformed. The credit for this socio-economic transformation goes to late Hon'ble Vishwanath Anna alias Tatyasaheb Kore, a visionary man with foresight, rare organizational skills and dedication. Late Hon'ble Tatyasaheb Kore was fully aware of the fact that along with the material prosperity, the cultural development and enlightenment is equally important and necessitated the creation of educational facilities. He wanted to provide work to the empty hands and made them strong and self-reliant.

Warana co-operative sugar factory is established in 1960 and proved to be a turning point which brought about socio-economic and consequently educational changes in the life of the people of this area. The development of sugar factory changed the socio-economical standard and living standard of poor farmers in Warana valley. But economic enrichment was not his only goal. His mission was to bring in the total transformation of rural youth and create a New Man who will be well educated, self-reliant, culturally rich and morally upright. He knew that along with the material prosperity, cultural development and moral enlightenment are equally important. He realized that creation of educational facilities, particularly facility of higher education was the prior need of this area.

Before the establishment of the aforesaid educational facilities, the students of this area were deprived of higher education and only a few well-to-do could afford to go to Kolhapur, the nearest city, for pursuing higher education. Having realised this, the leadership decided to create these facilities for the youth of this area for their total transformation. This led to the establishment of Shree Warana Vibhag Shikshan Mandal (Education Society) and subsequently, Shree Warana Mahavidyalaya, Warananagar in 1964. The college was renamed as Yashwantrao Chavan Warana Mahavidyalaya, in 1992. Since 1964. our education society is striving towards the fulfillment of the above mentioned objectives. Establishment of our college, the first step in higher education, was followed by setting up of Primary and Secondary Schools, Engineering College, English Medium School, Military Academy and other educational institutes. All these institutes have more than adequate infrastructural facilities like imposing buildings, beautiful premises, spacious playgrounds. well qualified staff, rich libraries and laboratories. Each institute has proved to be a step ahead towards the achievement of our mission of 'Creating A New Man'.

1.1.1 Mission:-

"We stand united and determined for the total transformation of rural youth of Warana region towards self reliance, confidence and enlightment through higher education".

1.1.2Vision:-

"To become an Academy of excellence in higher education and human resource development in rural area".

1.1.3 Aims and Objectives of our Education Society

1. To create facilities of all sort of education by establishing, conducting and / or managing educational institutions of various types for imparting education such as literary, scientific, cultural, moral, physical, technical, vocational and professional. as the case may be.

2. To strive for an all-sided educational development and progress by instituting, scholarships, educational loans, prizes, free studentships and providing hostels or in any other convenient manner.

3. To facilitate education by conducting educational institutions at different places in accordance with the exigencies or circumstances and also to affiliate, to amalgamate or to

take over or to co-operate with such other institutions which have similar aims and objectives, more particularly in the area of Warana region, in the Kolhapur and the Sangli Districts.

4. To start libraries, to organise courses of studies or lectures, to publish books, pamphlets, brochures, to issue, to print and publish other periodicals, daily bulletins, magazines, hand written, printed or cyclostyled papers, intended to advance social and cultural studies in all their branches.

5. To undertake such other activities as are conducive to and for the attainment of the above objectives.

1.1.4 Motto and Emblem of our College :- Our college was established in June 1964 with 128 students and 12 lecturers. Right from the beginning, it has Arts, Commerce and Science faculties. The motto of our college is taken from a well-known poem by Mr. V. V. Shirwadkar alias Kusumagraj, a great poet of Marathi.

With the above motto in mind, our college is striving for making the students attain perfection, become prosperous and lead a contented and successful life. The emblem of our college reflects the dreams seen by Late Hon'ble Tatyasaheb Kore for the development of Warana region. At the background of the emblem is Warana Sugar Factory, the nucleus of this industrial and educational complex. The symbols represent humanities, commerce, science, culture, defence, agricultural and industrial development through co-operation.

1.1.5 Goals and Objectives of our College:

1. To provide opportunities of higher education to the students of this rural area, coming from modest family background and to make them competent enough to face the challenges of the modern world.

2. To promote women's education by providing them hostel and boarding facilities at concessional rates.

3. To encourage the students to pursue higher education by providing them financial assistance in the form of free-ship.

4. To encourage the meritorious students by giving them scholarships and prizes for academic achievements.

5. To promote in-door and outdoor sports through creation of a spacious ground, an in-door stadium and necessary equipments.

6. To give opportunities to the students to expose their latent talents and promote their socio-cultural growth.

7. To provide the facility of post-graduation for the students of Warana region.

Philosophy of the Founder Late Hon'ble Tatyasaheb Kore, the founder of this complex wanted to bring about a total transformation of the rural youth and create a 'New Man', who is well educated self-reliant, economically sound, culturally rich and morally upright.

Linkages between Goals and Activities The college undertakes a number of curricular, co-curricular and extra-curricular activities to achieve the above mentioned goals. For this purpose it runs its academic courses in all three faculties viz. Arts, Commerce and Science. The college has highly qualified faculty members, well maintained class rooms, well equipped laboratories and a rich library.

Our College was established in June 1964 (128 students and 12 lecturers) right from the beginning, has Arts, Commerce and Science faculties. Today campus is covering an area of 27 acres and college has15departments, 11 COC courses, 03 Post-graduate course and about 5000 students and 157 staff members. Also college imparts education in Arts, Science and Commerce faculties.

Since last 4-5 years, several attempts are being made to overcome the image of the college as a regional academic college. Several steps have been taken to raise the standards of teaching,

learning, evaluation and research so as to measure up to global standards. Recently the expert team of Shivaji University, Kolhapur visited our college after evaluating all panel declared "Award of academic excellence". The faculties of Arts and Commerce are also gearing up to meet the demands of changing time. Establishment of COC courses ,add- on courses and extension activities etc are indicators of this change.

1.2 Green audit outline: Yashwantrao Chavan Warana Mahavidyalaya, Warananagar is playing a key role in the development of human resources and producing awareness about the environment consciousness, for which institute take number of steps by organizing different events of green practices. This institutes campus runs various activities with the aim to percolate the knowledge along with practical dimension among the society as well as the stakeholders. Our institute also try to give solution for different burning issues related to environment , its awareness as well as its protection. Different types of evolutionary methods are used to assess the problem concerning environment includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Survey, Collection of data, Interviews, Observations, Green audit etc.

As educational institutions nowadays are becoming more sensitive to environmental factors more concepts are being introduced to make them eco friendly. To preserve the environment within the campus, various viewpoints are applied by the our institute to solve their environmental problems such as promotion of the energy savings, energy conservation, water reduction, water harvesting , water environment, Solid waste management, air quality, noise pollution, minimizing use of Plastic, etc. Our institution plays an active role in creating and modeling solution for such environmental problems. 'Green audit' is one of such concepts or principles introduced to make the educational institute environmentally sustainable.

"Green audit is a tool to assess general practices implemented by organization in term of its impact on environment". Green audit also throws a light on adverse practices which are responsible for degradation of environment. It shows strength and weakness of organization towards conservation of environment. It is helpful to recognize the need to function around the year in a manner to minimize its harmful environmental impact through ' Green Policy'. It means Green Audit is the base line survey to decide the Green policy. It also pinpoints the disturbing practices of natural resources

utilization. It shows the path to build, implement and test new innovative system for better utilization of resource and minimization of waste generation. It helps to achieve the goal of university to become a role model in higher education of sustainable campus in social, economical and environmental views.

1.3 Need of Green audit: Green auditing is the process of identifying and determining whether institution practices are eco-friendly and sustainable. Traditionally we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals have become habitual for everyone especially in common areas. Now, it is necessary to check whether our processes are consuming more than required resource, Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resources utilization. In the era of climate change and resource depletion it is necessary to verify processes and convert them in to green and clean one. Green audit provides an approach for it and increases overall consciousness among the people working in institution towards environment.

1.4 Goals of Green audit:

Yashwantrao Chavan Warana Mahavidyalaya, Warananagar has conducted a green audit in the year 2014-15 with specific goals as follows:

1. To conduct a baseline survey to know the reality status of green practices in institution.

2. To identify strength and weakness in green practices conducted in organization.

3. Identification and documentation of green practices followed by the institution.

4. To analyze and suggest solution for problems identified from Audit Report.

5. To assess reality status of different types of waste management inside the institution.

6. To increase environmental consciousness throughout the campus among all the stakeholders.

7. To identify and assess if some environmental risks inside the institution.

8.To motivate staff as well as students for optimized sustainable use of available natural resources.

9. The long term goal of the environmental Green audit program is to collect baseline data of environmental status and implement Green Policy to resolve environmental issue before they become a problem.

10. To discuss some ways to strengthen the green practices inside the institution.

11.To give the direction to work on some local environmental issues.

1.5 Objectives of Green audit:

1.To make the baseline survey to know the reality of green practices in the institution.

2. To identify and analyze significant environmental issues in campus.

3. To examine the current practices which can have impact on the environment such as of resource utilization, waste management , energy conservations, etc.

4. Formation of green policy with goal, vision and mission for Green practices in the college campus.

5. Continues assessment for betterment in performance in green practices and its evaluation.

6. To prepare Green Audit Report and listing the green practices followed by different. departments, support services and administration office.

7. Prepare proposed Green policy (Green Practices Plan) from Academic year 2015-16.

Chapter-II

‘The best friend of earth of man is the tree. When we use the tree respectfully and economically, we have one of the greatest resources on the earth.’ - Frank Lloyd Wright

METHODOLOGY

2.0.METHODOLOGY :- This is the baseline survey of our college which is totally based on proposed strategy on the Greening concept approved by the IIT Council on Greening Educational Institutions in the meeting held on 2 nd March 2013 at Indian Institute of Science, where representatives from six IITs along with IISc participated. This is the first attempt to conduct Green Audit of Yashwantrao Chavan Warana Mahavidyalaya,Warananagar, campus; hence, there is no baseline data for the present work. The present study is based on onsite visits, personal observations and questionnaires and survey tools. Initially, based on data requirement, sets of questionnaires about Electricity consumption, Water consumption, fuel waste, solid waste collection, chemical waste, E-waste, Air pollution, Noise pollution etc were prepared. The Green Audit committee members then visited to all the departments in Science, Arts, Commerce, Computer lab., Administrative office, Gymkhana, Exteriors, Common Facility Centers (Eight parts for study) of the college and the members helped for filling the questionnaires. Such filled questionnaires are collected from each department for each month in the Year 2014-15. The generated data is subsequently gathered together, tabularized and used for the further analysis. From the outcome of the overall study, a final report is prepared. At first, all the secondary data required for the study was collected from various sources, like concerned departments, garden etc. At the beginning two seminars were arranged for the staff to clear the idea of green auditing and guide lines were provided to fill the questionnaires. Different case studies and methodologies were studied and the following methodology was adopted for present work.

2.1 Survey by Questionnaire: Data for green audit report preparation was collected by questionnaire survey method. Questionnaires prepared to conduct the green audit in the YWCM campus is based on the guidelines, rules, acts and formats prepared by Ministry of Environment and Forest, New Delhi, Central Pollution Control Board and other statutory organizationsand guidelines from proposed strategy on the Greening concept approved by the IIT. Most of the guidelines and formats based on broad aspects and some of the issues or formats were not applicable for YCWM campus. Therefore, using these guidelines and formats, combinations, modifications and restructuring was done and sets of questionnaires were prepared as solid waste, energy, fuel, water, hazardous waste, and e-waste, etc (Annexure - Audit forms-A to E). With the help of questionnaires

some data related to Green Audit is collected from students, employers.(Annexure-F,G) and data related from management is collected from interaction with them.

All the questionnaires comprises of group of modules. The first module is related to the general information of the concerned department, which broadly includes name of the department, month and year, total number of students and employees, visitors of the department, average working days and office timings etc. The next module is related to the present consumption of resources like water, energy, fuel or the handling of solid waste and hazardous waste. Maintaining records of the handling of solid and hazardous waste is much important in green audit. There are possibilities of loss of resources like water, energy due to improper maintains and the assessment of this kind of probability is necessary in green audit. At some locations in some departments loss of water and major energy consumption was observed due to lack of observation and improper handling of technical equipments. One separate module is based on the-questions related to this aspect. Another module is related to maintaining records like, records of disposal of solid waste and records of solid waste recovery etc. For the better convenience The coordinator, green audit committee members arranged number of meetings with the HODs, professors and laboratory assistants of all the departments and officers in charge in CFC. In these meetings idea of the environment audit, green audit, indicators of green audit, greening practices, environmental issues in campus are discussed for concept clearance. Some statistics like, basic energy consumption characteristics for electrical equipment, Wattages of different common equipments in colleges etc. was provided with the questionnaires itself. Coordinator and co-coordinator of Green Audit committee guided to fill the questionnaire in month of Jan. 2014. The filled questionnaires from each department are collected at the end of each month in span of Jan. 2014 to Dec. 2014.

2.2 Site visits and observations : YCWM campus is of 27 acres and has vast built up area comprising of various departments, administrative building, teachers and staff quarters, student hostels, girls hostel, medical facility center, Gardens, Library, sports complex etc. All these amenities have different kinds of infrastructure as per their requirement. All these buildings and parts of campus were visited by the Green Audit committee members to check the present condition. They are checked with the help of the filled questionnaires of departments and verified on site.

Personal observations were made during the onsite visit. The census pertaining plants and trees in campus was carried out by Junior, Senior wing faculty , students of B.Sc.-II and III of Botany and Zoology department after their regular college timing in span of 2th November 2015 to 16th November 2015. (Exhibit –P Tree Counting: Survey of trees, plants etc in campus-). All the amenities were clubbed in as per their similarities and differences, which makes the survey and further analysis easier. For convenience all the science departments (Sr. and Jr.) were clubbed in one group, all Arts departments (Sr. and Jr.) were clubbed in one group, whole commerce department (Sr. and Jr.) as one group, administrative departments/ office / common staff room and related common things were clubbed in one group, computer lab. as one group, the Botanical garden, garden in front of new building, in front of library, in back of college buildings and roads in campus were clubbed as one group as Exteriors, Gymkhana , Gymnasium hall, Shivneri Kridangan were clubbed in one group, in another common facility centers services including Canteen, mess, Library, MPSC center, Boys/ girls hostel, teacher's quarters , medical facility center were grouped together. In such way YCWM campus is divided into eight parts for convenience of study of green Audit.

2.3 Onsite/Offsite Monitoring :-After collection of information from various department, committee members visited periodically and verified the data. The data related to energy survey, lighting survey, vehicle survey, solid waste generation, E- solid waste generation, water waste etc is verified personally by committee. Committee is periodically monitoring water storage, water requirements, water losses and water leakages in campus. Dr. Prashant Banne and his team periodically monitored and recorded the information regarding the air quality, noise pollution at Onsite/Offsite the campus. (Annexure-Q: Analysis Report and Ambient Air Monitoring Results by Green Circle, Inc. Integrated HSEQR Consulting Engineers, Scientists And Trainers, Recognized By Ministry Of Environment And Forest New Delhi Under EPA 1986)

2.4. Data analysis and report preparation: A proper analysis and presentation of data produced from work is a vital element. In case of green audit, the filled questionnaires of the survey from each group, were tabulated as per their modules, in excels spreadsheets. The tabulated data is then used for further analysis. For better understanding of the results and to avoid complications, averages and percentages of the Tables were calculated. Graphical representation of these results was made to give

a quick idea of the status. Interpretation of the overall outcomes was made which incorporates all the primary and secondary data, references and interrelations within. Final report preparation was done using this interpretation.

Chapter- III

Earth provides enough to satisfy every man's need, but not every man's greed.
- Mahatma Ghandi

"Only when I saw the Earth from space, in all its ineffable beauty and fragility, did I realize that humankind's most urgent task is to cherish and preserve it for future generations."
Barack Obama

Globally, the highest number of irrigation projects are in India, and within the country, the highest number is in Maharashtra.
Sharad Pawar

Overview of Green Audit

3.0 Overview of Green Audit

3.1 Solid waste audit:

As you all know that our population is increasing day by day therefore, there is an increasing demand for natural resources and other things necessary for fulfilling our day to day material needs. We are dependent on things right from small metal pin/ pen to chemicals, plastic and big house with full of glass material. Today`s era is of use and throw era. In this 21st century we have become technosavy, as every person is using laptops, Personal computer, Mobile, tabs, printer etc and when they become useless they are thrown out as a waste.

Waste management is one of the burning problems not only in India but also in the world. Hence it is necessary to use the things properly and mange them cautiously. The main purpose behind this audit is to analyze the quantity and volume of solid, liquid waste and their proper management. Similarly ,to make aware about their hazardous effects and to create awareness amongst the students, teachers about minimum use, reuse and recycle of the waste.

Solid waste generation and its management is a burning issue in current days. The rate of generation of solid waste is very high and yet we do not have adequate technology to manage the generated waste. Unscientific handling of solid waste can create threats to public health and environmental safety issues. Thus, it is necessary to manage the solid waste properly to reduce the load on waste management system. The purpose of this audit is to find out the quantity, volume, type and current management practice of solid waste generation in the YCM campus. This report will help for further solid waste management and to go for green campus development.

3.1.1 Generation of Solid Waste in Various Departments in college:

3.1.1.1 Status of solid waste generation in college: To analyze the total solid waste in various units and departments in college , it is categorized into eight groups viz. Science Departments, Arts Department, Commerce Department, Computer IT Department, Office , Gymkhana , Exteriors and Common Facility centers. Further at each department solid waste is measured in category like Paper, Plastic, Biodegradable, Glass waste and other. The solid waste collection in different department of college is shown below:

Table no. 1.1: Category wise solid waste generation at college (Kg/Month)

Sr. no	Departments	Category of Waste								Total solid waste	Description
		Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other		
			Hard	Soft	Carry bags						
1.	Science	146.5	10.6	15.4	2.1	61.5	0	20.3	0	256.4	
2.	Arts	319.75	17.5	11.8	7.3	129.0	0.0	5.8	211.5	702.65	High
3.	commerce	6	0	0	0	0	0	0	0	6	Low
4.	I.T	20.00	20.0	0.0	0.0	20.0	0.0	0.0	0.0	60.0	
5.	Office	288.00	54.0	30.0	24.0	252.0	0.0	0.0	0.0	648.0	
6.	Gymkhana	20	5.0	5.0	5.0	150.0	0.0	0.0	0.0	185.0	
7.	Exterior	124	0.0	3.0	3.0	8.5	0.0	0.0	0.0	138.5	
8.	CFC	1571	422	164	77.7	3620	0.0	43.3	0.0	5820.3	Very high
Total solid		2495.25	529.1	229.2	119.1	4241	0.0	69.4	211.5	7816.85	
		2495.25	877.4			4241	0.0	69.4	211.5		

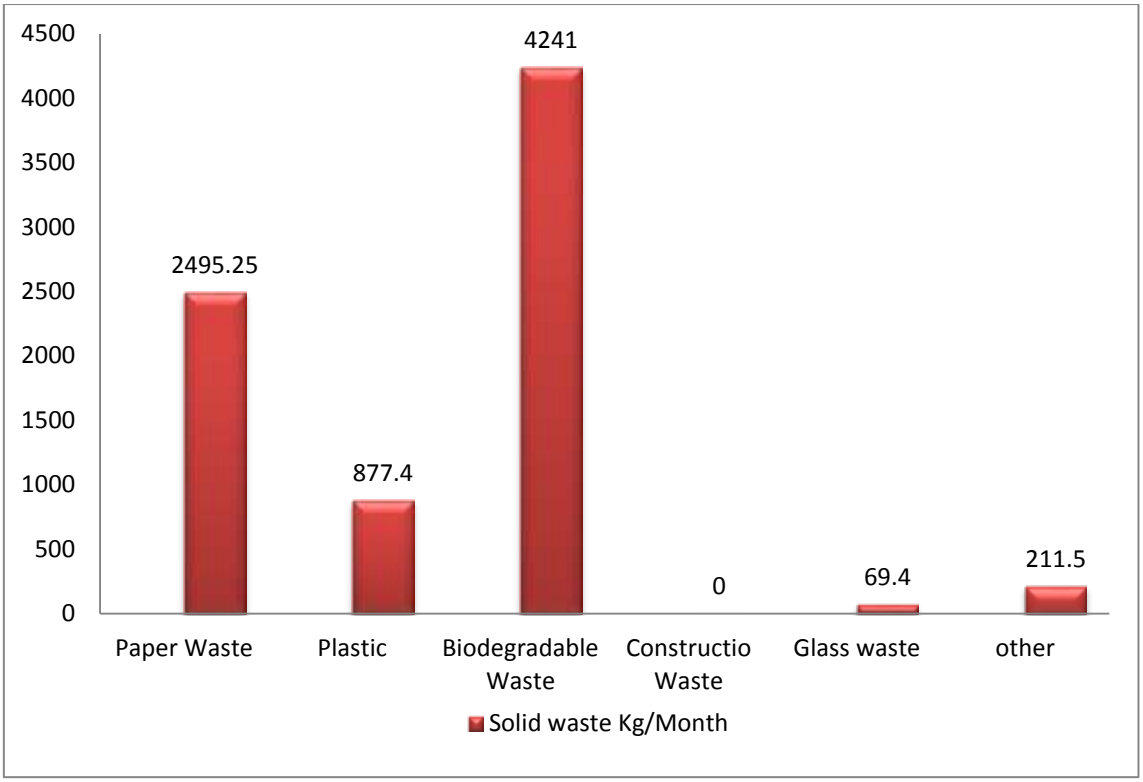
Data in Table No. 1.1 shows Category wise solid waste generation at different department in college. Very high amount of total solid waste i.e.≈7817 Kg/Month is collected in college, while maximum

solid waste (5820.3 Kg/month) at CFC and minimum at Solid Waste (60 Kg/month) at IT. In assessment period Paper waste and Biodegradable is maximum i.e. 2495.25 Kg/month and 4241 Kg/Month respectively.

Table no. 1.2: Category wise solid waste generation at college (Kg/Month)-

Category	Paper Waste	Plastic	Biodegradable Waste	Construction Waste	Glass waste	other
Solid waste Kg/Month	2495.25	877.4	4241	0.0	69.4	211.5

Graph 1.1: Category wise Total solid waste generation at college (Kg/Month)-

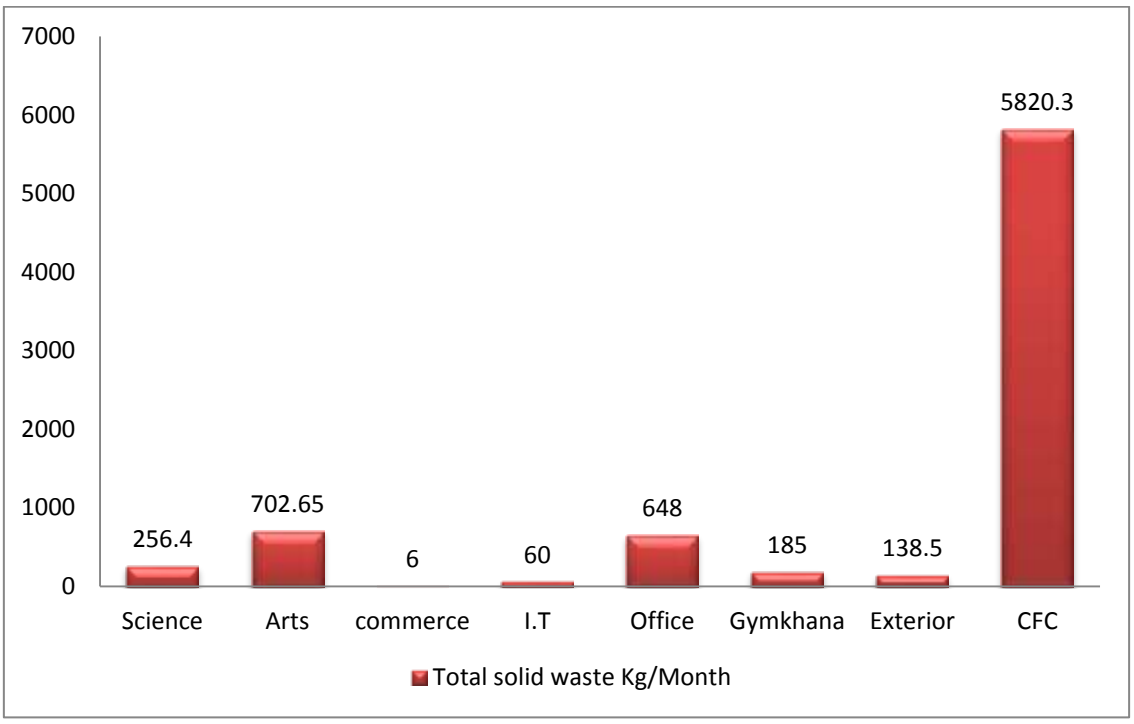


Above Table No. 1.2 and Graph 1.1 shows Category wise total solid waste generation at college in (Kg/Month). Data plotted shows that maximum Biodegradable waste (4241Kg/Month) and Paper waste (2495.25 Kg/Month) is generated while very less constructional waste and glass waste generate in college.

Table no. 1.3: Category wise Total solid waste generation at different department in college (Kg/Month)-

Sr.no	Department	Total solid waste Kg/Month	Percentage with Total
1.	Science	256.4	3.32
2.	Arts	702.65	8.9
3.	commerce	6	0.08
4.	I.T	60.0	0.77
5.	Office	648.0	8.29
6.	Gymkhana	185.0	2.37
7.	Exterior	138.5	1.77
8.	CFC	5820.3	74.45
Total Solid Waste		7816.85	100

Graph 1.2: Category wise Total solid waste generation at different department in college (Kg/Month)

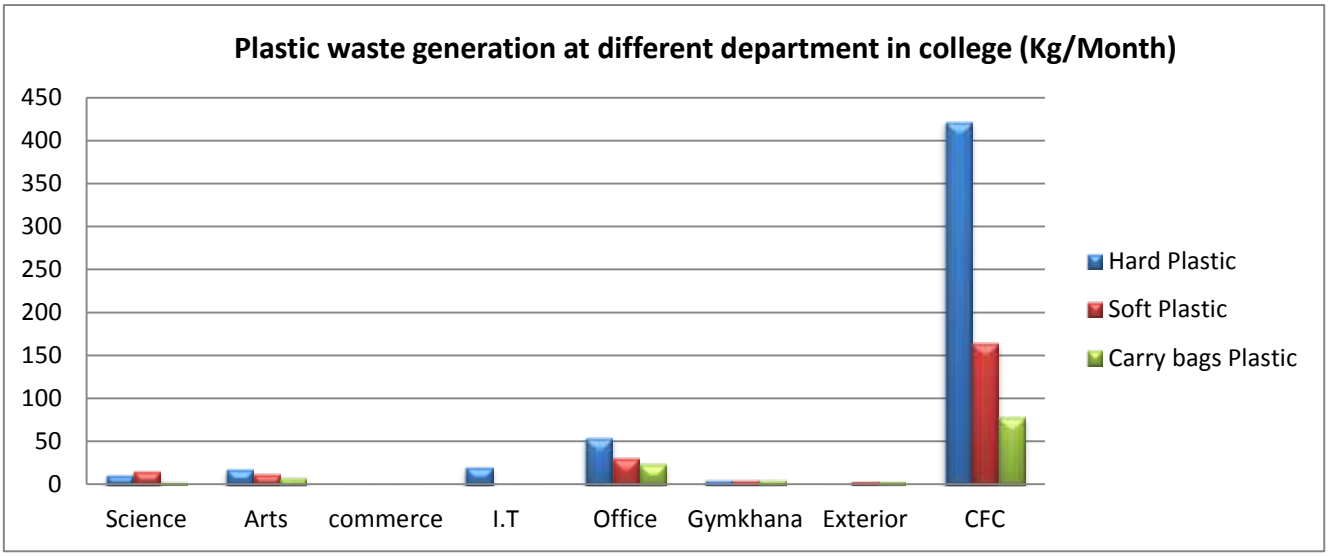


Above Table No. 1.3 and Graph 1.2 shows Category wise total solid waste generation at different department in college in (Kg/Month). Data collected shows that maximum total solid waste about 5820.3 Kg/Month is generated at CFC and minimum of only 6 Kg/month total solid waste generated in commerce department.

Table no. 1.4: Category wise Plastic waste generation at different department in college (Kg/Month)

Sr.no	Department	Hard Plastic	Soft Plastic	Carry bags Plastic	Total plastic
1.	Science	10.6	15.4	2.1	28.1
2.	Arts	17.5	11.8	7.3	36.6
3.	commerce	0	0	0	0
4.	I.T	20.0	0.0	0.0	20
5.	Office	54.0	30.0	24.0	108
6.	Gymkhana	5.0	5.0	5.0	15
7.	Exterior	0.0	3.0	3.0	6
8.	CFC	422	164	77.7	663.7
		529.1	229.2	119.1	877.4
		60.30%	26.12%	13.57%	

Graph 1.3: Category wise Plastic waste generation at different department in college (Kg/Month)



Above table no. 1.4 and Graph no.1.3 shows Category wise Plastic waste generation at different department in college (Kg/Month).It shows that maximum Hard plastic(422Kg/Month), Soft Plastc (164Kg/Month), Carry bags (77.7Kg/Month) is generated in CFC while comparatively zero Plastic waste generated in commerce department.

Table no. 1.5: Categorization of plastic waste in college (Kg/Month)

Category	Hard Plastic	Soft Plastic	Carry bags Plastic	Total plastic
Total plastic in Kg/ Month	529.1	229.2	119.1	877.4
% with total	60.30%	26.12%	13.57%	100%

Graph 1.4: Categorization of plastic waste in college (Kg/Month)

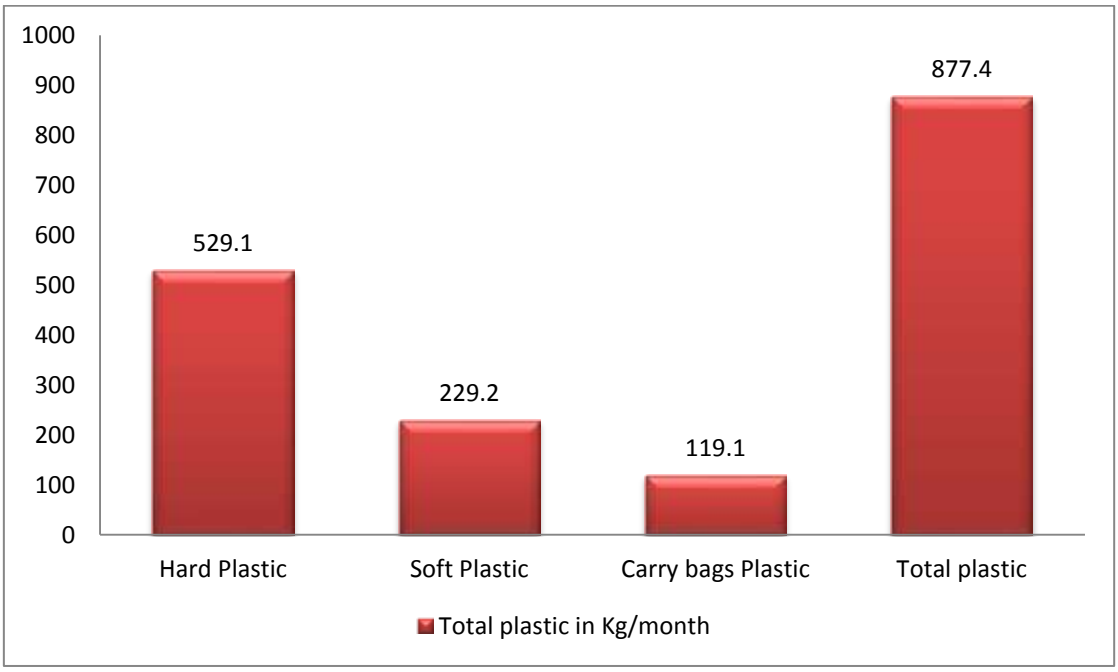


Table no. 1.5 and graph 1.4 shows that out of plastic waste 60.30% is hard plastic,26.12 % is soft plastic and 13.5% is carry bags. Total plastic waste generated in college is 877.4 Kg/month.

3.1.1.2 Status of solid waste generation in Science Department:-

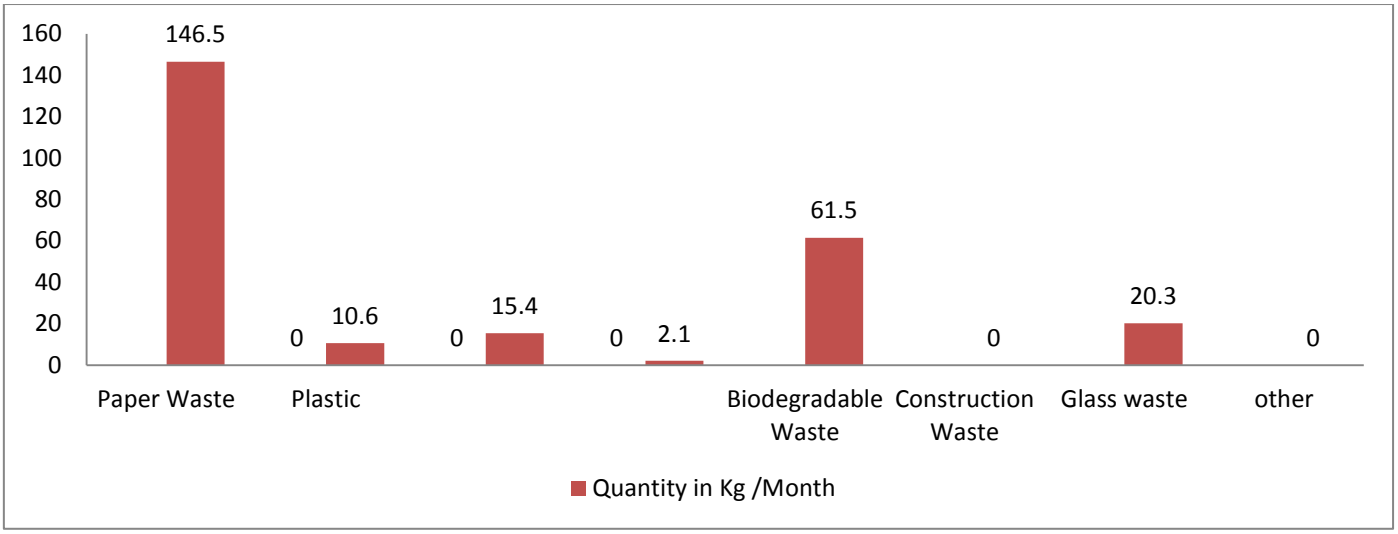
It includes Department of Physics, Chemistry, Mathematics, Botany and Zoology .

1. **Category wise solid waste generation at Science Department(Kg/Month)**

Table No.1. 6 Category wise solid waste generation at Science Department (Kg/ Month)

Category of waste	Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other	Total solid waste
		Hard	Soft	Carry bags					
Quantity	146.5	10.6	15.4	2.1	61.5	0	20.3	0	256.4
Percentage	57.14	4.13	6.00	0.82	23.99	0	7.92	0	100

Graph No.1.5 Category wise solid waste generation at Science Department (Kg./Month)



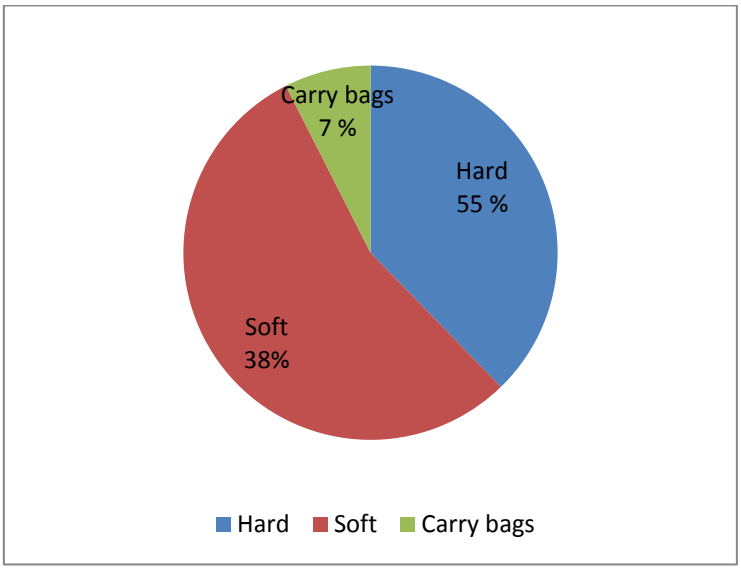
The data collected from the science department reflects that paper waste and biodegradable waste generated in the department is higher as compared to other category of waste. However, glass waste is a periodical type of waste generated every year. Most of the time it is from laboratory breakage of glassware's. Other than this plastic waste is also important waste generating categories. About 256.4 kg. of total solid waste has generated in science department per years.

Graph no. 1.5 clearly shows that paper waste is 146.5 Kg/Month, while biodegradable waste is 61.5 Kg/Month.

Table No. 1.7 . Category of Plastic waste generation at Science Department (Kg./Month)

Category of waste	Plastic			Total
	Hard	Soft	Carry bags	
Quantity	10.6	15.4	2.1	28.1
Percentage	38.0	55.0	07.0	100

Graph No.1.6 Category of Plastic waste generation at Science Department (Kg.)



Among the plastic waste hard plastic contributes about 55 % of total plastic waste. Soft plastic wastes contribute about 38 % and carry bags 7%.

Table No. 1.8 Solid waste generation at Science Department

Solid waste generation at Science Department	Department	Quantity (Kg/Month)
Maximum Solid waste generation Department	Chemistry	91.7
Minimum Solid waste generation Department	Physics	32.0

Department of chemistry is generated highest 91.7 Kg/Month while Department of Physics is generated lowest 32.0 Kg/Month waste.

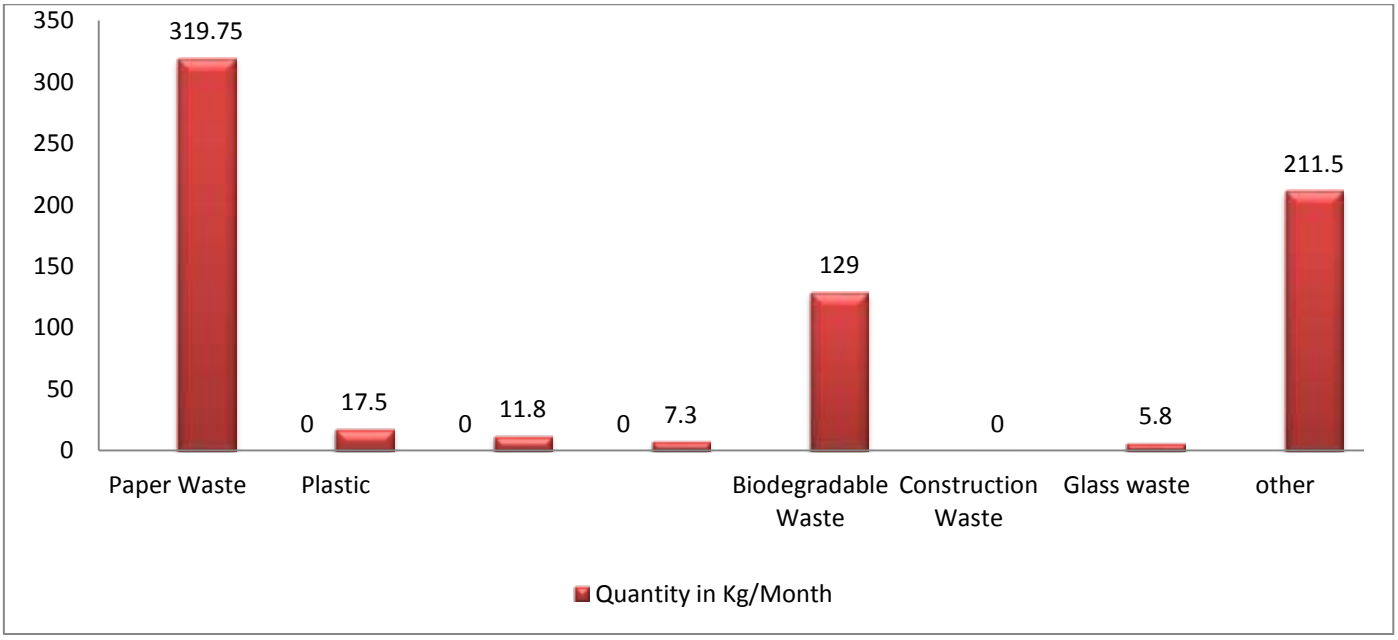
3.1.1.3 Status of solid waste generation in Arts Department

Department of Marathi, Hindi, English, History, Economics, Sociology, Geography and HSVC were studied in this category.

Table No. 1.9 Category wise solid waste generation at Arts Department (Kg/Month.)

Category of waste	Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other	Total solid waste
		Hard	Soft	Carry bags					
Quantity	319.75	17.5	11.8	7.3	129.0	0.0	5.8	211.5	702.65
Percentage	45.50	2.49	1.68	1.04	18.36	0	0.83	30.10	100

Graph No. 1.7 Category wise solid waste generation at Arts Department (Kg/Month.)

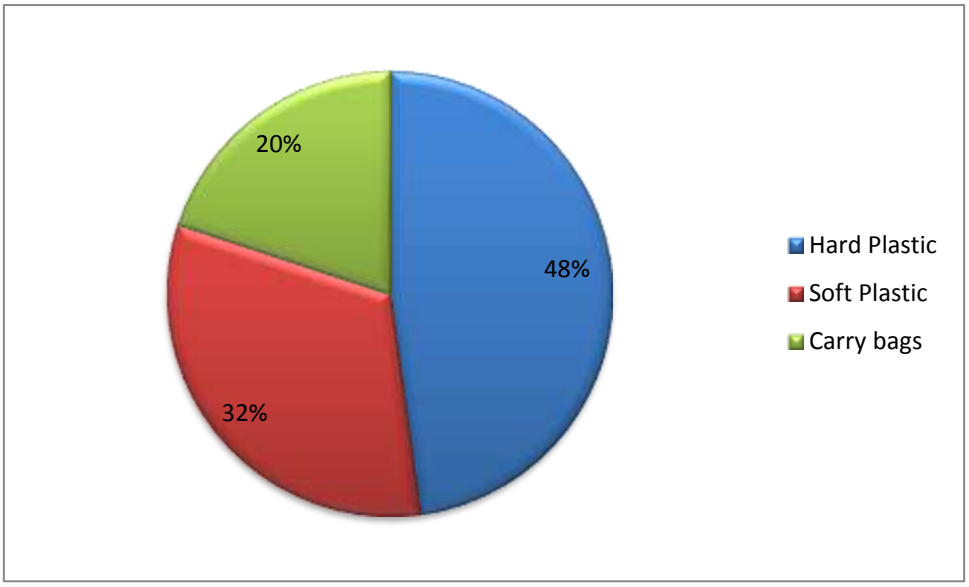


The Table No.1.9 and Graph no 1.7 are for the Category wise solid waste generation at Arts Department (Kg/Month.).The analyzed data for Arts department shows that maximum paper waste (319.75 Kg), other waste (211.5 Kg.) and Biodegradable waste (129.0 Kg.) and construction waste is found to be zero. However glass waste is minimum (5.8 Kg.) compared to others.

Table No.1.10 Plastic waste generation at Arts Department (Kg/Month.)

Category of waste	Plastic			Total
	Hard	Soft	Carry bags	
Quantity in Kg/Month	17.5	11.8	7.3	36.6
Percentage	47.81	32.24	19.94	100

Graph No.1.8 Category of Plastic waste generation at Arts and MCVC Department (Kg/month)



Above table no.1.10 and Graph 1.8 shows the categorization of plastic waste generated in Arts department. Out of Plastic waste 48% is hard plastic ,32% is soft plastic and 20% is carry bags plastic waste is found.

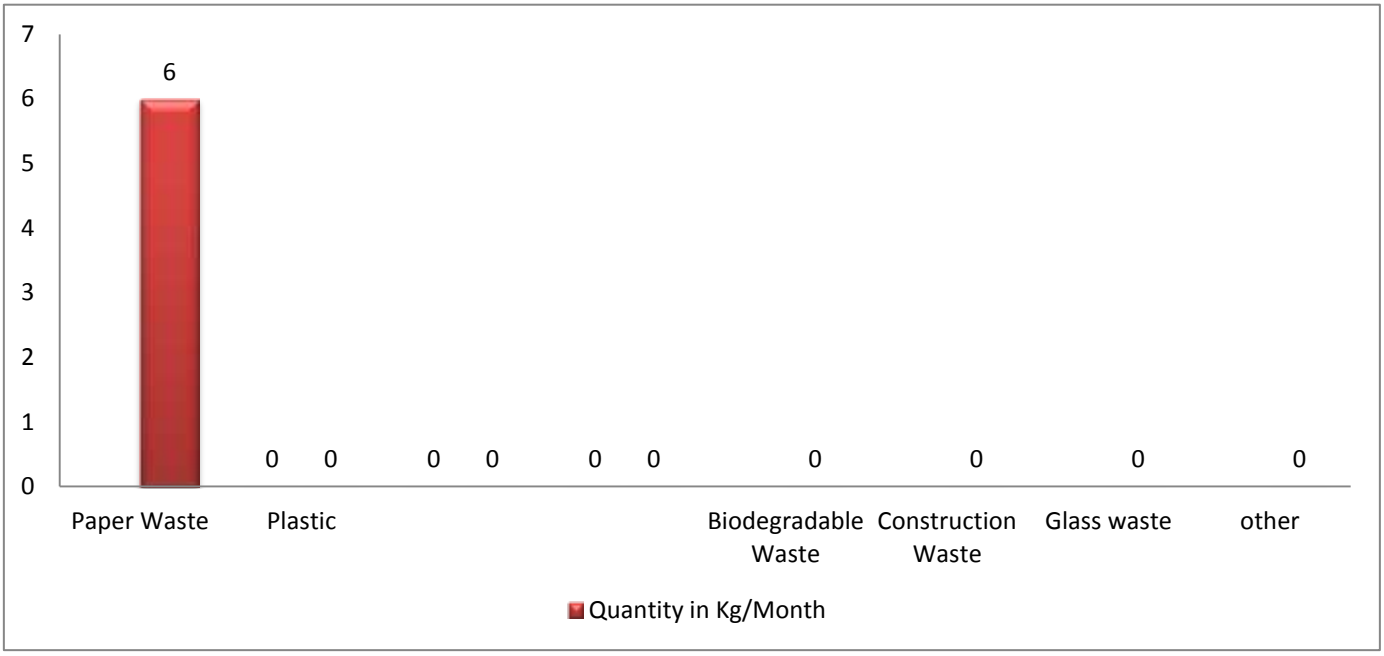
3.1.1.4 Status of solid waste generation in Commerce Department

Table No. 1.11 Category wise solid waste generation at Commerce Department (Kg.)

Category of waste	Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other	Total solid waste
		Hard	Soft	Carry bags					
Quantity	6	0	0	0	0	0	0	0	6
Percentage	100	0	0	0	0	0	0	0	100

Commerce department is generating 6.0 kg. paper waste only. There are no plastic, biodegradable, construction and glass waste.

Graph No.1.9 Category wise solid waste generation at Commerce Department (Kg.)



Commerce department is generating only paper waste, other types solid waste is zero.

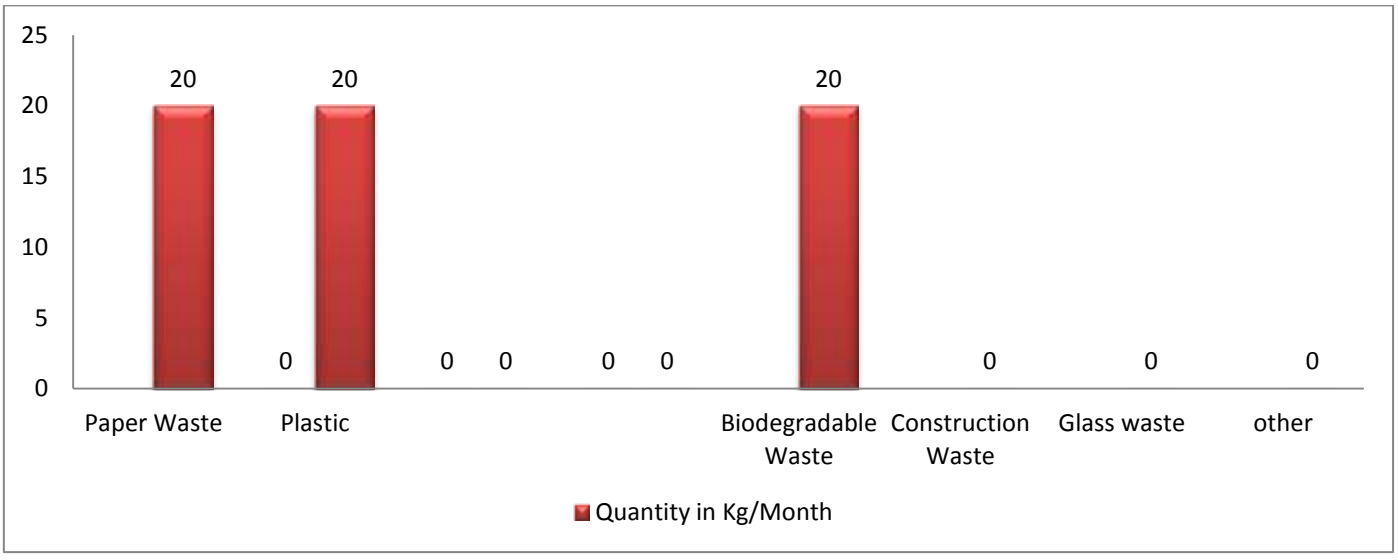
3.1.1.4 Status of solid waste generation in I.T.Department

Computer Science, I.T.,COC computer and subjects, two computer laboratory were studied in this category .

Table No.1.12 Category wise solid waste generation at generation at I.T. Department (Kg/Month)

Category of waste	Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other	Total solid waste
		Hard	Soft	Carry bags					
Quantity	20.00	20.0	0.0	0.0	20.0	0.0	0.0	0.0	60.0
Percentage	33.33	33.33	0.00	0.00	33.33	0	0.00	0.00	100

Graph No. 1.10 Category wise solid waste generation at I.T. department (Kg/Kg/Month)



I.T department generate equal amount of paper waste, plastic waste and biodegradable waste , glass waste and other types of solid waste are not recorded.

Table No. 1.13. Category of Plastic waste generation at I.T. department (Kg/Month).

Category of waste	Plastic			Total
	Hard	Soft	Carry bags	
Quantity	20	0	0	20
Percentage	100	0	0	100

Collected data of plastic waste generated shows that there is only hard plastic (20 Kg/Month) waste and no soft plastic as well as carry bags plastic is generated.

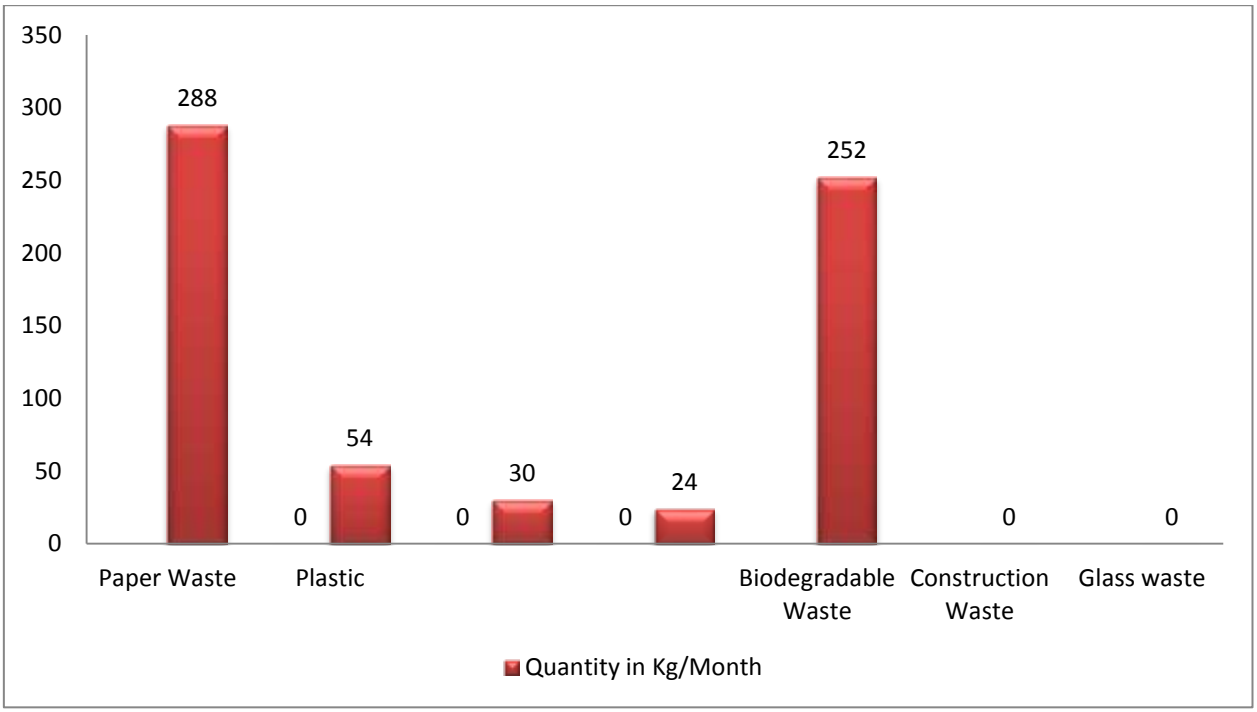
3.1.1.5 Status of solid waste generation at office

The solid waste generated in Main administrative office, Principals chamber, Staff room, Ladies room, store room, enquiry section, meeting hall, NAAC room, Non residential hall, CAP section etc, were studied in this category

Table No.1.14 Category wise solid waste generation at Office. (Kg/Month)

Category of waste	Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other	Total solid waste
		Hard	Soft	Carry bags					
Quantity	288.00	54.0	30.0	24.0	252.0	0.0	0.0	0.0	648.0
Percentage	44.44	8.33	4.63	3.70	38.89	0	0.00	0.00	100

Graph No.1.11 Category wise solid waste generation at Office (Kg.)



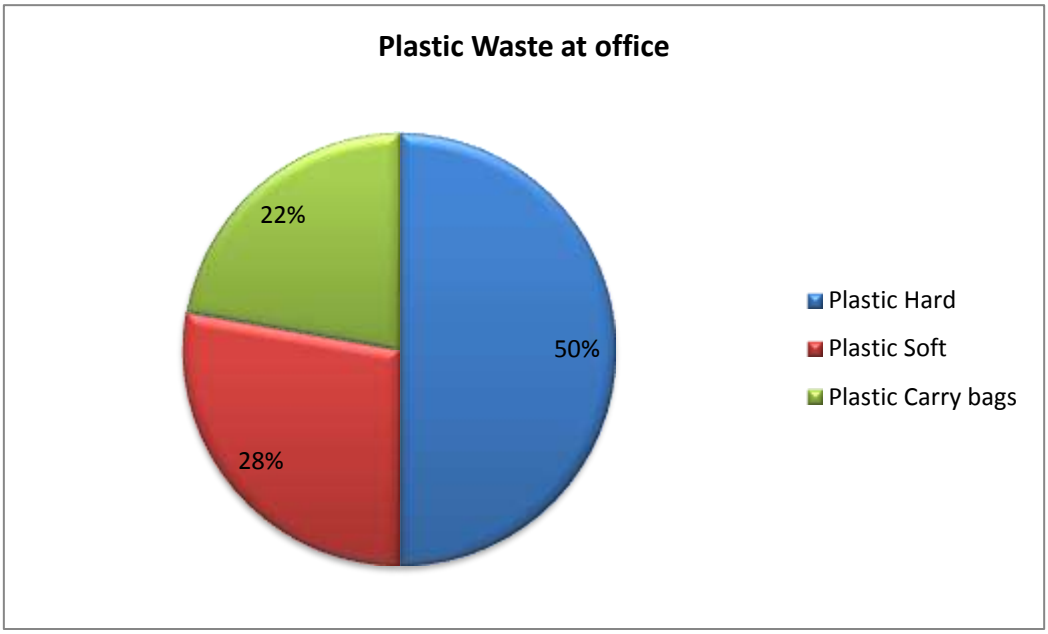
Above table no.1.14 and Graph 1.11shows category wise recorded solid waste generation at Office in Kg/Month. Total solid waste generated in office is 648 Kg/Month. Out of that 288 Kg/Month is paper wastes, 250 Kg/Month is biodegradable waste and 54 Kg/Month,30 Kg/Month, 24 Kg/Month

is respectively Hard, Soft, Carry bags Plastic solid waste. The data of solid waste collected shows the construction, glass and other wastes are not observed at office.

Table No.1.15. Categorization of Plastic waste generated at Office (Kg/Month)

Category of waste	Plastic			Total
	Hard	Soft	Carry bags	
Quantity	54.0	30.0	24.0	108.0
Percentage	50.0	27.8	22.2	100.0

Graph No.1.12. Categorization of Plastic waste generated at Office (Kg/Month)



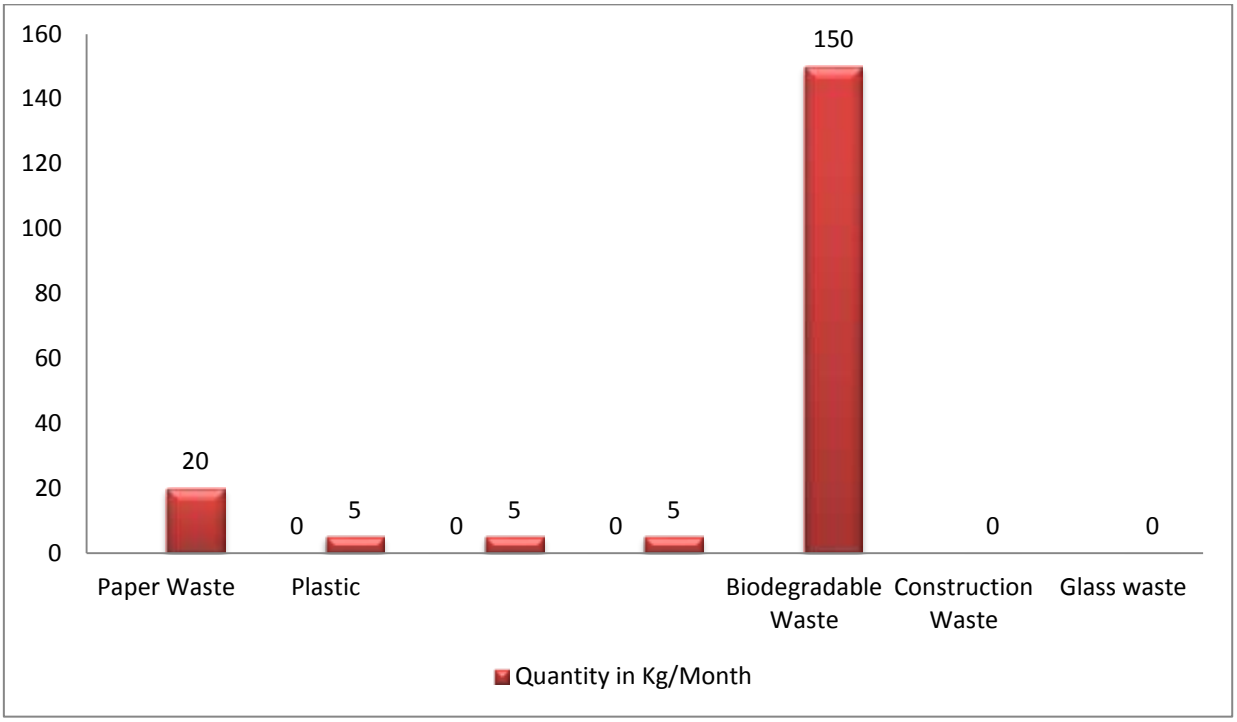
Maximum amount of 54 kg hard plastic waste is reported in office. The soft plastic waste is about 30 kg while as 24 kg waste of plastic carry bags is recorded. Graph no 1.12 shows that out of plastic waste generated at office 50% is hard plastic,28% is soft plastic and remaining 22% is carry bags plastic waste.

3.1.1.6 Status of solid waste generation at Gymkhana:

Table No. 1.16 Categorization of solid waste generation at Gymkhana(Kg/Month)

Category of waste	Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other	Total solid waste
		Hard	Soft	Carry bags					
Quantity	20	5.0	5.0	5.0	150.0	0.0	0.0	0.0	185.0
Percentage	10.81	2.70	2.70	2.70	81.08	0.0	0.0	0.0	100.0

Graph No.1.13 Categorization of solid waste generation at Gymkhana(Kg/Month)

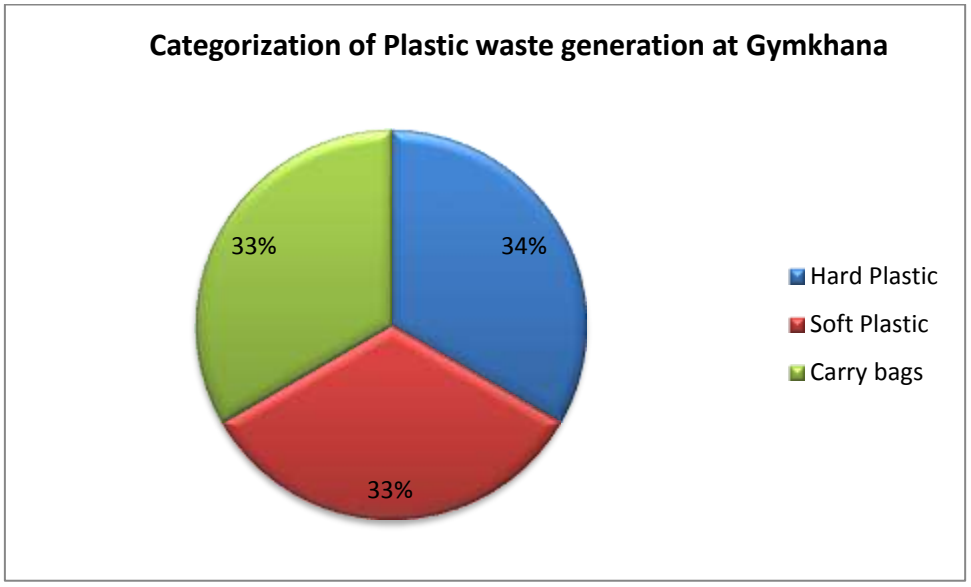


The total solid waste found at Gymkhana is 185kg/Month. Out of which biodegradable waste is 150 kg/Month, 20 kg/Month is paper waste and 15 kg/month is plastic waste.

Table No.1.17 Categorization of Plastic waste generation at Gymkhana

Category of waste	Plastic			Total
	Hard	Soft	Carry bags	
Quantity	5.0	5.0	5.0	15.0
Percentage	33.33	33.33	33.33	100

Graph No. 1.14 Category of Plastic waste generation at Gymkhana



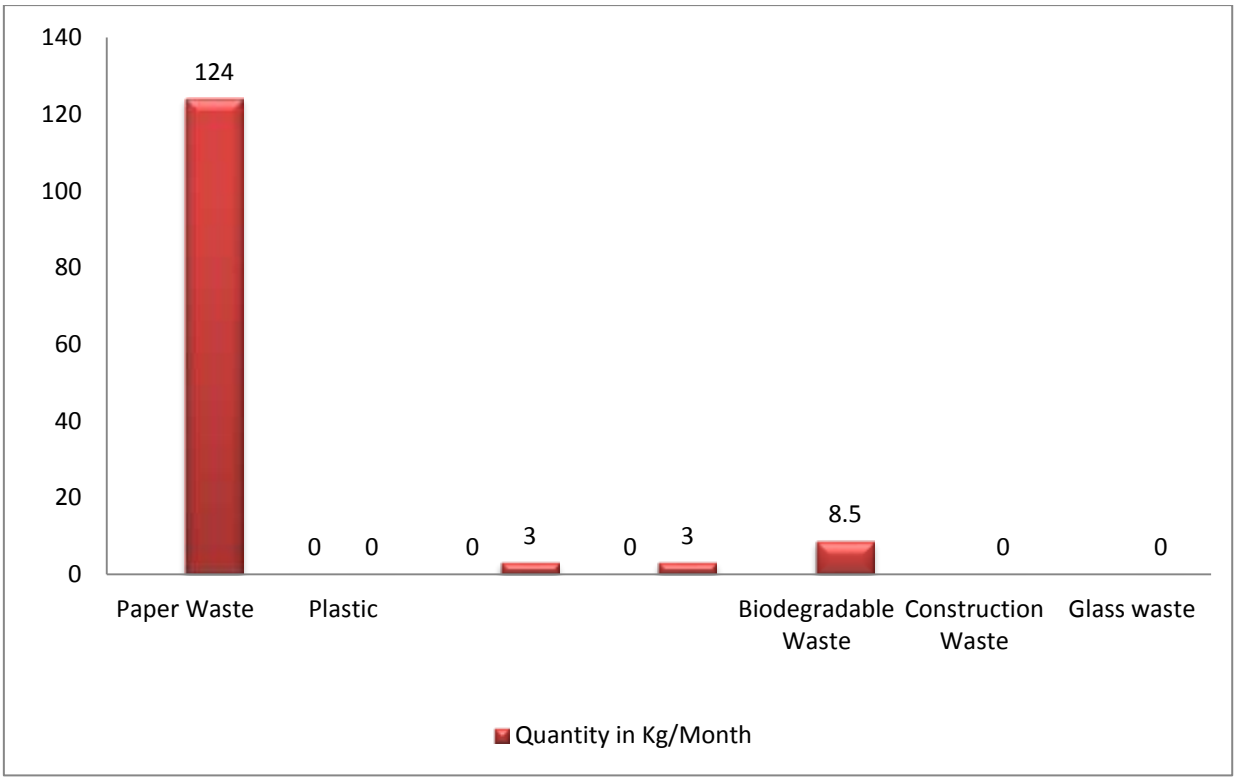
Plastic waste generated at gymkhana is15 Kg/Month, is very small compared to other department. Its categorization in Hard, Soft and carry bag is shown above.

3.1.1.7 Status of solid waste generation at Exterior

Table No. 1.18. Category wise solid waste generation at Exteriors (Kg/ Month)

Category of waste	Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other	Total solid waste
		Hard	Soft	Carry bags					
Quantity	124	0.0	3.0	3.0	8.5	0.0	0.0	0.0	138.5
Percentage	89.53	0.0	2.17	2.17	6.14	0.0	0.0	0.0	100.0

Graph No. 1.15. Category wise solid waste generation at Exteriors(Kg/Month)



The solid waste generation at exteriors is 138.5 kg/month includes 124 kg/Month paper waste, plastic waste 6 kg/Month, soft and carry bags 3 kg/Month. Exteriors have only 8.5 kg biodegradable waste. The constructional and Glass waste is not observed in Exteriors.

Table No.1.19 Categorization of Plastic waste generation at Exteriors

Category of waste	**Plastic**			**Total**
	Hard	**Soft**	**Carry bags**	
Quantity	0.0	3.0	3.0	6.0
Percentage	0.0	50.0%	50.0%	100

The plastic waste found is in less quantity i.e. 6 kg, soft and carry bags 3 kg/Month each.

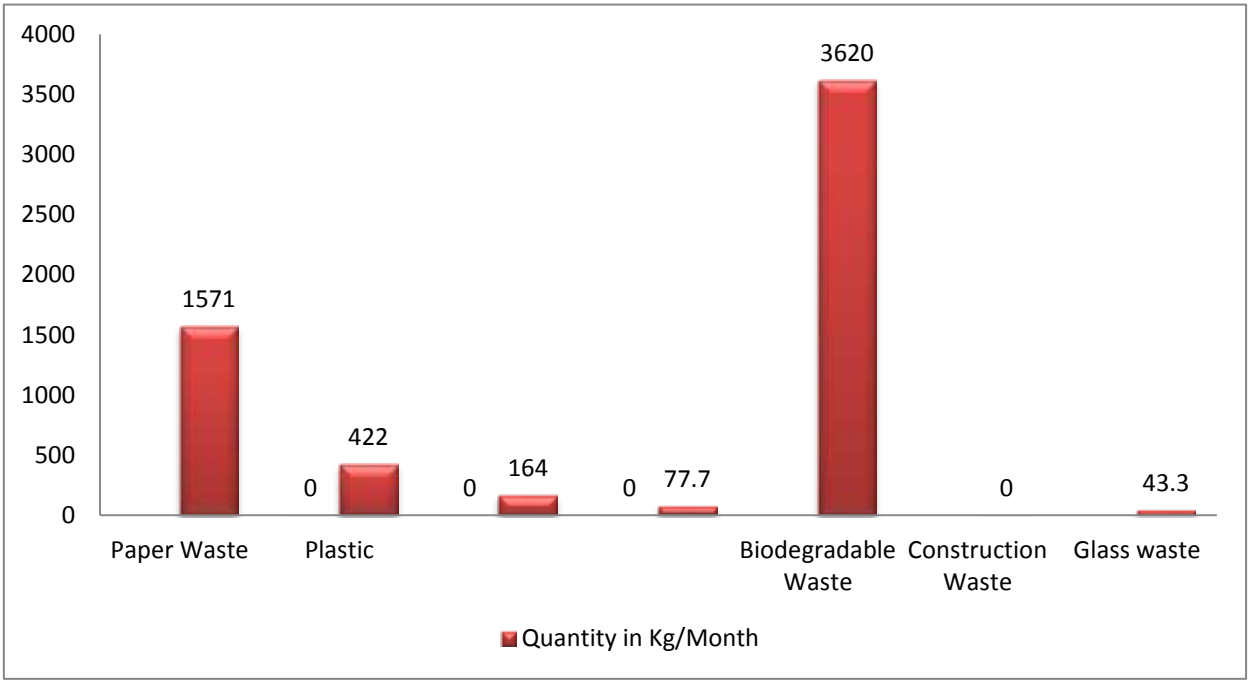
3.1.1.8 Status of solid waste generation at CFC

Category wise solid waste generation at Common Facility Centers (CFC)

Table No.1.20 Category wise solid waste generation at Common Facility Centers (Kg.)

Category of waste	Paper Waste	Plastic			Biodegradable Waste	Construction Waste	Glass waste	other	Total solid waste
		Hard	Soft	Carry bags					
Quantity	1571	422	164	77.7	3620	0.0	43.3	0.0	5820.3
Percentage	26.99	7.25	2.82	1.33	62.196	0.0	0.74	0.0	100

Graph No. 1.16. Category wise solid waste generation at Common Facility Centers (Kg/Month)

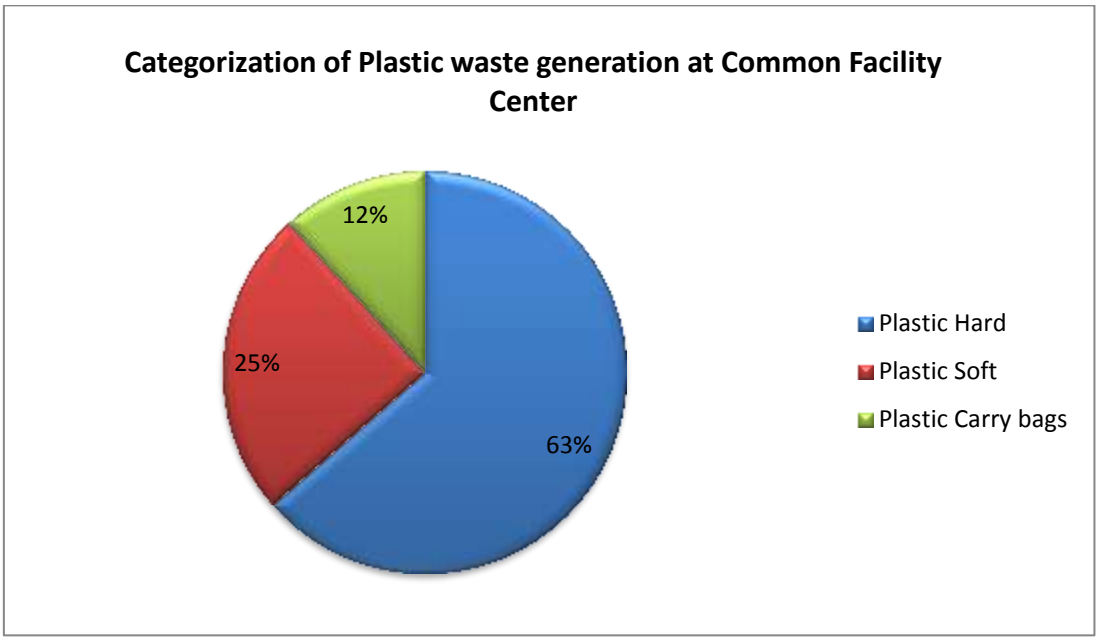


The total amount of solid waste found in common facility center is 5820.3 kg/Month. Data collected shows 3620 kg/Month is maximum than that of paper waste(1571 kg/Month) and Plastic waste (422 Kg/ Month) .Minimum amount of constructional waste (0 Kg/Month) is recorded at CFC.i.e. biodegradable waste is maximum and Construction waste is minimum.

Table No. 1.21. Categorization of Plastic waste generation at Common Facility Center (Kg/ Month)

Category of waste	Plastic			Total
	Hard	Soft	Carry bags	
Quantity	422	164	77.7	663.7
Percentage	63.58%	24.7%	11.71%	100

Graph No. 1.17. Category of Plastic waste generation at Common Facility Centers (Kg/Month)



About 663.7 kg/Month plastic waste has recorded. The hard plastic waste is maximum i. e. 422 kg/Month, soft plastic is about 164 kg and that of carry bags 77.70 kg/Month.
Above Graph No.1.17 shows that out of total plastic waste from CFC 63% is hard plastic , 25% is soft plastic and 12% is carry bags.

3.1.2 Current practice of solid waste management:

Biodegradable waste generated in campus mostly from canteen, hostels, mess, and quarter kitchens, Canteen waste is not properly collected. It is thrown on site. Biodegradable waste from gardens, lawns and classroom waste is burned at different location on site like back of the office, near canteen, near boys hostel, on side of roads, near botanical garden etc. Glass waste is generated from laboratory mainly in the form of bottles, glassware's is not send for recycle, it is thrown on site of campus and other glass waste are thrown with solid waste.

Paper waste is a major solid waste generated by all departments. Most of the departments including Administrative building are using one side papers for printing and writing. But in some departments like Physics , Chemistry, Botany, Zoology, store , examination section use two sided paper / used papers in journal for printing. Old journal files are used for filing the official records, it reduces expense on stationary as well as solid waste generation.. Answer sheets, old bills and confidential reports are sent for pulping and recycling after completion of their preservation period through private scrape merchant. Periodically college sell the paper waste scrape to private merchant.

Plastic waste is the category of solid waste generated in large quantity in the campus and it is not segregated or categorized it is throw with paper waste, other solid waste and burned on site at different locations. Most of the departments are throwing the plastic waste along with regular waste. Plastic waste generated in college / college campus can't send for proper destroying/ recycling.

3.2 Electricity and energy audit: Main energy source in the campus is electricity of MSEB. As 'Warana' is industrial and educational complex, MSEB department supplied 1mega Volt uninterrupted power supply . Warana Shikshan Mandal provides electricity to our college, When rarely interrupted we get electricity from diesel generator(≈5 KV) which is common facility of Warana Shikshan Mandal . Energy sources utilized by all the departments of college include electricity, liquid petroleum and LPG. Major use of the energy is at office, canteen, hostel and laboratories for lighting, transportation, cooking and laboratory work. There is no provision of generating electricity on site of campus.

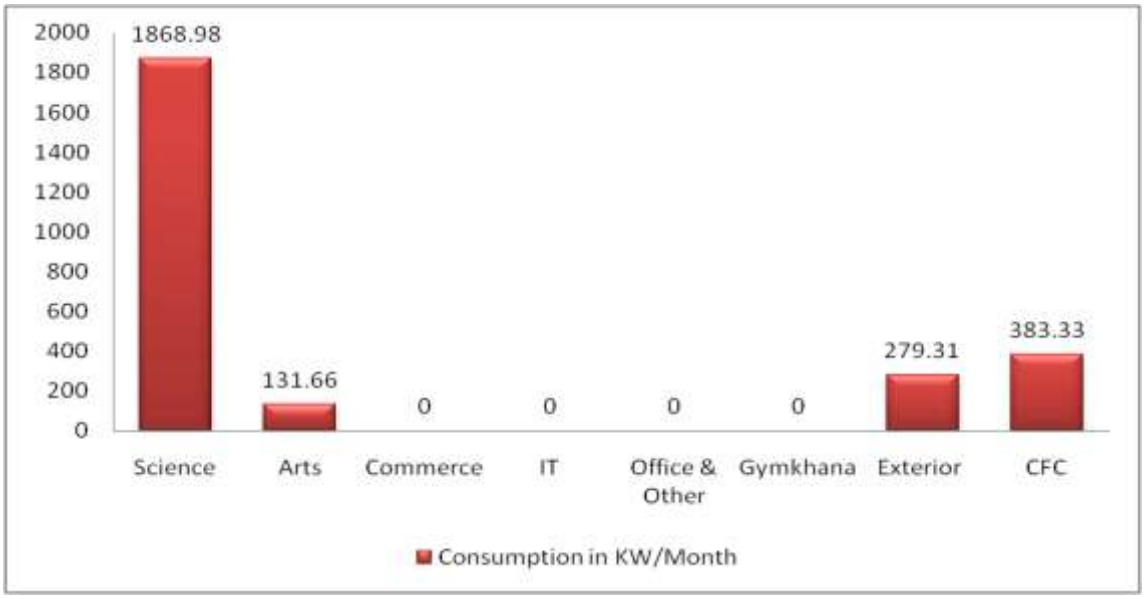
To analyze the total energy consumption, various units and departments in the college are categorized into eight groups viz. Science Departments, Commerce Department, Arts Department, Computer IT Department, Office , Gymkhana , Exteriors and common Facility centers. Further at each category, energy consumption is calculated on energy usage like office equipments (Computers, Printers, Laptop, LCD projector), Lights, fan and vehicles for evaluating fuel consumption. For sort of analysis electric energy consuming equipments are categoriesed in to three groups Major energy consuming Equipments, less energy consuming Equipments , Lightning equipments and collected data analyzed together for total energy consumption.

3.2.1 Energy consumption at college

Table No. 2.1 Energy consumption by Major energy consuming Equipments in College.

Sr.No.	Department	Consumption in KW/Month	Description
1)	Science	1868.98	High
2)	Arts	131.66	
3)	Commerce	00	Low
4)	IT	00	Low
5)	Office & Other	00	Low
6)	Gymkhana	00	Low
7)	Exterior	279.31	
8)	CFC	383.33	
Total		2663.28	

Graph No.2.1 Energy consumption by Major energy consuming Equipments in College.

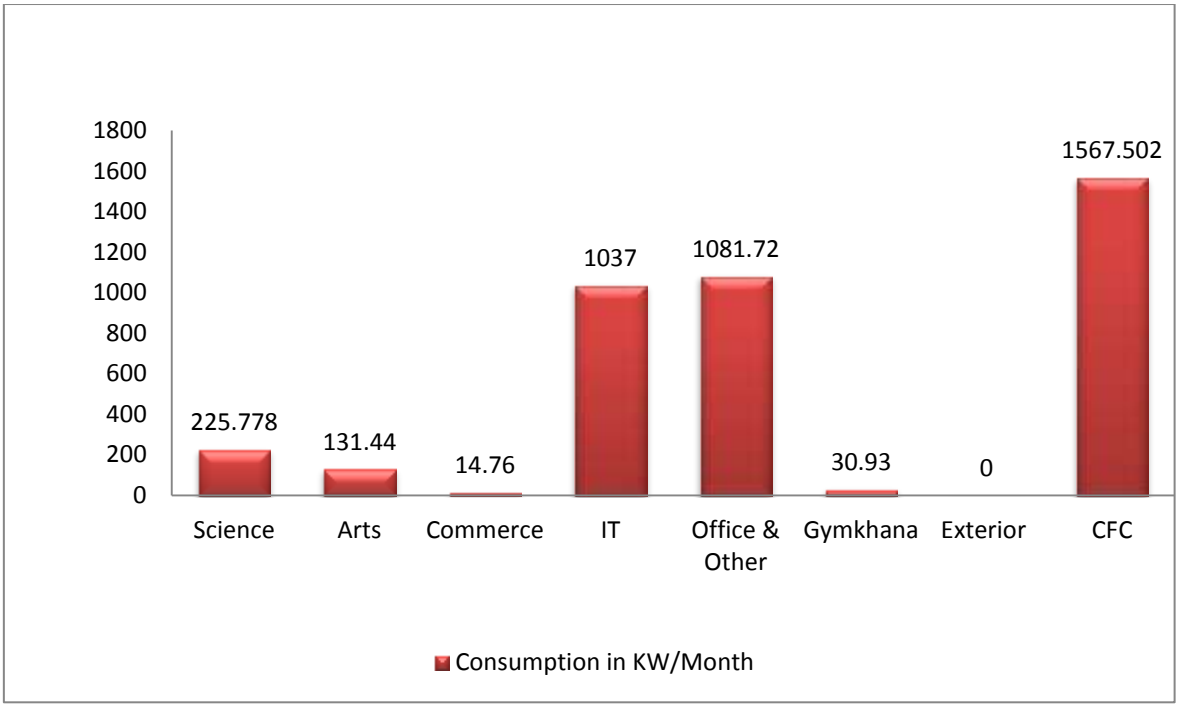


Above table and graph shows major energy consuming Equipments are available at science departments hence energy consumption for it is high(1868.98 KW/Month) and less number of Major energy consuming Equipments are required at Arts, commerce, IT, office and gymkhana, hence electric energy for these department is low.

Table No. 2.2 Energy consumption by less energy consuming Equipments in College

Sr.No.	Department	Consumption in KW/Month	Description
1)	Science	225.778	
2)	Arts	131.44	
3)	Commerce	14.76	
4)	IT	1037	
5)	Office & Other	1081.72	
6)	Gymkhana	30.93	
7)	Exterior	00	Low
8)	CFC	1567.502	High
Total		4089.13	

Graph No.2.2 Energy consumption by less energy consuming Equipments in College.

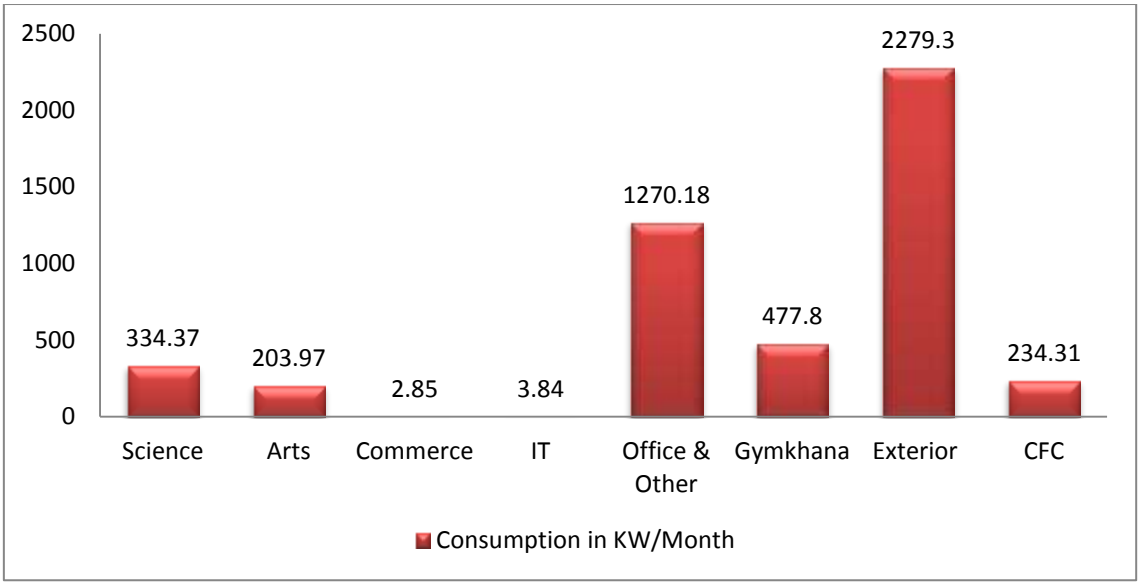


Above table and graph shows less energy consuming Equipments consuming high energy at IT, Office and CFC((1570.50 KW/Month)while such equipments consuming very less electric energy at Gymkhana, Commerce, IT and exterior of college.

Table No. 2.3 Energy consumption by Lightning Equipments in College

Sr.No.	Department	Consumption in KW/Month	Description
1)	Science	334.37	
2)	Arts	203.97	
3)	Commerce	2.85	Low
4)	IT	3.84	
5)	Office & Other	1270.18	High
6)	Gymkhana	477.80	
7)	Exterior	2279.3	
8)	CFC	234.31	
Total		4806.62	

Graph No.2.3 Energy consumption by Lightening Equipments in College.

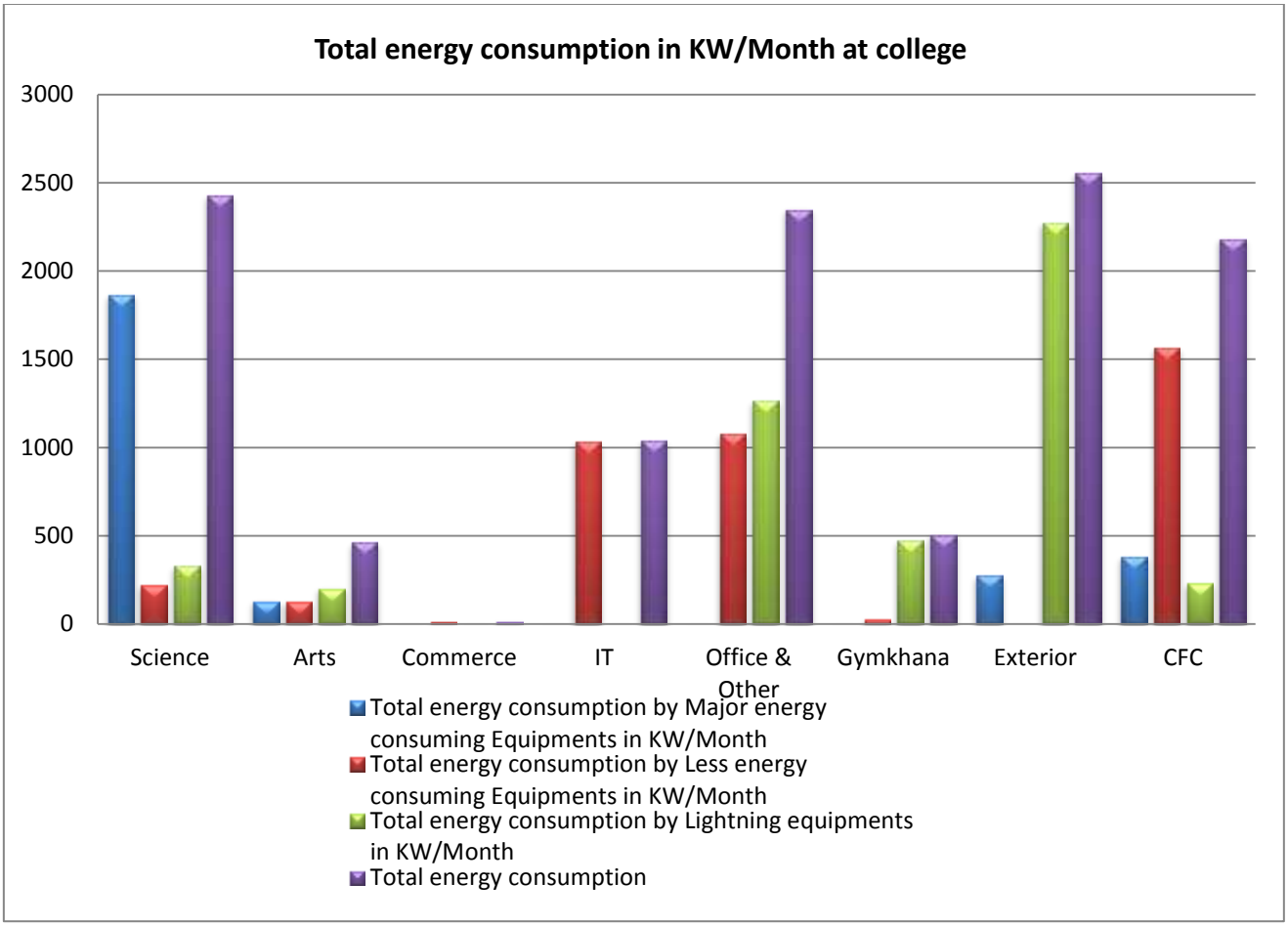


Energy consumption by Lightning equipments in different departments of College is shown above. High energy consumption for lightning purpose is shown at Exteriors of college while very small consumption of it is shown at I.T and Commerce department.

Table No. 2.4 Total energy consumption in KW/Month at college

Sr.No.	Department	Total energy consumption by			Total	Description
		Major energy consuming Equipments in KW/Month	Less energy consuming Equipments in KW/Month	Lightning equipments in KW/Month		
1)	Science	1868.98	225.778	334.37	2429.128	High
2)	Arts	131.66	131.44	203.97	467.07	
3)	Commerce	00	14.76	2.85	17.61	Low
4)	IT	00	1037.58	3.84	1041.42	
5)	Office & Other	00	1081.72	1270.18	2351.9	
6)	Gymkhana	00	30.93	477.80	508.73	
7)	Exterior	279.31	00	2279.3	2558.61	High
8)	CFC	383.33	1567.502	234.31	2185.142	
Total		2663.28	4089.13	4806.62	11559.61	

Graph No.2.4 Total energy consumption in KW/Month at college.

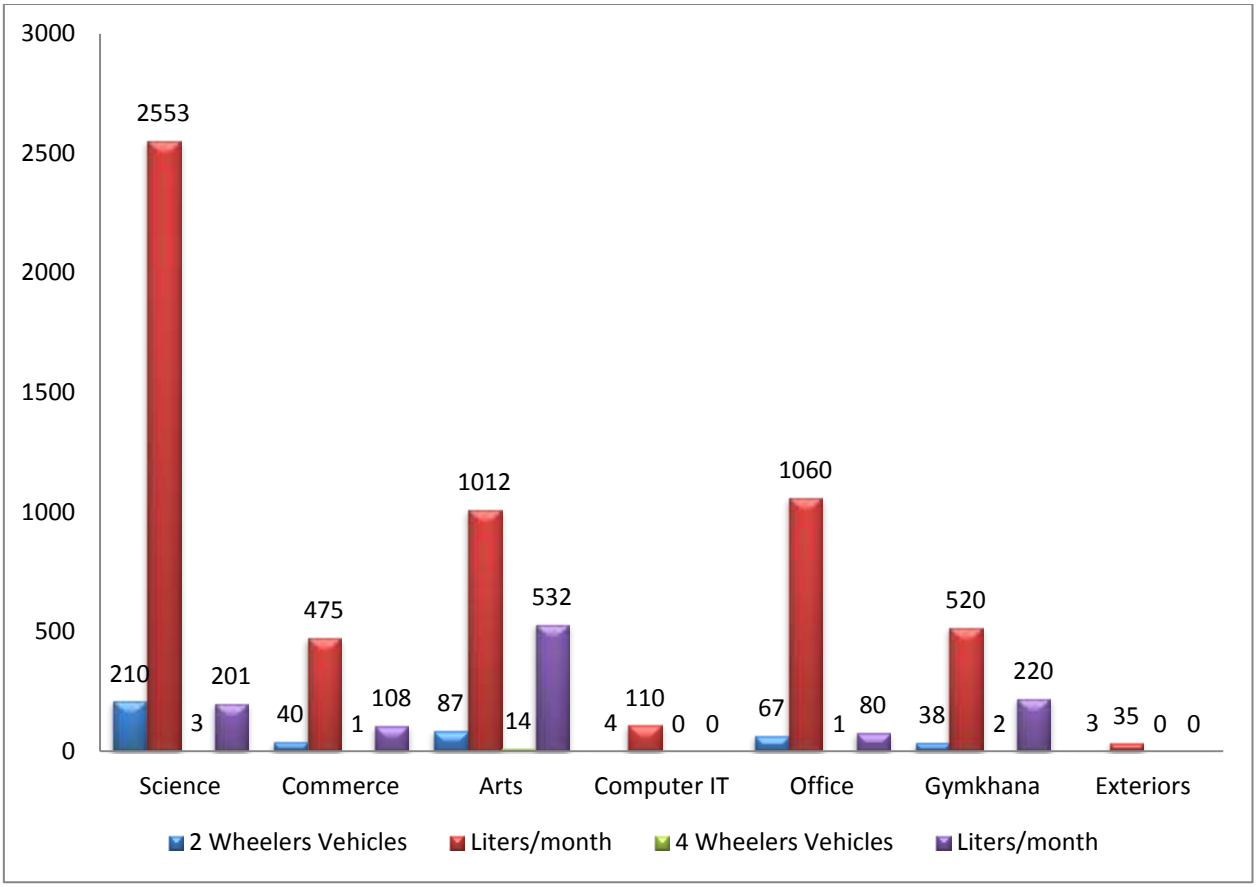


Collected data for total electric energy consumption in different departments of the college shows that more consumption is observed at Exteriors (≈2559 KW/Month) while in Arts, Commerce and Gymkhana its overall consumption is very less.

Table No. 2.5 Number of Vehicles and Their Fuel Consumption at college at glance:-

Sr. No	Department	Vehicles				Description
		2 Wheelers	Liters/month	4 Wheelers	Liters/month	
1.	Science	210	2553	03	201	High
2.	Commerce	40	475	01	108	
3.	Arts	87	1012	14	532	
4.	Computer IT	04	110	00	00	
5.	Office	67	1060	01	80	
6.	Gymkhana	38	520	02	220	
7.	Exteriors	03	35	00	00	Low
8.	CFC	148	1193	27	697	
Total		597	6958	48	1838	

Graph No. 2.5 Number of Vehicles and Their Fuel Consumption at college at glance

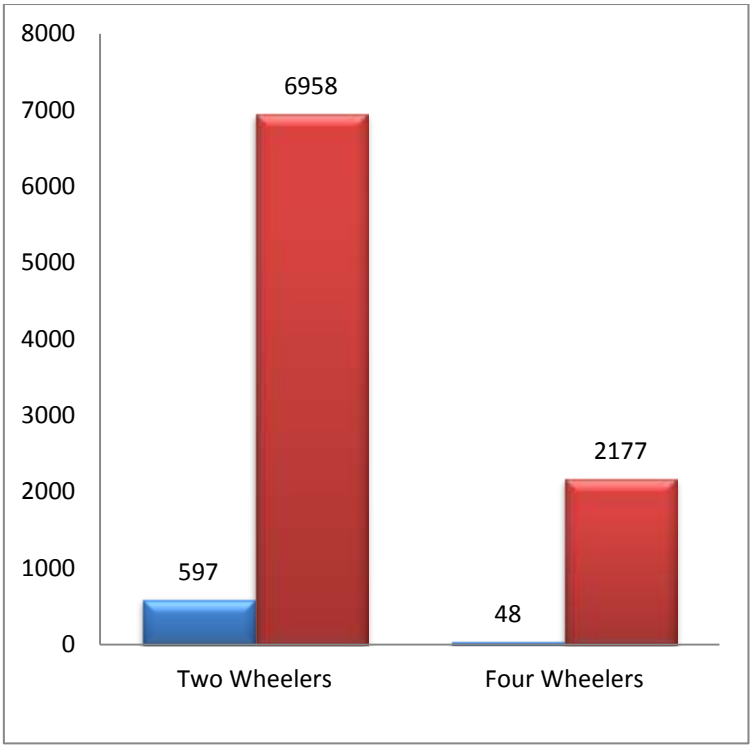


We collected data from students, teaching staff, administrative/non-teaching staff about Vehicles, their Fuel Consumption and mode of transportation using questionnaires **(Annexure-F- G)**. It is collectively shown in above reveals that larger number of vehicles and higher consumption of fuel (≈2754 Liter/Month) is at Science department while less number of vehicles and consumption of fuel at IT and Exterior of the college.

Table No.2.6 Number of Vehicles and Their Fuel Consumption at College

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	597	48
2.	Average Liters of fuel / month	6958	2177
3.	Maximum at	Science	CFC
4.	Minimum at	Exteriors	Computer IT/ Exteriors

Graph No.2.6 Number of Vehicles and Their Fuel Consumption at College

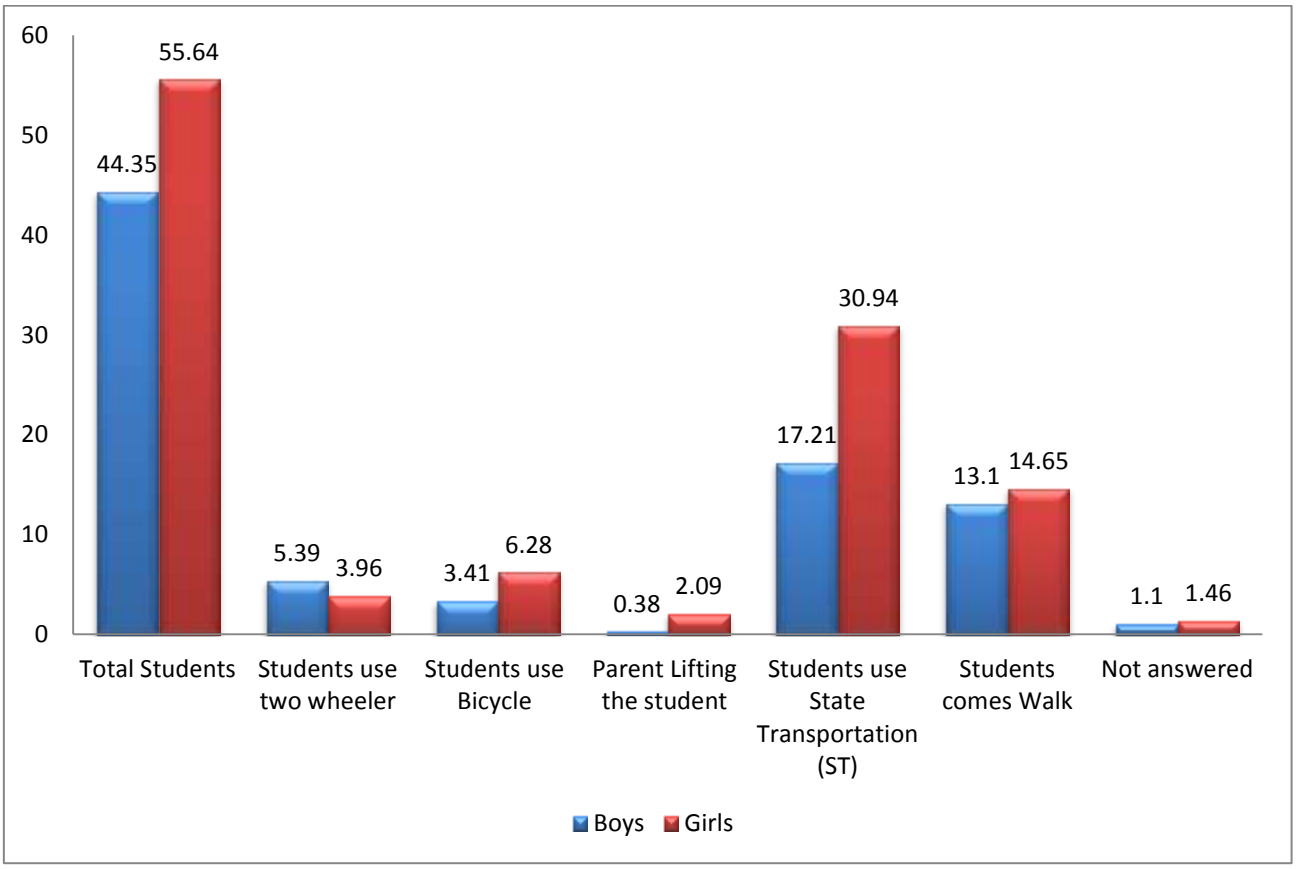


Mainly fuel consumption on college campus is by vehicles , it is also an important criterion for energy audit. Average count of two wheelers is 597 and of four wheelers it is 48 (Graph No. 2.6). It is seen that number of two wheelers is more than that of four wheelers. The fuel utilized by two wheelers is 6958 liters /month and by four wheelers is 2177liters /month . Collected data also shows that number of four wheelers is maximum at science departments while minimum at Exterior and Computer/I.T. department. Science department has maximum number of two wheelers as number of students is maximum at the concern department. At the exterior of the college campus has minimum number of two wheelers because there is minimum number of students/ staff and guest are interacting.

Table No.2.7 Students data at glance : Number of Vehicles and Their Fuel Consumption at College

Sr.no		Total Students			Students use two wheeler			Students use Bicycle			Parent Lifting the student			Students use State Transportation (ST)			Students comes Walk			Not answ-ered
		Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	
1.	Total	1144	1435	2579	139	102	241	88	162	250	10	54	64	444	798	1242	338	378	716	66
2.	%	44.35	55.64	100	5.39	3.96	09.34	3.41	6.28	9.69	0.38	2.09	2.48	17.21	30.94	48.15	13.10	14.65	27.76	2.56
% with total		100%			09.34%			9.69%			2.48%			48.15%			27.76%			2.56 %

Graph No. 2.7 : Students data at glance : Number of Vehicles and Their Fuel Consumption at College



We collected an information from students for the completion of Energy Audit (Annexure Form –A to G) In this form also survey of students vehicle, type of transportation used by the students is done. We prepared a questionnaire to get information in detail. As the strength of students in our college is 4450, circulation of an questionnaires to students, taking information, gathering together, handling it for analysis is very difficult, hence our Green Audit team collected all relating information from the students in the classroom at the time of lectures by raising their hands. With this method it minimized not only physical and mental exertion but also it saved an expense on much of stationary and minimizes relating solid waste. We got the information of students who were present in the classroom on the day of data collection is only the demerit of this method. The collected data, its statistical analysis , distribution and percentage with total is shown in above Table No.2.7 . It shows the percentage of female students is (55.64 %) greater than male students (44.35%). About 48.15 % students are using State Transportation (ST), about 10% students are using bicycle and about 28% students use the walking mode while only 9.5% students use their own two wheeler vehicle. Parents of 2.5% students drop them to the college.

In our college there is cycle bank scheme for girl students, so majority of girls' student use bicycle for college and It is seen that 11.50% of girls are using bicycle for transportation also about 27% of girls students use walking mode.

Table No.2.8 Data of the Students using vehicles: (%):

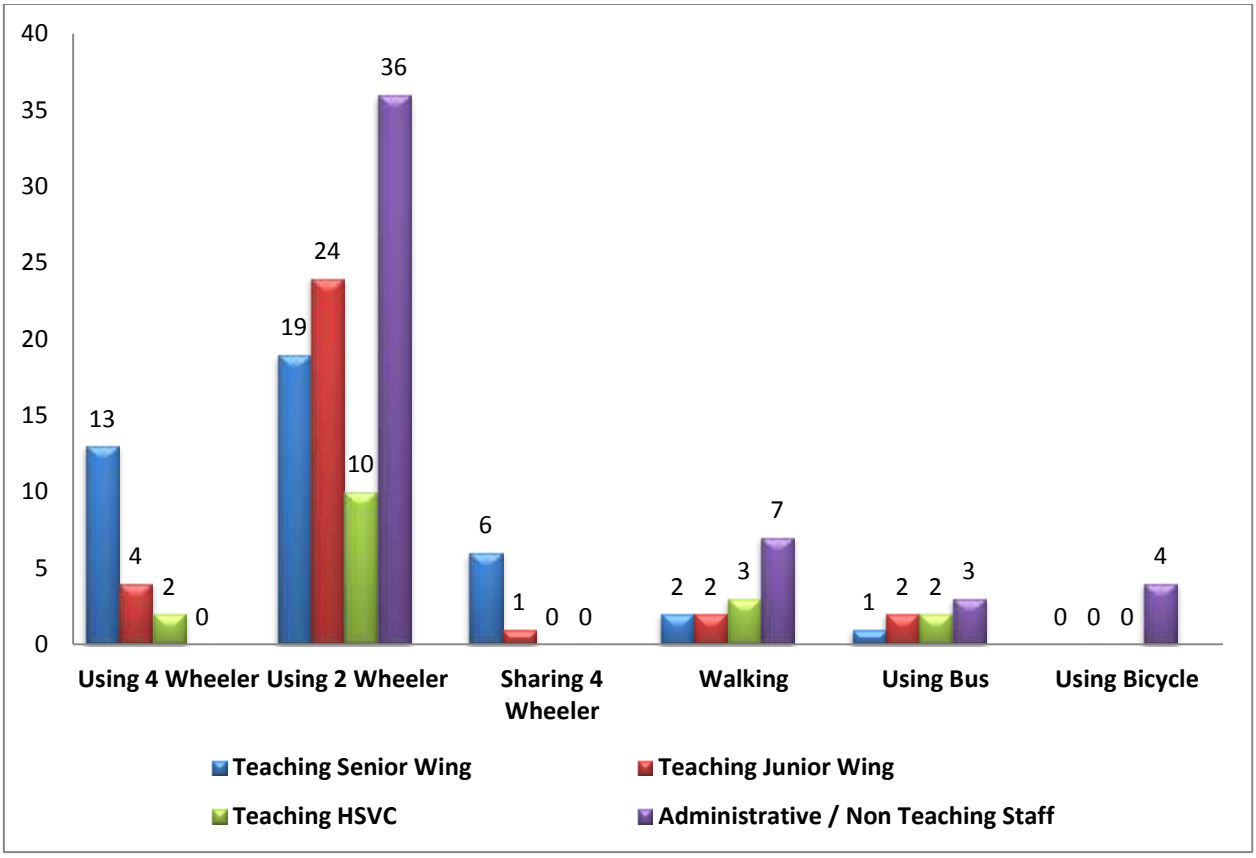
Sr. no.		Total Students		Students using two wheeler		Students using Bicycle		Parent Lifting the student		Students using State Transportation (ST)		Students come by Walk mode		Not answered
Boys /Girls		Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	
1.	Total	1144	1435	139	102	88	162	10	54	444	798	338	378	66
2.	%with total strength	44.35	55.64	5.39	3.96	3.41	6.28	0.38	2.09	17.21	30.94	13.10	14.65	2.56

This table shows the comparative percentages of male and female students adopting the mode of transportation for college. It reveals that percentage of girl students adopting State Transportation (ST),walking, bicycle is greater than that of the percentage of boy students and Greater number of boys about12% are using two wheeler at the same time only 7% of girl student are using their two wheeler. That our girl students are more conscious about environment than boys student, so they use environment friendly modes of transportation like ST (Vehicle with sharing), Bicycle, walking etc.

Table No. 2.9 Use of Vehicles by Staffs (For the Fuel Consumption)

Sr. No.	Staff	Using 4 Wheeler	Using 2 Wheeler	Sharing 4 Wheeler	Walking	Using ST Bus	Using Bicycle	Total
1.	Teaching : Senior Wing	13	19	06	02	01	00	41
2.	Teaching : Junior Wing	04	24	01	02	02	00	33
3.	Teaching : HSVC	02	10	00	03	02	00	17
4.	Administrative / Non Teaching Staff	00	36	00	07	03	04	50
Total		19	89	07	14	08	04	141
% with total		13.48%	63.12%	4.96%	9.93%	5.67%	2.84%	100%

Graph No. 2.8 Use of Vehicles by Staffs (For the Fuel Consumption)



Like the students we collected an information from staff for the completion of Energy Audit (Annexure : Form –A and G) . In this survey of Staff (Faculty of all Sr. Jr. wing, office staff, non-teaching staff, Gardner etc) we collected data about vehicle, type of transportation used by them to come to college. So we prepared questionnaire to get information in detail, distributed them, helped them for filling, completed in all respect and collected. Its statistical analysis is grouped in four categories Teaching : Senior Wing, Teaching :Junior Wing, Teaching : HSVC, and Administrative / Non Teaching Staff is shown in above Table No:2.9.

Above Table as well as Graph 2.8 shows the use of vehicle by staff of our college. About 14% of staff is using four wheeler, 63% staff is using two wheeler vehicles while about 5% staff is using four wheeler with sharing, 10 % are come by walking, about 6% staff use ST and about 3% staff using Bicycle for transportation.

Table No. 2.10 Showing Residence of staff:-

Sr	Details	No. Staff having residence near campus	No. Staff having residence just far from campus	Total
1.	No. of staff members	**90**	**51**	141
2.	Its %	**63.83%**	**36.17%**	100%

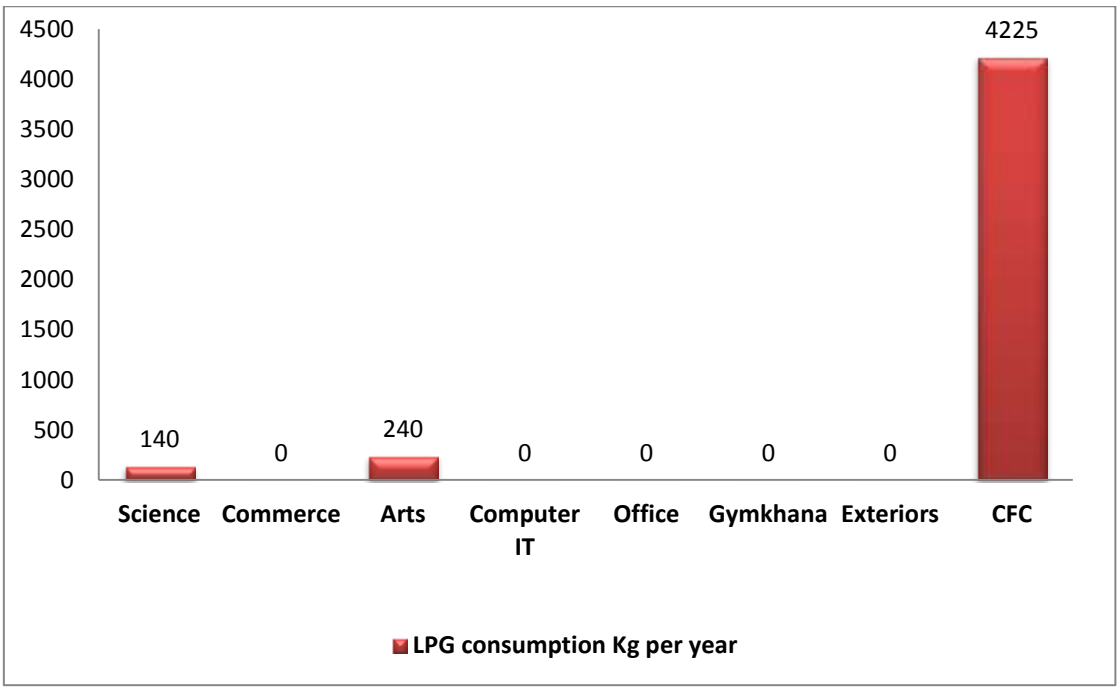
Graph No. 2.9 Showing Residence of staff:

While collecting information from staff by questionnaire we collected the information about the residence of the staff from college campus. From above Table No :2.10 it clears that about 63.83% of our staff resides near the college campus and only 36.17% of staff resides just far from campus (≈ 25 to 30 KM distance) which minimize fuel consumption in liter per month.

Table No.2.11 LPG consumption in college:-

Sr.No	Department		Kg per year	Total
1.	Science	Physics	10	140
		Chemistry	100	
		Botany	30	
2.	Commerce	--	--	--
3.	Arts	HSVC	240	240
4.	Computer IT	--		---
5.	Office	--		--
6.	Gymkhana	--		--
7.	Exteriors	--		--
8.	CFC	--	4225	4225
Total				4605

Graph No.2.10 Department wise LPG consumption in college:-



In our college LPG gas required for practical purpose at science wing in Chemistry, Physics, Botany department, at Arts wing in HSVC and at Common Facility Centers(CFC) in canteen for cooking/ domestic .Collected information shows LPG consumption is higher at CFC.

3.2.2 Science Department

It includes Department of Physics, Chemistry, Mathematics, Botany and Zoology .The collected data also shows that Department of Mathematics has maximum number of office equipments and energy consumption is 40.01 KW / month while minimum number of office equipments and energy utilization is by Botany and Zoology department.

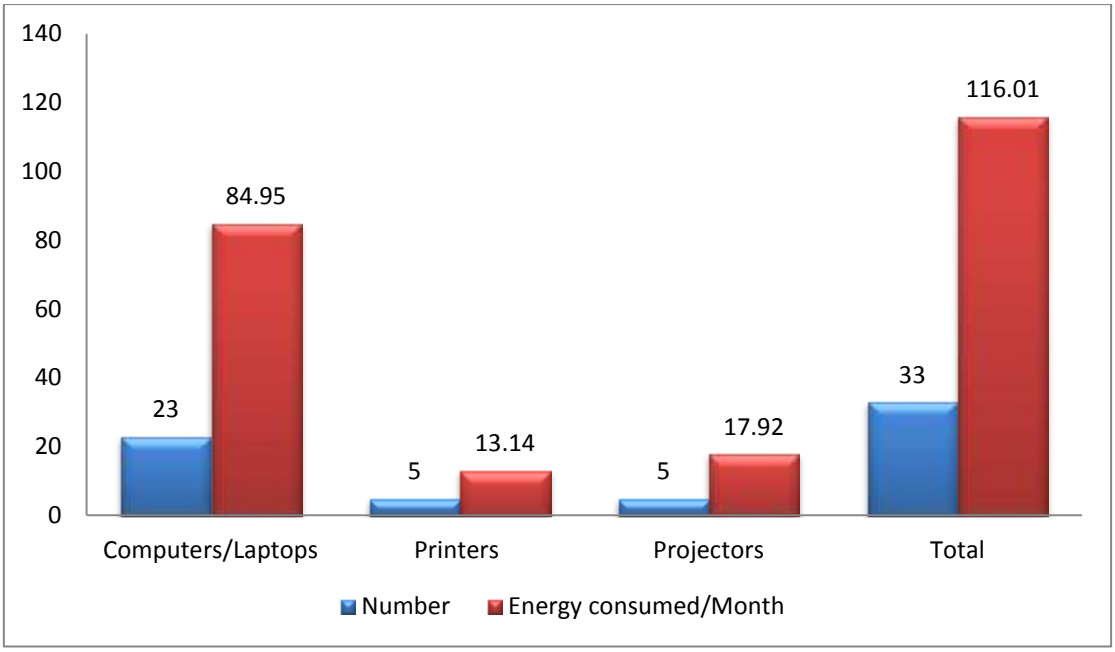
Table No.2.12 Department wise office Equipments and their energy consumption (KW/ Month) at Science Department.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
	Physics	02	01	01	01	01	06	30.5	
	Chemistry	02	01	03		01	07	25.5	
	Maths.	08	01	01	01	01	12	40.01	High
	Botany	01	01	03	01	01	07	09	Low
	Zoology	01	01	01		01	04	11	
		14	5	9	03	05	36	116.01	

Table No.2.13 Office Equipments and their energy consumption (KW/ Month) at Science Department.

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	23	05	05	33
Energy consumed/Month	84.95	13.14	17.92	116.01

Graph No.2.11. Office Equipments and their energy consumption (KW/ Month) at Science Department.



Total number of office equipments at Science department is 33 and energy consumption is 116.01 KW/Month. As office equipment ,number of computers in science department is 23 with printers and LCD projector hence energy consumed is maximum i.e. 84.95 KW/Month followed by projectors and printers i.e 17.92 KW/Month and 13.14 KW/Month respectively.

Maximum number of office equipments and energy consumption by them is in the Mathematics department that is 40.01 KW/Month and minimum number of office equipments and energy consumption by them is in the Botany department that is 09 KW/Month.

Similarly, to analyze the electric consumption lightening equipment(Tube, bulb, CFL etc) and fans(Ceiling, Table, Wall, Pedestal etc.) is also considered.

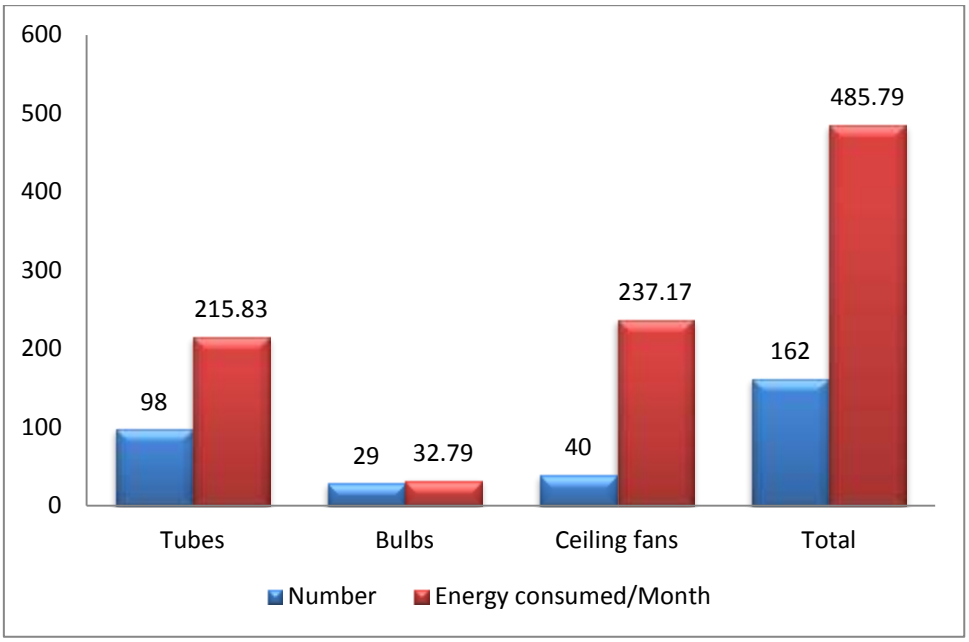
Table 2.14 Department wise Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Week) at science Department:

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	CFL	Ceiling /Table Fans			
1.	Physics	42	12	00	12	61	130.96	High
2.	Chemistry	16	00	15	12	43	114.21	
3.	Maths	08	00	02	05	15	92.25	
4.	Botany	18	00	00	06	24	76.17	
5.	Zoology	14	00	00	05	19	72.20	Low
		98	12	17	40	162	485.79	

Table No 2.15 Number of florescent tubes, bulbs and fans and their energy consumption (KW/Month) at science Department.

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	98	29	40	162
Energy consumed/Month	215.83	32.79	237.17	485.79

Graph No.2.12. Number of florescent tubes, bulbs and fans and their energy consumption (KW/Month) at science Department



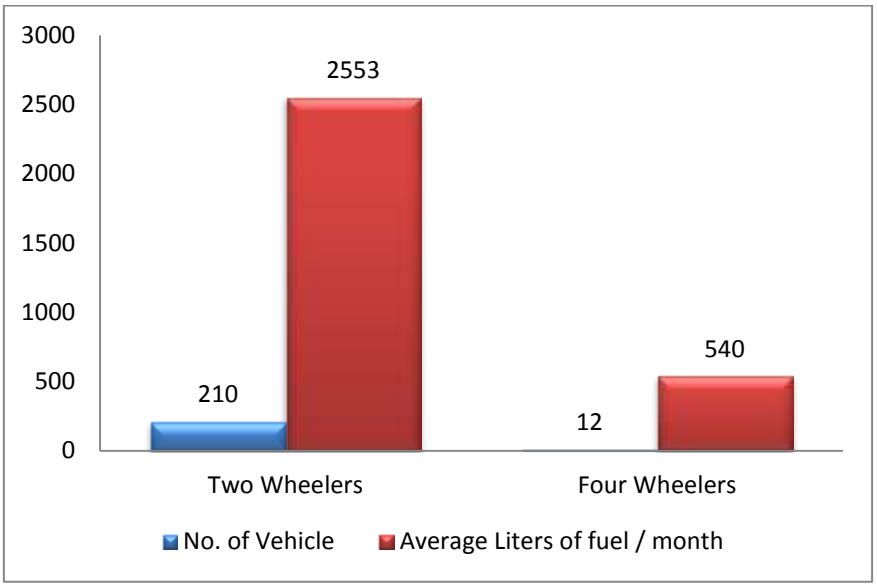
Maximum use of the energy for lightening and fan is in the Department of Physics minimum use of the energy for lightening and fan is in the Department of Zoology.The total number of fluorescent tube is maximum i.e. 98 and their electric consumption is 215.83 KW per Month. In science department total number of ceiling fans is 40 and their electric consumption is 237.17 KW per Month.

Energy consumption of fuel was calculated by counting two wheeler and four wheeler at the Science Department.

Table No. 2.16 :Number of Vehicles and Their Fuel Consumption at Science Departments

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	210	12
2.	Average Liters of fuel / month	2553	540
3.	Maximum at	Chemistry	Zoology
4.	Minimum at	Maths. and Zoology	Physics

Graph No. 2.13. Number of Vehicles and Their Fuel Consumption at Science Departments



In science departments there are 210 two wheelers, utilizes 2553 liters/ month fuel while only 12 four wheelers utilizes 540 liters/ month fuel. Department of Chemistry utilizes maximum fuel/month by two wheelers while Department of Zoology utilizes maximum fuel/month by four wheelers . Minimum fuel for two wheelers is utilized by Mathematics and Zoology Department and minimum fuel for four wheelers is utilized by Physics Department.

(Annexure-H to J)

3.2.3 Arts department

Department of Marathi, Hindi, English, History, Economics, Sociology, Geography and HSVC were studied in this category.

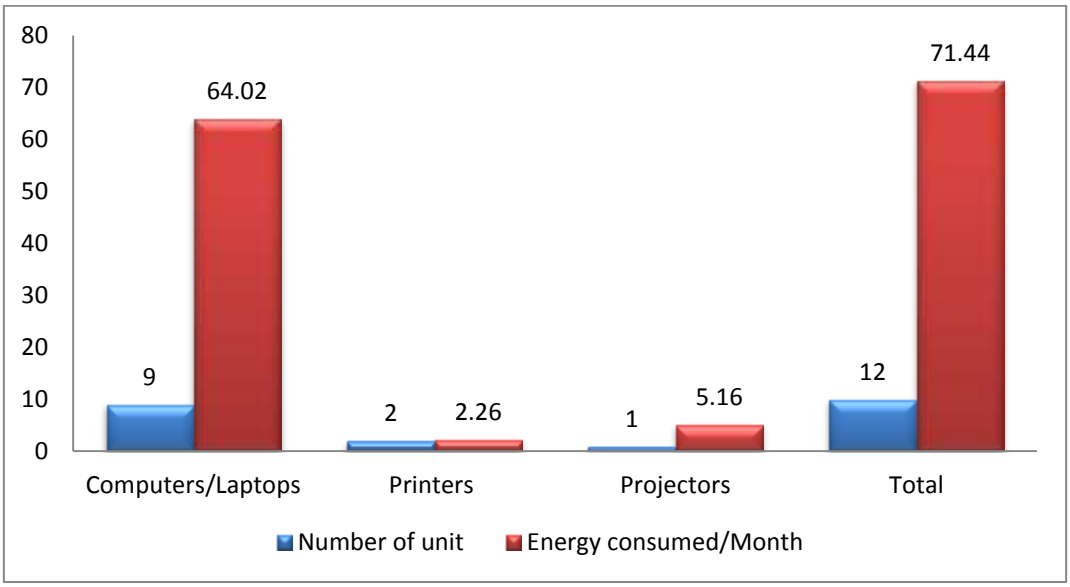
Table No. 2.17 Department wise Office Equipments and their energy consumption (KW/ Month) at Arts Department.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KWper Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
1.	Marathi	01	--	--	--	--	01	04	
2.	Hindi	01	--	--	--	--	01	8.28	
3.	English	01	--	--	--	--	01	19.12	
4.	History	01	--	--	--	--	01	5.33	
5.	Economics	01	--	--	--	--	01	4.2	
6.	Sociology	01	--	--	--	--	01	14.95	
7.	Geography	01	01	01		01	04	5.21	
8,	HSVC	01	01				02	10.35	
Total		08	02	01		01	12	71.44	

Table No. 2.18.Energy consumption (KW/Month) at Office equipments in Arts Department.

Name of Equipment	Computers /Laptops	Printers	Projectors	Total
Number of unit	09	02	01	10
Energy consumed/ Month	64.02	2.26	5.16	71.44

Graph No. 2.14.Energy consumption (KW/Month) at Office equipments in Arts Department



Total number of office equipments at Arts department is 12 and energy consumption is 71.44 KW/Month. As office equipment ,number of computers in Arts department is maximum i.e.09 than printers and LCD projector hence energy consumed is maximum i.e. 64.02 KW/Month followed by projectors and printers i.e 5.16 KW/Month and 2.26 KW/Month respectively.

Maximum number of office equipments is maximum i.e. 04 at Geography and energy consumption in the Department English is 19.12 KW/Month and minimum number of office equipments and energy consumption by them is in the Marathi department that is 04 KW/Month.

Table 2.19 Department wise Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Week) at Arts Department

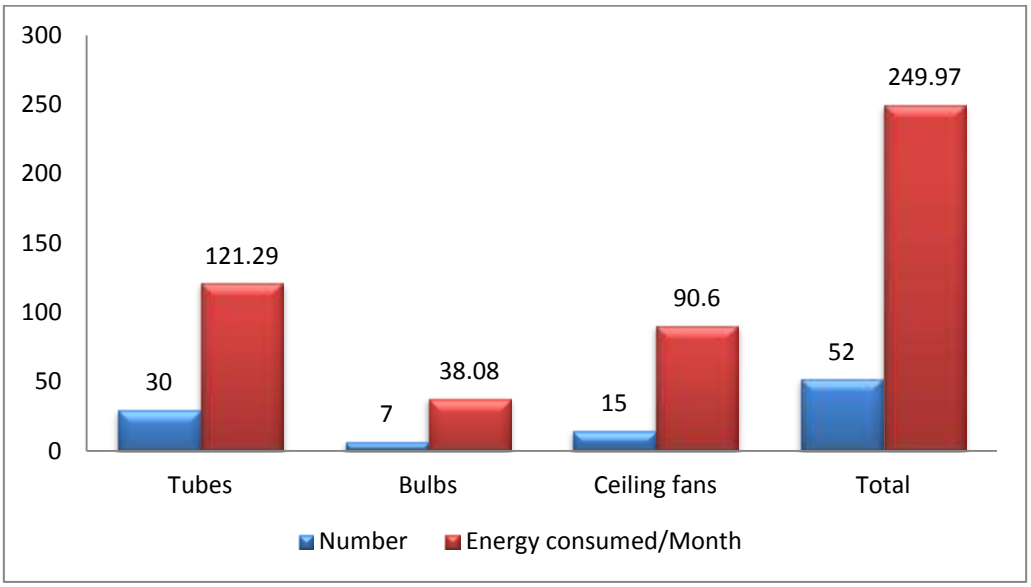
Sr, No.	Departments	No. of equipments			Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	Ceiling /Table Fans			
	Marathi	01	00	01	02	6.9	
	Hindi	02	00	02	04	3.76	low
	English	01	00	01	02	103.2	
	History	01	00	01	02	8.26	
	Economics	01	00	01	02	6.4	
	Sociology	01	00	01	02	103.89	High
	Geography	18	00	05	23	6.36	
	Hsvc	05	07	03	15	11.2	

		30	7	15	52	249.97	

Table No.2.20 Number of florescent tubes, bulbs and fans and their energy consumption (KW/Month) at Arts Department.

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	30	07	15	52
Energy consumed/Month	121.29	38.08	90.6	249.97

Graph no. 2.15 Number of florescent tubes, bulbs and fans and their energy consumption (KW/Month) at Arts Department.



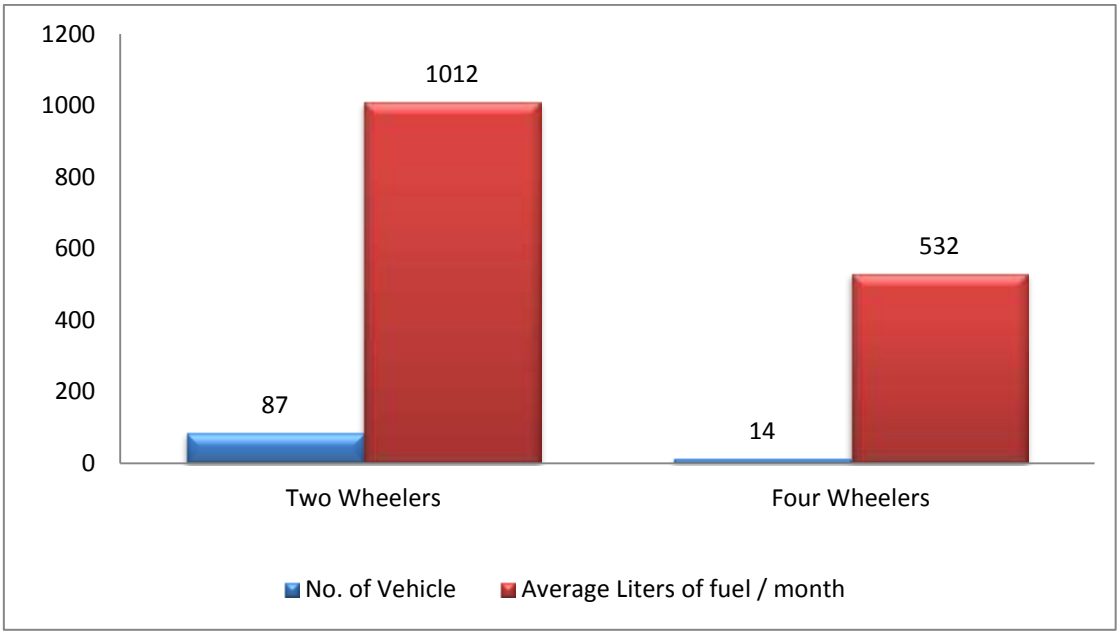
Maximum use of the energy for lightening and fan is in the Department of sociology minimum use of the energy for lightening and fan is in the Department of Hindi. The total number of fluorescent tube is maximum i.e. 30 and their electric consumption is 121.29 KW per Month. In Arts department total number of ceiling fans is 15 and their electric consumption is 90.6 KW per Month.

Energy consumption of fuel was calculated by counting two wheeler and four wheeler at the Science Department.

Table No.2.21.Number of Vehicles and Their Fuel Consumption at Arts Departments:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	87	14
2.	Average Liters of fuel / month	1012	532
3.	Maximum at	HSVC	HSVC
4.	Minimum at	English	Economics

Graph No.2.16 Number of Vehicles and Their Fuel Consumption at Arts Departments



In Arts departments there are 87 two wheelers ,utilizes 1012 liters/ month fuel while only 14 four wheelers utilizes 532 liters/ month fuel. HSVC at jr. wing utilizes maximum fuel/month by two wheelers and by four wheelers . Minimum fuel for two wheelers is utilized by English Department and minimum fuel for four wheelers is utilized by Economics Department **(Annexure-H to J)**

3.2.4 Commerce Department: Senior and Junior commerce wing is categorized here.

Table No. 2.22 Office Equipments and their energy consumption (KW/ Month) at Commerce Department.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
1.	commerce	01	0	0	0	0	01	8.21	low

Table No. 2.23 Energy consumption in (KW/Month) at Office equipments in Commerce Department.

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	01	00	00	01
Energy consumed/Month	8.21	00	00	8.21

Number of office equipments at Commerce department is 01and energy consumption is 8.21 KW/Month.

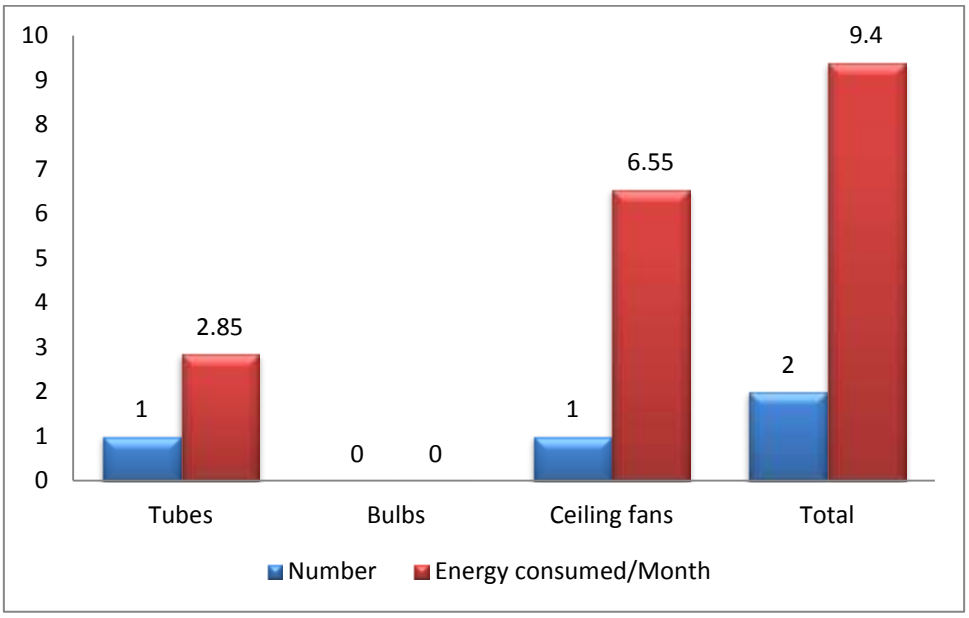
Table 2.24 Department wise Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Commerce Department

Sr, No.	Departments	No. of equipments			Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	Ceiling /Table Fans			
1.	Commerce	01	00	01	02	9.4	low

Table No. 2.25 Number of florescent tubes, bulbs and fans and their energy consumption (KW/Month) at Commerce Department.

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	01	00	01	02
Energy consumed/Month	2.85	00	6.55	9.4

Graph No. 2.17 Number of florescent tubes, bulbs and fans and their energy consumption (KW/Month) at Commerce Department



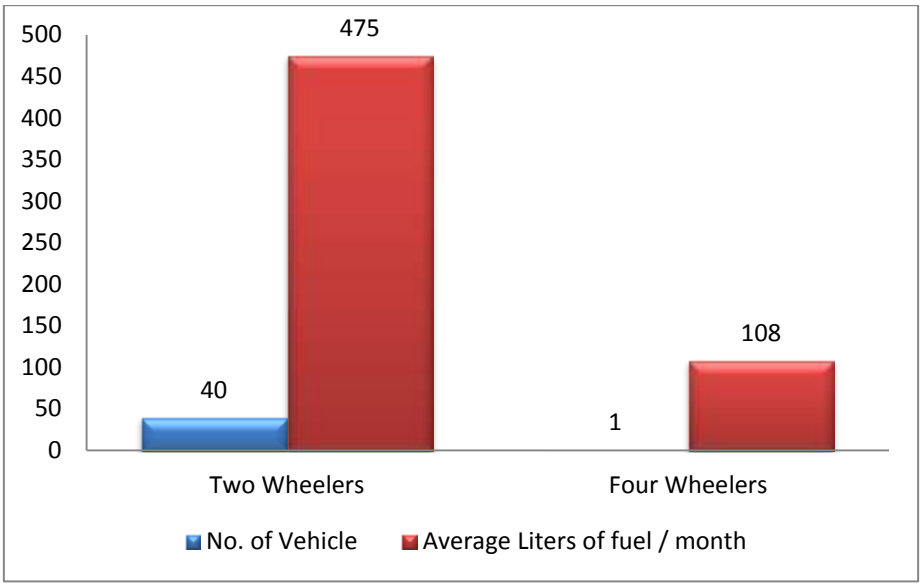
Number of lightening equipments and fans at Commerce department is 02 and energy consumption is 9.4 KW/Month.

Table No.2.26 Number of Vehicles and Their Fuel Consumption at Commerce Departments:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	40	01

2.	Average Liters of fuel / month	475	108

Graph No. 2.18 Number of Vehicles and Their Fuel Consumption at Commerce Departments



In Commerce departments there are 40 two wheelers , utilizes 475 liters/ month fuel while only 01 four wheelers utilizes 108 liters/ month fuel.

3.2.5. I.T. Department: Computer Science, I.T.,COC computer and subjects, two computer laboratory were studied in this category .

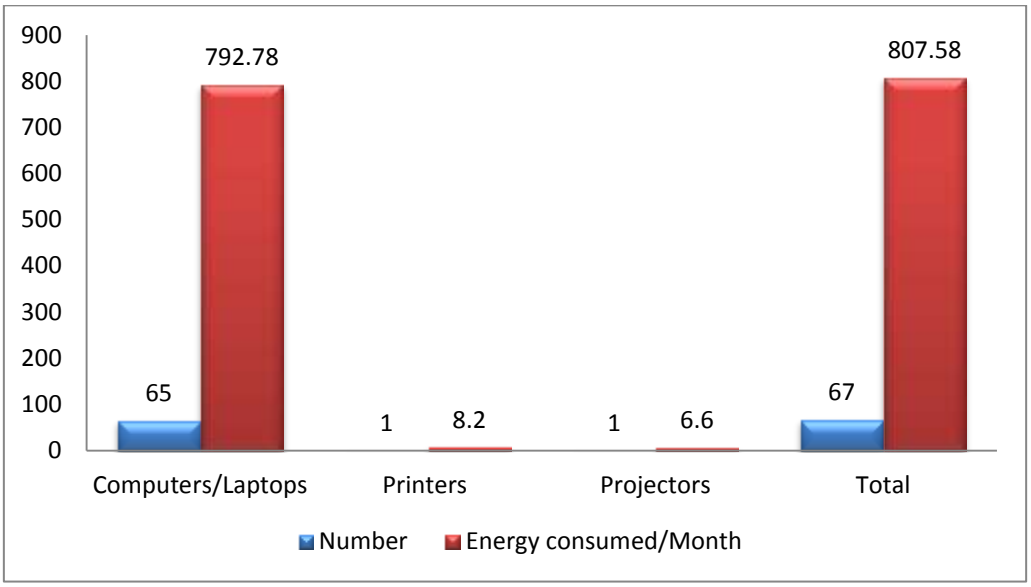
Table No. 2.27 Total Office Equipments and their energy consumption (KW/ Month) at I.T. Department.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
1.	I.T	63	01	02	00	01	67	807.58	high

Table No. 2.28 Office Equipments and their energy consumption (KW/ Month) at I.T. Department.

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	65	01	01	67
Energy consumed/Month	792.78	8.2	6.6	807.58

Graph No. 2.19 Office Equipments and their energy consumption (KW/ Month) at I.T. Department



Total number of office equipments at I.T. department is 67 out of that 63 are computers, 02 laptops, 01 printer and 01 LCD screen, total energy consumption is maximum i.e. 807.58 KW/Month.

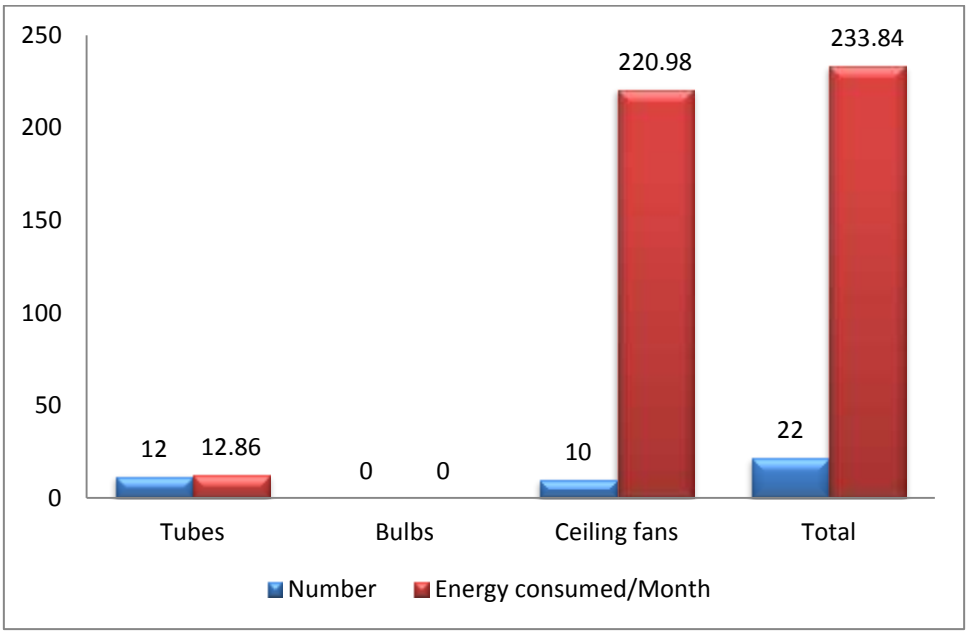
Table 2.29 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at I.T. Department

Sr, No.	Departments	No. of equipments			Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	Ceiling /Table Fans			
1.	IT	12	00	10	22	233.84	High

Table 2.30 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at I.T.Department

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	12	00	10	22
Energy consumed/Month	12.86	00	220.98	233.84

Graph No. 2.20. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at I.T. Department

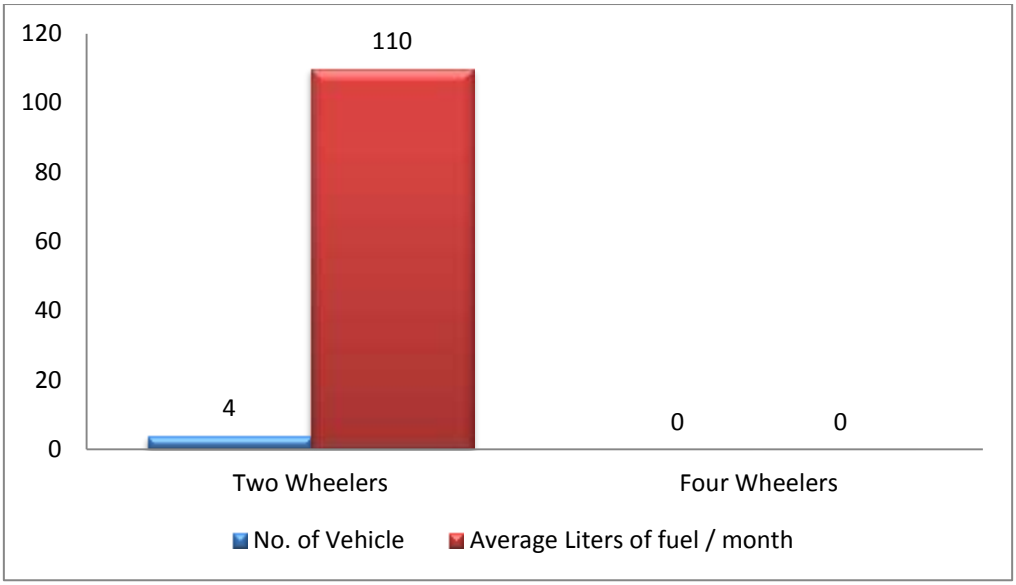


Number of lightening equipments and fans at I.T. department is 22in which 12 are tube and 10 are fans and energy consumption is 12.86 KW/Month ,220.98 KW/Month respectively. Here total energy consumed is 233.84 KW/Month.

Table No.2.31 Number of Vehicles and Their Fuel Consumption at Computer(I.T) Departments:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	04	00
2.	Average Liters of fuel / month	110	00

Graph 2.21. Number of Vehicles and Their Fuel Consumption at Computer(I.T) Departments



In Computer (I.T.) departments there are only 04 two wheelers ,utilizes 110liters/ month fuel which is very less rather than other departments, also no any staff member has an four wheelers.

3.2.6 Office :

The energy consumption in Main administrative office, Principal's chamber, Staff room, Ladies room, store room, enquiry section, meeting hall, NAAC room, Non residential hall, CAP section etc, were studied in this category.

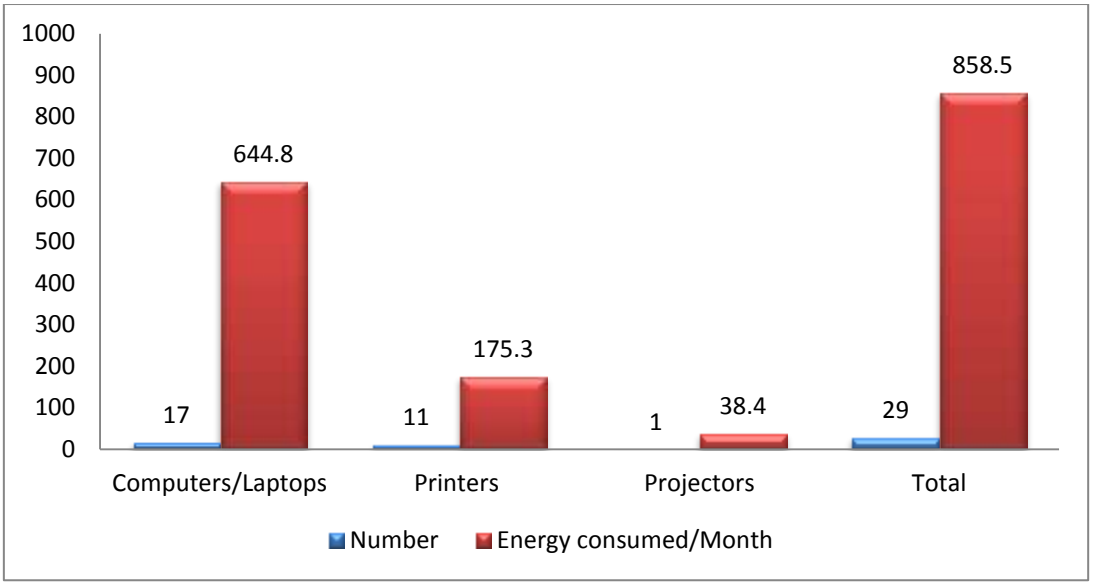
Table No. 2.32 Office Equipments and their energy consumption (KW/ Month) at Office

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	OHP	LCD projectors			
	Office	13	08	02		01	24	801.03	High
	CAP	02	03				05	57.47	
		15	11	02		01	29	858.5	

Table No. 2.33 Office Equipments and their energy consumption (KW/ Month) at Office.

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	17	11	01	29
Energy consumed/Month	644.8	175.3	38.4	858.5

Graph 2.22. Office Equipments and their energy consumption (KW/ Month) at Office



Total number of office equipments at office department is 29 out of that 17 are computers/ laptops,11 printer and 01 LCD screen, total energy consumption is maximum i.e. 858.5 KW/Month.

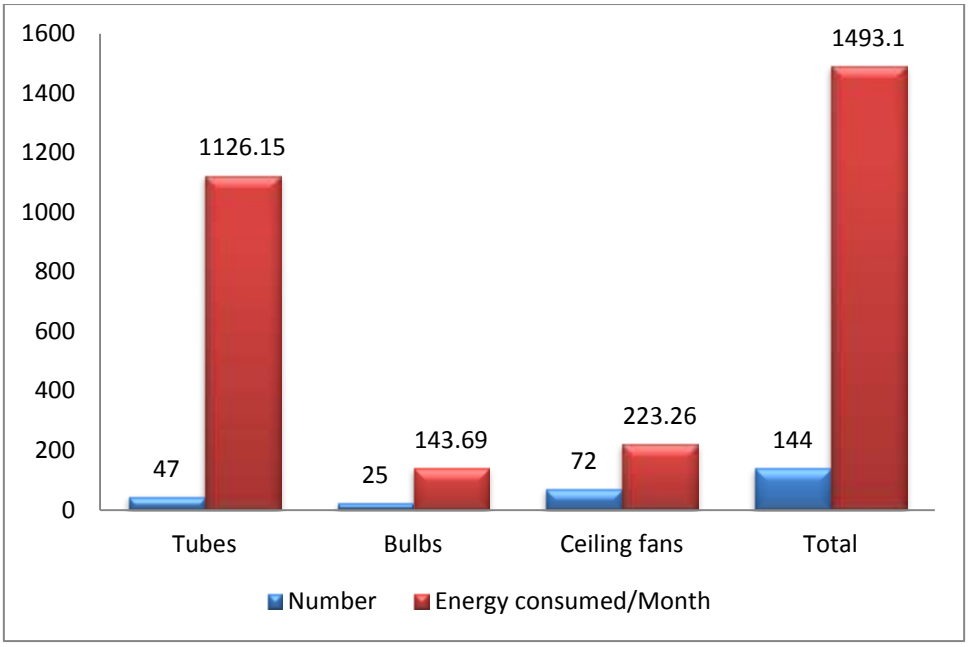
Table 2.34 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at office

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	LED	Ceiling /Table Fans			
	Office	43	00	21	64	128	1470	high
	CAP	04	00	04	08	16	23.1	
		47		25	72	144	1493.1	

Table 2.35 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at office

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	47	25	72	144
Energy consumed/Month	1126.15	143.69	223.26	1493.1

Graph 2.23. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at office

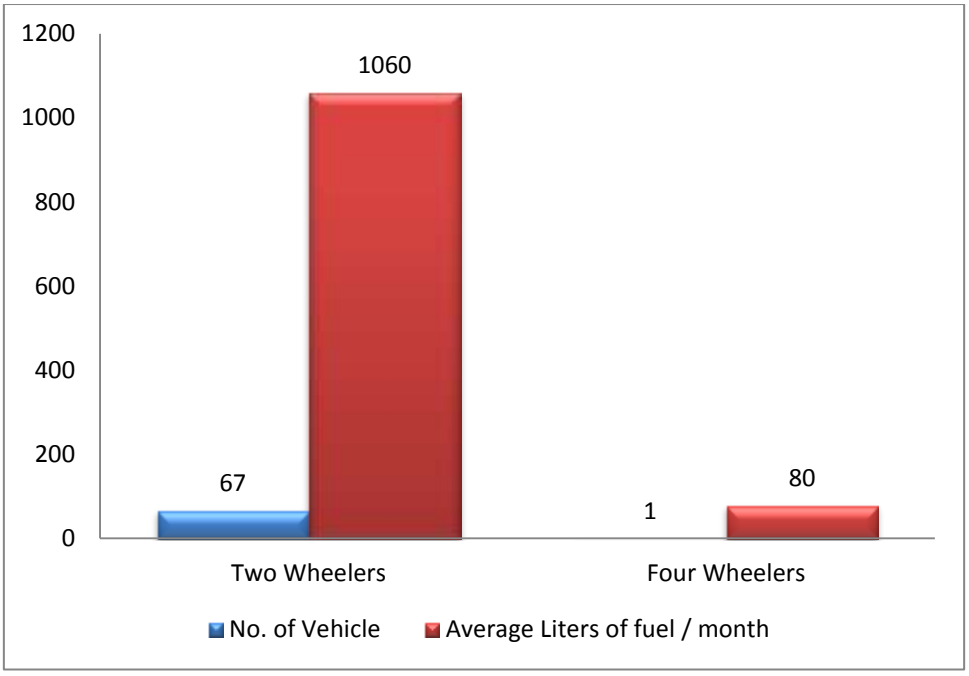


Number of lightening equipments and fans at office department is 140 in which 47 are tube, 25 bulbs and 72 are fans and energy consumption is 1126.13 KW/Month ,143.69 KW/Month ,223.26 KW/Month respectively. Here total energy consumed is 1493.1 KW/Month.

Table No.2.36 Number of Vehicles and Their Fuel Consumption at Office:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	67	01
2.	Average Liters of fuel / month	1060	80

Graph No.2.24. Number of Vehicles and Their Fuel Consumption at Office



At administrative office there are 67 two wheelers ,utilizes 1060 liters/ month fuel while only 01 four wheelers utilizes 80 liters/ month fuel.

3.2.8 Gymkhana : The energy consumption in Gymkhana office, Gymnasium hall, Shivneri ground etc, were studied in this category.

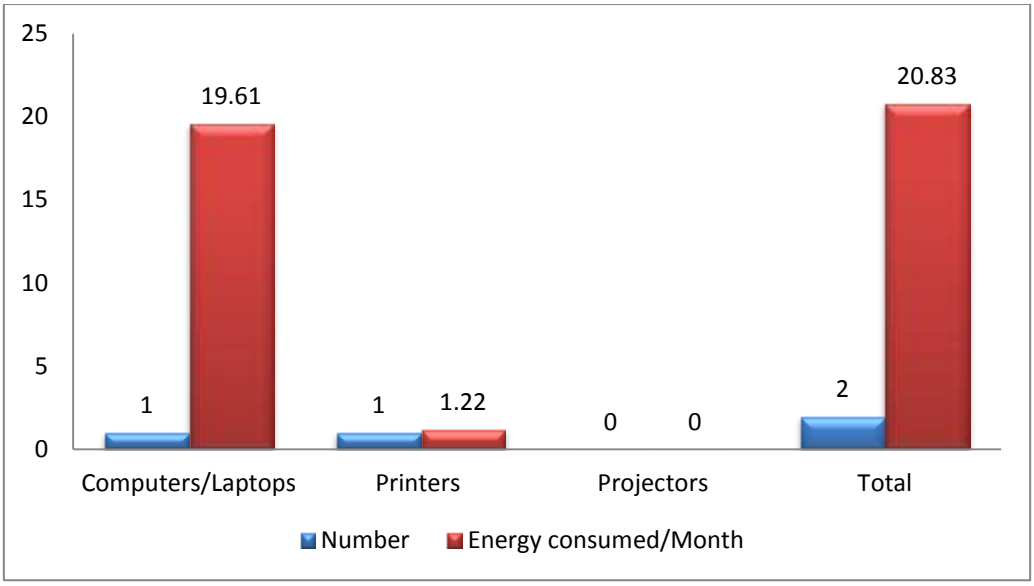
Table No. 2.37 Office Equipments and their energy consumption (KW/ Month) at Gymkhana

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	LCD	projectors			
1.	Gymkhana	01	01	00	00	00	02	20.83	

Table No. 2.38 Office Equipments and their energy consumption (KW/ Month) at Gymkhana

Name of Equipment	Computers/Laptops	Printers	Projectors	Total
Number	01	01	00	02
Energy consumed/Month	19.61	1.22	00	20.83

Graph no. 2.25. Office Equipments and their energy consumption (KW/ Month) at Gymkhana



Total number of office equipments at Gymkhana department is 02, total energy consumption is maximum i.e. 20.83 KW/Month.

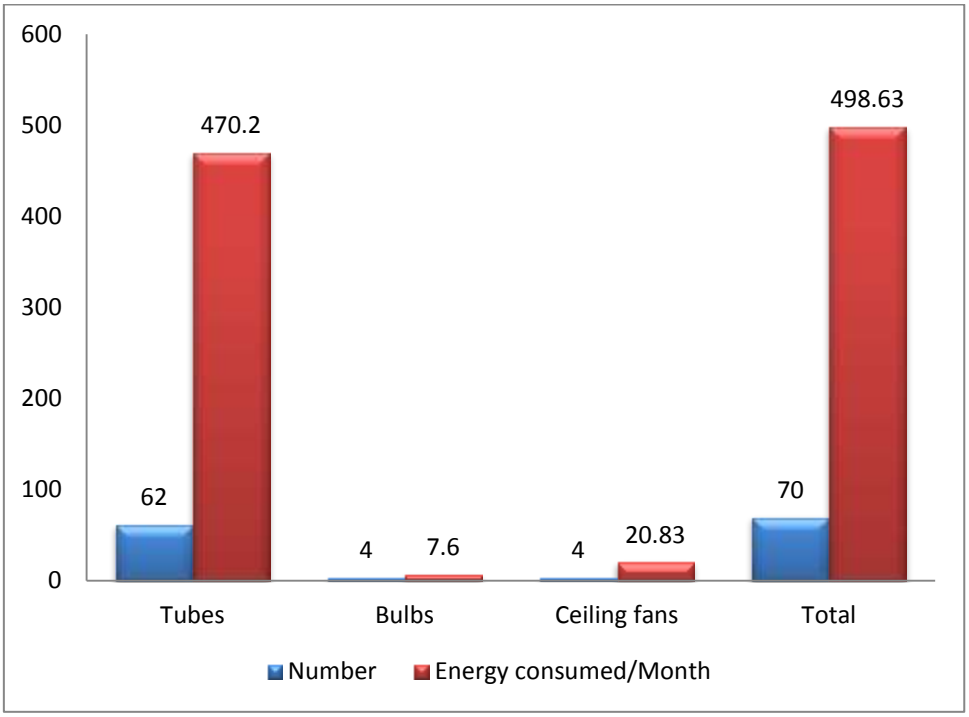
Table 2.39 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Gymkhana.

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	CFL	Ceiling /Table Fans			
1.	Gymkhana	62	00	04	04	70	498.63	

Table 2.40 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Gymkhana.

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	62	04	04	70
Energy consumed/Month	470.20	7.60	20.83	498.63

Graph no. 2.26. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Gymkhana

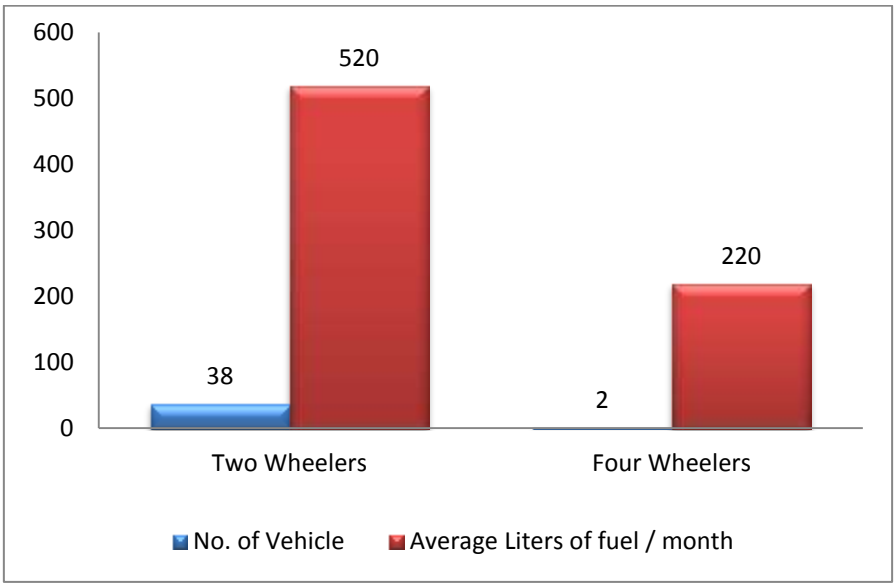


Number of lightening equipments and fans at Gymkhana department is 70 in which 62 are tube, 04 bulbs and 04 are fans and energy consumption is 470.2 KW/Month ,7.6 KW/Month , 20.83 KW/Month respectively. Here total energy consumed is 498.63 KW/Month.

Table No.2.41 Number of Vehicles and Their Fuel Consumption at Gymkhana:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	38	02
2.	Average Liters of fuel / month	520	220

Graph no, 2.27. Number of Vehicles and Their Fuel Consumption at Gymkhana:



At Gymkhana there are 38 two wheelers ,utilizes 520 liters/ month fuel while only 02 four wheelers utilizes 220 liters/ month fuel.

3.2.9 Exteriors: The energy consumption in Botanical Garden, Gardens, Lawns in campus, roads in campus, Lamps used lighting the campus etc, were studied in this category.

Table No. 2.42 Office Equipments and their energy consumption (KW/ Month) at Exteriors

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	LCD	projectors			
1.	Exteriors	00	00	00	00	00	00	00	nil

No any office equipments are used in Exterior**.**

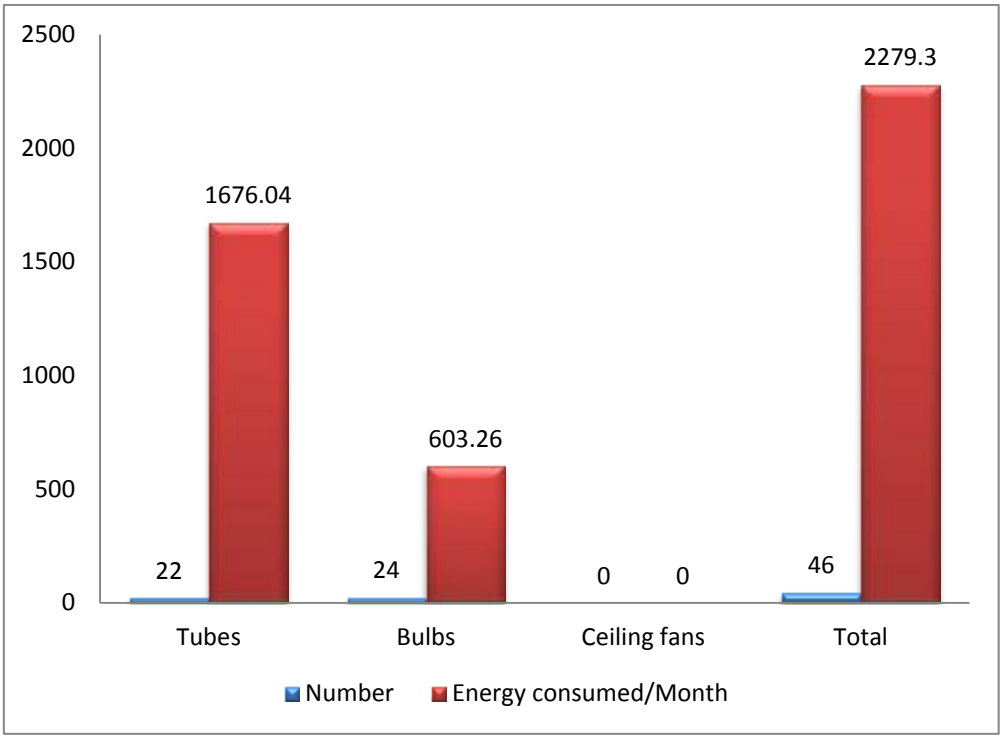
Table 2.43 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Exteriors

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	CFL	Ceiling /Table Fans			
1.	Exterior	22	20	04	00	46	2279.3	high

Table 2.44 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Exteriors

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	22	24	00	46
Energy consumed/Month	1676.04	603.26	00	2279.3

Graph No. 2.28. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at Exteriors

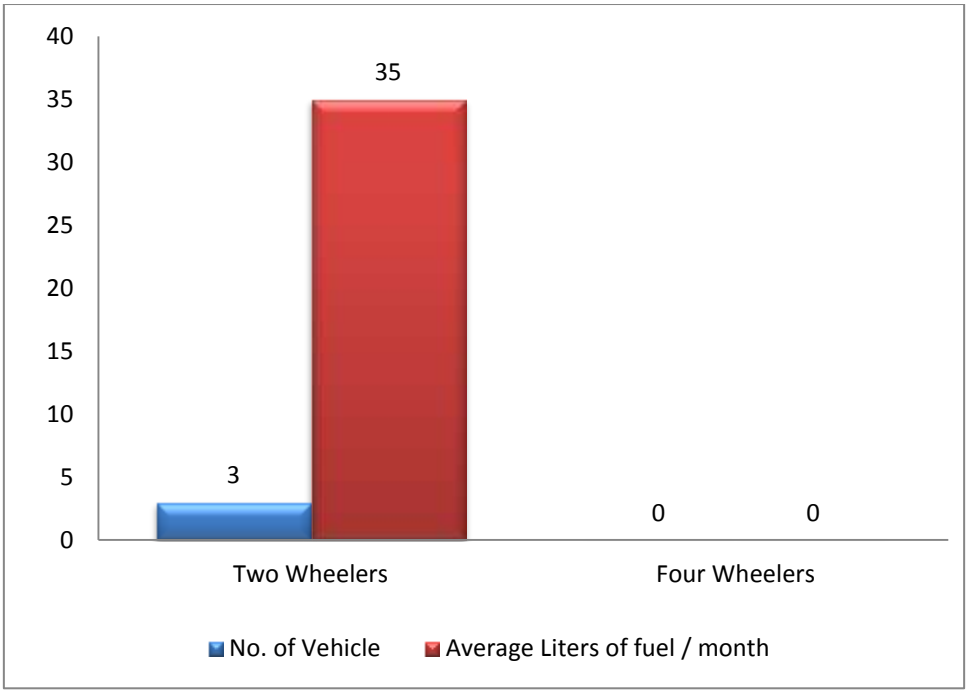


Number of lightening equipments and fans at Exteriors of college is 46 in which 22 are tube, 24 bulbs and energy consumption is 1676.04 KW/Month ,603.26 KW/Month respectively. Here total energy consumed is high i.e.2279.3 KW/ Month .

Table No. 2.45 :Number of Vehicles and Their Fuel Consumption at Exteriors:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	03	00
2.	Average Liters of fuel / month	35	00

Graph no.2.29 Number of Vehicles and Their Fuel Consumption at Exteriors



At Exterior of college campus there are only 03 two wheelers ,utilizes 35 liters/ month fuel while there are no four wheelers .

3.2.10. Common Facility centers (CFC)

The energy consumption in Library, Canteen, VKCA ,Boys Hostel, Girl Hostel, Staff Quarter, Health center, Medical center etc, were studied in this category. But electricity bills of section Boys Hostel, Girl Hostel, Staff Quarter, Health center , Medical center is paid by Management . Hence energy consumption in these section is not considered for the report. The energy consumption in Library, Canteen, VKCA ,Boys Hostel, Girl Hostel, Staff Quarter, Health center, Medical center etc, were studied in this category. But electricity bills of section Boys Hostel, Girl Hostel, Staff Quarter, Health center , Medical center is paid by Management . Hence energy consumption in these section is not considered for report

Table No. 2.46 Office Equipments and their energy consumption (KW/ Month) at CFC.

Sr, No.	Departments	No. of office equipments					Total equipments	Energy Consumed KW per Month	Description
		Computers	Printers	Laptops	LCD	projectors			
1.	Exteriors	00	00	00	00	00	00	00	nil

No any office equipments are used in CFC**.**

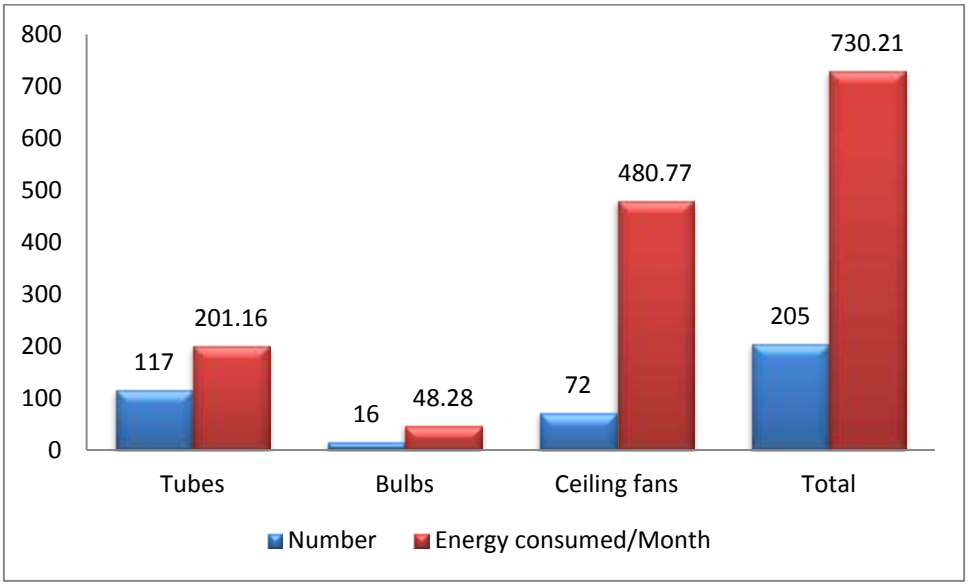
Table 2.47 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at CFC

Sr, No.	Departments	No. of equipments				Total equipments	Energy Consumed KW per Month	Description
		Tubes	Bulbs	CFL	Ceiling /Table Fans			
	CFC	117	08	08	72	205	730.21	

Table 2.48 Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at CFC

Name of Equipment	Tubes	Bulbs	Ceiling fans	Total
Number	117	16	72	205
Energy consumed/Month	201.16	48.28	480.77	730.21

Graph No. 2.30. Number of Fluorescent Tubes, Bulbs and Fans and Their Energy Consumption (KW / Month) at CFC

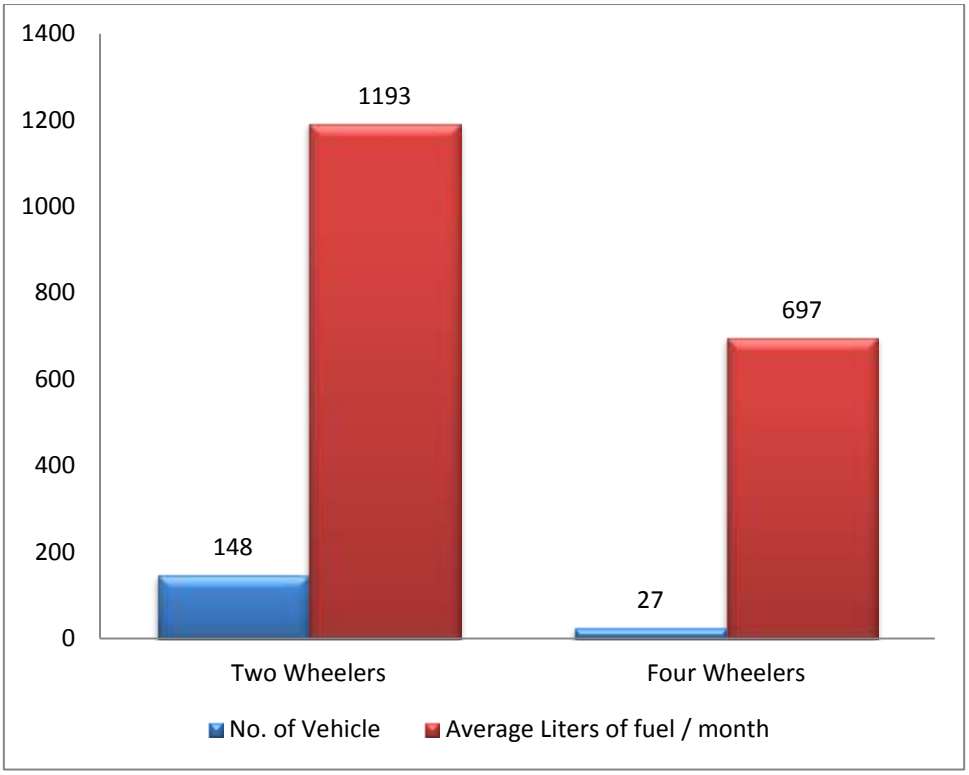


Number of lightening equipments and fans at CFC of college is 205 in which 117 are tube, 16 bulbs 72 fans and energy consumption is 201.16 KW/Month ,48.28 KW/Month,480.77 KW/Month respectively. Here total energy consumed is high i.e.730.21 KW/Month .

Table No.2.49 :Number of Vehicles and Their Fuel Consumption at CFC:

Sr. No.	Vehicle	Two Wheelers	Four Wheelers
1.	No. of Vehicle	148	27
2.	Average Liters of fuel / month	1193	697
3.	Maximum at	Staff Quarter	Staff Quarter
4.	Minimum at	Medical center	Medical center

Graph no. 2.31. Number of Vehicles and Their Fuel Consumption at CFC



In Common Facility Centers (CFC) there are 148 two wheelers ,utilize 1193 liters/ month fuel while only 27 four wheelers utilizes 697 liters/ month fuel. At staff quarters utilizes maximum fuel/month by two wheelers as well as four wheelers . Minimum fuel for two wheelers and four wheelers is utilized by Medical center .**(Annexure-H to J).**